HOME HANDICRAFTS,
NEEDLEWORK and
REPAIRS

NEEDLEWORK PICTURE. A BEAUTIFUL EXAMPLE, ABOUT 100 YEARS OLD

Household Reference Library

HOME HANDICRAFTS NEEDLEWORK *and* REPAIRS

With more than 1,090 illustrations in the text and 63 special art plates

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THE FLEETWAY HOUSE

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HOME FURNISHING AND DECORATION
Including
Furniture-Making for the Amateur

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HOME HANDICRAFTS, NEEDLEWORK AND REPAIRS

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COMPLETE HOME COOKERY

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BOOK OF GOOD HEALTH

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HOME MANAGEMENT AND ENTERTAINING
A Household Miscellany

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GARDENING AND OUTDOOR WORK

Printed in Great Britain by The Amalgamated Press, Ltd., London.

EDITOR'S INTRODUCTION

AS its name indicates, this volume is essentially practical in its scope. Primarily it is for the handyman—and handywoman. The prevailing note throughout its pages is "how to make" or "how to mend"; it tells how, by the expenditure of a little time and trouble, by the acquisition of the necessary degree of skill—generally speaking, a matter of practice—the home can be made vastly more efficient and more comfortable, a better place altogether to live in.

A prominent feature of the volume is the space given to repairs of a most general and varied description. Have you a chair in the kitchen with a broken leg? Then here you may learn how to mend it. Have you a key that will not turn, a lock that has stuck, a drawer in the bureau or dresser that refuses to budge? Are there in your cupboard some much valued pieces of china that, alas! are literally pieces, and hence cannot be displayed in rack or cabinet? Does your kettle leak? Have you a broken windowpane? Is there a draught under your front door? In the pages that follow you will find detailed instructions how to carry out the necessary repairs or adjustments whereby these and many another breakage or inconvenience in the home may be effectively remedied.

Another very important class of subjects dealt with in this volume is that which covers home decoration and repairs. Many householders nowadays—particularly those who are buying their houses through a building society—attempt the jobs of painting and papering. Neither the one nor the other is particularly difficult, and the advantages of doing them oneself are sufficiently obvious. They can be decidedly "messy" and troublesome, however, without a few "how-to-do-it" hints. Just these very necessary hints are given here, so that the amateur, even though he (or she) has never used a paint brush before or hung a roll of paper, let alone mended a crack in the ceiling or cornice, can go about the business in a thoroughly businesslike way, and produce even at the first attempt a very creditable and good-looking result.

Then we have the large number of articles on home handicrafts, ranging from woodwork and its subsidiaries—joinery, marquetry, inlaying, chip carving, fretwork, and so on—to casting, metal turning and metal spinning, basket-making, glass and Italian Renaissance work, modelling in wood and plaster, leather work, papier mâché, weaving—to mention just a few. All the principal tools are described, and in most cases illustrated; and the amateur is shown how to use them in the most effective way. The distinctively feminine crafts of needlework and embroidery, crochet and knitting occupy many pages; and in others there is guidance in the making of such things as cushion covers, napkin rings, candlesticks and candlestick shades—artistic knick-knacks that add so much beauty and "finish" to the tasteful and well-ordered home.

Finally, among the host of miscellaneous articles may be noted those on panelling, laying linoleum and parquet flooring, making leaded lights and stained glass windows. The mere mention of such things will act as an inspiration to all who aspire after a "home beautiful." "How much nicer," they will think, "the hall would look with an oak parquet floor!" and, "Wouldn't a panelled dining-room set off well our Jacobean style furniture?"

If this book suggests such thoughts, it also provides the key to their realization—a key, moreover, which every home-lover, every home-maker, may, through its pages, learn to turn.

LIST OF SPECIAL PLATES
IN THIS VOLUME

HOME HANDICRAFTS NEEDLEWORK & REPAIRS

ACCUMULATORS, Care of. When a suitable electric current is sent through an ordinary secondary cell, hydrogen passes from the anode or positive plate, which is said thus to become peroxidised, to the other plate—the cathode or negative—where it combines with some of the oxygen of that plate, which thus becomes reduced. This chemical change is the measure of energy put into the cell and stored. The plates will remain in this charged condition for some time, though they will gradually run down if left alone; but if the terminals of the cell be connected outside, chemical action restarts in the opposite direction, the hydrogen removed from the one plate returns, and an electric current passes through the connexion in the opposite direction to that in which the current entered the cell. The cell is thus discharged. These operations of charging and discharging may be repeated indefinitely. It is while discharging that the electricity which has been put into the accumulator (stored) is utilised.

While essentially simple, accumulators require careful attention. The most serious trouble arises from sulphating. The sulphate is a white scale which forms on the plates and renders them useless. Sulphating may arise from over-discharging, running down the battery below the limit voltage; by leaving the battery discharged for a time, or from too strong a solution. If not too bad, the scale may be scraped off the plates, and by slow and careful charging proper conditions may be restored. If badly scaled the plates may become buckled or the preparations disintegrated, necessitating renewal of the plates. Any acid which may be spilled from the vents should be wiped off carefully, and the terminals should be coated with petroleum jelly to prevent corrosion.

New accumulators are generally sent out dry, i.e. without the electrolyte. The maker's instructions should be followed carefully as to the rate of charging, specific gravity of the electrolyte, etc.

If it is necessary to prepare acid of the required strength, the strong acid should be slowly added to the distilled water, stirring it in a little at a time. Never, in any circumstances, add water to the acid.

Accumulators are made up of 2-volt units, usually separate, although two or more cells may be housed in a single outer container. The output, expressed in amperes, is governed by the size of the cells.

The electrolyte in the cell should cover the plates. Any loss caused by evaporation must be made good by adding distilled (not tap) water until the electrolyte is at least half an inch above the top of the plates. The best time to do this is just before charging, as the charging process facilitates the mixing of the water and acid. Vent holes should always be clear, so as to allow gas to escape.

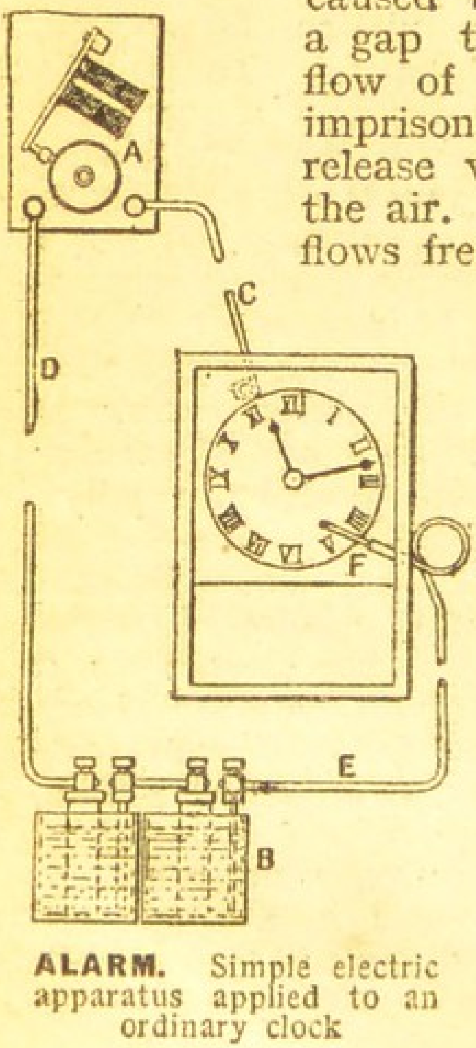
The specific gravity of the cells can be tested with a hydrometer. Average readings for an accumulator in different states of charge or discharge are:

Condition of Cell.	Sp. Gravity.
Fully charged	1·285
Half discharged	1·245
Fully discharged	1·190

The voltage of a cell should not be allowed to fall below 1·85. On charging the voltage rises to about 2·2. It is useful to remember, in connecting cells together, that joining them in series adds voltage, and that connecting them in parallel adds amperage.

ADZE. This is an edged tool having a curved blade set at right angles to the handle, so that the cutting stroke is always towards the worker. It is used principally for rough planing timber. The tool is extremely dangerous for an amateur to use.

AIR LOCK. In a hot water system an air lock is generally caused by faulty pipe arrangements permitting a gap to form in the column of water. The flow of hot water is thereby impeded by the imprisoned air. The remedy is to provide a release valve which can be opened to release the air. It should remain open until the water flows freely.



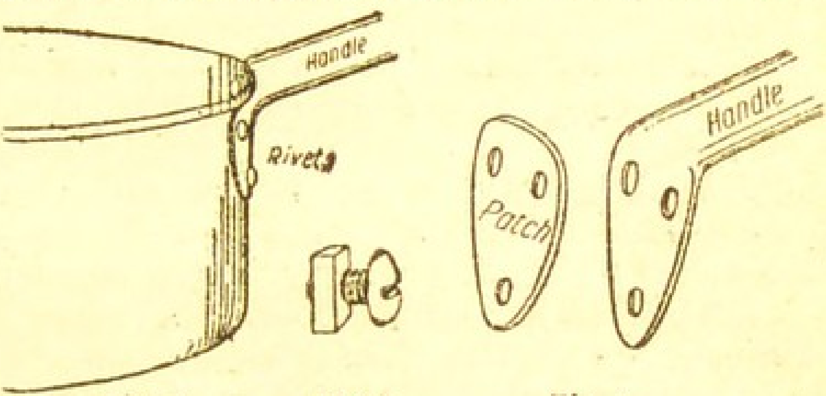
ALARM. Simple electric apparatus applied to an ordinary clock

ALARM. Any person can set up for himself a simple and effective call alarm. The necessary materials are: a plain clock, an electric bell, a small electric battery (one or two Leclanché cells will do), and sufficient insulated copper wire.

The diagram shows the arrangement: the bell, A, is near the bed head; the battery, B, in any convenient place; the wire lead, C, is fixed to the metal frame of the clock, twisted round any accessible part with bare wire against the metal, and goes to the bell. Another lead, D, goes from the bell to the battery, from which a third, E, goes back to the clock. Here it is fixed near the end to the wooden part of the clock, leaving a short free piece.

The tip of this piece is exposed and bent into a small hook. If the bell is to go off at 5 o'clock, say, this bare tip is set so that when the hour-hand of the clock gets to that time it will touch the tip and thus complete the circuit, whereupon the bell will ring and keep on ringing until the hand of the clock is released.

ALUMINIUM UTENSILS, Repairing of. To a large extent articles made of aluminium are cast in solid metal or pressed from a single piece or sheet. Handles of saucepans and similar articles are generally riveted on, as seen in Fig. 1. The body of the saucepan is a single piece of aluminium, and the handle is of malleable iron. Rivets sometimes become loose and the handle slack. The remedy is to tighten the rivet by hammering one end while the other bears on solid metal. If rivets are lost replace them with small stove bolts (Fig. 2).



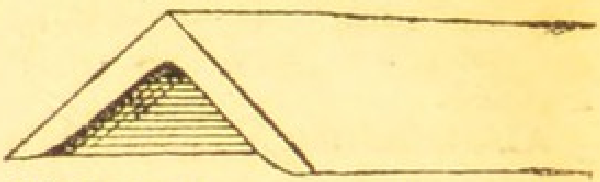
ALUMINIUM. Fig. 1. Saucepan with iron handle attached by rivets. **Fig. 2.** Stove bolt. **Fig. 3.** Method of attaching handle by stove bolt

These are easier to insert than rivets. After it is screwed up the projecting end should be nipped off or filed till it is nearly flush with the nut, and the end can be hammered over. If a rivet hole has become too large a washer can be used between the bolt head and the sheet metal. Sometimes damage to the rivet holes in the pan may be made good by covering them with another piece of metal, as in Fig. 3, the metal of the pan being enclosed between.

A hole lower down in a saucepan is not easy to deal with. The quickest and perhaps most satisfactory way is to use one of the pot-menders which are obtainable at most ironmongers. These consist of two small disks of tin, with a cork washer between, and a central bolt or patent rivet. The cork washer goes inside the utensil and is covered by one of the tin disks; the other is placed outside. They fit closely and, generally speaking, last for a long time.

Aluminium is a difficult metal to solder. Fluxes are considered useless, and the general practice is to tin the surface as quickly as possible after it has been cleaned. Solder specially made for aluminium is employed. The efficiency of the joint depends on the adhesion between the tinning coat and the aluminium. As heat is conducted rapidly the metal near the joints should be heated almost to the melting point of the solder. The parts should be kept pressed closely together till the solder is set. The joints should be protected by paint or varnish.

ANGLE-IRON. An iron bar bent to form a right angle longitudinally is called angle-iron, and the shape greatly increases the strength and rigidity of the bar. Angle-iron may be had from bar-iron dealers or retail from a blacksmith in sizes 1 in., 1¼ in., 1½ in., 2 in., and 3 in., and is sold by weight.



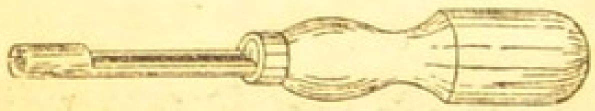
ANGLE-IRON. Section and perspective

ANGLE TEMPLATE. An angle template is used for marking and testing angles on metal, wood, and other materials. The most commonly used angles are 45°, 30° and 60°, but when necessary templates are made for any other angle. For use in picture-framing a 45° template is useful, but others are necessary when setting out the angles for hexagonal shapes and other types of frames.

Angle templates are commonly used in building for roof work and other purposes, and in such cases they are made to a large size and framed up with strip material.

ANTIMONY. Apart from its value in the making of type metal, one of the chief uses of antimony is in the preparation of the Britannia metal and pewter employed for making teapots, coffee-pots, spoons, and other domestic articles. It is also used for trinket boxes, dressing table trays and ornaments. It does not tarnish and can be kept clean by simply washing with soap and water.

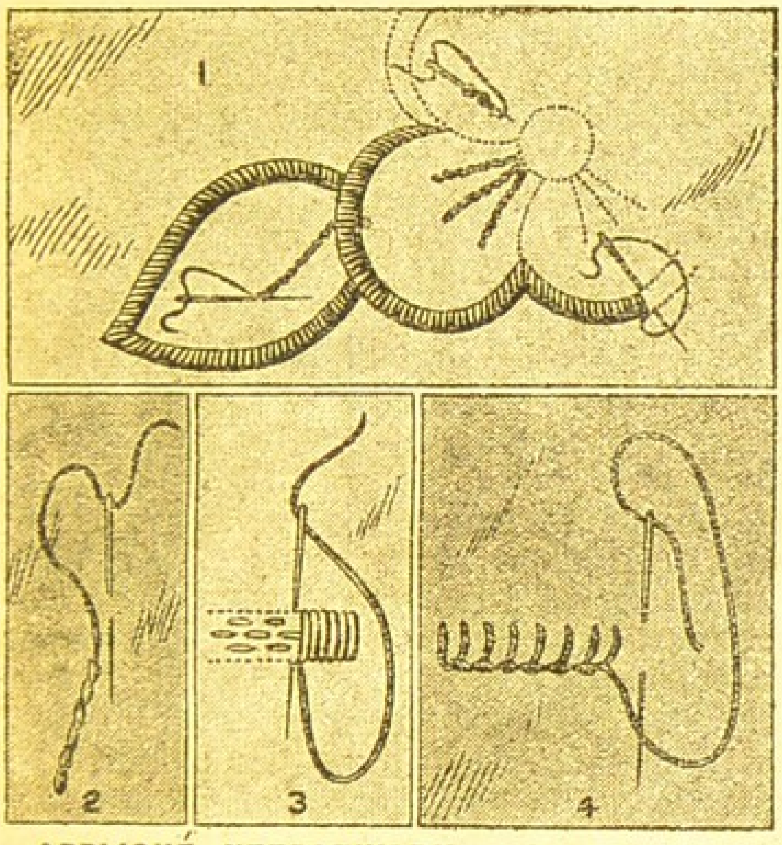
APPLE CORER. A simple corer is made from a length of steel tube with half the upper portion cut away, and fitted in a handle. The tubing is then ground and sharpened on the inside. When blunt it can be sharpened with a small round oilstone, or fine emery cloth wrapped round a pencil and rubbed along the edge. The steel should not be sharpened on the outside.



APPLE CORER. A useful kitchen utensil

APPLIQUÉ NEEDLEWORK. This is a type of decorative trimming formed by one kind of material being "applied" upon another. Thus lace is appliquéd on washing satins and crêpes for blouses or underwear, and silks, satins, or cretonnes on cushions, bags, curtains, etc. Motifs, ready made for appliqué can be purchased in lace and in such diverse materials as tinselled braid and brushed wool, (the latter in white "animal" shapes for applying to nursery coverlets), but more originality can be displayed by cutting out designs suitable to the work in hand.

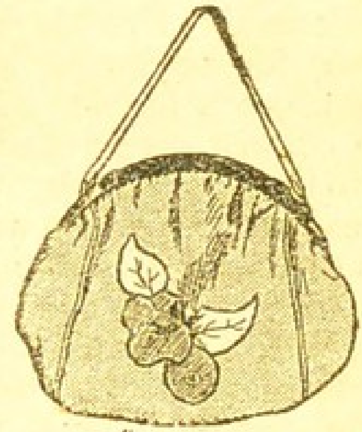
Lace, for instance, particularly lends itself to good effects when a needlerun kind is chosen with a large flower design, which can be cut out and sewn or embroidered on to the garment, smaller pieces of the lace design being used to fill out the pattern as required. Special lace motifs can be made for household linens, but a brighter note in decoration is the coloured border to white linen, wide enough to take motifs designed each from a different fruit, apple, pear, cherries, grapes, etc. These can either be drawn on the coloured linen selected, or transfers can be obtained. Flower designs can be applied in the same way if preferred. Luncheon sets and afternoon tea cloths are most successful with this appliqué.



APPLIQUÉ NEEDLEWORK. Stitches used: **Fig. 1** and **4.** Buttonhole. **Fig. 2.** Stem-stitch. **Fig. 3.** Satin-stitch

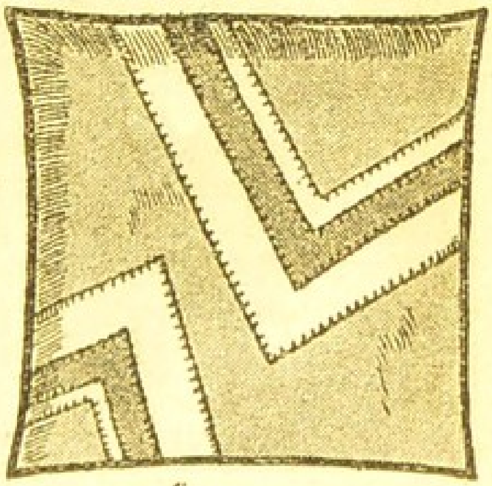
A simple form of appliqué is shown in the bag illustrated in Fig. 5. Such designs can be used for cushions, blotters, sachets, etc.

Buttonhole stitch, Figs. 1 and 4, and satin stitch, Fig. 3, are the two simple stitches employed for appliqué, and the design should first be neatly tacked on to the article in the correct position. Where possible edges should be turned in, especially for linens which will have to be frequently laundered. Details too small for appliqué, such as stalks of flowers or tendrils of vines, can be embroidered, using stem stitch, Fig. 2.



APPLIQUÉ NEEDLEWORK. **Fig. 5.** Trimmed bag

The simpler the design the more effective the work. Conventional or geometrical patterns are particularly good for colour notes on cushions or curtains. The stitch employed for the appliqué of the angular design in coloured satins on the cushion illustrated in Fig. 6 is buttonhole stitch in coarse silk.



APPLIQUÉ NEEDLEWORK. **Fig. 6.** Cushion decorated with geometrical patterns

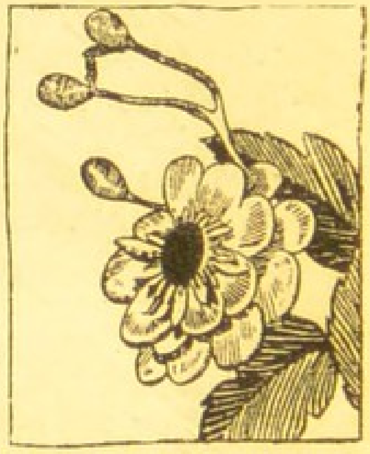
ARTIFICIAL FLOWERS FOR HOUSE DECORATION

How to make Blooms and Foliage from Various Materials

Although most artificial flowers nowadays are made by machinery, the craft still deserves a place among those practised in leisure hours in the home

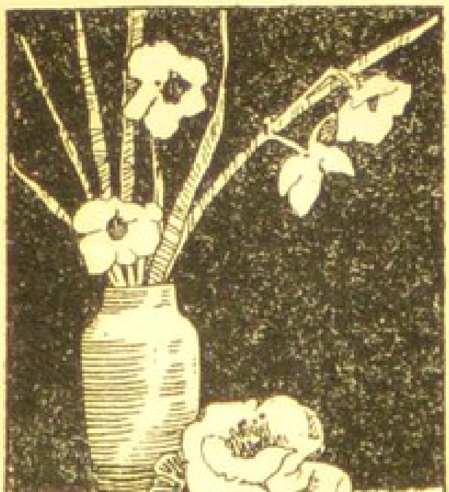
Made of shells, fish scales, glass, knitting yarns, raffia, scraps of silk, cotton, velvet or felt, of crêpe paper and of leather, artificial flowers of all kinds can be selected for dress, fancywork, table and Christmas decoration.

Shells and glass lend themselves to original and striking designs for conventional vase sprays and for floral trees of the weeping willow type on solid glass blocks and fancy stands. Mother of pearl shells, which do not require tinting, are sold from 1s. a dozen (prices vary according to required size), miscellaneous shells from 3s. a pound, and fish scales about 1s. an ounce. French enamel varnishes are suitable for colouring all shells and scales, and cost 9d. a bottle. These can be intermixed to obtain other shades and removed or lightened in colour by use of methylated spirit. Leaves and petals are supplied in crystal or in coloured glass for a few shillings a hundred. Where a pearly sheen is liked on glass flowers, a mother of pearl solution is obtainable, to coat the petals.



ARTIFICIAL FLOWERS. Bud and leaves made in glass

Besides these materials, flower centres, varieties of stamens and foliage, stems, wire, brown or green gutta percha, various kinds of calyx and tools for piercing shells can be obtained or ordered at art shops. Small camel-hair brushes are best for tinting ; clean them with methylated spirit after using the enamel varnish.

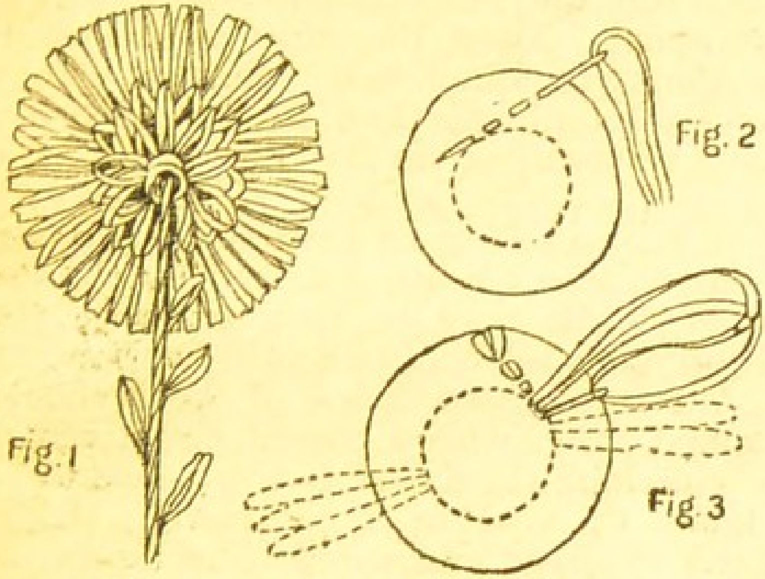


ARTIFICIAL FLOWERS. Narcissi made from shells, the leaves being of cardboard covered with green raffia. The rose is also in shell

Anemones Made From Shells. Anemones are effectively made in shells by selecting five shells the required size of anemone petals. Pierce, from inside, the thickest part of the shell where the hinge is, with two holes, a quarter of an inch apart, thread with wire, working from inside shell. Wire the five thus, and then colour. For a red anemone, a brushful of crimson enamel varnish would start from the top of the petal and blend with a little mauve from the base, where afterwards a small dab of black should be used, as seen in the natural flower. Both sides must be coloured and various tints will be suggested by the real flowers for sufficient blooms to make an effective vaseful.

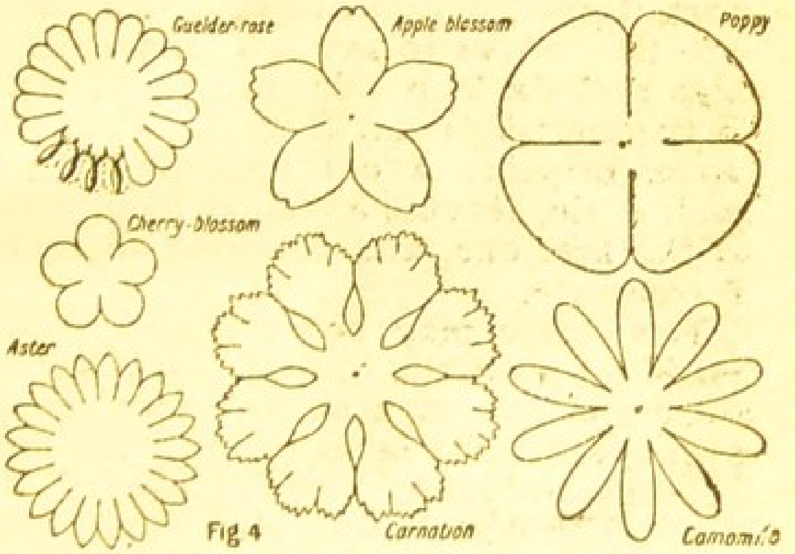
Take an anemone centre, surround with stamens (ready made), wired together and spaced evenly round the centre, and then wire to a piece of galvanised wire for the stem. Next wire the coloured petals to this stem by the wires already fixed to them. Green sealing wax may be used to hide the mass of wires beneath the petals. After a short piece of rubber tubing has been pushed up over the wire stem a special ready-made anemone stem is used to which short leaves, as found on the real flower, are attached. This should be gummed on to complete the flower.

By piercing the shells at the thin top edge incurving petals are obtained. Thus, when making a rose or a water lily, the central petal shells are pierced at the thin edge and the outer or open petals are pierced, as in the anemone described, at the hinge side. For a bud all the petals would be pierced on the thin top edge. A special calyx is obtainable for a rose and double-ended yellow stamens.



ARTIFICIAL FLOWERS. Fig. 1. Daisy made in raffia. **Fig. 2.** How to start making the flower. **Fig. 3.** How the petals are formed. **Fig. 4.** Simple shapes for cutting out flowers in silk, cotton or crêpe paper

Natural twigs are often used for almond or apple blossom, gutta percha strips in a matching colour concealing the wiring of the bloom to the twig. For large leaves, flat sun shells are obtainable from 3 to 4 in. in diameter, and can be cut with special cutters to the desired shape and coloured after piercing.



With large shell flowers, rattling of petals caused by too loose wiring must be carefully avoided. Glass flowers are made in the same manner as shell, but gold, silver or silk-covered wire is used. For heavy flowers or tree effects the stem wires must be extra stout.

FISH SCALES. Fish scales are good for making small flowers when an enamelled effect is liked for millinery purposes. One side of the scale has a satin finish and should be used for the upper sides of petals. These can be curled round on a knitting needle if desired, cut to shape with scissors and holes pierced for wiring with a stout needle.

To make violets, select five fish scales, four about the size of a sixpence and one of a threepenny-piece ; cut five lengths of wire, 7 in. long, wire up the scales, and then colour both sides with violet enamel varnish. Take a violet centre and arrange the coloured petals, two at the top, one at each side and the small one at the bottom, overlapping. Twist the wires of the petals together firmly to make the stem foundation. Bind a narrow strip of green gutta percha round this and finish. Ordinary artificial violet leaves may be used, or leaves cut out of green suède.

Wool or chenille flowers for attaching to knitted work or for posies are usually very simple, effect being obtained by the use of bright colours. A wool needle may be threaded with the yarn, a loose knot made and loops worked with this, overlapping each other all round. About a dozen loops of wool should suffice. The centre is formed either with a bought flower centre with a wired stem, or by attaching the flower to the article to be trimmed with French knots of wool in a contrasting shade. Leaves are easily crocheted to shape and wired if necessary, or cut out felt leaves may be used for a posy.

Raffia flowers usually start with a canvas foundation, from which the loops of raffia may be worked. Daisy-like flowers (Fig. 1) can be made on a circle of canvas rather larger than a penny with an inner circle marked the size of a farthing. To start, thread a raffia needle with the selected colour and darn into the canvas to avoid a knot (Fig 2) ; from the centre circle edge make a loop 1 in. in length, taking the needle back close to the starting point (Fig 3). Pass the needle under the centre circle, bringing it out opposite loop just made. Take needle back again, leaving a similar loop, making it as close as possible to the first one, and continue all round till the circle of petals is complete.

The centre may be of looped yellow wool or small wooden beads sewn on the canvas. The back is finished off by cutting away the canvas near to where the petals start and covering with green raffia in loops until the remaining canvas is hidden. Through the back, wire is passed to form the stalk about 8 in. long. Use double wire and wind round with brown raffia. To keep the raffia in place, pass it through the flower, when it may be bound with a little brown cotton. Wire in an occasional loop of green raffia on the way down the stalk, as shown in Fig. 3.

FLOWERS OF RIBBON, SILK AND PAPER. Narrow ribbon flowers can be made in the same way. Circles of felt, skiver or suède, with slit edges, in diminishing sizes, form conventional asters with bead flower centres and wired stalks covered with gutta percha or raffia.

Ready-made stems, centres, stamens and leaves can be used if an attempt at natural flowers is desired. After cutting out, if the petals are to be coloured, it is a good plan to pin material to white blotting paper, wet slightly with clean water on a small sponge, and tint with water colour to which add a little gum. Aniline dyes are quite useful for this purpose.

In using crêpe paper for decorative flowers, cut the paper with the grain, use as little adhesive as possible, and allow pasted petals, etc., to dry before using them. Fold the paper into several thicknesses so that several petals or leaves may be cut out at one time, draw or trace design on top fold and use a sharp pair of scissors.

To make a daffodil or a bell flower, turn down the end of a wire and cover with the paper to make a small head on to which to fix six stamens, each made from a square inch of paper, twisted tightly between the fingers to form a thread. Cut the bell or cup three inches square and join with paste. Turn the top edge slightly over, stretching the paper a little. Put over the centre of the flower and bind with fine wire. For the daffodil cut six petals and also bind these with a sheath of brown crêpe, pointed at one end, at the base. The bell flower is finished underneath by a calyx cut from a circle of green paper into points. Stalks are bound with crêpe.

ASBESTOS. Being a fibrous material which is non-combustible, asbestos has many uses for fire protective purposes. It has a low thermal conductivity, and is thus an excellent heat insulating material. As an electric insulating material it has been extensively used in electric heating devices of various types.

Asbestos mill-board can be purchased in sheets from about $\frac{1}{8}$ in. thickness upwards. The thinner boards can readily be cut to shape with strong scissors or a sharp knife. Asbestos cord bound around the handles of pots and pans or on the knob of an oven door prevents burnt or blistered fingers.

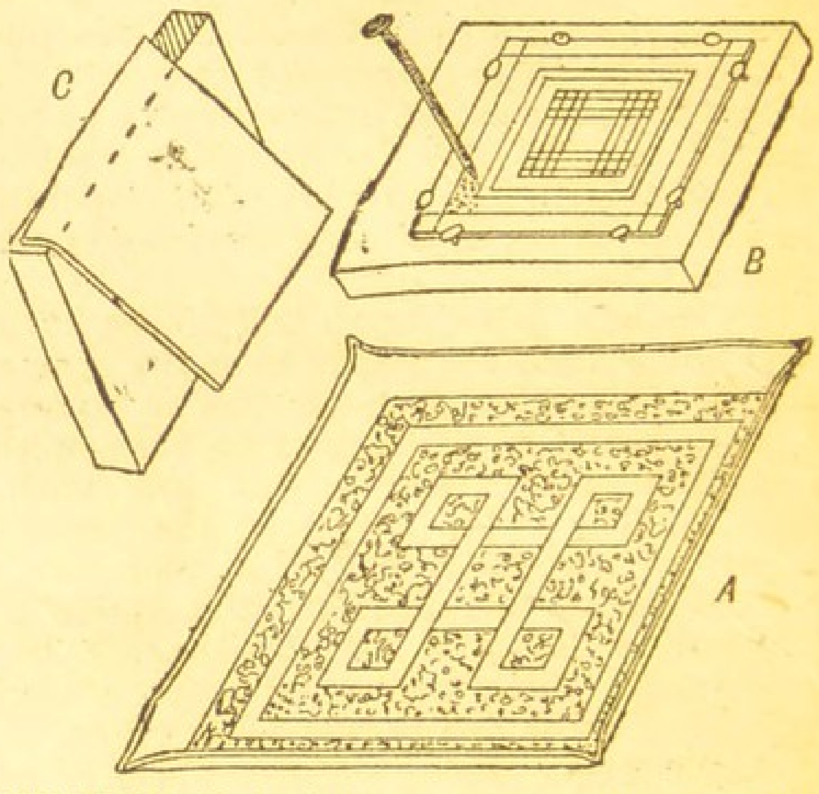
Moulded asbestos is used in the form of briquettes, balls, etc., for gas heating stoves.

For building purposes asbestos is generally combined with other materials, such as magnesia or Portland cement, and is treated in various ways to render it waterproof. For amateur use sheets of such a material are very effective. It has to be cut to the desired shape and nailed in place. The joints between the sheets are covered with strips of wood nailed to the " studding" or framework.

ASH. Tough, flexible, and able to resist shock without breaking, ash is a wood that is extensively used in many trades. It is light brown or nearly white in colour, with rather coarse grain. For the handles of garden implements and tools ash is well suited.

ASH TRAY. A simple form of tray is illustrated, which may be made without any of the special tools. A piece of thin brass or copper sheet of No. 18 standard wire gauge, measuring 5 in. square, is required, both sides being first cleaned with fine emery cloth and oil, and the design drawn on with a lead pencil and lined in with a metal point.

The plate must be secured to a piece of wood with strong tacks close to the edge, and the background of the pattern covered with indentations made with the point of a large wire nail. The plate should next be removed and the edges lightly tapped over with a hammer, holding the metal on the edge of a narrow strip of wood and at an angle of 45°. The surface of the metal should be rubbed over with dry pumice powder, with a hard nail-brush and, after being warmed, coated with colourless lacquer.



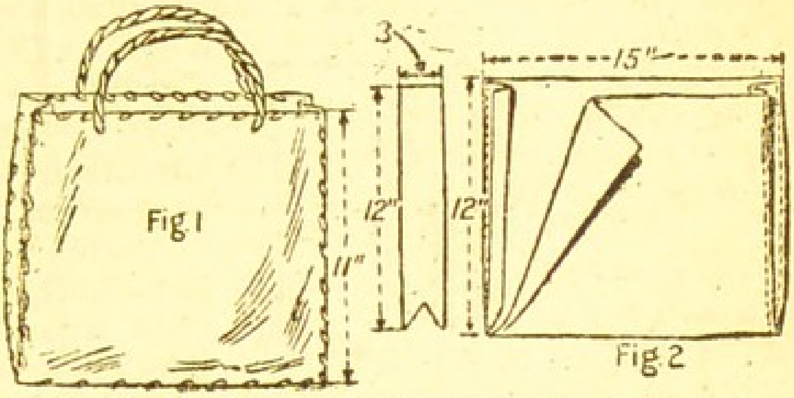
ASH TRAY. Made of thin metal sheet. **A**, finished tray. **B**, punching the pattern. **C**, bending the edges

BAG, How to make a. A shopping bag is shown in Fig. 1. It may be of American cloth, hessian, or striped canvas. It should be lined through with cretonne or similar fabric to give extra strength, and requires ½ yard of 24-in.-wide material, with the same quantity of another fabric for lining. Take the material for the outside, and cut a 3-in.-wide strip from one of the cut edges, not the selvedges; then cut this strip in half, to obtain two strips 3 in. wide and 12 in. long.

Cut a V-shaped piece out from one end of each of the two strips, as in left-hand side of Fig. 2. Fold each strip lengthwise down the centre, and sew the edges of the V-shaped opening together. Now fold the larger piece of material to bring the selvedges together, as in Fig. 2, with right side inside. Join the long edges of the folded strips to the side edges of the larger piece (Fig. 2) so that the narrow strips are sandwiched between the two layers; then turn the bag right side out.

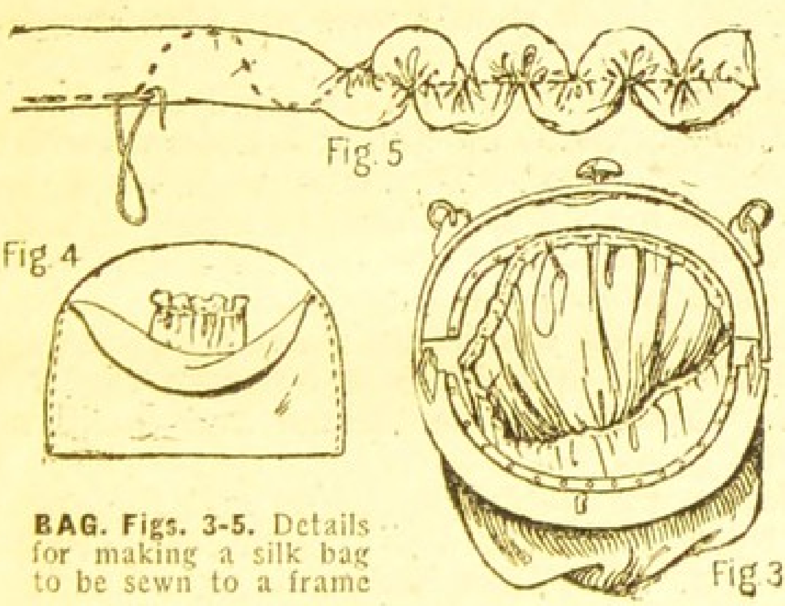
Make up the lining in the same way, and slip it inside the bag with seam turnings facing; turn top edges in to meet, and oversew along with embroidery silk, a fine coloured twine, wool or raffia, finishing the remaining edges with decorative oversewing to match. Next cut small holes within the top edges to take handles, and oversew or buttonhole the edges round for strength ; then add handles of cord, or strips of material doubled and stitched along. Hand embroidery or appliqué work can be added as a decoration.

FRAME-MOUNTED BAGS. Handbags of silk and other materials, mounted into a frame of ivory, tortoiseshell, or an imitation of either, or of metal, with chain handle, or one made of the material, can be easily worked at home, frames being purchased. These are made with rows of tiny holes through which the bag is sewn on. The bags are lined and may be supplied with pockets to contain powder puff or mirror, while the top of the lining is finished off with a narrow ruching, galon, or silk floral trimming.



BAG. Fig. 1. Simple shopping bag. **Fig. 2.** How it should be cut out and the gusset inserted

Details for making such a bag are shown in Figs. 3-5. The mount or frame illustrated measures about 6½ in. in width ; ½ yd. of 18 in. wide silk for the outside of the bag is required, and also ½ yd. of 18 in. wide silk for the lining. If there is no handle to the frame, to make one, cut a strip off the width of the material 1½ in. wide, fold double, and stitch along for strength.

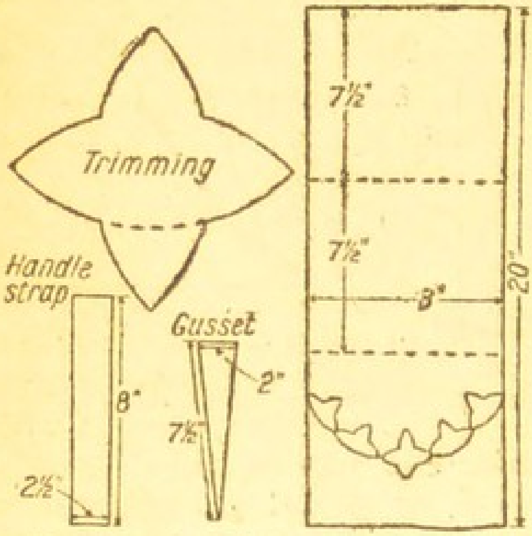


BAG. Figs. 3-5. Details for making a silk bag to be sewn to a frame

Begin by taking the silk for the outside of the bag, folding it into halves, and then cutting off the two top sets of corners to form a circle. Now turn in the edge of the silk circle to the wrong side and run in a gathering thread, leaving long ends of cotton. Open out the frame or mount to its full extent so that it will lie flat on the table as in a circle, and measure all round the inside edge of the frame where the tiny holes are. Then draw up the gathering thread along the silk edges to make them the same size as the mount. Sew the bag into the mount, working from the inside, according to the pattern sketched in Fig. 3.

Pass the needle through the edge of the bag and through one of the holes to the outside ; then carry the needle below the frame edge, and push it through the silk to the inside again, then passing on to the next hole. Take the silk for the lining, and from it cut a strip measuring about 17 in. long (an inch less than the length of the bag silk) and about $8\frac{1}{2}$ in. wide; that is, 2 in. more than the width of the frame. Fold this strip in half with the right side inside and curve off the top corners slightly. Then seam up the sides as far as the commencement of the curves.

A pocket for holding a small mirror and comb, and made of a square of material, hemmed at the top and having an elastic run through hem, can be stitched to one side of the lining before it is seamed up, as suggested in Fig. 4.



BAG. Fig. 6. Diagram giving details for making and trimming pochette

Turn in the curved top edges of the lining and gather up lightly, then slip them inside the bag, and hem them to the top of the latter. Finally, add a strip of floral trimming, or ruching, over the edges. Ruching is made by cutting on the cross a long strip of lining silk, about $1\frac{1}{2}$ in. wide, folding it over with the wrong side outside and running it along as though for an ordinary rouleau. Turn inside out with the aid of a small safety pin and, with sewing silk to match, run it in a zig-zag line from side to side, as shown in Fig. 6. When this gathering thread is drawn up, a pretty trimming is the result. This can be sewn to the bag along the gathering thread, which should now run in a straight line down the middle.

Flat shaped bags on stiff, one-piece tortoiseshell or wooden mounts show off embroidery or make up well in heavier materials such as tapestry, tweed, or moiré. To make such a bag in brown moiré silk, with shell mount and lining of moiré to tone, cut two pieces of moiré, one for cover and one for lining, 9 in. wide and 14 in. long; fold in half, making depth of bag 7 in. Join up the side seams and slip the lining into the bag, oversewing together at top; attach a small square tab on one side, made of double moiré. Turn in corners, fit into frame and finish off lining with a narrow gold galon.

POCHETTES. Two pieces of material, for lining and for cover, each measuring 18 in. by 9 in. and folded in three, are needed for a simple pochette bag. If to be embroidered, trace the pattern on the first 6 in. of cover and press before making up.

Interline with buckram to stiffen before folding the bag into three and oversewing the two sides. Such pochettes are useful for evening bags, but not for hard wear. They may be fastened by press studs concealed under the flap or by a jewelled button and tinsel cord.

For a more practical pochette side gussets are required. Cut cover and lining, as shown in Fig. 6, to measure 8 in. by 20 in., also a piece of buckram ¼ in. smaller all round; draw and cut a paper pattern of the trimming (to be of silk in a contrasting shade to the cover), three times size of diagram, lay on material and cut out (see diagram). Having marked position, tack neatly and sew the trimming to bag, pressing afterwards with a slightly warmed iron on the wrong side of material. Edge the trimming with tinsel cord couched on to the flap. Tack cover to buckram, turning edges of material over the buckram so that the trimming comes on edge of bag. Then slipstitch lining to cover. Cut the gussets in covering and lining silks, turn in the edges and stitch together. Fold the bag and neatly sew in gussets. Such a shape lends itself to a variety of trimmings; a central appliqué ornament may be used, a monogram, or the whole flap may be gaily embroidered; or it may be cut out in an envelope shape and made of brocade.

Effective pochettes for use with summer dresses are made of coloured linens embroidered with wools in contrasting shades. Other charming varieties are of canvas worked in petit point. Canvas for these is obtainable cut to shape with designs transferred for working. *See* Tapestry, Needlework.

BAMBOO WORK. Bamboo differs from wood, but is easy to deal with when its peculiarities are known. It is obtainable in lengths of pole or rod, is straight and parallel except for its nodes, and is light and comparatively strong, with a hard, glossy skin. Diameters stocked by English dealers are from about ½ in. to 2 in. The small diameters easily bend when heated, and remain bent when cold, but old bamboo does not bend so easily as does new.

Hot water can be used for heating, but more frequently it is done with a smokeless flame, as in Fig. 1. The flame can be allowed to touch the surface, but either bamboo or flame should be kept moving slowly. As the diameter increases it becomes more difficult to bend, and then only slight curvatures are attempted. In bending there is necessarily some amount of flattening or loss of cylindrical shape at the bends. The outer curve is longer than the inner, and in large diameters and sharp curves this must be assisted by making a number of shallow saw-cuts across the inner part.

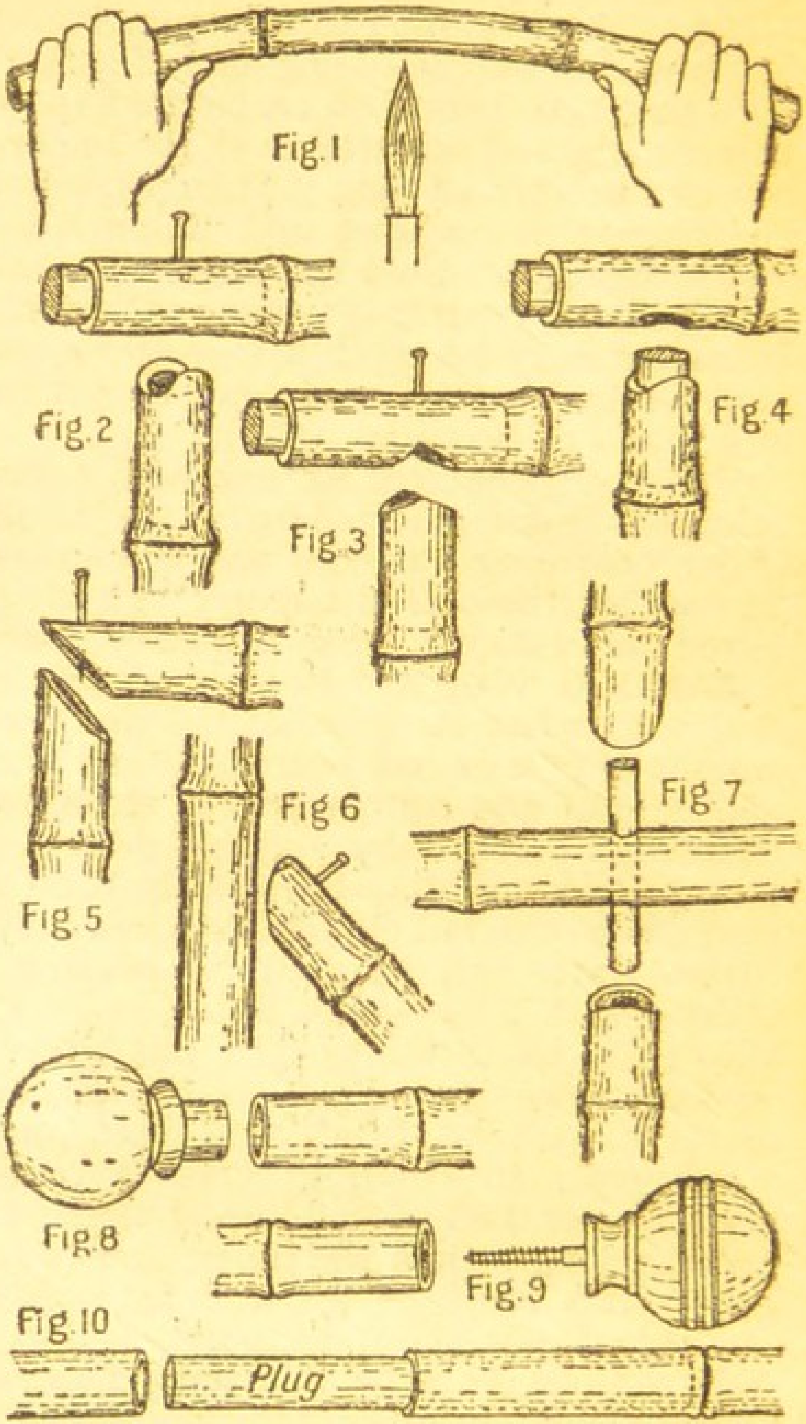
As bamboo is hollow, it is nearly always plugged with soft wood at places where joints have to be made. A rasp of half-round section is used for preparing the interior. Figs 2, 3, 4, 5 show joints at right angles. Plugs are shown in both parts, but this is not always practicable. Glue and fine nails are used for holding the joints. Glue does not hold well on the natural enamel of bamboo, and therefore it should be rasped or glass-papered before glueing.

A diagonal joint may be made as in Fig. 6, the end being gouged or rasped to fit the curve. Fig. 7 shows a piece of dowel put transversely through one piece to fit into the ends of pieces which cross the first. The ends are plugged in the ordinary way, and then a hole to fit the dowel is bored in the centre of each of the plugs. The dowel is smaller in diameter than an ordinary plug.

Many articles of furniture can be made of bamboo, either entirely or in conjunction with wood. Unless holes are bored for nails there is risk of splitting. A bradawl may be used, but it is better to bore with a brace and bit or a drill. Bad joints can be filled with a paste of sawdust and melted glue. Bamboo will not take stain, but may be varnished or enamelled.

For bamboo pole, a useful size is about $1\frac{1}{4}$ in. diameter. This is cut up for simple articles of furniture, and is used simply as a pole for numerous purposes, one of the commonest being curtain poles. The ends are generally put on in a way which permits of removal if it is desired to take the rings off.

Two methods are shown in Figs. 8 and 9. In the latter the pole is plugged, and the knob fitted with a double-ended screw, so that the knob can be screwed on. Poles may be joined end to end to obtain the required length. They are united by inserting a wooden plug, as in Fig. 10.



BAMBOO. Fig. 1. Showing how it may be bent. **Figs. 2-7.** Methods of making different joints. **Figs. 8 and 9.** Two ways of fastening knobs on to bamboo. **Fig. 10.** Joining with wooden plug

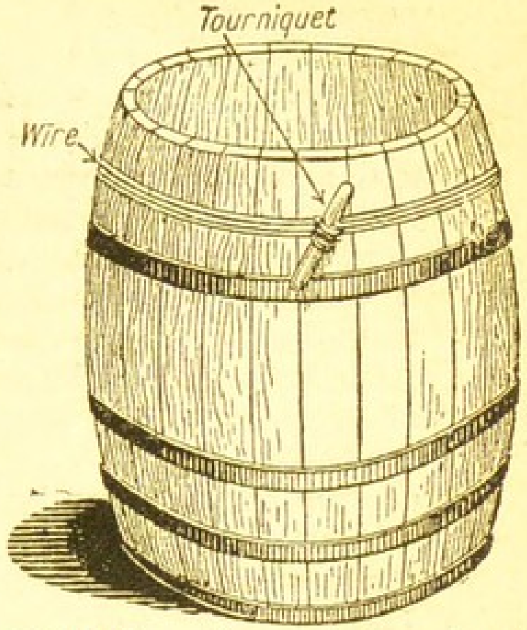
BARBOLA. *See* Gesso.

BARREL. Barrels can be utilised in various ways in or around the house. A port wine pipe set up on legs or on a small platform serves as a rainwater-butt. It should be coated inside with tar, which is then set on fire and burned out. A second coating of tar is then given, and the exterior painted. A draw-off tap near the bottom and overflow pipe at the top with lid may be added.

When barrels have been left lying about for some time the staves generally become slack; they can be tightened by driving the hoops farther down the barrel, or by wiring them tightly The wiring is done by twisting several turns of $\frac{1}{16}$ in. diam. (16 gauge) galvanised wire round the barrel and tightening it up with a tourniquet. Secure the wire with clout nails, or by cutting a shallow groove for it to lie in, to prevent it shifting from its place.

To clean old barrels, wash and scrub them with caustic soda solution, or use one of the paint removers.

Two good wash-tubs or pickling vats may be obtained by cutting a barrel in two. Smaller sizes form admirable receptacles for flowers or shrubs.



BARREL. How a leaky barrel can be mended by tightening the staves with wire

BASKET AND BASKET MAKING

How to Acquire Skill in an Old-time Handicraft

Here an expert in this delightful craft tells the reader how baskets can be made and repaired

Basket making may be carried out with the aid of a few simple tools, and although elaborate baskets require skill in manipulation simple work may be produced after learning a few of the methods of weaving the rods. Most baskets are made with osiers worked up with the bark intact; others are made with rods from which the bark has been removed, and either left white or stained to a buff colour.

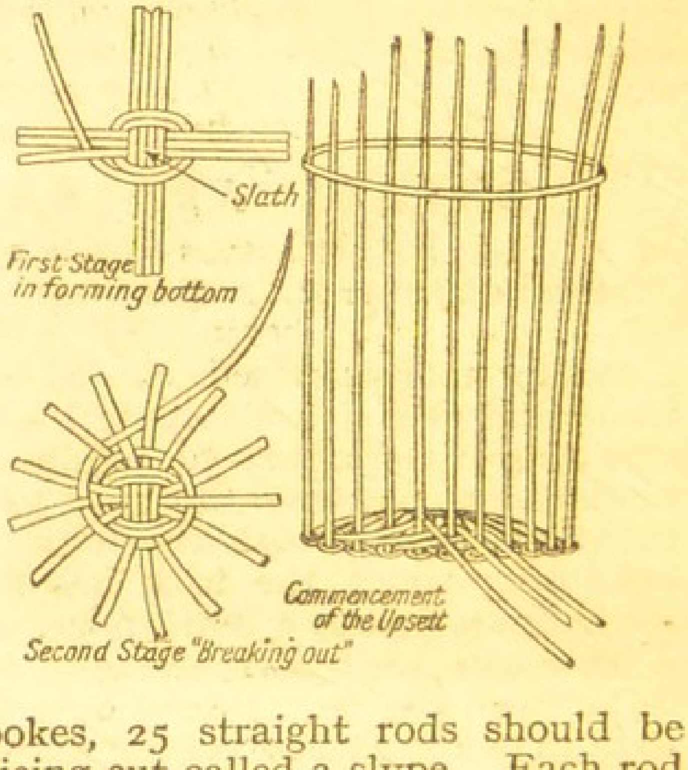
All osiers must be thoroughly soaked in water before use, to make them pliable. Round baskets may be made with no other tools than a knife and bodkin, but for square-sided work a screw-block is required to hold the stakes whilst weaving. A simple round basket embodies the principal methods of weaving, termed strokes. Such an example is shown. Short lengths of osier may be used; either the sizes known as luke and small in brown osier or tack and long small in white and buff will be suitable.

The bottom should be commenced by preparing six 12 in. lengths cut from the thick ends. For the first stage these lengths must be tied together in two sets of three as shown in the illustration, but as there should be an uneven number of spokes, a whole rod should be used to provide the extra spoke, and also the material for binding the lengths together. The long rod will rest with its thick or butt end alongside one of the sets, and the remainder must be carried over and under the crossed lengths until it has been twice round.

The next stage commences the separation of the spokes, and the weaving of the rod is continued, first under and over each length until it is used up. Care must be taken to bend the spokes evenly and to work the weaving length as closely to the centre as possible. The succeeding work is quite straightforward, and only needs care in keeping the weaving rods close up as each round is finished. New rods are started two spokes back and left projecting about 1 in. beyond the top of a spoke, or the end may be pushed down alongside one of the spokes and then bent out. When a diameter of 9 in. is reached the end of the weaver should be cut off and pushed down alongside the nearest spoke, and the projecting ends of the spokes cut off close to the weaving.

The sides should now be formed by inserting the stakes, which are long lengths sharpened at the butt end, and pushed in alongside the spokes. It is still necessary to have an odd number of

BASKET. Simple round basket, useful for marketing, and three stages in weaving it from short lengths of osier



rods, so, as there are 13 spokes, 25 straight rods should be trimmed at the ends with a slicing cut called a slype. Each rod should be pushed down by the side of a spoke, a hole being prepared if necessary with the bodkin, and the single rod placed at the point where two spokes are closest together. The bottom must be placed flat on a table with the crown uppermost, and each spoke turned upright. If the osiers have been properly soaked, and the point of the knife is dug slightly into the angle of the bend this can be done readily enough. The tops should be gathered together and placed in a hoop, as shown.

The next stage is known as the upsett, three rods being worked round the stakes to stiffen them. Sharpen three rods and push the first alongside the single stake and the next two following. The three are now worked together, each one being carried in front of two spokes and behind the third, taking them in order, and continuing until they are used up. This should be done as tightly and closely as possible, working down on the corner in order to give a firm foundation to the succeeding work.

METHODS OF WEAVING. The quickest way of filling up the sides, known as slewing, consists of three or more rods worked in and out all the way up, new lengths being taken as required, and each length started with the top or thin end. The used end is left projecting on the inside and cut off later when the work is dry. The slewing should be continued to a height of 5 in., and the rods worked out to leave the top level; if necessary short lengths of osier can be worked in in order to obtain the required level.

A band termed a wale has to be worked round the sides. Pick out four thin rods of medium length and, commencing with the tops, place them behind four stakes in order, and then carry them alternately in front of three and behind one, until the round has been completed and the commencing ends covered. A single rod weaver should be worked, adding others to bring the sides up to the height of 8 in. This method of weaving is termed randing. The top should be left level, and if the weaving has been carefully done all the upright stakes will be equally spaced all around.

The sides are now ready for the border, which may be quite simple or full. The simple border is formed by bending each stake down in turn, and carrying the bent top in front of the first on the right, behind the next, and left outside the third, the ends being trimmed off a little beyond the stake they rest against.

For the full border, commence by laying down four spokes, the first behind the second and left in front of the third; the second is taken behind the third and left behind the fourth, the third behind the fourth and left behind the fifth. The fourth stake is taken behind the fifth together with the end of the first one laid down, the fifth stake is worked together with the second laid down, and so on until the complete round has been worked, the last four stakes being worked together with their corresponding ends underneath the bends of the first four. The projecting ends which are now on the outside of the border are trimmed off quite close to the border, when the work is dry.

The handle is formed from a stout length of rod, and bound in position with lengths of osier. A rod is cut to a length of 30 in., with both ends sharpened. One end is driven down through the border to a depth of 6 in. alongside the stakes. The rest of the rod is carefully bent, and the other end driven through the border alongside a stake on the opposite side. The plain bow may be covered with a double spiral formed by driving the sharpened end of the rod each side of the handle. The rods should be wrapped round and the ends worked across and through under the border on the opposite side in each case.

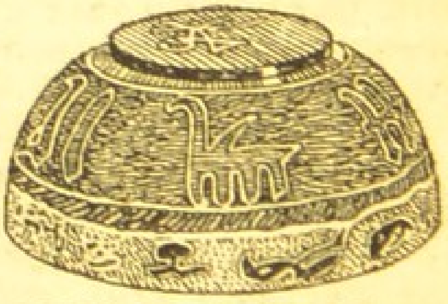
The basket should be finished by cutting off all the projecting ends left inside, but as the rods shrink when dry, sufficient should be left to prevent the end slipping past the stake on which it rests.

Basket Repairing. The handles of clothes baskets are formed with two thoroughly soaked rods which are driven through the border alongside suitable stakes. The ends should be driven down as far as possible. Bend the rod on the left and pass the top under the border from the outside alongside the rod on the right and pull it right through to form a bow. Now twist the second rod on itself and carry it in the form of a spiral three times round the bow, carry it under and through the border and return to the commencing side and repeat. The end of the first rod can be treated in the same way, and this is continued until the bow is filled up. The same method may be followed in re-covering a large bow handle when the covering is broken.

The bottom rim of both square and round baskets can be strengthened by driving in, alongside the upright stakes, a number of single stakes, endeavouring to get them as far through the weaving as possible. The upright ends are treated much in the same way as a border, each rod being carried down behind the next, in front of the one following, and left either behind the next or in front of the next but one. When the ends are cut off, the new rim will form a solid foundation to the old work.

BASS. Bass or basswood comes from the lime, but more usually from the tulip tree of N. America. Alternative names are American whitewood, American poplar, tulip wood, and canary wood. It is a soft wood, usually light yellowish-green in colour, is obtainable in large sizes, and is often used instead of pine for furniture, panels, boxes, pianos, toys, and carving. Bass is as straight in grain and as free from knots as pine, and slightly harder. It takes stain and polish well, the usual stains being ebony or walnut.

BATIK. The process of colouring fabrics known as batik is carried on principally in Java, and is to be recognized by the "crackle," a network of fine lines.



BATIK. Wooden bowl decorated with barbaric design before being plunged into dye bath

Batik is suitable for the decoration of curtains, some ornamental objects, and of silk scarves, etc. It can be applied to all fabrics, silk being the easiest, and it can also be employed for decorating wood and paper.

To make a batik, first draw a design on thin paper and measure to see that the size is correct. Then make a pounce of it either by pricking with a fine needle or with tracing wheel. The rough side of the pounce must be placed uppermost on the material and carefully rubbed over with old sandpaper.

Having fixed the design on the material, which has either been stretched in a frame, laid on oiled manilla paper or a sheet of glass, go over the surface with a pouncing pad dipped in pounce powder. If this is not available, make a wad of rag and use powdered charcoal. Put a piece of special wax into a small pan and allow it to get hot, but not boiling, over a spirit lamp. Dip a round brush with long hair into the wax, and proceed to fill in the design. If the wax is at the right temperature it will penetrate the material. The moment it clogs put the brush into the hot wax and heat thoroughly. The size of the brush varies according to that of the design, but No. 12 is a useful size, with a flat brush about 1½ in. wide for borders.

The tjantin or Javanese batiking spoon resembles a metal teaspoon with the edges turned up and a tiny spout at one end, through which the hot wax flows. A similar tool, called a pipette, is obtainable. When using this the work should be laid flat on a table. The point of the spout must not touch the material, as this closes the hole and stops the flow of wax. Do not hold it over a flame; fill by plunging into the hot wax, wipe with a rag, and work as quickly as possible. When cool hold it in the hot wax in the pan until the wax is melted again. There is also a batik pencil which resembles a stylo pen. Small sticks of wax are inserted in a tube, and the pen is held over a flame until the wax is melted, when it flows through the point. It is useful for drawing on wood.

To ensure a clean outline, outline the edges of large designs with a fine brush or the pipette, and then fill in with a large brush. Before dyeing look at both sides of the material, and if the wax has not penetrated apply again on the wrong side.

The dye bath is prepared by mixing concentrated colour into water, either tepid or cold, until the desired shade is obtained. Take a small piece of material, wet, and dip into the dye bath. Leave it a few moments, and then squeeze and hold up to the light to get an idea of the colour when dry. If incorrect, allow more water or more dye as may be necessary. India-rubber gloves should be worn.

Household dyes can be employed, but those specially prepared are easier to manipulate. One of the hall-marks of hand-made batik is the crackle, a network of fine lines. This is produced by crushing the waxed material between the hands before the final dipping.

If only one dye bath is used the material can be rinsed, hung up to dry, and then ironed between sheets of newspaper to remove the wax. To have more than two colours, portions of the design must be re-waxed. If part has been waxed, and that material dyed grey, wax in some of the grey and dye scarlet, then wax in some of the scarlet and dye black. In this way a multi-coloured design will be obtained. It is best for the beginner to use the lightest colour first, and to avoid too much crackle, as, owing to the uneven waxing of the design, a certain amount of colour will be sure to go through where the wax is thin and shade the work.

Another method is to colour the design in with a brush, then cover with wax and dye the background some dark colour.

BEADS AND BEADWORK

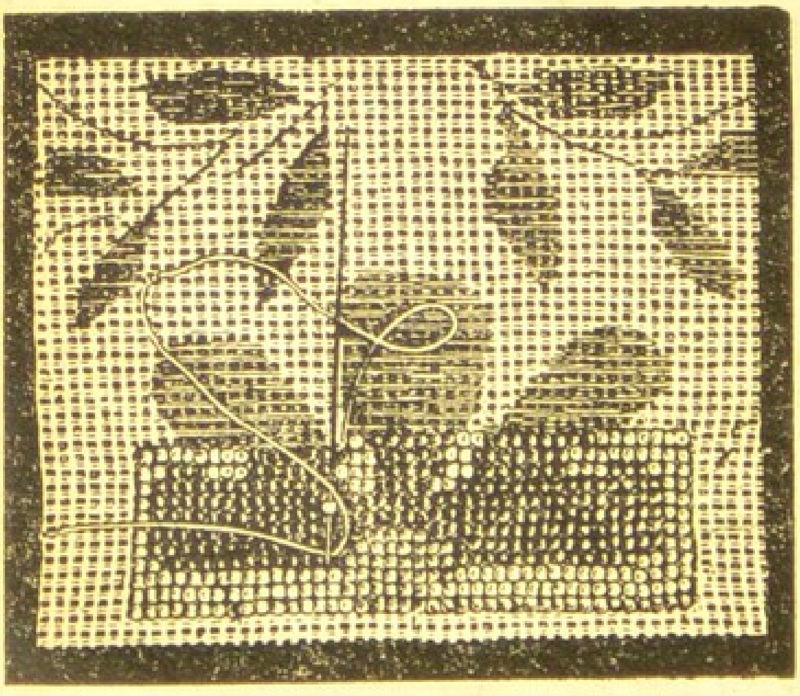
Methods Adaptable to Decorative and Practical Uses

Our contributor here describes some of the many articles, e.g., Bags, Curtains and Necklets, that can be made with beads

Bead work may be divided into five classes: needle and thread bead work (on canvas or on the thread only); crochet bead work; knitted bead work; loom bead work, and novelty bead work.

A special loom bead can be bought for the finest work in this class. There are wooden millinery beads, Venetian necklet and flower beads, rondles, a flat glass disc for threading between beads to lengthen a necklet, appliqués, tubes for dress-trimming, large glass beads and long bugles, diamanté, imitation cord, jade, etc.; beads of papier mâché, of cork, of leather and of metal. Most of the small glass or crystal beads, and also tiny metal beads, are sold in hanks.

Most of the metal beads have fairly large holes and can easily be threaded with a No. 9 or 10 bead needle. These needles run in sizes from 8 to 16, and have elongated eyes which allow the passing of a thicker thread, although the actual needle is finer than the finest darning needle. For necklet threading, special cards of silk in white and colours are sold with a threading wire attaching to one end.

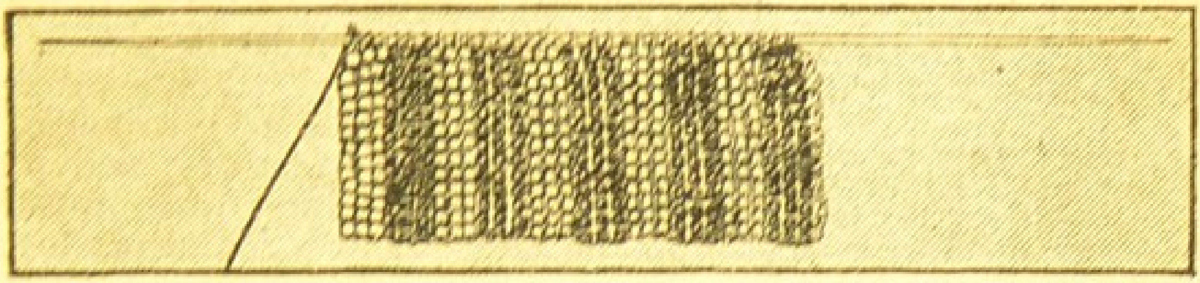


BEADS. Fig. 1. Portion of canvas showing how pattern is followed. The work is done in rows from left to right

The sizes range from 4 to 8, the lower number being the finest.

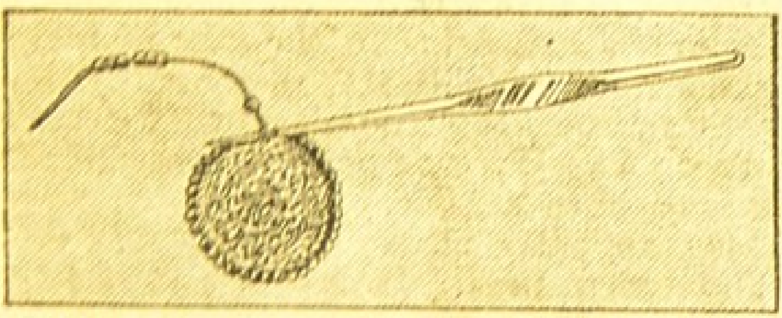
Little cards of necklet wire in gold and silver colours, medium size only, are sold for threading heavy beads.

In Fig. 1 a portion of a design for working on canvas is shown. Designs can be bought ready stamped on canvas, but an ordinary transfer can be used, with two-thread canvas — that is, two threads going both ways of the canvas and producing a square mesh. When buying the beads, get a size that will just cover the mesh, so that the canvas will not show afterwards. The beads should not be too large.



BEADS. Fig. 2. Beadwork applied in stripes to plain knitting for a bag

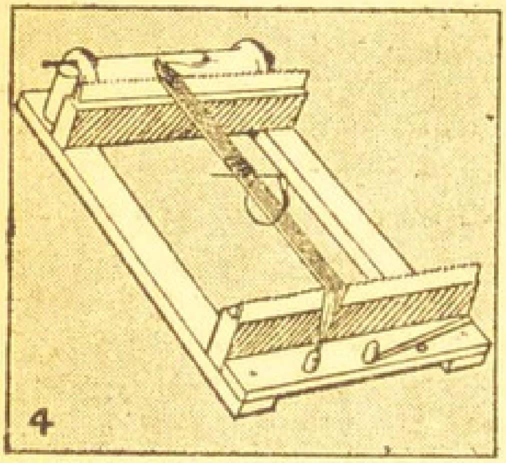
This work is done in rows from left to right. Join the thread securely on the wrong side of the canvas, then bring up the needle at the left-hand lower corner of the mesh. Thread a bead and pass the needle down through the upper right-hand corner and up again through the mesh right underneath, making a stitch like the first half of a cross-stitch with a bead resting on it. The work can be done in coloured sections, if desired. (*See* Fig. 1, with the needle in position.) When the end of the row is reached, pass the needle and thread through the meshes just under the beads to get back to the left-hand side. The alternative is to fasten off at the end of each row, as you must begin the following one at the left-hand side. The pattern must be followed in each row. Follow the colours and the outline for the shape of the bag, as marked on the canvas.



BEADS. Fig. 3. Crochet bead bag, worked in circles

CROCHET WORK. Bags, purses, etc., can be worked in crochet bead work, in short rows. If a square or oblong bag is required, it is best to work in rounds like a stocking, beginning on a ring of chain according to the width of bag required, and working from the inside so that the beads are always on the outside. The sides of the bag may be worked in circles, and these are joined by a long crochet strip eight beads wide, sewn to the circles as far as the hinge of the metal top to which the purse will afterwards be sewn. The straight strip of crochet bead work will give more capacity to the bag. Fig. 3 shows the work in progress.

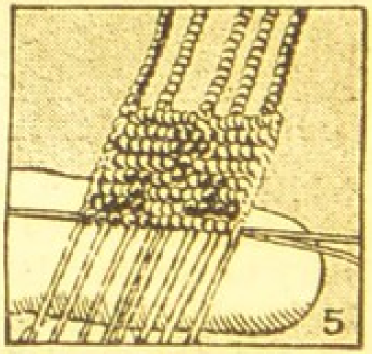
To work, first procure a metal top in order to know what size to work to. Unwind the thread, passing it on an empty reel, and as you unwind, slip the thumb and forefinger of the right hand along the thread to feel for knots. If you leave a knot that is too large to take the beads you will find that they will not push down in the course of working, and all the labour of threading will be wasted. Sylko No. 8 can be used with a No. 10 bead needle, a No. 3 steel crochet hook and No. 7 beads. If No. 9 beads are used fewer increasings must be done to keep the work flat. A whole bunch of beads can be passed on, and when all the beads are worked up the thread can be broken, another ball threaded, and the two threads joined by a knot at the back of the work close up to the last bead. For a circular purse 25 amber and 25 brown beads were threaded alternately, and produced a maze design when worked up, no fewer than 3,100 beads being used in the whole design.



BEADS. Fig. 4. Bead loom in position for working with necklet in progress

Make 4 chains and join into a ring by slip-stitching to the first stitch. 1st round: * 1 double crochet into the ring, push up a bead close against this stitch, and repeat from * 5 times. 2nd round: 2 double crochet in each stitch all round, always pushing up a bead after each stitch and taking up the back loop of the double crochet. The beads will appear on the side of the work that is away.

Now sew a piece of white cotton in the first stitch of the round to know when you come to it, as it is important to keep the rounds uniform. Do three more rounds like the second one. 6th round: * 1 double crochet in first stitch, 2 double crochet in next stitch, and repeat from * all round. In the case of bigger beads increase in every 5th stitch. 7th round: 1 double crochet in each stitch. Now repeat the last two rounds until the circle is big enough to fit the top. The work must be quite flat; if loosely worked the circle may flute a little. This is remedied by working an extra plain round or two without any increasings. If tightly worked the circle may curl in a little, and in this case an extra increase round with 2 double crochet in each stitch will set it right.



BEADS. Fig. 5. Needle passed back through beads above warp threads

When the piece is big enough work a few rounds of plain double crochet at one end of the circle without beads. This is the part that will fit into the metal top, and if the latter is oval a few extra rounds can be worked with short rows in the middle, to shape. When the two circles are finished, work a narrow strip, doing about 5 beads in each row as follows: After working one row of beads and double crochet as just described, turn and slipstitch back along all the stitches just worked, to get to opposite end of needle again. Then repeat row of beads alternately with a slipstitch row until the strip is long enough to go around the lower portion of the circle, measuring from where it will meet the hinge of the clasp.

Before sewing up the beaded portions cut a lining in silk or other suitable material. Cut two circles, allowing a $\frac{1}{4}$ in. over all round, and also a strip for the narrow piece, allowing a $\frac{1}{4}$ in. over at each side. Sew these together, and turn a $\frac{1}{4}$ in. in round the top of each side on to the wrong side of silk.

Now oversew the narrow strip of beaded work to the two circles; slip in the lining so that the wrong sides of lining and bag meet. Oversew the top of bag and lining together, then sew on the metal mount with strong linen thread thus: Join the thread on the wrong side, push up through the first hole from wrong to right side, thread a bead on the needle, then push the needle back through the same hole; then repeat this in each hole around mount. When the end of the clasp is reached draw up the sides of the bag a little to close them, and fasten off securely. Fig. 2 shows bead work on plain knitting. Thread the beads on the silk, then decide whether a plain bag or one that will be gathered on the mount is required, so that enough stitches are allowed when casting on.

For a striped bag, cast on any number of stitches divisible by 6 and 3 over for edge stitches, which are knitted plain. Knit two rows plain without beads. 3rd row: Slip 1, knit 1, * put the needle in the next stitch in position for plain knitting, then push up a bead against the last stitch and finish knitting the next stitch; repeat from * to the end, and knit plain the last stitch without a bead. Now knit the next row without beads. If threaded correctly, you should now have 3 beads of the same colour to begin each row, so keeping the stripes intact. If knitting a pattern the beads should be carefully threaded in the right order before beginning to work. Any cross-stitch pattern can be copied in crochet, knitting, or loom bead work.

Loom Bead Work. With this type of bead work a good colour scheme is of primary importance.

The loom is a simple wooden device made in three sizes. The medium loom, $11\frac{1}{2}$ by $7\frac{1}{2}$ in., is used chiefly for necklets, purses, and bags. On this size a bag 7 in. wide can be made, but it is best to work wide designs in strips, taking 20 to 40 beads according to size and joining the strips together afterwards by threading in and out of the bead on the edge of the strips. Extra long bead needles are sold for wide designs. Any cross-stitch or tapestry design can be followed and there is no preliminary threading of the beads, as they are taken up each row according to pattern.

Ordinary strong linen thread or silk twist can be used. First prepare the warp threads, allowing some inches over the length of the intended article. Cut the threads in separate lengths, allowing one more thread than there are beads for ordinary flat weaving, as in the case of a bag. The loom is always placed with the spool end farthest away from the worker, Fig. 4.

To set the warp, tie all the threads together on one end, and secure on one of the nails on the spool at the top of the loom. Then place the threads in rotation on the notches of the first bridge, and carry this thread down to the corresponding notch on the lower bridge. When all the warp threads are set, draw them down firmly, pass the ends through one of the holes at end of loom and push in the little peg to keep these threads quite taut; then wind the remaining length of thread round the end of the loom and pegs.

Take the weaving thread, which can be the same kind as the warp thread, thread it into the needle, and tie at the top of the first left-hand warp thread. Thread the full number of beads for the first row, pass the needle from left to right under the warp threads, and push the bead up in position between each warp. Where there are too many beads to keep on the needle let them slip down the thread, push them in position and hold under the warp threads with the forefinger of the left hand. The beads should be pushed well up between the threads so that the latter do not come up over the needle when passing back.

Take the needle in the right hand, and pass it back from right to left through all the beads, taking care that the needle keeps above the warp threads to the end of the row (Fig. 5). Draw the thread up firmly. The passing of the thread under and over the work makes a selvedge on both edges. When the loom is full wind the work round the spool away from you, but leave a little of the work to project over the top bridge, as the threads can now only be pressed down the notches of the lower bridge. If they were passed down the upper bridge a gap would result in the work. Secure the ends firmly round the pegs again before beginning to weave. At the left-hand side of the spool there are three holes, into one of which a loose nail is passed to keep the spool in position when working, and so keep the warp threads taut; they must not be allowed to slacken in the working.

Embroidery is often enriched by bead outlining, as also are tapestry and paisley designs.

BEAUMONTAGE. This is a kind of hard stopping, used in the home for filling small holes, repairing damaged veneer, and similar purposes on all kinds of furniture.

It is made by dissolving a lump of resin, about the size of a large walnut, in a gill of common orange shellac, and adding a piece of beeswax about half the size of a walnut. This must be melted in an iron pot or tin can by gently heating in the oven or on a stove. Before heating, a suitable colouring pigment must be added (about a teaspoonful) in powder form, blending it to match the work to be repaired. The mixture is made into sticks by pouring some of it on to a wooden board, laying it in a line, and rolling with another board. The boards should be warmed.

To use the material, it is melted into the hole or over the damaged places by means of a rod of hot iron. Do not have the iron too hot and press the mixture well down into the hole, and leave a little of it above and around the damaged part. When dry the surplus is removed with a chisel and fine sandpaper.

BEAUMONTIQUE. This is an adhesive used in certain classes of cabinet and joinery work. It is composed of equal parts of litharge, white lead and whiting, worked into a stiff paste with boiled oil.

BEAVER BOARD. A Canadian product named beaver board is used for the covering of internal partitions and similar purposes. It is composed of wood fibre worked by a patented process, and resulting in a five-ply board approximately $\frac{1}{4}$ in. thick. It is clean and pleasant to handle, is made in a range of convenient sizes, and obtainable from any good builders' merchants.

BEDSTEADS, Repairs and Renovations. These are well within the capabilities of most amateurs, provided they exercise common sense and pay due regard to the nature of the work.

FOUR-POSTER BEDSTEAD. The majority of bedsteads of this type will be found to be more or less worm-eaten, and probably damaged. If the worm is still in the wood, it can be detected by the deposit of fine wood dust on the ground beside the part affected. It can be treated by injecting petrol into the worm holes by means of a very small syringe or steeping the parts in turpentine or paraffin. The work is then cleaned and repolished, treating the worm holes with beaumontage (q.v.) or other filling.

The joints were frequently held together with a form of coach screw; this will probably no longer hold in the wood, so bore out the hole, plug it with a well-fitting wooden plug, well glued into place, and drill out a suitable size hole for the screw. If the original canvas mattress is badly torn, either replace it with new or carefully patch and stitch together all the torn places, and re-work the holes for the lacing, using a buttonhole stitch. Probably only the old framework will be retained and a box-spring mattress fixed to it. All that is needed are some extra battens at the head and foot or elsewhere to support the framework of the box-spring.

IRON BEDSTEAD. The usual failings of iron bedsteads are chipping of the enamel, rusting and tarnishing of the ornamental brass knobs and other parts, and breakage of castors. The paint work is readily dealt with by filling the chipped places with hard stopping, after cleaning the metal, and re-enamelling the whole framework. If the brass work is badly tarnished, remove the parts, then boil in strong soda water to remove the remnants of the old lacquer. Polish with very fine and old emery cloth (that known as blue black is the best), then polish thoroughly with good metal polish, wash in hot water and re-lacquer. A good effect is often obtained by bronzing the brass-work, say, to blue-grey, and enamelling the metal work in a contrasting colour.

Missing castors which have been cast on can be replaced by cutting off the old castor with a hacksaw, and drilling out the end of the tubular leg. Obtain a new castor of similar size to the others on the bedstead and mount this on a hardwood, or preferably metal, plug that can be tightly driven into the hole of the leg. An alternative is to fix a 6 in. tube to the castor, either by riveting or brazing (q.v.) and then fit the leg into the tube.

All-brass bedsteads can be dealt with along the same lines.

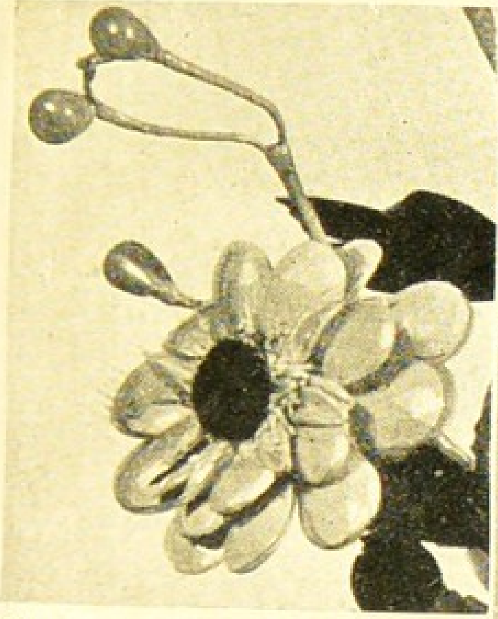
WOODEN BEDSTEAD. Wooden bedsteads sometimes give trouble by the failure of the screws holding the shoe or cast-iron fitment into which the side bars are fitted. The only remedies are to withdraw the old screws, plug the holes, glueing the plugs securely into place and fitting new screws. A drastic and effective remedy is to bolt the shoes on with coach bolts.

Sometimes it is desirable to alter the colour of a bedstead so as to harmonise better with the scheme of decoration. When the bed is an enamelled one, the treatment is obvious—re-enamel it in the desired tint. Many bedsteads are made of oak, birch, or similar material and then stained and polished. Here the old colour can to a certain extent be removed with methylated spirit or turpentine. Follow this with a careful rubbing down with fine glass paper. Re-stain the wood with a good quality water stain of the desired colour (obtainable from an oil shop) and then re-polish, or work up a gloss with a good grade of furniture polish.

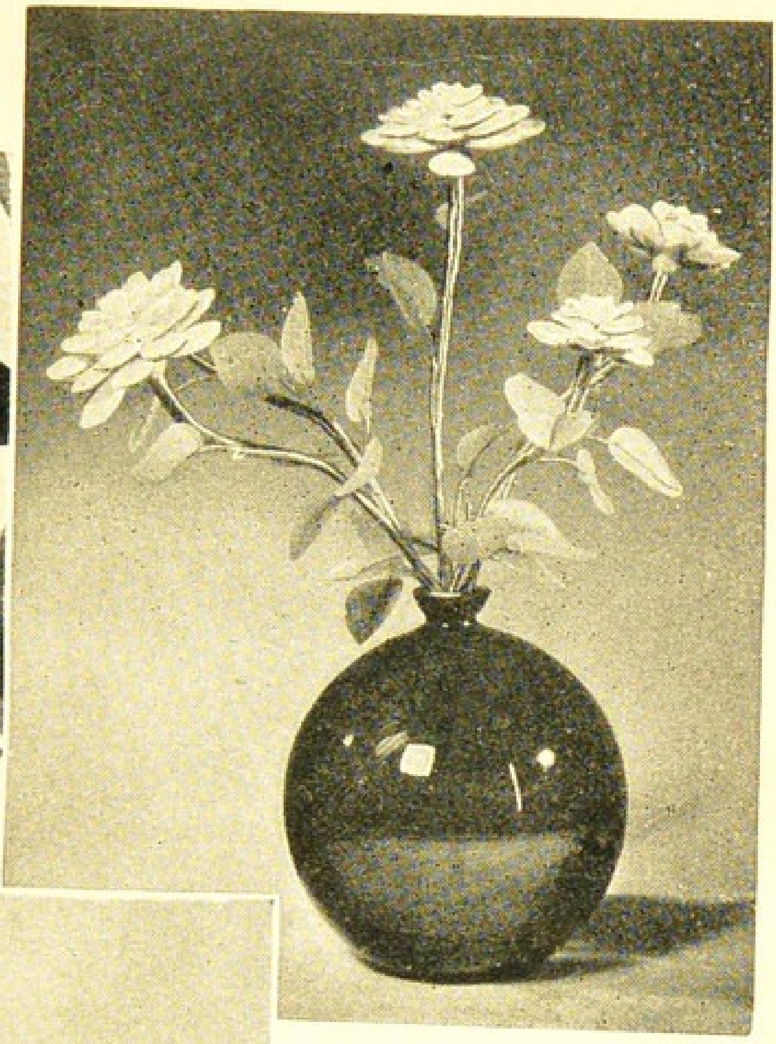
BEECH. One of the chief uses of beech wood is for chairs. Most of the bentwood variety are of beech, and so are the windsor and other non-upholstered chairs. The frames of upholstered chairs and couches are often of beech and it is used for tool handles, wood-workers' benches, dowel rods, brushes, and rollers for wringing machines. Beech is a heavy wood with straight and close grain, light in colour, sometimes with a reddish tinge.

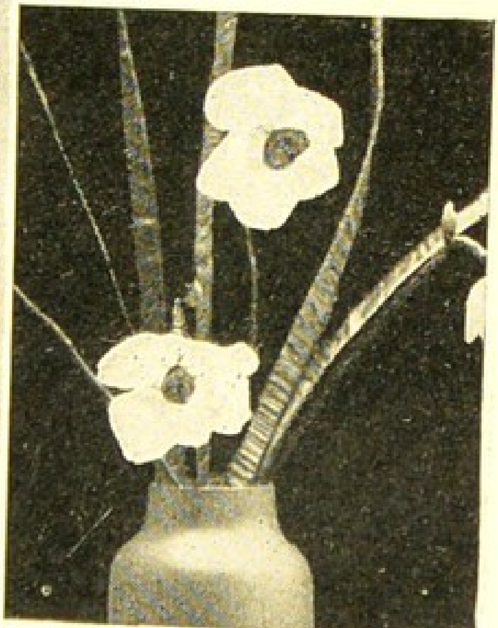
BEEFWOOD. This wood, which is used by cabinet-makers. comes mainly from the various species of the Australian tree Casuarina. It is also obtained from the bully tree grown in Guiana.

BENCH. A bench is an essential for the wood-worker. The combined bench and cupboard shown in Fig. 1 is within the capabilities of any amateur. Convenient sizes are 3 ft. long, 1 ft. 9 in. wide on top, and 2 ft. 9 in. high. The legs are 2 ft. 7 in.



Flower greatly enlarged to show details of construction. Right. Glass camellias with green leaves



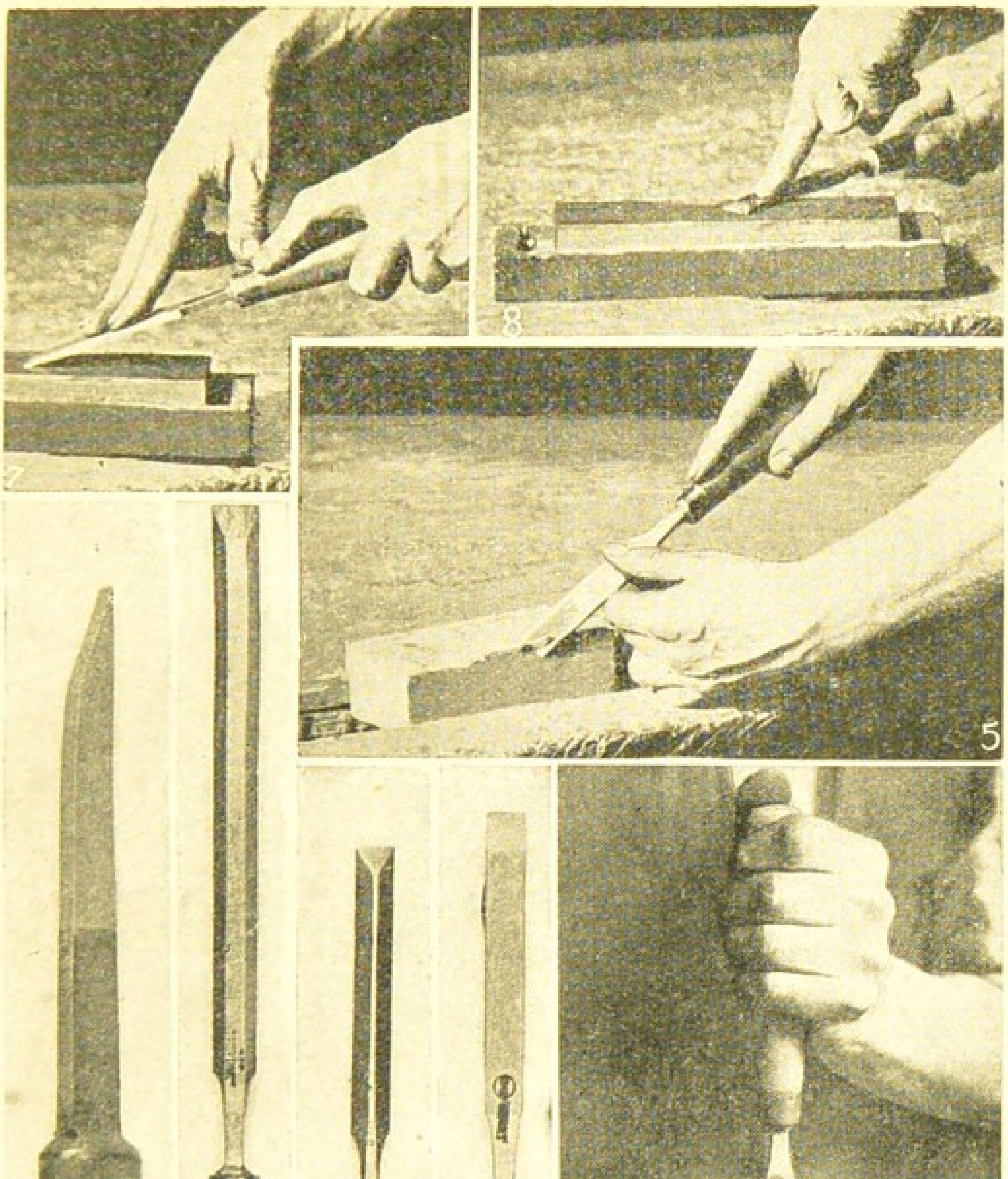


Narcissi made from shells, the leaves being of cardboard. Left. Conventional flowers, buds and leaves made in glass and stuck in sand

ARTIFICIAL FLOWERS: SOME BEAUTIFUL PRODUCTIONS

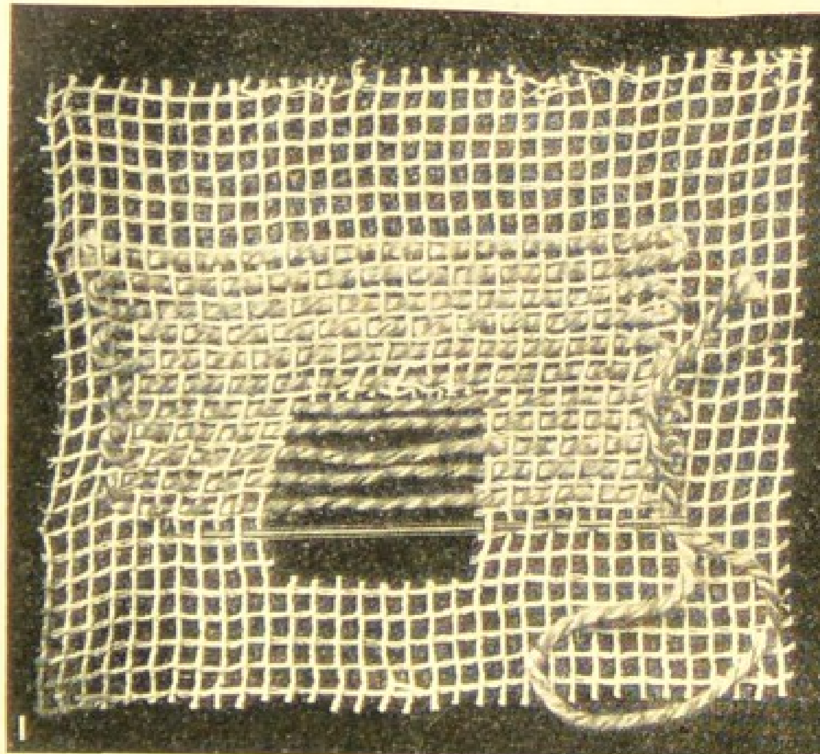
Perpetual calendar on an embroidered sampler in cross-stitch. Left. Corner of a silk scarf decorated in vivid Spanish colours

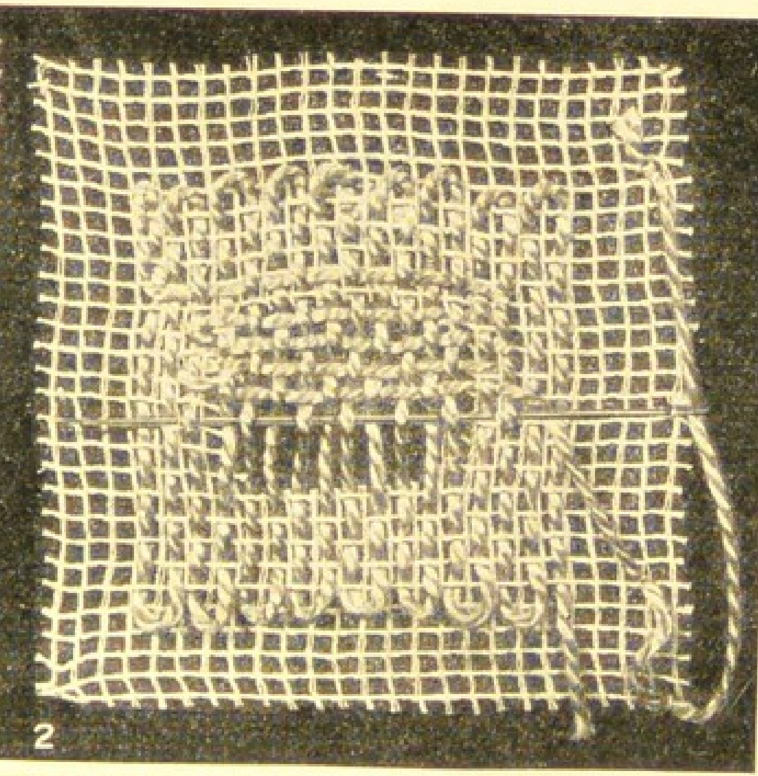
A BATIK SCARF IN RICH COLOURS AND A CALENDAR ON AN EMBROIDERED SAMPLER

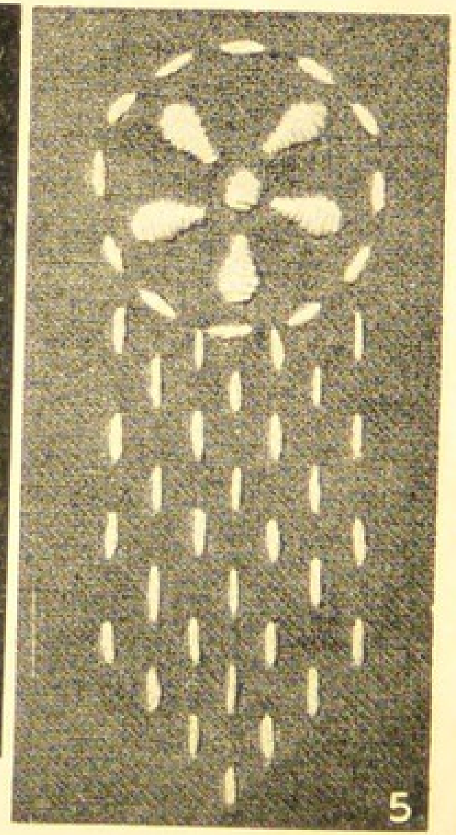


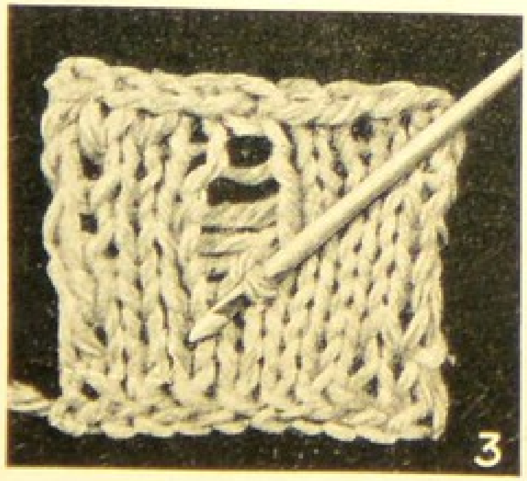
CHISEL. 1. Mortise. 2. Paring. 3. Bevelled edge firmer. 4. Ordinary firmer. 5. Horizontal chiselling. 6. Vertical work. 7. Sharpening edge. 8. Removing rough edge after sharpening

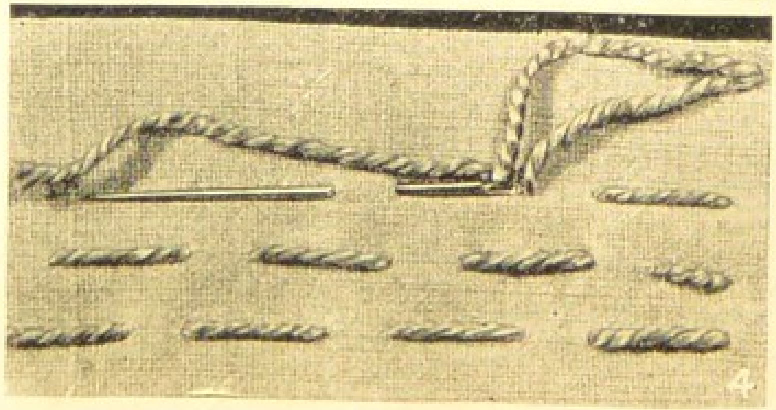
CHISELS AS EMPLOYED BY THE WOODWORKER











DARNING. Figs. 1 and 2. Method of darning a hole, illustrated on open mesh canvas to show stitches. Fig. 3. Mending a ladder with an ordinary crochet. Fig. 4. Straight darning stitch used in embroidery. Fig. 5. Pattern in which the stitch is employed

METHODS OF DARNING A HOLE, SHOWING THE STITCHES EMPLOYED

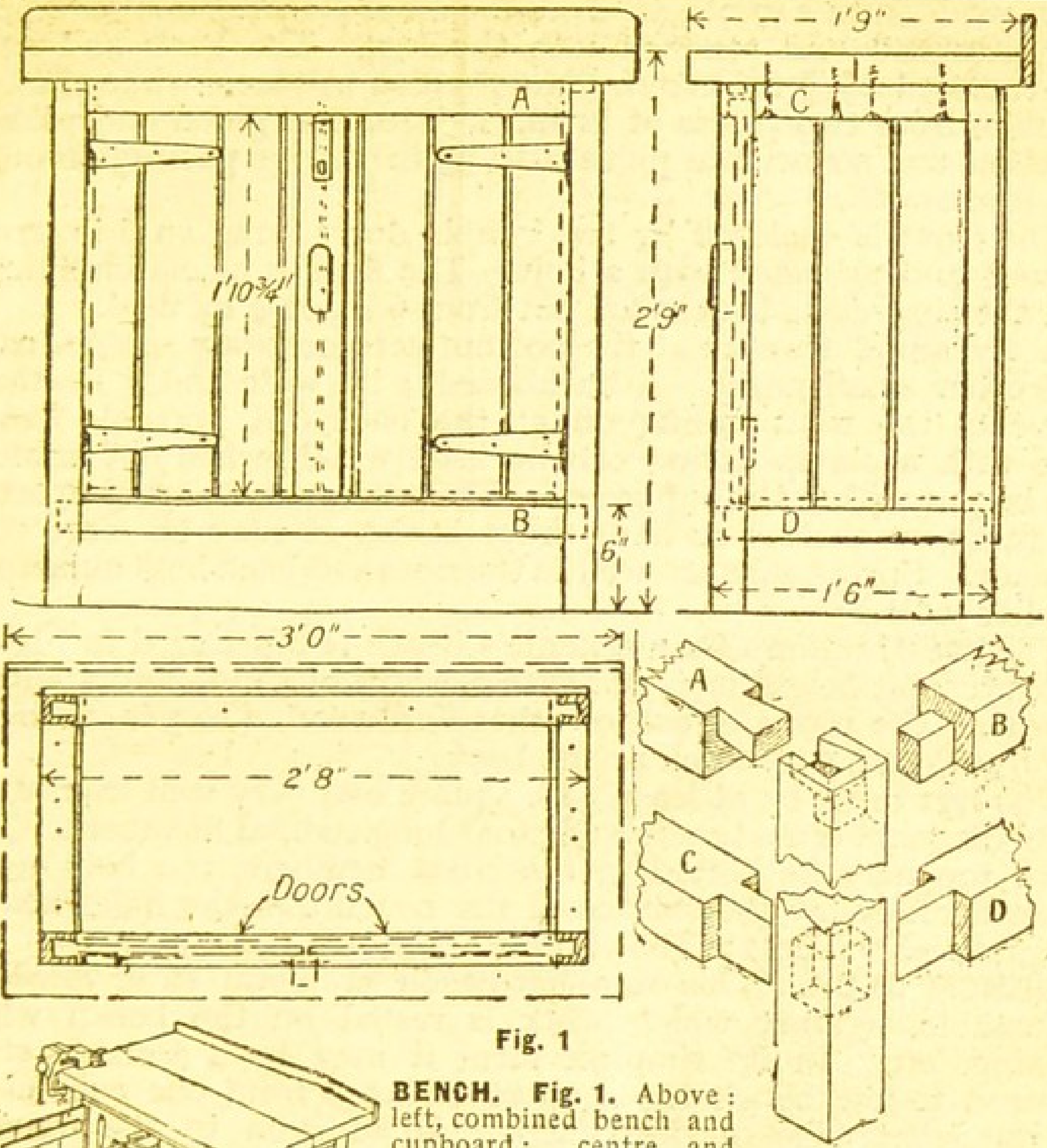
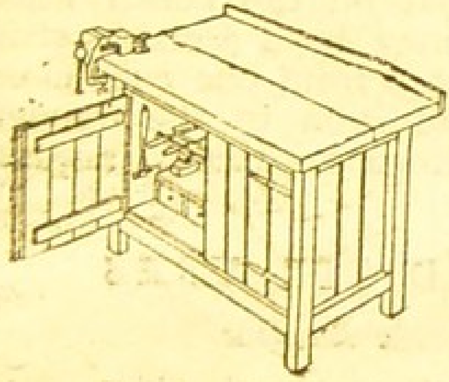
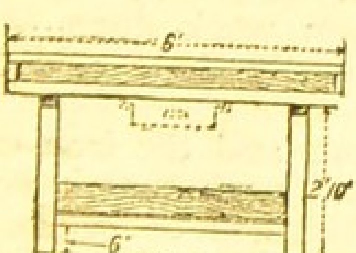


Fig. 1



BENCH. Fig. 1. Above: left, combined bench and cupboard; centre and right, front elevation and end. Below: left, plan of framing; right, joints used. **A,** top rail, dovetail; **B,** cross rail, tenon; **C,** bottom rail, and **D,** bottom cross rail, mitred tenon

BENCH. Fig. 2. Diagrams explaining the construction of a mechanic's bench



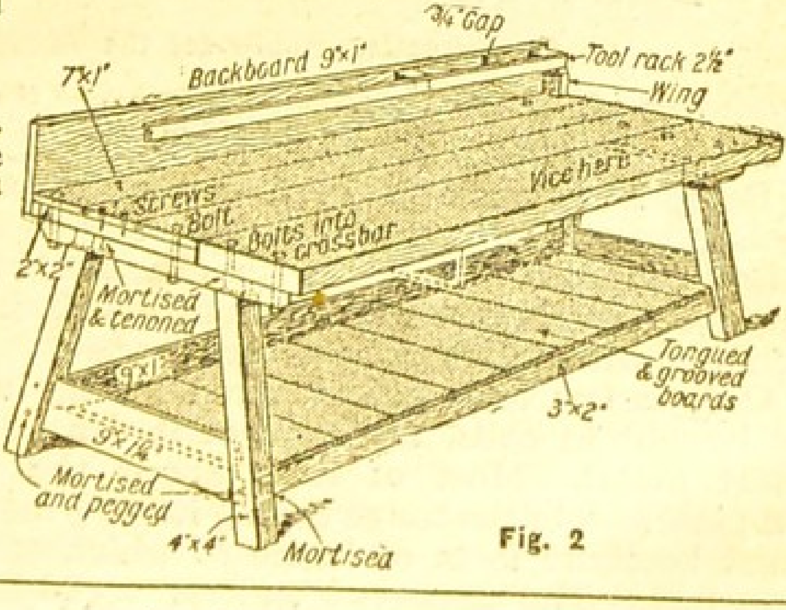


Fig. 2

long, made from 2 in. × 2 in. deal, the cross-pieces of similar scantling mortised and tenoned into the legs. The back and ends are enclosed by $\frac{3}{8}$ in. match-lining, nailed in place, while the top is made from two pieces of 11 in. × 2 in. deal glued and pinned together and screwed in place with $3\frac{1}{2}$ in. screws passing through the framework.

The front is enclosed by two simple doors hung on 6 in. cross garnets and provided with a bolt. The floor is of match-lining; and the shelves and racks are cut from 6 in. × $\frac{5}{8}$ in. deal.

A few small drawers at the bottom accommodate screws, nails and other small parts. A backboard 4 in. wide and $\frac{5}{8}$ in. thick prevents the tools falling off at the back. A portable bench vice with a clamp fitting can be used which, when not wanted, can be put within the cupboard. The various tools are supported on racks or shelves or hang from hooks, as may be most convenient. Spring clips screwed to the sides and back hold numerous smaller tools.

The construction of a mechanic's bench is illustrated in Fig. 2. A convenient height is 34 in., with a width of 30 in., and a length of 6 ft. The top is of oak or other hardwood, 2 to 3 in. thick at the front, and 1 in. thick at the back.

The legs must be at least 3 in. square and very well framed up with diagonal cross braces and stout longitudinal members. The thick top may be bolted to the cross members, the bolt heads being sunk below the surface of the bench and the holes neatly plugged. *See* Tools; Tool Chest.

BENCH STOP. This is a hardwood or metal stop, fixed or adjustable, against which work is rested on the bench when planing, etc. In its simplest form it may be a wooden strip screwed to the bench top a short distance from one end, close to the front edge of the bench. In addition to the wooden stops, there are available various metal stops, capable of adjustment as required.

BENT IRON WORK AND ITS USES

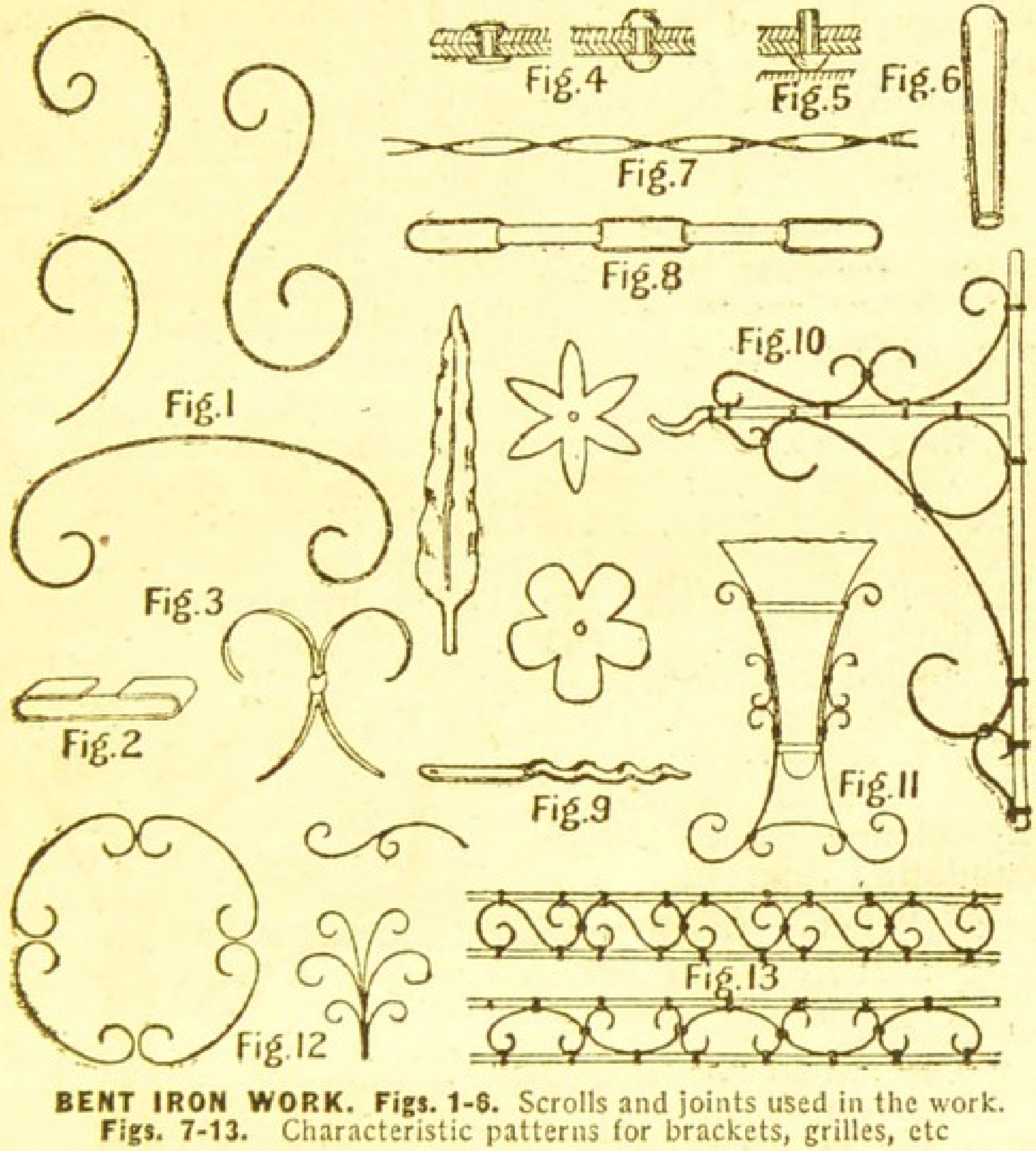
An Attractive Hobby for the Artistic Amateur

Here will be found practical instructions for the amateur who wishes to employ artistic metal work in the beautifying of his home

Bent iron work is used for numerous household articles, including grilles, screens, lamps, stands for flower bowls, and other purposes. It varies in character from work done at a forge on red-hot metal to that which is easily done cold by bending with pliers or with the fingers.

Only a few tools are required for the work and the iron can be bought in coils, or strips of it can be cut with shears from sheet metal. Most of it is about the thickness of ordinary tin plate. Widths range from $\frac{1}{8}$ in. to $\frac{3}{8}$ in. In most articles there must be some form of frame to which ornamental work can be attached. The apparent endless variety is made up of a few elementary forms repeated continually. These are shown in Fig. 1.

The strip of metal is cut with shears and then bent with pliers. Round-nose pliers are used for bending small curves, the unbent part being held with flat-nose pliers or with the fingers. Heavy, flat pliers are used afterwards in taking out



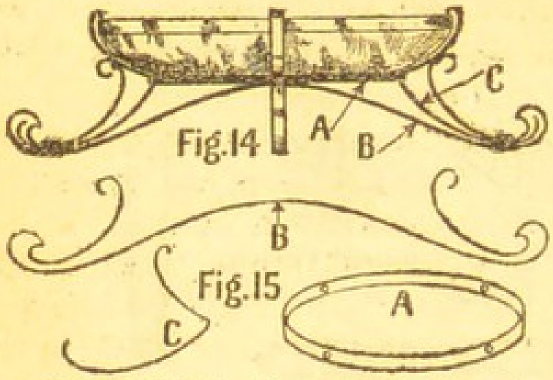
BENT IRON WORK. Figs. 1-6. Scrolls and joints used in the work. **Figs. 7-13.** Characteristic patterns for brackets, grilles, etc

kinks and improving the curve. If several have to be made alike, the curve is drawn on paper to serve as a pattern.

Parts in contact are generally held together by clips (Figs. 2 and 3). These are made from the ordinary strip and pinched tight with pliers. Sometimes joints are riveted and sometimes soldered. Riveting is only practicable when the parts can be laid on an anvil for hammering the rivets. Holes for rivets are generally punched. In thick metal drilling is the only way. In metal too thin to be countersunk the rivets used must be of the types shown in Fig. 4.

Fig. 5 shows the cup-head or snap-head type of rivet. The tool shown in Fig. 6 is used, in the same way as a punch, for imparting a neat convexity to the tail of the rivet, after the preliminary work has been done with the hammer only. A block with a similar concavity should be placed beneath the head of the rivet to keep it from flattening.

Small bolts are occasionally used instead of rivets. For soldering, the surfaces must be coated and flux applied. They can then be coated with solder and pinched together with hot tongs, or bound with pliers while the solder is running. Of all the above methods the clip is the most popular and the quickest.



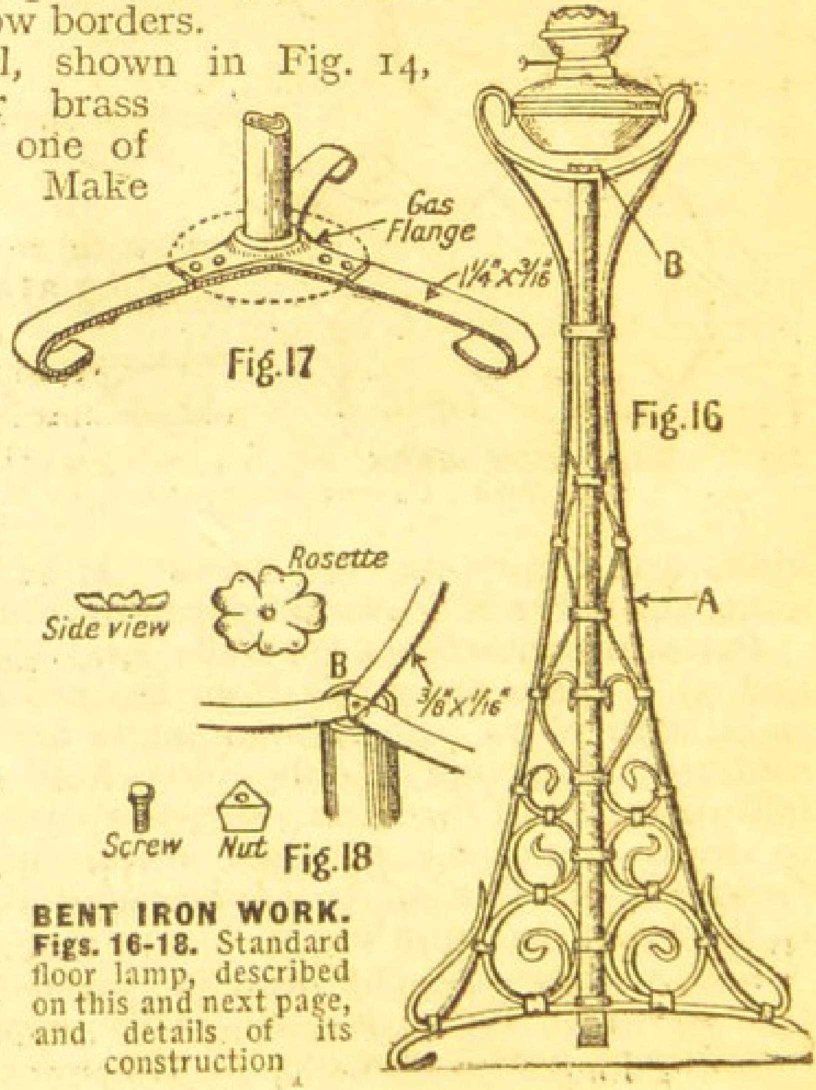
BENT IRON. Figs. 14-15. Stand for a copper or china bowl

Fig. 7 shows how strip can be twisted. The ends are held with pliers or one end is held in a vice and the other twisted with pliers. Fig. 8 shows chain made from strip iron. Fig. 9 shows examples of sheet-metal ornaments. These are often of copper and, strictly, they are classed as repoussé rather than bent-iron work.

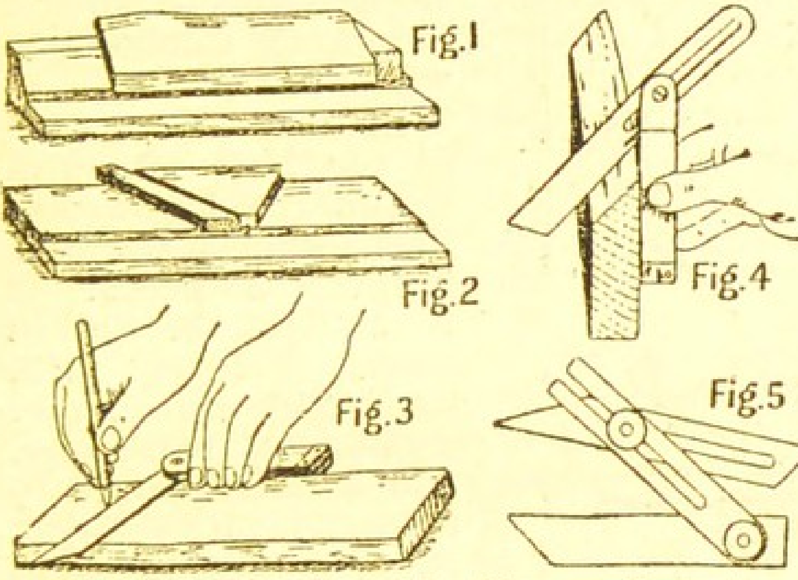
Fig. 10 shows a wall bracket, the frame of which consists of stout iron rod. Fig. 11, made entirely of bent iron, is a stand made to suit a glass or china vase. Fig. 12 shows how the large areas of grilles and screens are filled in by a repetition of some simple pattern. Fig. 13 shows the same method applied to narrow borders.

For the flower bowl, shown in Fig. 14, a polished copper or brass bowl can be used, or one of brightly-coloured china. Make the foundation ring, A (of a size to suit the bowl), from stout iron, to which is attached the ornamental iron-work. The stand is made in two units, as shown in Fig. 15, each composed of three parts; these, when made up, are riveted to the foundation ring and form the four legs.

MAKING A STANDARD LAMP. A design for a floor lamp is shown in Fig. 16. First choose the lamp and make the top ring to suit it from $\frac{3}{8}$ by $\frac{1}{32}$ in. metal. Then cut



BENT IRON WORK. Figs. 16-18. Standard floor lamp, described on this and next page, and details of its construction a piece of gas barrel $\frac{3}{4}$ in. outside diameter, and at the lower end fit a gas flange, screwing it on to the tube. The flange has to be cut away to form three arms (Fig. 17) and to these the bottom legs of $1\frac{1}{4}$ by $\frac{3}{16}$ in. iron are riveted or brazed. The long and continuous outer members, A, of $\frac{3}{8}$ by $\frac{3}{16}$ in. iron, and then the pieces B (Figs. 16 and 18) are bent and riveted in position. The inner ends of the latter are turned down into the bore of the upright pipe and secured by driving in a $\frac{3}{16}$ in. Whitworth nut filed to fit as in Fig. 18. This part is completed with a rosette and ball head screw. The remainder of the decorative work is carried out in ordinary $\frac{1}{4}$ in. strip iron, shaped and clipped in place as shown in Fig. 16. The design could be readily adapted to take an electric lamp.



BEVELLING. Figs. 1-5. Diagrams illustrating the making of bevelled edges

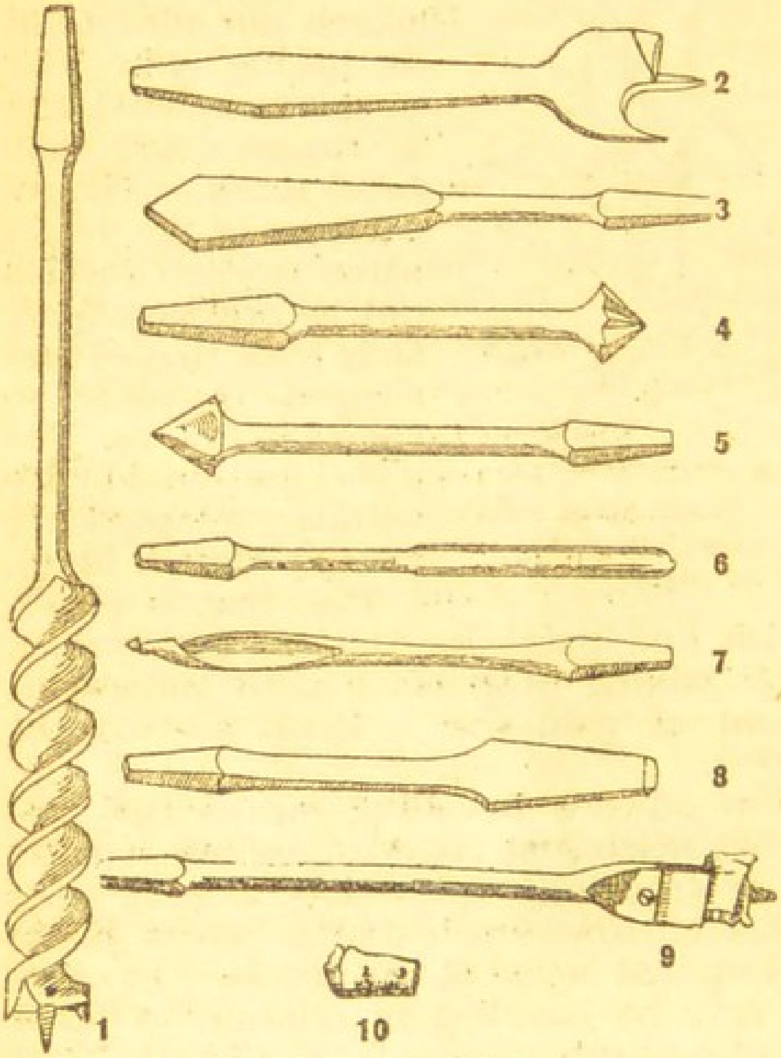
Bent iron is generally given a dull black finish, and paint for this can be obtained ready for use, or made by mixing drop black with turpentine and adding a small amount of gold size. Brass and copper ornaments may be lacquered.

BEVELLING. Used in woodwork bevelling means the production of surfaces which are neither at right angles nor parallel with each other. A box or tray with splayed or sloping sides and ends, or the body of a barrow, are instances where joints are bevelled to obtain the required shape of the article. In other cases an exterior surface may be bevelled in relation to other surfaces, e.g. the top edge of a plinth.

In furniture, edges are frequently chamfered, which means planing off the angles so that a narrow flat at the angle of 45° is formed. Parts meeting with a joint at 45°, such as the corners of picture-frames, are said to be mitred. A sloping joint uniting pieces in the same plane is a scarfed or spliced joint. All come under the heading of bevelling.

As a general rule lines are marked on the work to show the exact extent of the required bevel, and the cutting tools work to these lines. In other cases appliances are used for guiding the tools. In sawing small pieces at an angle of 45° a mitre box or a mitre block may be used to guide the saw. For planing the angles two types of shooting boards are used. These may be for 45° only, or adjustable to any angle. One kind is used for planing long edges (Fig. 1) the other for short ends (Fig. 2). In both the plane is used lying on its side. It is slid backwards and forwards with the right hand, while the work is held in position with the left.

A woodworker's bevel is used for marking lines (Fig. 3) and testing (Fig. 4). The bevel is adjustable to any angle, and is tightened by a screwdriver or by a wing-nut. Definite angles are obtained from a protractor, or by drawing a full-size view of that portion of the work on paper. Fig. 5 shows a type of bevel used chiefly by metal-workers. Besides this there are bevels in combination with protractors.



BIT. Figs. 1-8. Bits of patterns in common use. **Figs. 9 and 10.** Expansion bit and extra routing cutter for obtaining large diameters

BIRCH. The wood of the birch is one of the cheaper hardwoods, used for much the same purposes as beech. It is a light brown in colour, close-grained, sometimes with a figure similar to mahogany, and is often stained to resemble that wood. Birch is easy to work, and has a smooth surface with a rather lustrous appearance. It is used for bedroom furniture and frames of chairs and couches, turned articles, brush heads, casks and tubs, handrails, and dowel rod. Plywood is often made of layers of birch, and in this form it is used for chair seats, vehicle bodies, as well as for panels for various purposes.

BITS, DRILLING. Small steel cutting tools or bits are used for boring wood or metal; they are rotated by means of the brace or stock, into which their square-tapered ends are fitted. Of many patterns, designed to suit all kinds of boring work, the most useful are the following:

Auger bits, Fig. 1, for deep boring, are made with a long shank, a twist, and a head. The latter has two spurs which define the size of the hole, two cutters which remove the wood and place it so that the twist draws it up, and a screw which draws the bit into the wood. Sizes range from $\frac{3}{16}$ to $1\frac{1}{4}$ in. Centre bits, Fig. 2, for shallow boring are made with a central prong, a spur, and a cutter, which acts as a lifter or lip to carry off the shaving. They are made from $\frac{1}{4}$ in. to $1\frac{1}{2}$ in. in diameter.

Countersink bits are employed for boring conical depressions to allow screw heads to be turned in flush. There are three kinds in ordinary use. The flat bit, Fig. 3, having two inclined edges ground to opposite angles, is mainly used for iron and for enlarging the holes in hinges, etc. The rosehead bit, Fig. 4, is for brass, but is useful for hardwood; it has a conical head with edges which may be sharpened on a stone. The snail-head, Fig. 5, for soft woods, is conical, with one side cutter.

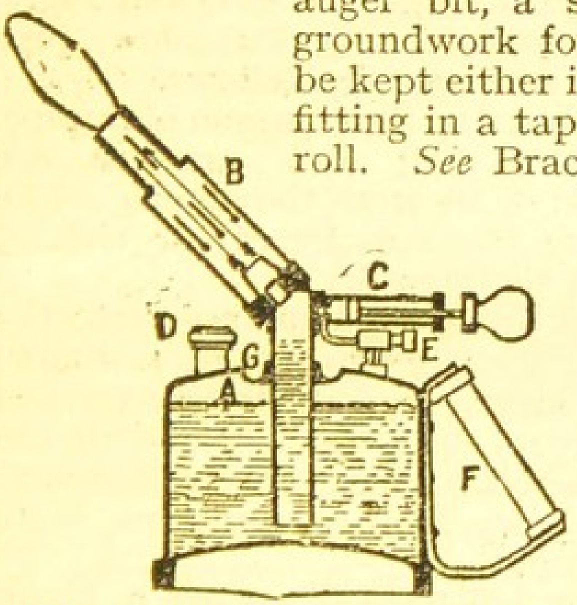
Nose bits, Fig. 6, are for end grain; they are hollow in the shank, with a centring projection at the point, and range from $\frac{1}{4}$ in. to $\frac{1}{2}$ in. in diameter. Shell bits are similar in shape, but have a plain rounded end. They are handy for cross-grain boring where deep holes are required. Spoon bits, also similar in form, have a pointed end.

Twist or gimlet bits, Fig. 7, are for hardwoods; they have a gimlet point and are cut on the curved sides of the shank. They are difficult to sharpen. Sizes range from $\frac{1}{32}$ to $\frac{3}{8}$ in.

Turnscrew or screwdriver bits, Fig. 8, are used in those cases where a large number of screws have to be driven.

Expansive or expanding bits are intended for boring shallow holes up to about 3 in. in diameter. They have a fixed screw-head and an adjustable spur and cutter. In Figs. 9 and 10 are shown Clarke's patent expansion bit and the extra routing cutter for obtaining large diameters.

A type of bit having practically no centre point is Forstner's auger bit, a splendid tool for boring away the groundwork for carved panels, etc. Bits should be kept either in a wooden stand, with the shanks fitting in a tapered hole, or in a canvas or baize roll. *See* Brace; Drilling; Soldering.



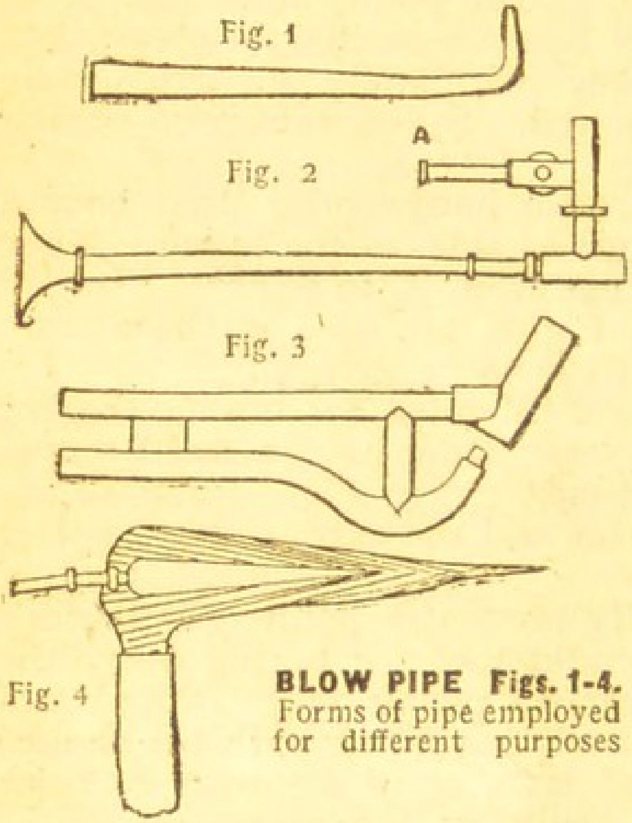
BLOW LAMP. Diagram showing how the appliance acts.

BLACK JAPAN. A compound of asphalt, boiled oil, and turpentine is used as a varnish for metals under the name of black Japan. Brunswick black is a similar article.

BLOW LAMP. The blow lamp is used mainly to cut and make up metal connexions and to blister old paint so that it may be removed. The instrument has a steel or brass reservoir, A, capable of holding from a quarter of a pint, in the small sizes, to two pints in larger ones, of petrol, paraffin, or kerosene. The spirit is forced through a nozzle in a very fine annular jet into a special Bunsen type burner, B, either by means of compressed air or by warming the body of the lamp. As the spirit passes through the burner it is more or less completely vaporised by heat from the walls of the burner, which become very hot, and at the same time draws air in with it, producing strong flame. The diagram shows a form for burning paraffin oil, in which an air pump, C, is used. There is a groove, G, running round the base of the burner, in which a little methylated spirit is placed and lighted when starting the lamp, to give a preliminary heating. D is the filling cap, E a relief valve to reduce pressure when needed, and F, the handle.

A few strokes of the pump forces out the jet of oil, and, once started, the heat of the flame soon keeps the lamp going.

BLOW PIPE. Blow pipes are divisible into two classes: those blown by the mouth, and those operated by mechanical means. The object in all cases is the same, namely, to supply an extra amount of oxygen, either as oxygen or as air, to a jet flame, to increase the intensity of its heat.



BLOW PIPE Figs. 1-4. Forms of pipe employed for different purposes

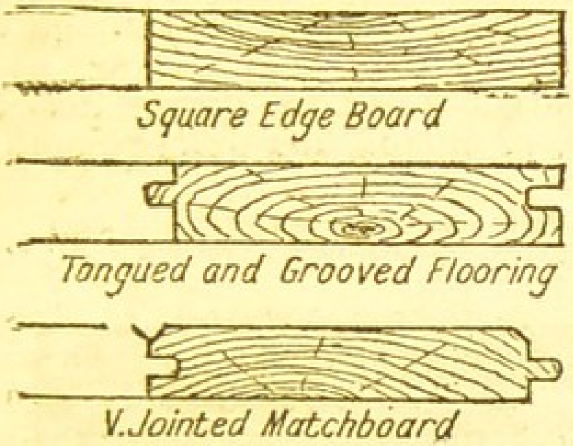
The simplest form is shown in Fig. 1, and consists of a piece of metal tube bent and tapering to a point; air is blown through this from the wide end by the mouth. Fig. 2 shows a mouth blow pipe with a connexion at A to a source of gas, and Fig. 3 shows an injector blow pipe to be blown by bellows.

In using the common blow pipe, some skill and practice are needed to maintain a steady stream of air from the mouth. The blast is to be kept up by utilising the muscles of the cheeks, breathing being carried on through the nostrils.

The introduction of the jet of air from the blow pipe into the body of the flame, as shown in Fig. 4, gives rise to a double combustion. The outside of the large, shaded, hollow cone is burning with the aid of the external air; the inside with the aid of the forced jet of air from the blow pipe. In consequence, the shaded cone part acquires a very high temperature, more than sufficient to soften a bar of iron.

BOARD. A board as generally understood means a plank or piece of wood relatively long in proportion to its breadth and thickness. In the timber trade a board is reckoned as 1 in. thick and most hardwoods, whitewood, walnuts, etc., are sold by board measure at per foot super. If the material measured 2 in. thick, then the price at 6d. per foot super would be 1s., because there are two layers, as it were, each worth 6d. The term prepared boards means that the edges and one flat surface have been machined or planed smooth. A rough board is one that has been left by the saw. Shelving boards are cut 9 in., 10 in., or 11 in. wide, and $\frac{3}{4}$ in., 1 in. or $1\frac{1}{4}$ in. thick. They are planed on face and two edges, and sold by the lineal foot or per foot run.

Matchboard is made in several thicknesses and widths; it is planed on one side, and machined on each edge. Weather-boarding is made in two general forms—the ordinary tapered or feather-edge board, and the rebated, which presents a flat surface on the interior and the familiar appearance on the exterior. A matched weatherboard is also made; this is tongued and grooved and machined, as shown in the diagram. Matchboard and weatherboard are sold by the square, that is, 100 nominal square feet.



BOARD. Sections of standard prepared board used in building

For the average indoor use ordinary square-edged planed boards can be purchased from stock at most timber yards in 3 in., 4 in., 5 in., 6 in., 7 in. or 9 in. widths and $\frac{1}{2}$ in., $\frac{3}{4}$ in., 1 in., and $1\frac{1}{4}$ in. thick. Flooring is usually stocked in $\frac{3}{4}$ in., 1 in. and $1\frac{1}{4}$ in. thicknesses, 1 in. being that most generally in request.

Matchboard is made in $\frac{1}{2}$ in., $\frac{5}{8}$ in., $\frac{3}{4}$ in., and 1 in. thicknesses, and $4\frac{1}{4}$ in., 5 in. and 6 in. widths. The quoted thicknesses of boards are always nominal, being derived from the deal or plank from which the material is cut. Thus a $\frac{1}{2}$ in. board will only measure a full $\frac{3}{8}$ in. actual thickness, and a board nominally 6 in. wide will only hold up to an actual $5\frac{7}{8}$ or possibly $5\frac{3}{4}$ in. if planed on both edges.

When using boards for shelving it is important to see that the thickness is adequate for the space to be spanned by the board. In general a 9 in. by $\frac{3}{4}$ in. board will span only 2 ft. without sagging under normal loading.

BOG OAK. This is the name given to oak found buried in peat bogs which centuries of immersion have turned to a deep black colour. It has applications in cabinet-making.

BOLT. For doors, cupboards, and similar purposes, bolts are made in hundreds of different sizes and styles.

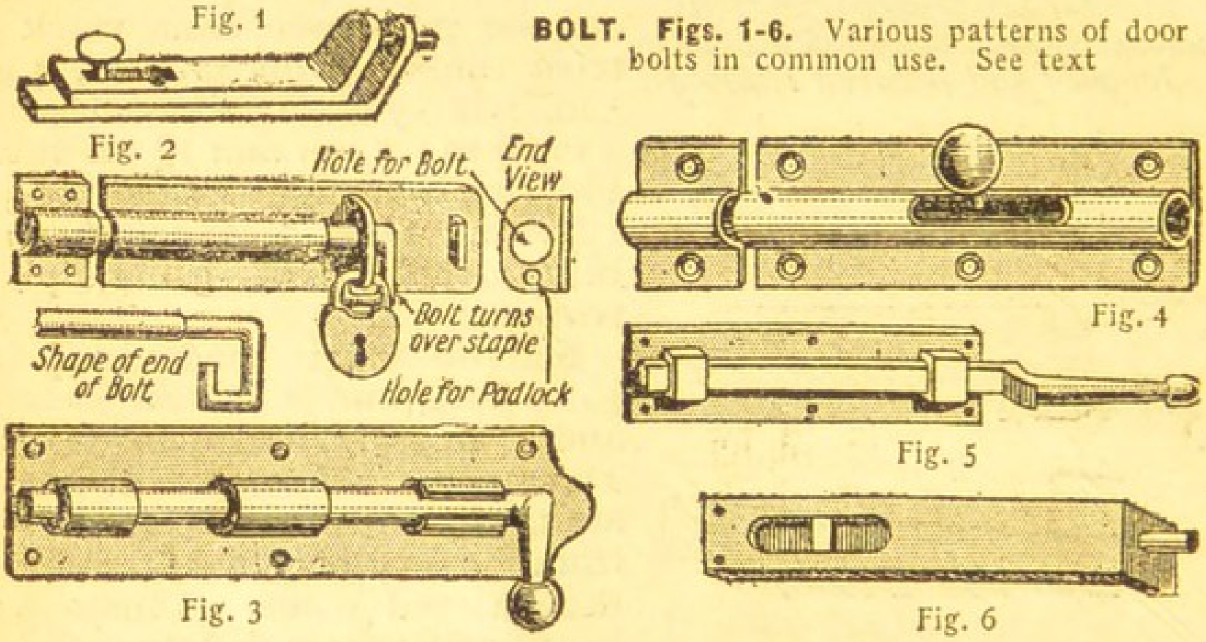
A few of the more useful types of bolts are illustrated, on the next page, their principal uses being as follows: Common japanned tower bolts (Fig. 3) are made in several sizes, from 4 in. to

12 in. long, and are used for outhouse doors and general purposes. They frequently shoot into a plain hole drilled in the doorpost.

Brass barrel bolts (Fig. 4) are made in sizes from 2 in. to 24 in. long for internal work, and are screwed flat on the door. Flush bolts (Fig. 6) are generally made in brass, with a sunk slide, in many sizes and widths, from 3 in. long by $\frac{1}{2}$ in. wide to 24 in. long by $1\frac{1}{4}$ in. wide. They are fixed to the edge of a door, and embedded by cutting a recess, and are frequently used on the one side of a double door.

Blind bolts (Fig. 1) are made straight or necked, and extensively used on cabinet work, for doors of small cupboards, etc. They screw flat on to the door, and may shoot into a hole, through a brass plate, or into a socket.

Monkey-tail bolts (Fig. 5) are largely used for garage doors. They are mostly about $\frac{3}{4}$ in. square, 12 in. and upwards in length.



BOLT. Figs. 1-6. Various patterns of door bolts in common use. See text

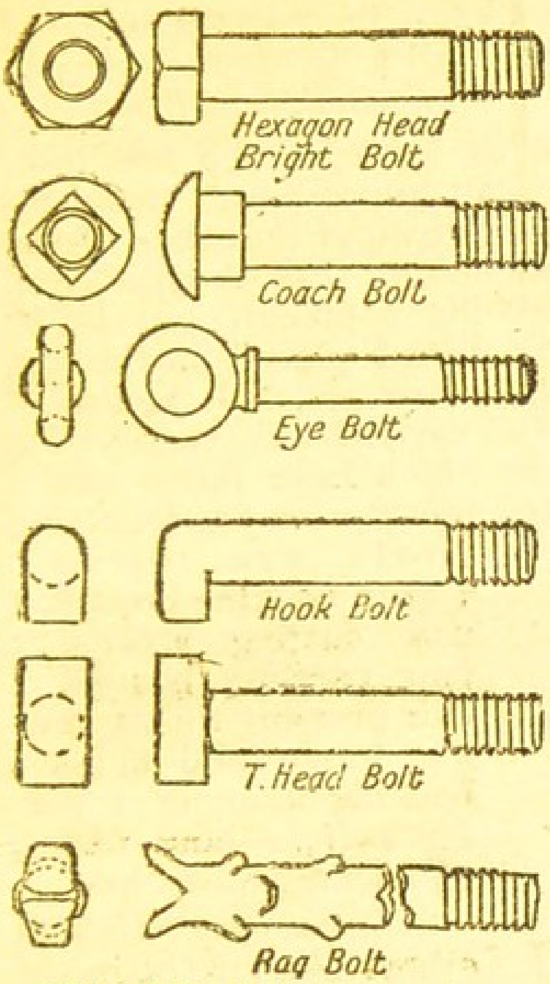
Padlock bolts (Fig. 2) are sometimes used on the outside of storehouse or shed doors, the bolt being locked to a staple with a padlock. They are usually galvanised.

Numerous patent bolts are made. Some act as a spring catch until a knob is turned, when the bolt is securely locked. Finally, there is the old-fashioned bar bolt, consisting of a stout bar of iron or wood inserted into two staples and secured with a padlock.

Bolts fitted with stamped metal sockets sometimes work stiffly, when they can be corrected by holding a hammer beneath the barrel and striking a few sharp blows with a light hammer on the upper part of the barrel or socket. This stretches the metal somewhat and makes more room for the bolt. The bolt should be shot into the socket while doing this, as it then presses on the tight spot; the jarring due to the hammer blows is transmitted to these tight spots, and they are thus stretched.

The ordinary black ironmonger's bolt with hexagonal head is used in all houses. The hole for it to pass through must be slightly larger in diameter than the nominal diameter of the bolt, as it is not machined to exact size.

Bolts in Engineering Work. British standard fine-threaded bolts, known as B.S.F. bright bolts, are extensively employed on automobile and aircraft work.



BOLT AND NUT. Various types commonly used in engineering

Engineers' bright bolts are machined all over, and hold up very closely to size. Made from superior grades of mild steel, they should always be used where strength is a consideration.

Coach bolts, which are much used for bungalow work and poultry houses, have a rounded head and square portion on the shank immediately beneath the head to prevent the bolt turning round.

Eye bolts are so named because the head is formed as an eye or ring. Generally screwed Whitworth and made in the black and bright qualities, they are used for attaching a hook or fastening a line.

Hook bolts are serviceable when circumstances prohibit an ordinary bolt, as when temporarily bolting a plate to a girder.

T-head bolts are extensively employed on machine tools for bolting castings or other work to a faceplate or saddle.

Rag bolts are adapted to secure machinery to a concrete foundation, being inserted before running in the concrete.

Small bolts which are used for clockwork and model making are made in sizes from $\frac{1}{16}$ in. to $\frac{1}{4}$ in. diameter, and are variously threaded. Model threads are 40 t.p.i. (threads per inch). Whitworth model sizes are 40 and 60 t.p.i. B.A. threads are used on small-size bolts especially for scientific instruments and other fine work.

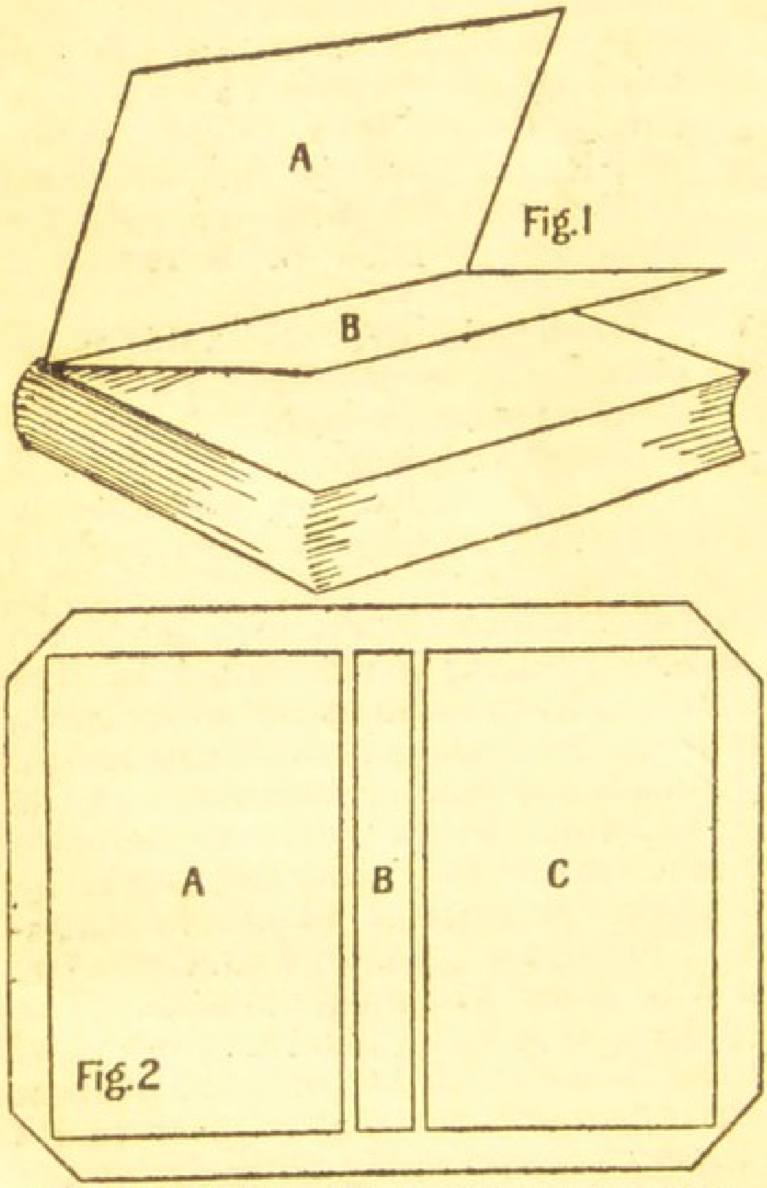
For all-round household work the regular black, hexagon-head bolts, or the coach bolts, $\frac{1}{4}$ in., $\frac{5}{16}$ in., $\frac{3}{8}$ in., or $\frac{1}{2}$ in. diameter, and of appropriate length, will be found the most suitable. The length of a bolt is measured from under the head to the end of the shank. The diameter is the diameter of the threaded portion or shank. An ordinary bolt is screwed for only a part of its length, the usual length of thread being roughly three times the diameter. When a bolt is wanted with a thread all the way from the head to the end, it is known as a screw and should be purchased as such.

BOOKBINDING AS A HOBBY

How to Keep One's Library in Good Repair

Below the bibliophile who is also a handicraftsman will find guidance in preserving his cherished volumes

Simple bookbinding may be done at home with a few tools and appliances, and the handy man can improvise or make for himself many of those required. The principal branches of the work are sewing, forwarding, and finishing. For these a lying press is indispensable, its accessories being a plough, pin, knife, and stand. The stand, with a large board placed on the top, serves as a bench when the press is not in use. By means of these simple binding operations can be carried out, these often taking the form of re-binding books which have fallen into a state of disrepair. In addition to the lying press the following tools are required: 1 pair backing boards, 1 pair cutting boards, 1 pair pressing boards, 1 pair pressing tins, 1 sewing frame and keys, 1 backing hammer, 1 paring knife, 1 bone folder, 1 knocking down iron.



BOOKBINDING. Fig. 1. New end papers. **A** and **B**, tipped on to the first section. **Fig. 2.** Making a new case: **A** and **C**, boards; **B**, strip of manilla paper

To these may be added others likely to be in the amateur's tool box, i.e. a small tenon saw, a square, and a glue pot. A paste pot will be needed also. A bookbinder uses a "tub" for this purpose (Fig. 8), a rectangular wooden box having fixed across it at one end a wooden strip on which to rub out surplus paste from the brush. Special glue and paste brushes can be obtained, together with other requirements, from the firms which specialise in these goods.

The laying press (Fig. 8) is indispensable. The tool called a plough, which is used in conjunction with the laying press, is also necessary if the pages are to be cut by the amateur bookbinder. Since, however, the cutting of book edges presents some difficulty to the amateur, and is done by machinery in a fraction of the time taken by the old-fashioned method, it is suggested that the local bookbinder's aid be sought.

We will commence with a cloth bound book which has come out of its cover, and is otherwise in fairly good order. Dealing first with the cover, remove any loose portions of the end papers and any hard glue adhering to the back. If the corners have been "telescoped" they can be carefully hammered out flat. The back of the case may be repaired with pieces of binding cloth of the same sort and colour as the original.

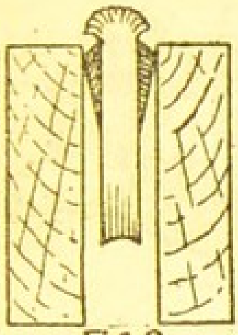
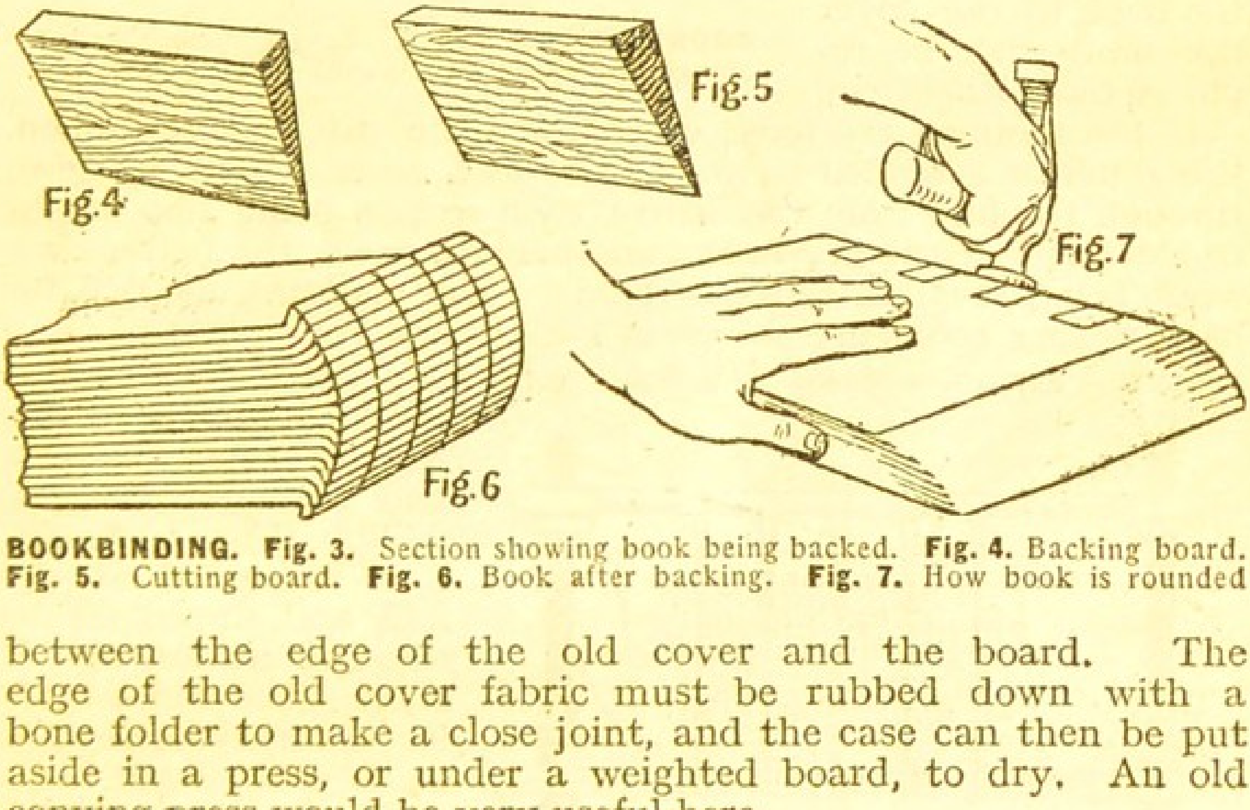


Fig.3

A new back may be made from a strip of cloth. It must be cut wide enough to allow an overlap on each side, which is glued and pressed between the edge of the old cover and the board. The edge of the old cover fabric must be rubbed down with a bone folder to make a close joint, and the case can then be put aside in a press, or under a weighted board, to dry. An old copying press would be very useful here.

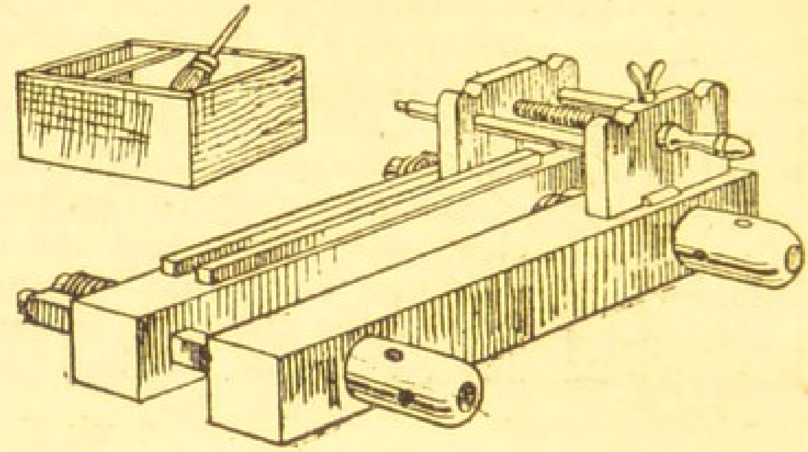


BOOKBINDING. Fig. 3. Section showing book being backed. **Fig. 4.** Backing board. **Fig. 5.** Cutting board. **Fig. 6.** Book after backing. **Fig. 7.** How book is rounded

A new case is easily made, the old one serving as a gauge for size. If the old boards are usable, the measurements of the case should be observed before stripping, and a piece of binder's cloth cut to the size, allowing an overlap all round for turning in. If new boards are necessary, strawboard of the appropriate thickness should be obtained and carefully cut to size with a sharp knife and a metal straight-edge. A piece of stiff paper is glued to the back, leaving a space between the boards and paper strip. Fig. 2 will make this clear.

The cloth is glued out and left for a minute, when the left-hand board, A, is placed on it, leaving the correct margin for turn-in.

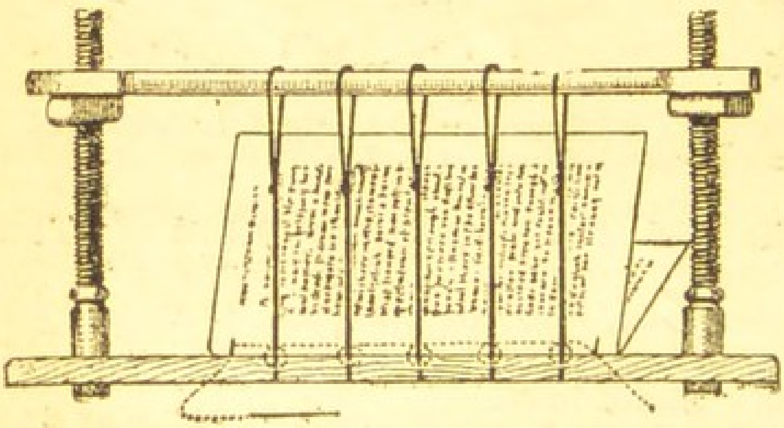
The manilla strip, B, is then placed on the cloth, and finally the right-hand board, C. The positions might be marked on the cloth by pencil lines before glueing. Turn in the edges, rubbing the cloth down with the folder. It will be noted that the point of the board comes a little within the diagonal edge of the cloth, just leaving a little cloth to form a fold when the edges are turned over the board. The cover is then turned right side up and the whole surface rubbed down well with the folder. If the glue is hot and in proper condition there will be a smooth surface and no bubbles. The book itself must now be dealt with. New end papers will be needed, and holding the back to the cover the mull may be replaced by another strip.



BOOKBINDING. Fig. 8. Laying press, showing plough for cutting book edges; (above) paste tub

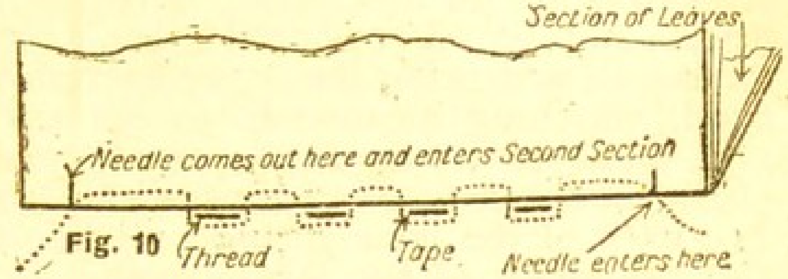
If the sections are loose or some of the stitches are broken, this must be attended to first. The sections of a book are sewn through the fold from the centre, each section being also caught to the next. Ordinary books are machine sewn, the better-class work being sewn to tapes or cords. The methods adopted for hand-sewing books are shown in Figs. 9 and 10.

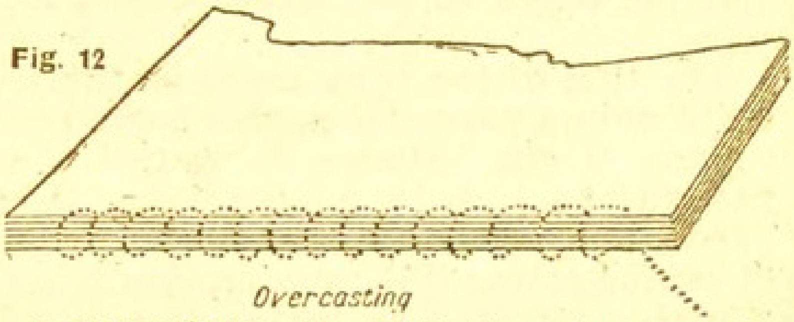
END PAPERS. Make new end papers by cutting a sheet of stout white paper twice the size of the book page and folding it in the middle (Fig. 1, A, B). This is pasted at the fold and tipped on to the first section of the book. The end papers for the final section are made and fixed in a similar way. Any torn leaves in the book may be mended with paper resembling that of the original. The old end leaves will furnish paper for patching or mending, and gummed transparent mending paper may be utilised. Loose plates should be tipped with paste and carefully replaced.



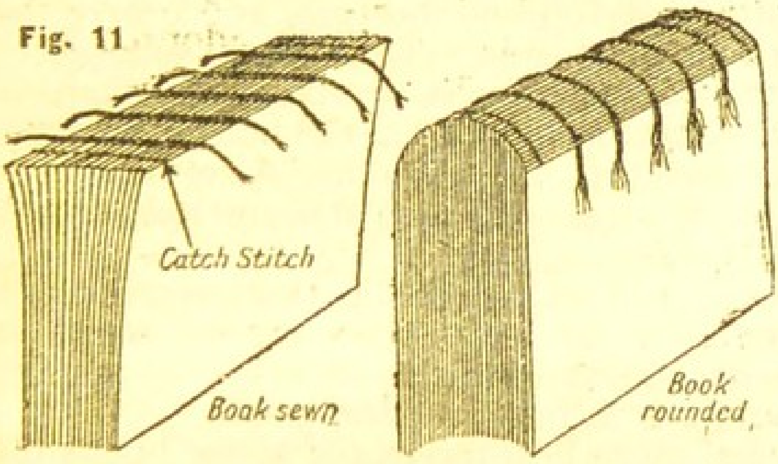
BOOKBINDING. Fig 9. Sewing press, showing the method of sewing on cords. Path of needle indicated by dotted line

After any loose sections have been dealt with, and new end papers attached, the back should be glued up. Place the book in the press between boards, and work thin glue well into the back. When the glue is dry, but not hard, the book may be rounded. Fig. 7 shows how this is done. Place the book flat on the bench, front edge towards you. With the four fingers of the left hand stretched across the side and the thumb pressed into the front edge, pull the thumb and fingers towards each other, at the same time hammering the back of the book towards you. Turn the book over, and repeat the hammering. This will force the sections forward on each side, and the book will now be perfectly flat with a round back, instead of being wedge-shaped with a flat back as when first sewn (Fig. 11). The threads used for sewing do not now fall exactly over one another, and the increased thickness or sewing swell is thus reduced (Fig. 10). (These illustrations show a book which has been sewn on cords. In good class work the ends of the cords are laced through holes in the boards of the cover. The cloth or leather cover is then made on the book itself.)





BOOKBINDING. Fig. 10. Sewing on tapes; path of needle shown by dotted line. **Fig. 11.** Book sewn on cords, showing catch stitch between sections. Left, after sewing; right, back rounded. **Fig. 12.** Method of overcasting single leaves



Place the book between backing boards in the laying press back outwards. The top of the backing boards should be about the same distance away from the back edge of the book as the thickness of the cover boards (Fig. 3). Screw up tightly and hammer outwards from the centre to form a groove into which the cover boards will fit. Care must be taken to keep the round true, as near as possible the third of a circle (Fig. 6).

If the back of the book was in fairly good order it will not have been necessary to re-sew sections or to round and back the book. Glue up the back and line it with stout paper, rubbing down the lining after a while with a folder. When dry, glue up again and place on the back a strip of mull about 1½ in. wider than the back, leaving unglued the overlapping portion, which is pasted down to the covers when casing in the book.

INSERTION IN COVER. To insert the book into its cover, the front end paper, together with the overlapping portion of the strip of mull, should be evenly coated with thick paste and the book laid carefully on to the cover, seeing that the " squares " (margins) are equal on head, tail and fore-edge. Next paste the other (back) end leaf, which will now be uppermost, and leave it for a minute. Then hold the book with the right hand between its leaves, and bring the cover over on to the book with the left hand, watching meanwhile to see that the margins are even and equal to those of the front cover. The book must be placed between pressing boards and left overnight in the press. The back of the book should protrude from between the boards and the edges of the latter should be close up to the backing ridge.

The title of the book could be printed, typewritten, or neatly written on a paper label, this being pasted on to the back of the cover. If gilt lettering is wanted the local bookbinder would title the book for a small charge. Fig. 12 shows a method of over-sewing single leaves to form a section. In the illustration of sewing frame (Fig. 9) a section is shown being sewn to cords, a method adopted for better-class work.

All beginners are strongly advised to study the bookbinding in the Victoria and Albert Museum, South Kensington.

BOOK COVER. Spread the book open on a piece of material, linen, silk, etc. Mark where the edges come and cut a rectangle, leaving 1 in. for the turnings at top and bottom, and nearly the width of the cover extra at each side. Turn these side-pieces over the cover-boards, and shut the book to make sure there is enough play for the back. Then remove from the book and stitch down the loose side-pieces at top and bottom. Also turn in a narrow hem along their loose edges, and also the unstitched part of the top and bottom.

Turn the cover the other way out, and slip the cover boards of the book into it. The title can be written on the cover in coloured Mandarin ink, or embroidered, if of silk or brocade, but this must be done before it is put over the book.

BOOK ENDS. These are more decorative for a few books on table in living-room or bedroom than the ordinary book rest as they may be obtained in brightly-coloured pottery, tinted plaster, marbles, painted and lacquered wood and heavy glass. Weighted wooden ends are covered in embroidery on canvas and in raffia work.

BOOK PLATE. A printed label which can be pasted inside the cover of a book to mark its ownership, a book plate may be specially designed and an elaborate production blazoned with coat of arms or some fanciful design, or a simple form with the owner's name.

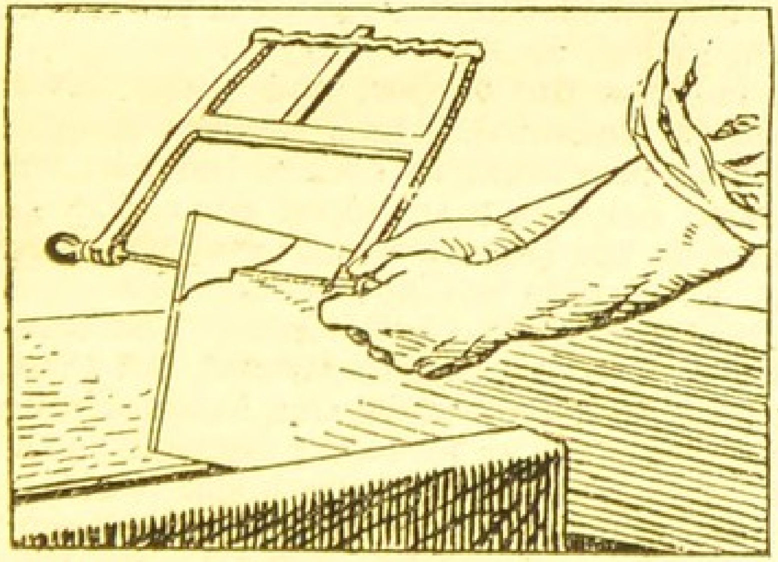
BORING AND BORING TOOLS. Boring is any process for making a hole in wood, metal, or other material, and, strictly speaking, it is a machine process. Apart from the recognized drilling operations, the tools mostly used for boring include single hand tools, such as the bradawl and gimlet, double-hand tools such as the brace and bit, and the regulation wood-boring machine. This last consists of a wooden or metal base, with an angularly adjustable upright member carrying a spindle, rotatable by means of bevel gears and two crank handles. The tool is usually an auger bit and is fed into the work by means of a rack and pinion, actuated automatically or by hand.

Bradawls are used to make holes for nails and screws. The brace and bit are employed to make holes from a small size up to $1\frac{1}{2}$ in. or 2 in. diameter in wood.

Holes are bored in brickwork or stone by means of a steel chisel or bar shaped with four flutes, thus forming an X-shaped cutter. Sometimes a jumper or tubular cutter is used. Either is pressed against the brickwork, given a blow with a hammer, rotated a quarter turn, and given another blow, until it is in to the required depth. China and glass are bored with a special drill stock.

When the lathe is used, if the object to be bored can be mounted on a faceplate or held in a chuck, it is customary to bore the hole with a tool held in the tool post of the slide rest. When possible the work is also held to the saddle of the lathe, adjusting it by means of packing blocks until it is axial with the lathe centre. A rough hole having been previously cast or drilled through the work, a boring bar is inserted through the hole and mounted between centres in the lathe.

A cutter is adjusted to the correct diameter and secured with a wedge or otherwise to a transverse slot in the boring bar. The latter is set in motion, and the work fed up to the tool, which thus bores the hole. A rough cut is usually taken first, followed by a smooth or finishing cut. Other methods of boring include the use of the oxy-acetylene blow pipe.



BOW SAW. How the saw should be held with both hands to ensure a steady cut

BOW SAW. A bow or frame saw is used cutting out various curved shapes in wood. It consists of a central bar with two end members, the horns of which are drawn inwards by a cord tensioned by twisting the lever or tourniquet.

The blade is long and narrow, pierced at each end to receive a pin, and it is retained in position by slipping it into slots and inserting pins. Tension is secured by twisting the cord. The saw should be used with a vertical up-and-down movement.

Good quality bow saw frames are made in beech or similar hardwood. A blade with frame, 12 in. in length is suitable for amateur use. The width of the blade should be governed by the work to be done. In working both hands are used on the saw.

BOWL, Making a Metal. In silver, copper, bronze, brass or Benares metal, bowls hold plants or flowers. In papier mâché, or stoneware pottery they are useful for bulbs, cut flowers or fruit. Glass and lustre bowls also have a decorative value.

The making of a bowl of simple form in ductile metal can be done at home with the aid of an anvil-block and a few tools. These comprise a ball peine hammer, a round-faced hardwood mallet (Fig. 1), a few ornamental punches, a pair of tinman's snips, pliers, and file.

The anvil-block can be made from an odd length of hardwood about 6 in. by 4 in. wide by 6 in. deep. Set it with the end grain upwards, and fasten it to a baseboard with a piece of felt on the underside, as in Fig. 2, if the work has to be done on a table. It is preferable to hold the anvil-block in a vice. The best material to begin on is sheet copper about No. 20 gauge.

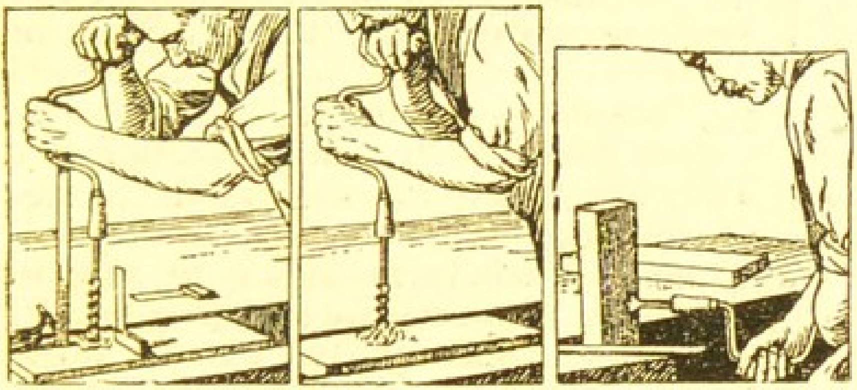
Cut a disk of copper of about 6 in. diameter and file the edges clean and smooth. Then draw circles from the centre of the disk, spacing the lines ½ in. apart. Holding the disk in the left hand, press it flat on to the anvil-block, so that the centre of the disk may be over the hollow in the block, and strike a blow near the centre with the round-faced mallet. This will cause an indentation or stretching of the copper, and it is by a series of light, rapid blows, producing numerous indentations, that the bowl is ultimately shaped. If commenced in the centre and carried steadily round until the rim is reached, the metal will speedily assume a bowl-like form, as in Fig. 3. Next beat out the hammer-marks by light blows, and using a curved faced block or the curved corner of the block shown in Fig. 2.

Repeated hammering hardens the copper, and when this is observed the metal must be annealed, which renders it quite soft. The edges of the disk may tend to cockle, but this will not matter when the design exhibits a scalloped edge (Fig. 4). This is formed by hammering the edge in a hollow-shaped part of the anvil, as in Fig. 5, working scallops on opposite edges of the bowl instead of progressing round the rim. The ornamentation, consisting of a conventional floral garland, is formed with the aid of a steel punch with a leaf-shaped end, held as shown in Fig. 6. A circular block shaped as in Fig. 7 (section 7A) is for the flattening of the base. The use of the block is shown in Fig. 8. The finished bowl (Fig. 9) only requires scouring with silver sand and water and a polish. The figures mentioned refer to the illustrations on Plate 1.

BRACE. The brace used by the carpenter consists of a cranked metal bar, one end provided with means to hold the bit, and the other end has a circular wooden knob or head. In the middle is a wooden handle free to rotate.

In use the brace is held upright with the point of the bit exactly on the centre of the spot marked on the wood where the hole has to be drilled (Figs. 1-3).

The left hand is pressed firmly downwards, while the right hand is employed in rotating the brace and bit. The chuck comprises a hexagonal exterior member that turns on a screw thread cut in the brace, this in turn contracting two or three jaws which grasp the bit or drill. Some chucks are only adapted for grasping brace shank bits, but those that will also grasp ordinary circular shank drills are better.



BRACE. Method of holding for different classed work. **Fig. 1.** Vertically, with forehead resting on hand. **Fig. 2.** Vertically, with chin as support. **Fig. 3.** Horizontally, with weight of body against brace

Some types have a ratchet movement which can be thrown into or out of action by moving a sleeve on the crank. This device enables holes to be drilled in awkward corners or near to a wall, where it would be impossible to rotate a plain brace.

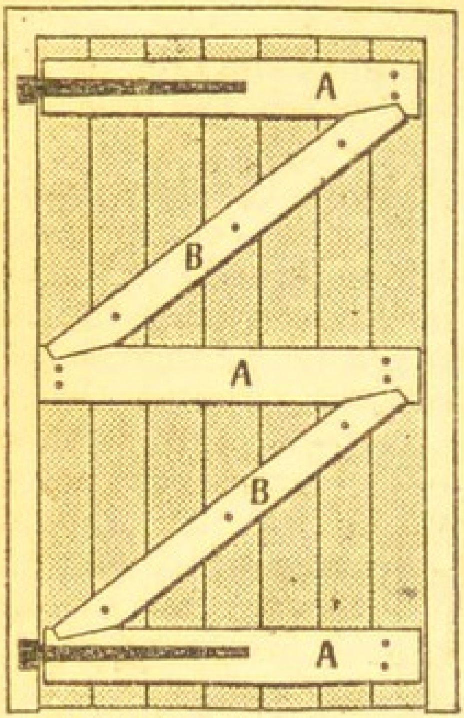
The brace can be used for driving screws, by using a screwdriver bit. The enlarging of holes in metal or wood is done with a rimer bit. The cone shaped recess to accommodate a screwhead is formed by the brace, using a countersink bit. Rounding the ends of dowel pins is accomplished by using a dowel shaver bit and a dowel rounder bit. Shallow circular recesses or sinkings for a nameplate are formed with a brace and a Forstner auger bit.

The engineer's brace is a ratchet-driven tool used for drilling holes. It is simple and effective, but is employed only where a hand drill would not be large or powerful enough, and when the work cannot be conveniently taken to a regular drilling machine.

A rim brace is largely used for removing and replacing the nuts on most types of detachable wheels on motor cars. Separate sockets are obtainable to fit these braces, and thus various size nuts can be dealt with from $\frac{5}{16}$ in. to $\frac{7}{8}$ in. across flats.

BRACING. This term is applied generally to the stiffening of a structure by means of a supporting brace generally placed diagonally between the parts to be strengthened, thus transmiting the weight from the overhanging, or weak part, to the wall, foundation, or strong parts.

The principle is shown in the ledged and braced door illustrated. The ledges, A, cannot entirely prevent the planks which form the door from sagging, but the two braces, B, act as brackets or supports, and also help to prevent warping.



BRACING. Method of strengthening a door

BRACKET. As ordinarily understood, a bracket is an L-shaped metal support for a shelf, although there are other types, such as the bracket of a lamp, or a gas bracket.

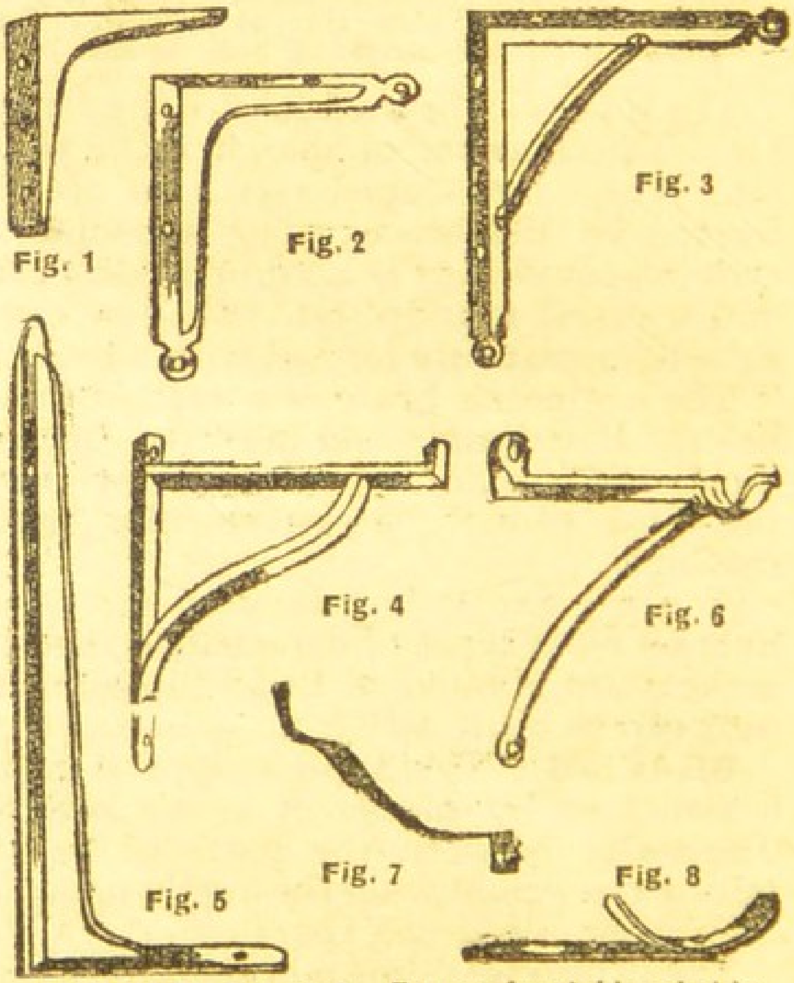
The iron bracket (Fig. 1) is intended for the repair of chairs or other furniture; these are usually 2 in. or 3 in. long and ½ in. wide. The strong light shelf bracket shown in Fig. 2 is known as the London pattern; it is made from pressed steel, and is finished in black japan. Usual stock sizes are 3 by 4 in. to 12 by 14 in. Another type similarly made, but with the additional stiffness given by the curved brace or strut, is shown in Fig. 3. They are handy for the rapid erection of shelves.

Shelf brackets intended to support plate glass or marble shelves are generally made in cast brass (Fig. 4). The little upturned nib or lip at the outer end ensures the glass shelf from accidental movement. Such brackets are made in many varieties.

Partition brackets (Fig. 5) are stout iron castings supporting a wooden or other partition and stock sizes range from 12 in. wide by 24 in. high to 14 in. wide by 48 in. long.

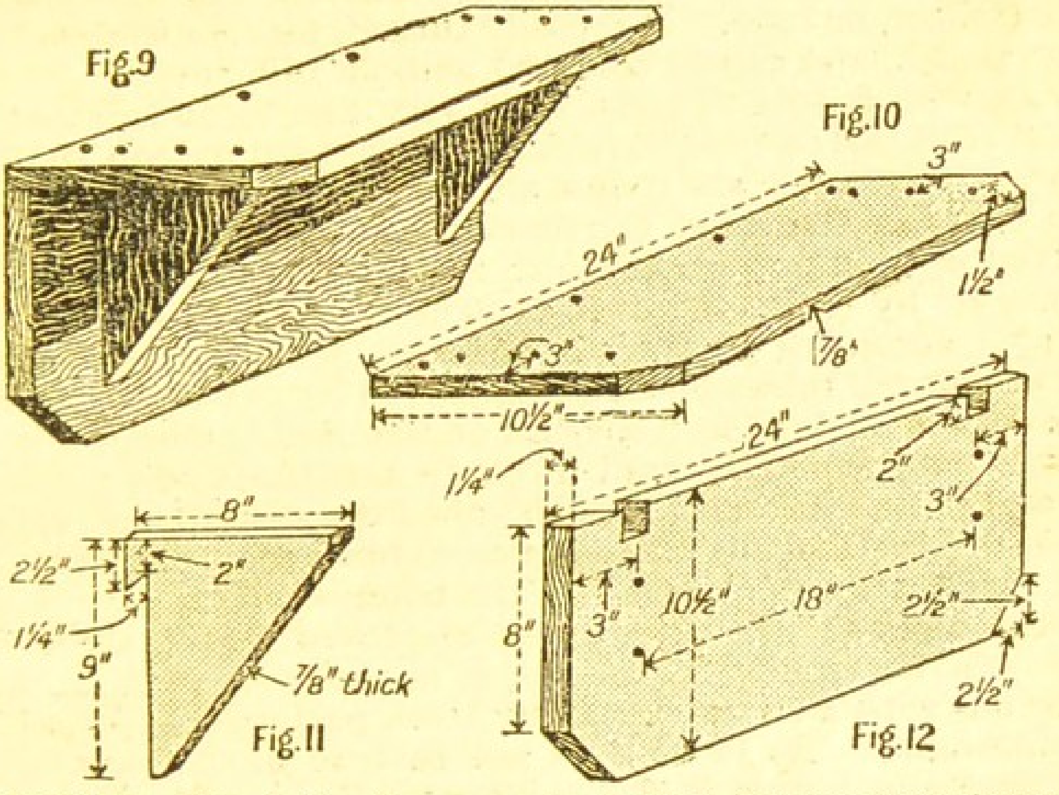
Bucket brackets (Fig. 6) are made in strong galvanised iron, and should be securely bolted to the wall to sustain the weight of a large fire bucket. Gutter brackets of two types are illustrated in Figs. 7 and 8, one to drive into a wall, and the other to screw on to woodwork.

Wooden brackets are frequently used for indoor work.



BRACKET. Figs. 1-8. Forms of metal bracket in use for domestic or building purposes. See text

The strong bracket shown in Fig. 9 is useful for supporting heavy weights, and the sizes given may be modified to suit requirements. The parts as shown in Figs. 10-12 consist of a plain top, cut from commercial 11 in. by 1 in. deal, planed up on the face and edges, and finished off with bevelled corners. The back is of heavier stuff, 1¼ in. thick, and has notches cut out at 3 in. centres from each end, 2 in. deep at the front and 2½ in. deep at the back, and ⅞ in. wide.



BRACKET. Figs. 9-12. Strong wooden bracket, for supporting heavy weights, with working drawings

The brackets are shaped as shown and can be sawn out with a handsaw, planed up on the top and front edges and cleaned up to shape at the back with a chisel. The half dovetail projection must fit tightly into the notches in the backboard, to prevent the bracket drawing forwards. To assemble the bracket put the back in the vice, then glue the edge of the bracket and the notch in the back, and screw the bracket firmly in place with 2½ in. No. 10 countersunk screws inserted through clearing holes drilled in the back. Then glue and screw on the top, using four screws at the back and three into each bracket. Drill holes through the back and screw the whole to wooden plugs cemented into a brick wall, or to the studding on a plaster wall, or employ Rawlplugs.

BRAD. Generally this name refers to an oval section wire nail with a narrow oval head. They are preferable to the ordinary wire nail for much internal household work. Convenient sizes are ¾ in., 1 in., 1½ in. and 2 in.

BRADAWL. A small hand tool, the bradawl is used for making holes in wood preparatory to inserting a nail or screw. Commence by pressing the bradawl firmly into the wood, cutting across the grain, as deeply as possible; then twist the bradawl a little, thus enlarging the hole, and again force it down, cutting across the grain, and repeat the operation until the hole is deep enough. Bradawls are made in 12 sizes, from $\frac{3}{32}$ in. wide to $\frac{7}{32}$ in. wide.

BRAD-PUNCH. A small steel punch, known as a brad-punch, is used for driving the head of a nail below the surface. These are made in four sizes, with cupped or hollow ends.

BRASS. One of the most useful of metals, brass is obtainable in rods, sheet, or tube. It is easily turned, filed, or soldered, takes a high polish, and can be coloured without difficulty.

Brass wire is sold in coils, from very fine to quite stout rods. Round stuff can be bought in drawn rods, with a clean and bright surface. Cast rods are rough and of little use to the amateur. Strip brass is the most convenient form in which to buy flat material up to 2 or 3 in. in width and 1 in. in thickness, down to $\frac{1}{16}$ in. wide by $\frac{1}{32}$ in. or less in thickness. Tubes are solid drawn and sold according to their outside diameter, and are stronger than the brazed tube commonly employed for gas-fittings. Brass-cased tube is made of iron covered on the outside with a thin layer of brass, and generally used in cheap bedsteads and for curtain rods and poles. Circular brass blanks from 1 in. to 4 in. diameter and $\frac{1}{16}$ to $\frac{1}{4}$ in. thick, as well as screwed brass rods, and brass gears of all kinds, are valuable aids to the home-worker.

Brass castings are extensively employed. Soft sheet brass, which can be readily hammered, is used for repoussé work, and can be cut with a fret-saw. Many stock patterns of pierced brass are obtainable. As brass does not rust, it should be employed for screws and hinges in damp places. For electrical work it is extensively used, being a good conductor.

BRASS-BACK SAW. Small brass-back hand saws are used for cutting thin, soft sheet metals and tubes, such as brass, copper, or pewter. *See* Saw.

BRAZING. Brazing is a method of uniting metal parts by means of a film of brass in the form of alloy, known as spelter. Metals that are usually brazed together are steel, wrought iron, brass, and copper.

The various stages in brazing are as follows: Thoroughly clean the parts to be brazed, apply a suitable flux to the joint, then assemble the parts and secure them so that they cannot move relatively during the brazing operation. Next apply the spelter to the joint. Heat the work thoroughly until the spelter runs or melts and unites with the metal parts. Finally clean the job, and remove any scale or surplus spelter.

The tools and materials required are a powerful brazing blow-lamp, or a gas blow-pipe supplied with air from a foot bellows, a stout iron pan on legs and filled with coke or lumps of asbestos, some spelter, borax in powder form, and a few rough pliers or tongs for holding the work while brazing. Some soft iron wire and a packet of brazing pins are needed to secure the parts, unless they are screwed or driven tightly together so that they cannot move while being operated upon.

A simple example is to braze a steel tube into a steel socket. Clean the joint thoroughly by polishing with emery cloth, or by filing or grinding, and paint it with a solution of powdered borax. Now force the tube into the socket; there is no fear of its being too tight, as the brass will run into the joint although there is apparently no room for it. Next drill a hole through the socket and tube, and hammer in the small end of a peg.

How to Apply the Spelter. Now place the work on the brazing pan and pack asbestos cubes around the back and sides, leaving space for the burner flame to retain as much heat around the joint as possible. Light up the blow-lamp, and adjust the flame to burn clean, that is, without yellow streaks or any trace of smoke. Move the lamp about so that the flame warms up the asbestos and the metal generally. Watch the borax or flux around the joint, and directly this begins to bubble and turn white, apply the spelter to the joint. Spelter is obtainable in granular form, like brass filings, and can be mixed with an equal proportion of powdered borax. In this state it is applied to the joint with a metal rod. Heat the end of this rod, dip it in the spelter, and sufficient will adhere. Apply this to joint as is needed.

If spelter is bought in the form of brass wire, it is roughly square in section and sold in rolls. Cut off a few feet and coil up one end, then heat the other and dip it in the powdered borax, a globule of which will adhere. Then heat the work steadily and thoroughly, at the same time melting off a piece of the spelter wire, or brazing wire, as it is usually called. Push this with the end of the rod into its place, or as near as possible; continue to heat the work, apply a little more flux from time to time to prevent the surfaces oxidising, and watch for the spelter to melt. When it begins to melt, watch where it runs. It should disappear into the joint. Spelter will follow the heat and the flux, and will not adhere to the metal except where the flux has been applied. Be careful not to inhale the fumes given off during the brazing process.

To be sure of the job being a sound one, it will have to be turned over. When one side is brazed, keep the flame on the work so as not to lose the heat, and turn the work over with the tongs.

When the work has cooled somewhat take it from the pan, holding it with tongs, and with a wire brush remove all surplus flux and scale. Later the scale can be cleaned off by pickling in a weak solution of sulphuric acid and water. The pickle should be made in an earthenware or glass jar, and preserved for future use. Leave the work in the pickle for an hour or so, then wash it in hot water, and file and polish until the metal is clean and bright. If feasible, run some oil or paint into the interior of the pipe to prevent it from rusting.

The secret of success in brazing is clean work at the start, sufficient heat applied in the right place, and to see the spelter runs freely. On some work the spelter and borax mixture can be applied direct to the work and then heated, but generally for all steel or iron parts the brazing wire is the best.

Brass and copper are brazed in the manner already described, but call for more care and skill on the part of the operator. The brass has to be heated to a dull red heat before the spelter will run, and at that heat the brass itself is on the verge of melting. It is best to use a soft spelter strip or specially prepared white spelter, as this melts at a lower temperature than ordinary brazing wire.

BROACH. Long and slightly tapered, these tools are used for enlarging holes in metal, hardwood, or fibre. Broaches, which are sometimes known as taper reamers, are made in numerous sizes, from a very fine one to $\frac{3}{8}$ in. It frequently happens that on a job such as fitting a pair of hinges, the screws are just a shade too large for the hole. In such a case a few turns with a broach will enlarge the hole, and the job can be at once completed.

BRODERIE ANGLAISE. The modern Broderie Anglaise is not limited to eyelet work, but often has solid stitches mixed with it to suit the design. The process consists of working and cutting round holes and ovals put together to form a design.

Having regard to the lasting quality of the stitchery itself, it is best to use good materials, such as linen, longcloth, taruntulle, lawn, cambric, and the best qualities of Japanese silk. Mercerised threads form the best working mediums. White thread is largely used, but the good embroidery cottons are made in washing dyes, the paler colours being very popular for this work on a groundwork of white material.

The work is best done in the hand instead of in a frame, as in some forms of white embroidery, but when working on very fine materials it is an advantage to have a backing of toile cirée. A pair of sharp embroidery scissors are also required for cutting the larger holes, and there is a special implement, with adjustable ends, for piercing either round holes or ovals.

To work this, first outline the petals with small running stitches, keeping just inside the outline. The second process is to whip the running stitches, passing the needle under each stitch from right to left, but not through the material. Now with sharp embroidery scissors make a clean cut right up the centre of the oval. Begin at the bottom left-hand side and overcast these whipped stitches, completely covering them and the outline of the design, and also taking in the piece of material which is folded back from the centre of the oval. The stitches should be placed closely and evenly together.

The pattern to be worked must first be transferred to the material. If it is a pattern traced from a book, place a piece of semi-carbon paper (inked on one side only) on the material, inked side downwards. Place the tracing of design over this, right side upwards, and secure top and bottom with drawing pins; but place a small piece of paper between the carbon and material when the pin will go in, to prevent soiling the material with carbon ink. Now go over the lines of the design with a blunt knitting needle or very sharp pencil. When the paper is removed the design will be clearly seen on the material.

The window pane method is an alternative method to transfer the design to thin material. Attach the tracing of design to a window-pane with a little stamp paper. Hold material over this with left hand, and the light at back of window will throw up the design so that it can be seen through the material, then trace on the latter with a soft lead pencil.

BRONZING. By bronzing, any metal, wood, plaster, or other material is given a bronze-coloured surface. Iron and steel are bronzed by exposing them to the vapours of heated aqua regis, and dipping them into melted vaseline. Plaster and wood are coated with size, then a metallic bronze powder is applied.

Dilute sulphuric acid and dilute nitric acid produce a bronze colour on many metals. The most artistic effects are obtained by the use of bronzing acids on brass or copper ware. The acids are obtainable from any dealer in such substances.

The brass object is first cleaned and polished either with emery powder, or by dipping in dilute nitric acid and washing off in hot water. The work is dried in hot sawdust, and must not be touched with the hands. Make a rubber of fine wood-wool shavings or linen, wearing rubber finger-stalls on the finger-tips to prevent the hands getting stained. Slightly warm the work, then wipe it over once only with the bronzing acid. Keep the work free from draughts, and move it about over, but not too near, a gas flame. A deeper colour can be obtained by using a stronger solution or by repeated and continued applications of the rubber, always taking care to work evenly.

Decorative work can be done by applying the bronzing acid with a brush, painting on the pattern previously outlined on the metal in chalk. After the acid has dried it is washed—first with hot, soapy water, and then with hot, clean water. Afterwards it is dried off in hot sawdust and the work is then lacquered. This method can be followed for various colours, such as deep greys verging on blues, greens and browns.

BRUSHES, Decorating. High prices call for a careful examination of brushes used for decorating. A common fibre brush is intended for rough work where lime is used. Whether tied on the handle in two knots with wire or string, or nailed on with tin or leather, a good finish is usually an indication of a well-made brush. The sash brush or tool of more than a dozen sizes is best made in a forked handle, and bound with a string or copper wire. The bristles are held together with a cement of resin and oil, and pulled into the handle while they are hot.

The distemper or whitewash brush with two knots is an expensive article. Five to 6 in. bristle is used, and the wire, which should not be stinted, may be secured by solder at the corners. All first-quality distemper brushes are stamped pure bristle, or covered with a similar guarantee. Black China bristle, while good in appearance, does not compare in usefulness with other bristles, mainly because it does not carry or hold paint or distemper.

A moderate adulteration of bristle with fibre and horsehair is quite acceptable for ordinary purposes. A popular brush, and one that has replaced many more expensive varieties, is the flat tin varnish. These are made of China bristle, and in sizes of an inch and upwards, and are intended for general use, including varnish work. They are usually bevelled at the top of the bristle which gives them the appearance of a part-worn brush.

A common fault with all paint brushes is the presence of free or loose hairs, which have not been caught by the cement or held by pressure, and one by one come out to spoil work and weaken the brush. Passing the hand over the top of the bristles, as if to test the spring, will cause these undesirable hairs to rise, and any considerable quantity denotes an unsound article. These loose hairs are particularly objectionable in pastry brushes.

In the process of making, paint brushes have probably been subjected to extreme heat and other unhealthy conditions, and manufacturers frequently issue instructions to purchasers which should be strictly observed, or the maximum of wear will not be obtained.

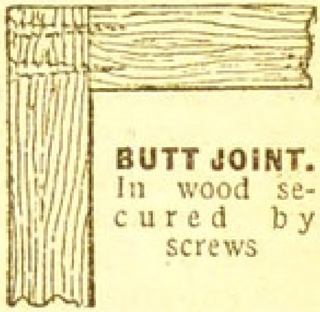
Care of Brushes. During intervals of work paint brushes should be suspended in the paint or distemper and not allowed to rest on the working end, otherwise they will become clogged and for a time unworkable. Before putting aside after use, they should be thoroughly cleaned and ready for use on the next occasion. Much can be done by wiping out on old boards, and water will remove any remaining whitewash or distemper.

Paint, varnish and enamel brushes must be softened and squeezed out in a little turps or paraffin, and finished with a warm solution of soap and hot water, working on a stone sink or board and removing all traces of turpentine or paraffin, as this destroys any cement in the brush.

BUHL. The chief characteristic of buhl, or boule, work is the application of thin coats of tortoiseshell veneering on prepared wood. The surface is inlaid with delicate tracery in metal, especially brass, and these inlays are adorned with tortoiseshell tracery.

Trouble with the brass inlay in buhl work is probably due to the perishing of the adhesive used in the laying. In the endeavour to press the brass back into position a kink often develops, and this must be removed as far as possible by taking out sufficient brass to enable the inlay to be hammered on something hard slipped under.

Shellac cement, either heated or reduced to a thick consistency in methylated spirit, may answer the purpose, or Scotch glue of good consistency, and full hot. Have at hand some means of pressure that will apply to the position of the inlay and some flat pieces of wood and brown paper. Apply the glue, using no more than is necessary, to the back of the brass, and press back into position with a hammerhead. Then lay the brown paper over, and the flat wood over this, before applying a weight for compression.



BUTT JOINT. In wood secured by screws

BUTT JOINT. The simplest of all joints is the butt, which might be described as the abutting of one piece of material on to another. It can be made in wood, metal, or other material. It is in woodwork that the butt joint is mostly used, and it is generally secured by glue, nails, or screws.

There are certain essentials to success in making a simple butt joint. The work must be measured correctly, cut off square and true, and assembled and nailed together in proper order.

In metal work, a butt joint is usually riveted, brazed, or welded.

CALENDAR. A calendar is quite simple to make. The necessary material, in the shape of cardboard or suitable paper, having been obtained, all that is necessary is to take a copy of the calendar for the previous year, and to move back all the dates by one, except for a leap year, when they must be altered by two. Thus the Sundays in January instead of reading 4, 11, 18, 25, will read 3, 10, 17, 24. This done, with any elaborations that taste suggests, it may be mounted on to a piece of cardboard, wood, or leather.

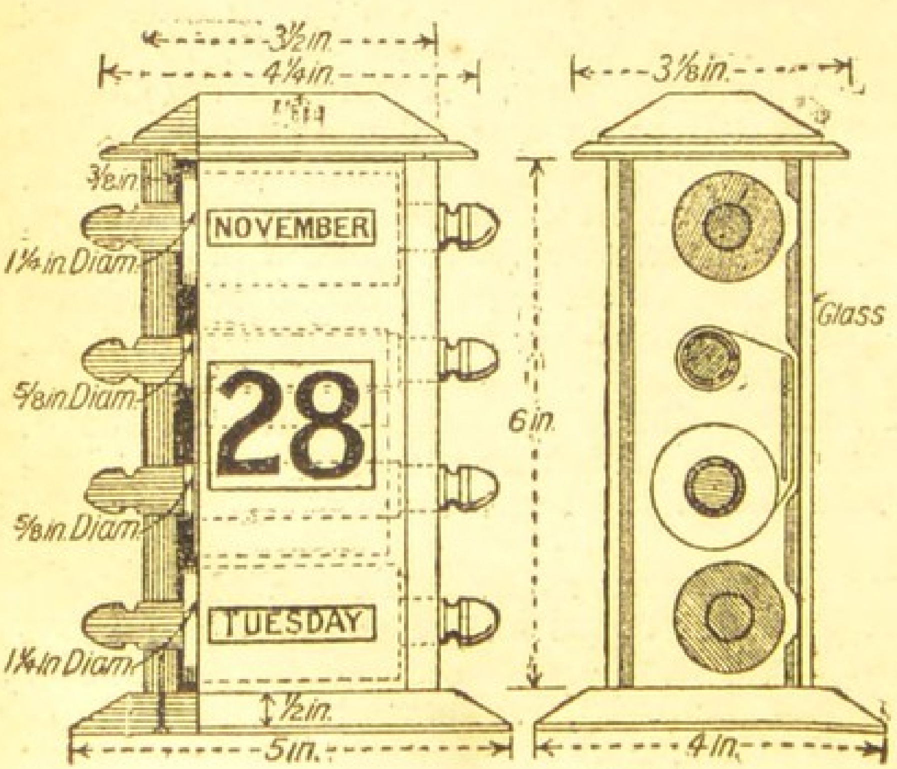
Gift calendars are easily made by children on tinted mounting boards, which can be obtained in various sizes. One, 10 in. by 8 in. can be decorated with stencilling. A very pretty design is arranged so that room is left to fix a small tab calendar after the stencilling is completed. Appropriate stencils—a blue bird, a squirrel, a ship, etc.—can be bought to be used with watercolour, and a small Jap brush. An alternative is to paste a photograph or a coloured print—outlining either with a black or coloured border, put in with pen or brush—on the mount. A smaller mounting board may be used and a booklet calendar fixed by two short lengths of narrow ribbon to hang below the board. A strip of firm paper should be pasted at the back of board and booklet in order to hold the ends of the connecting ribbons in place.

Stencils may be used on coloured suède. Take a piece about 7 in. by 3 in., place it on a flat board and stencil, on the suède side of the leather, the small design chosen. Mandarin inks or liquid stencil colours may be used. A border is painted or inked round the piece of suède, and appropriate words written, with the same colouring material, above the calendar. A hole is punched in the top of the suède through which a narrow ribbon is threaded to form a loop at the back and tied in a small bow in front. The lower end of the calendar may be fringed or the corners trimmed.

Lucky black cats, squirrels or birds, may be cut out of velvet and pasted on cardboard mounts cut to the shapes of the animals. A paper pattern should first be made by the help of a transfer. Glass beads may be used for eyes, fastened by wires at the back, the visible ends of the wires being covered with a dab of black paint to form the pupils of the eyes. The calendars can be gummed on the animals. Original designs can be drawn on the cardboard and cut out to form the pattern from which to cut the velvet covering. The latter may be touched up with paint to improve the outline.

CALENDAR. Fig. 1. Diagram showing how a bird calendar can be made from velvet and cardboard

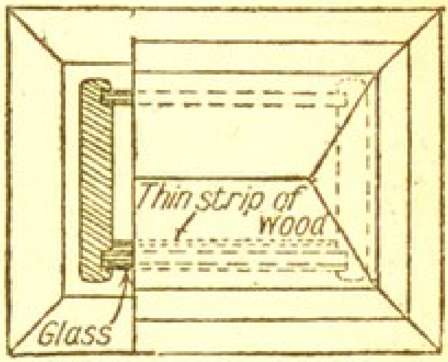
A calendar on which the figure of a bird is the main feature is shown in Fig. 1. A piece of cardboard is cut into a circle except for an extension at the bottom, as shown in the illustration, and it is fitted with a backing of cardboard. A piece of blue velvet is pasted on to the figure, except that in one place, as shown in the diagram, a piece of green is substituted. The bird is apparently supported on a bough, round which claws, also of cardboard, must be cut, and these should be covered with yellow cloth. The calendar can be hung on to the tail, and the whole suspended by a ribbon. It can then be hung on the wall of the sitting-room or study.



CALENDAR. Fig. 2. Perpetual calendar in the form of a box

PERPETUAL CALENDARS. Details of the construction of a perpetual calendar are given in Fig. 2. The work is simple; the side pieces are grooved to receive the front and back, the former being cut out and glazed. The top and base can be cut from the solid or built up from several layers.

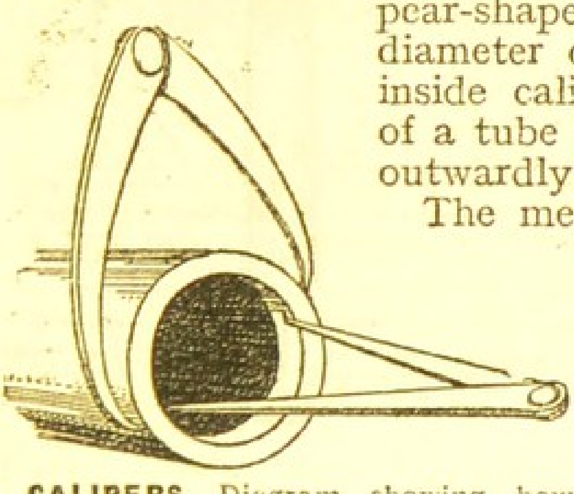
The rollers are shaped as shown, and carry the linen band on which are marked the numerals 1 to 31. The upper and lower rollers have the names of the months and the days of the week respectively marked upon them. The work is completed by staining or polishing.



CALENDAR. Constructional details of the perpetual calendar illustrated in the previous page

Perpetual calendars may be introduced into linen samplers embroidered in cross-stitch.

CALIPERS. These instruments are generally made of metal with firm joints; that is, the joint is so constructed that the calipers, when set to any given measurement, will not readily be displaced. They are made in various forms, those shown here being from 3 in. to 24 in. in length. The outside calipers are pear-shaped and adapted for measuring the diameter or thickness of a rod or bar. The inside calipers, used for measuring the bore of a tube or the diameter inside a ring, have outwardly turned ends or jaws.


CALIPERS. Diagram showing how they should be used for making inside and outside measurements

The method of using is illustrated. It is essential for accurate measurement that the calipers should be held erect and the jaws kept at right angles to the axial line of the work. Inside calipers are held in a similar manner, with the centre of the joint on the axial line of the bore of the work. The distance outside the jaws is then compared with a ruler to obtain the dimension. In the case of outside calipers the dimension inside the jaws is taken. Improved calipers for very fine measurements have a screw adjustment. Spring calipers can be easily and quickly adjusted with considerable accuracy, by means of the screw nut. Thread calipers for measuring the diameter of screw threads have extra wide jaws, while odd leg or jenny calipers are for scribing the centres on a bar or for other marking out and measuring purposes. For some work when it is impossible to reach a part which is to be measured without disturbing the setting of the legs of the instrument, and thereby upsetting the measurement, a type of calipers is made with an additional and shorter leg. Known as transfer calipers they are set in the same way as the other types. Woodworkers generally use large calipers made of wood.

CAMP BED, Making a. Of light make and designed to fold, the camp bed is easily portable and occupies little room. Its frame may be entirely of wood, or a combination of wood and steel, or entirely of steel. It may have a wire mattress or a canvas one. With the first the legs fold and the frame generally remains flat; with the second the bed is designed for rolling into a bundle when not in use.

Parts which are pivoted for rolling are usually riveted, as in Fig. 1. As wood is a comparatively soft material, each rivet should have four washers, one at each end and two in the middle. Those at the ends keep the head and tail of the rivet from sinking into the wood, and those in the middle keep the two pieces of wood from being pressed together too tightly to swivel freely. The two washers side by side will work against each other if the rivet is hammered up tightly enough to sink them slightly into the wood.

Fig. 2 shows the type of bolt used for the non-swivelling parts.

Fig. 1

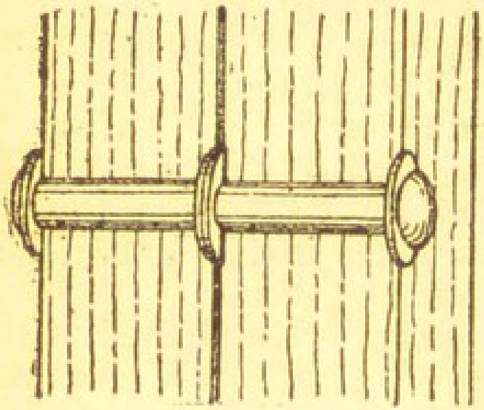
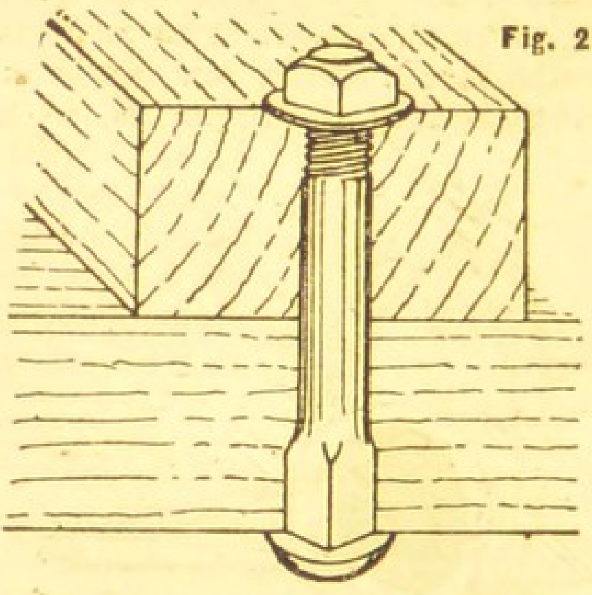


Fig. 2



CAMP BED. Fig. 1. Type of bolt used for the swivelling parts. **Fig. 2.** Type used for the non-swivelling parts

It has a convex head with a short length of square shank which keeps it from turning with the nut. The nut is square and a washer is used under it. A washer at the other end is unnecessary and is generally omitted.

In a simple camp bed the wood generally selected for frames is pitch pine, but oak, walnut, or mahogany may be used. The usual width of frame is 2 ft. 3 in., and length 6 ft.

A sketch of the framework (opened out) is given at Fig. 3. As shown, the head support has one crossrail about $1\frac{1}{2}$ in. from the top end of pivoting rails, which are bolted to the frame sides and a second a little farther down. The strut supports have two rails as a provision against side play in course of wear. Making a start, two lengths of 3 in. by 1 in. material will be required to finish 6 ft. long. These should be planed and papered up true and smooth and of 1 in. beyond each side rail. When secure in this position a hole for the reception of a $\frac{5}{8}$ in. bolt should be bored vertically through both B and A, (as shown in Fig. 4), the bolt being 3 in. long so that it just receives the $\frac{3}{8}$ in.

fastening nut flush in the under notching. If the notchings are cut square and the stretcher rails are shot true, a square frame will be the result when bolted up. Size for clamp slips is 2 ft. 5 in. by $1\frac{1}{4}$ in. by $\frac{1}{2}$ in. to screw on, the purpose for which is to clamp the wire spring when in position.

The action of the head support is made clear by Fig. 5 Only one cross rail, E, is shown. The supporting rail D obtains its bearing upon the projection of the stretcher rail, B. If a rise from the horizontal of from 6 in. to 7 in. is allowed for the extremity of the rail D, a comfortable angle for pillowing will result, and a preliminary placing of the supporting rail in position to this measurement will easily give the centre point for the roundheaded pivoting bolt to be entered and nutted on the inner side. Size for D will be 13 in. long by $1\frac{1}{2}$ in. by $\frac{7}{8}$ in., and for E 2 ft. 4 in. long by $1\frac{1}{2}$ in. by $\frac{5}{8}$ in., to be screwed on.

For the legs (Fig. 6) the width must be $\frac{1}{8}$ in. less than the width of the inside of bedstead frame, viz., 2 ft. $1\frac{1}{8}$ in. The legs, F, finish $1\frac{1}{2}$ in. by $1\frac{1}{4}$ in. (or $1\frac{1}{4}$ in. by $1\frac{1}{4}$ in. will serve), and the

The simple bedstead which can be made by following the instructions given in this article

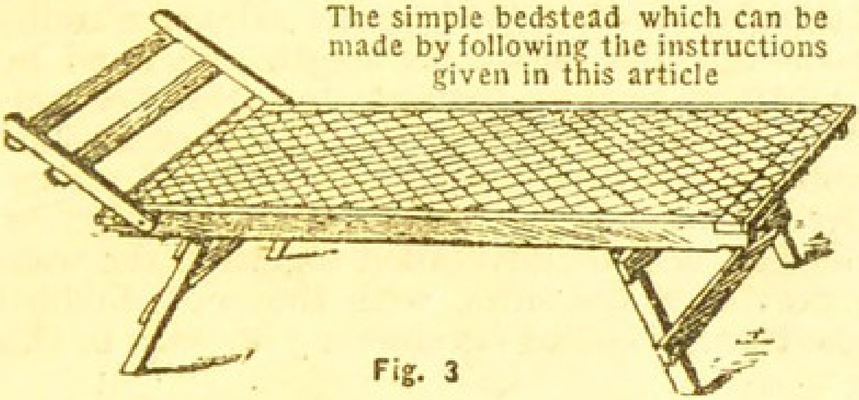
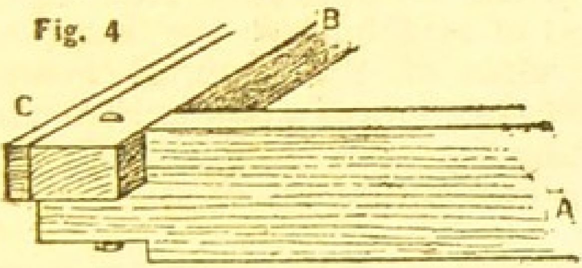


Fig. 3

Fig. 4



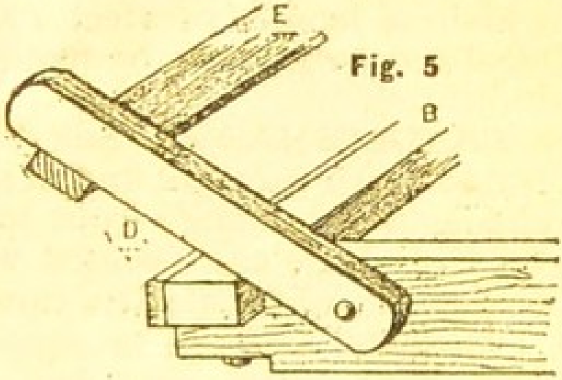


Fig. 5

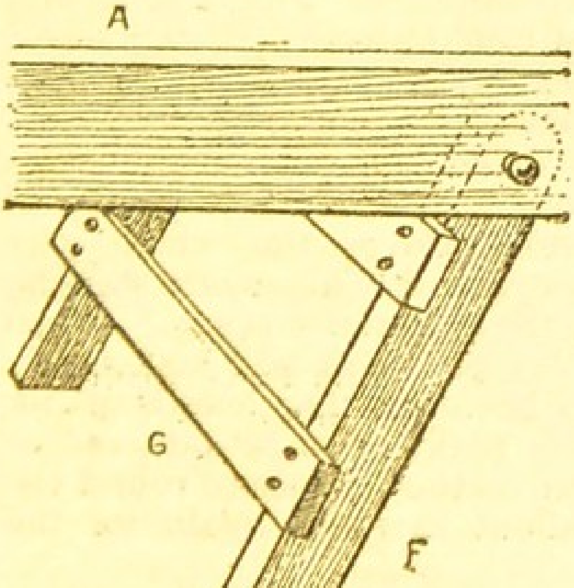


Fig. 6

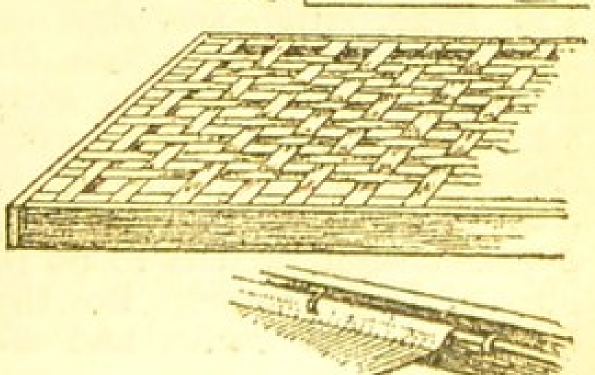


Fig. 7

Figs. 3-7. Diagrams showing in detail the construction of a Camp bed length should be $17\frac{1}{2}$ in. This will allow for the portion at top bolted inside the rails A (as shown by dotted line), and trimming at bottom, which may be as shown or rounded as at top, the latter being simpler. The rails, G, will be $1\frac{1}{2}$ in. by $\frac{5}{8}$ in. by 2 ft. 4 in., the latter measurement affording a projection of $\frac{1}{2}$ in. beyond A.

When it is opened out the angle of the legs should be about 4 in. out of the perpendicular on the floor line; they will be held securely at this angle by the bearing of the frame upon the upper crossrail, G. The usual finishing height from ground to top of rail, A, is 15 in., and with these measurements the setting out should prove a straightforward affair. A bolt is required each side for pivoting as before, and when folded up the two legs should come almost flush within the main framing. Pivoting will be about 13 in. from end of frame.

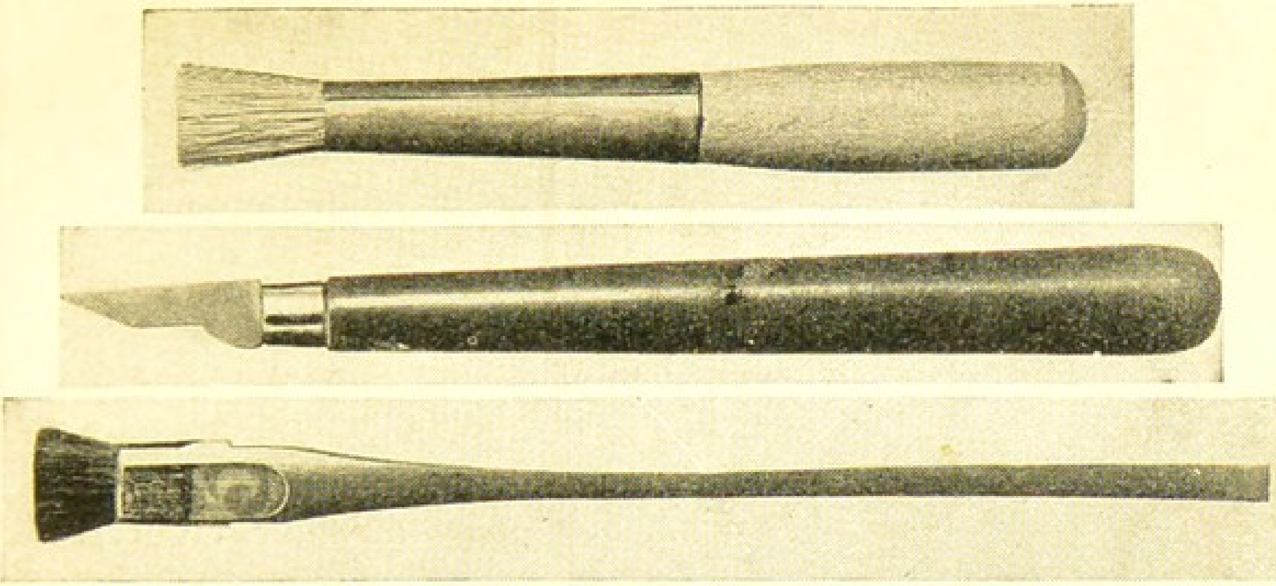
The wire spring is usually attached to the inner sides of framing by means of steel rods threaded along its length and fixed by staples, the ends of mattress passing between the stretcher rails and clamp slips—the latter being screwed on. Another method would be to cross-web the framing, passing each strand alternately over and under in the manner indicated at Fig. 7. A frame for this purpose had best be dovetailed together, the webbing being strained taut over the sides, with the ends doubled in and tacked, and the clamping slips (as shown 3 in. wide in this case) screwed on.

Another way is to fit a sacking or canvas bottom. This must be of stout canvas, and one method of attaching to the frame is also shown at Fig. 7, the length edges of the material being sewn over with a double row of stitching to form a piping through which a length of steel rod is passed. The piping, with its steel core, can then be fixed in position by means of staples, as indicated.

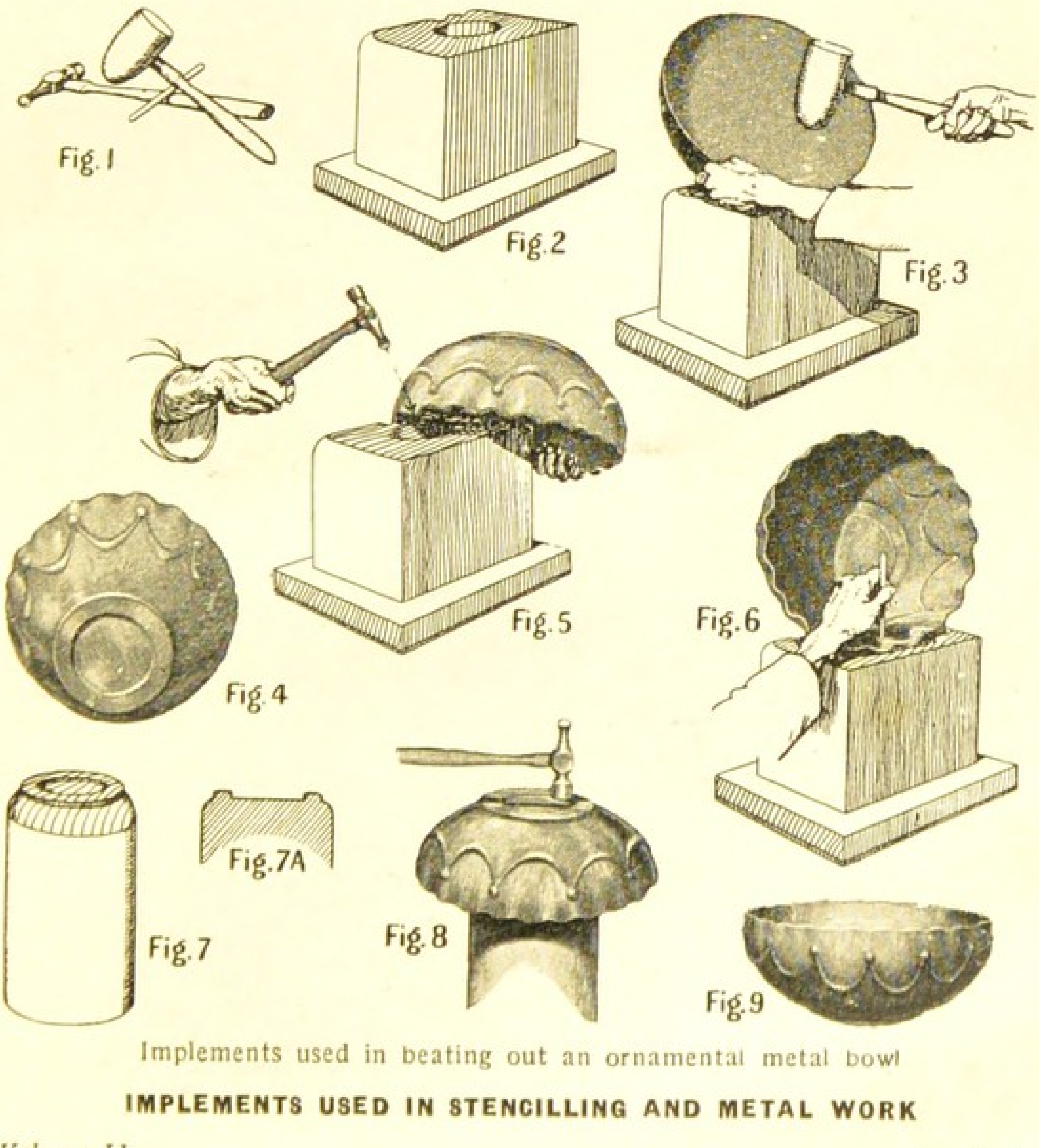
CANDLESHADE. Silk candleshades may be made on wire frames with thin silk and necessary trimmings. Fluted or square shades are a change from the usual round shape; or the shield type of shade can be used when the candles are placed on shelf or bureau, or for electric candle lamps in wall lighting.

To make a round or square silk shade first cut narrow strips $\frac{1}{2}$ in. wide, either selvedge, or crossway; if there is plenty of material available choose the latter. Cover the whole wire frame by tightly binding with the strips of silk; when starting a new strip, sew securely to prevent the material slipping. When the frame is completely covered, cut pieces of silk sufficiently deep to allow neatening at top and bottom. The length of silk depends whether it is to be perfectly plain or to be gathered or pleated on the frame. For the latter method, measure round the bottom of the frame, and allow about as much again for the gatherings.

Mark the halves and quarters of the strips of silk with a contrasting cotton, also the top and bottom rims of the frame.

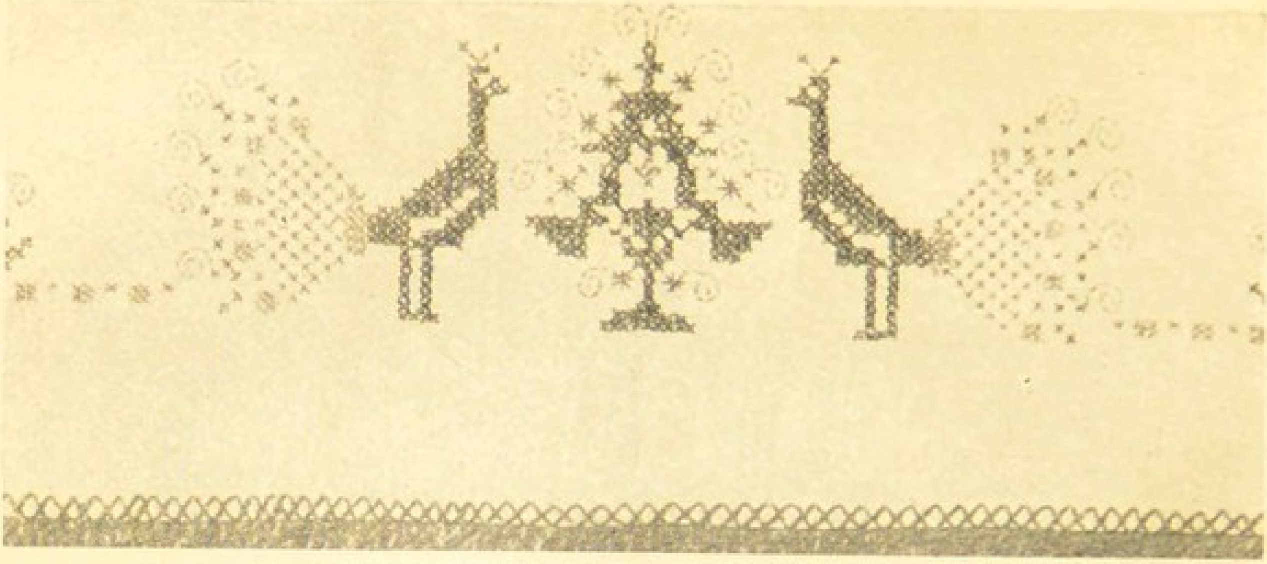


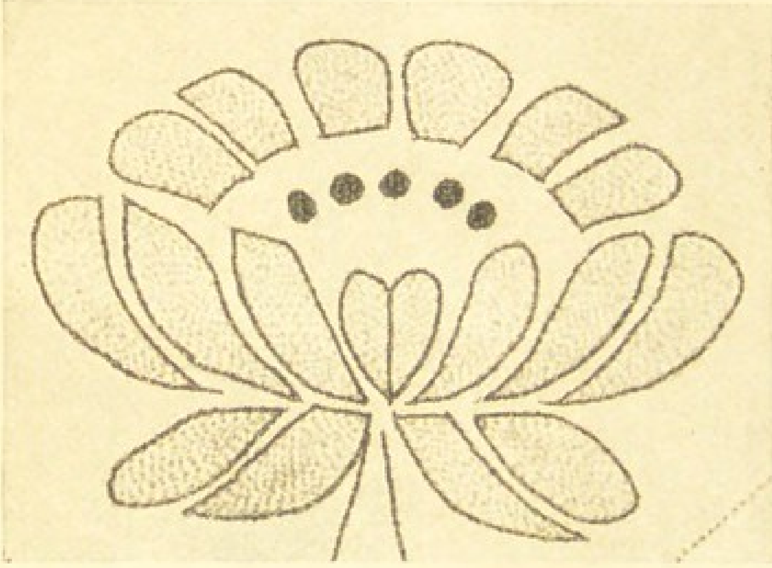
STENCILLING. Fig. 1. Tools used in the process: top, hog-hair brush; centre knife for cutting stencil plates: bottom, Japanese brush for thin materials.



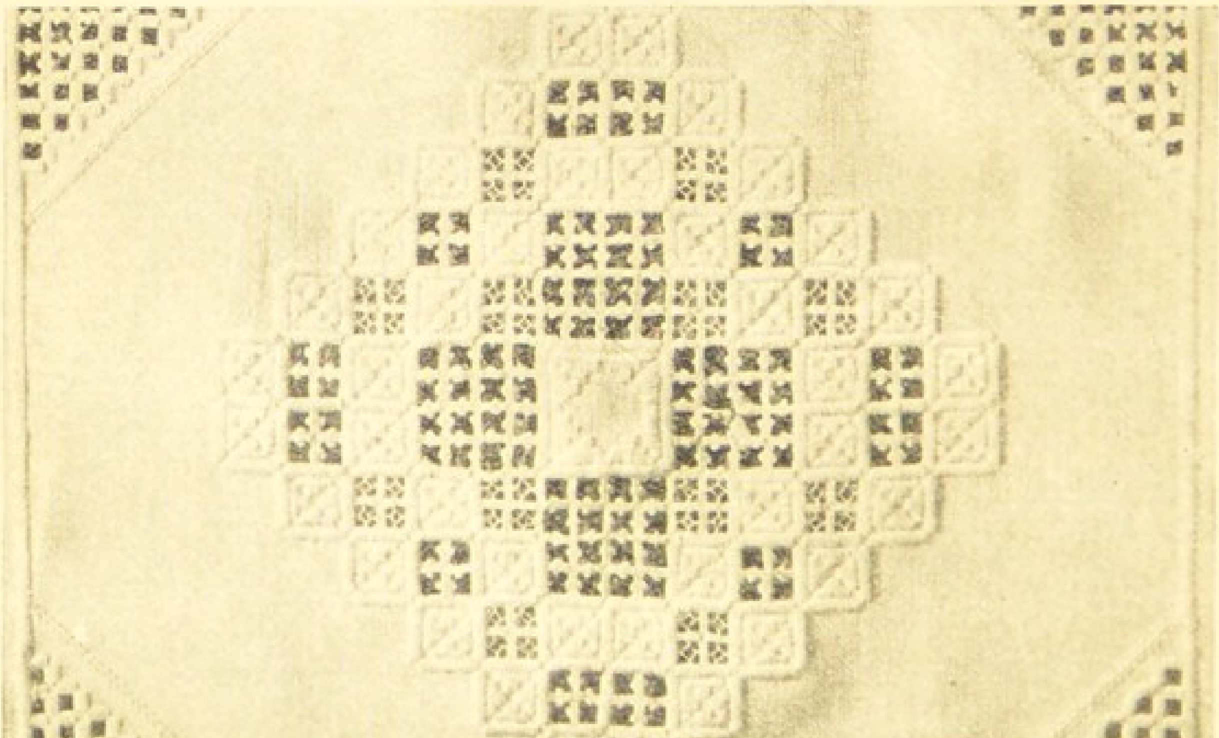
Implements used in beating out an ornamental metal bowl

IMPLEMENTS USED IN STENCILLING AND METAL WORK

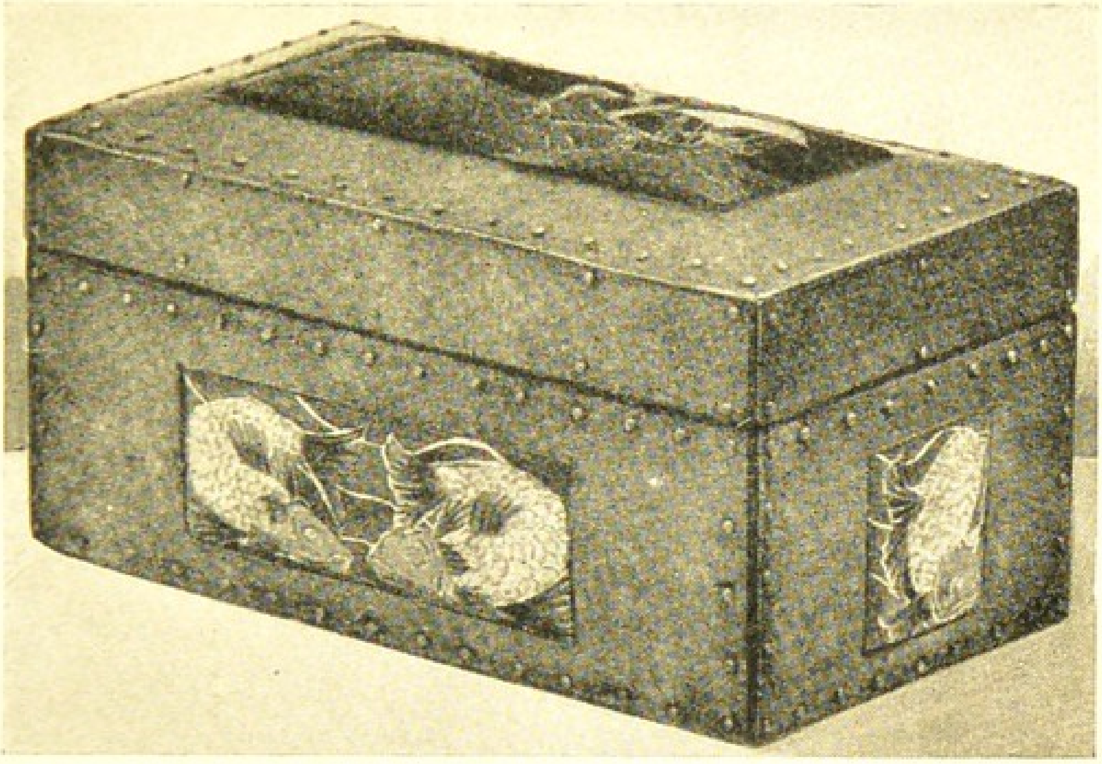




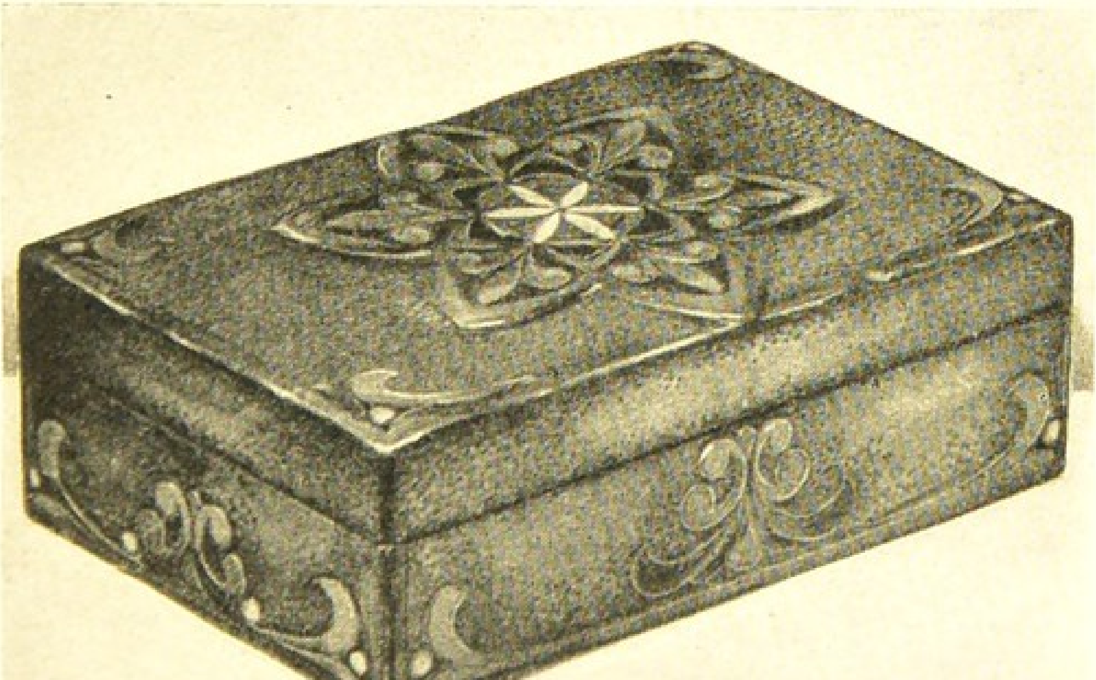
EMBROIDERY. Top. Cross stitch in colour on white linen, suitable for the border of a duchesse cover. Centre. Khetha work, in which the effect is chiefly produced by the darning stitch. Below. Hardanger work. Design for a table runner worked on loosely woven linen or canvas



THREE EXQUISITE EMBROIDERY PATTERNS

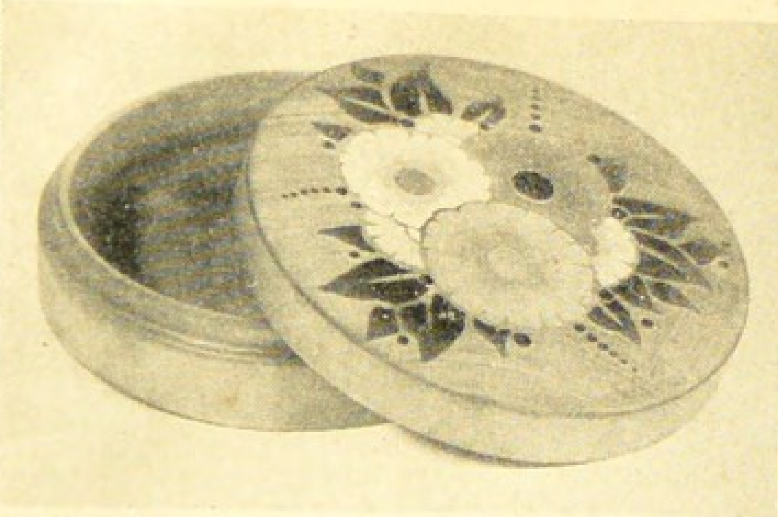


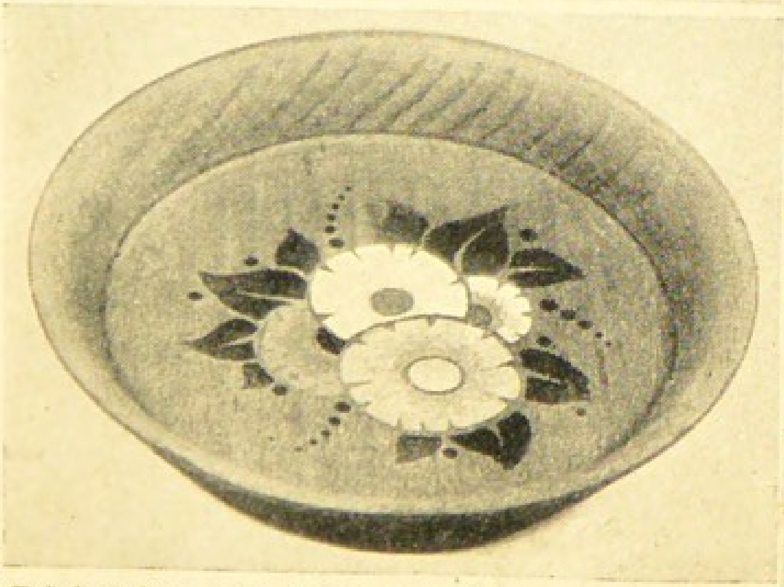
Cigarette box in polished copper, riveted on cedar wood, with enamelled designs on inset domed plaques



Cigarette box made of copper and then embossed and treated with brilliant coloured enamels

METAL CIGARETTE BOXES DECORATED WITH ENAMEL





TARSO WORK. Right. Panel showing a boldly outlined design of an eagle and trees

Trinket box, pin tray and (right) powder jar in stained grey wood with flower design in brightly coloured enamels

CONTRASTING METHODS OF DECORATING WOODEN ARTICLES

Run a gathering thread at both top and bottom edges of silk, join to form a circular strip, and gather the silk and place it in position on the frame, taking care that the halves and quarters of the silk are made to correspond with those of the frame. Attach the silk to the covered wire by sewing, the raw edges being turned inside. Neatening and trimming still remain to be done.

A good trimming is a tiny ruching of the silk sewn on the edges of the frame, or coloured wooden beads of different shapes may be threaded to hang from the frame in a kind of fringe, or a very narrow silk fringe to match the shade may be used on the lower edge. Iridescent glass beads may be sewn on perfectly plain to the bottom of the frame. Such shades are suitable for electric candle lamps.

Finished wire frames of all shapes are easily and cheaply obtained, but silk-covered wire can be bought, and with wire cutters and a little solder, the frames can be quickly made at home if preferred. The silk for covering should be of light colouring and thin texture, as thick silks are too dense and will not allow the light to penetrate.

Silk shields may be plain or designs may be painted or stencilled on them. The edge should be fastened with a cord or narrow gimp. Mandarin inks are the best colouring medium to use for shades as they are transparent. Stencilled designs may be outlined in embroidery silks. Parchment shields can be bought cheaply, and decorated by means of oil-paint transfers.

When making round parchment and paper shades, the stiffness of the medium may render a frame unnecessary, and the shade, when completed, is placed on a holder with adjustable clip. Although the word parchment is used, real parchment or vellum is not often employed for shades, owing partly to the cost and the limited supply, partly to the fact that more skill is required to work on vellum. To obtain the pattern, use any suitable paper; pencil a circle round an ordinary meatplate for outer circle and round a cup or small saucer for the small circle. The distance between the two circumferences gives the depth of the shade. Cut this wide circle in half, and there will then be patterns for two candleshades.

Amongst the simplest and cheapest kinds of candleshades are those fashioned of cartridge paper. These may have plain tops and coloured borders, or may be hand-painted with Chinese designs of dragons or birds, or illustrating the Willow pattern. Hand-painted or stencilled rural or desert scenes are often used to decorate these shades. The choice of colouring and design must be influenced by the room and candlestick.

Glazed linen is also used in every colour. There are electric candleshades with pointed domes to represent the flame of the candle, and with shades made in the form of half-shields in plain silk or painted parchment.

CANDLESTICKS FOR USE AND ORNAMENT

Some Pleasing Designs the Amateur can Copy

This article tells the amateur how to make candlesticks both of metal and of wood, and gives some hints on their decorative uses. See also Bent Iron Work

In places in the country where neither gas nor electricity is available, the candle is still the only illuminant for the bedroom, which is usually provided with standard candlesticks for dressing-table and mantelshelf. In addition a candlestick with a base for holding the matchbox and a handle is used. These candlesticks are placed on the hall table early in the evening, so that each member of the household and each guest can light himself or herself to bed.

The candlesticks may be of metal—brass, pewter, or silver, or of earthenware. A good modern pattern of the latter is made in plain-coloured pottery with a screen to prevent the candle from guttering in a draught, the handle being fixed to the back of the screen. To clean candlesticks they must be put in a warm place so that the wax or tallow of the candle is melted and can then be poured off preparatory to cleaning or washing the stick. A good deal of trouble is saved if a flat glass disk, with a hole for the insertion of the candle, is placed on the top of the candlestick, extending a short distance beyond it, to catch any wax or tallow that may run down the sides of the candle.

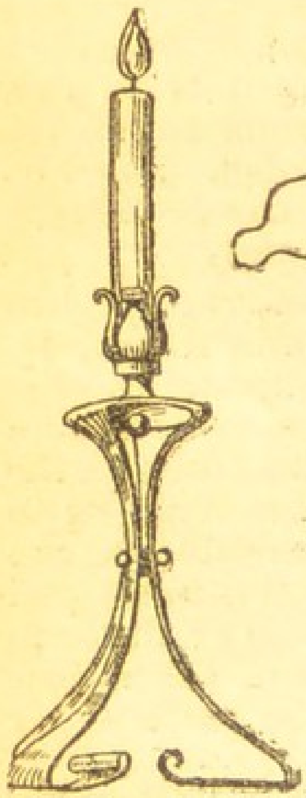


Fig. 1

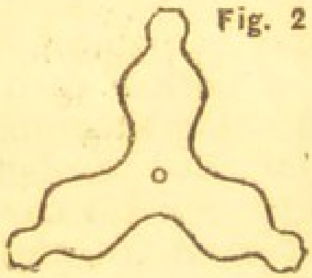


Fig. 2

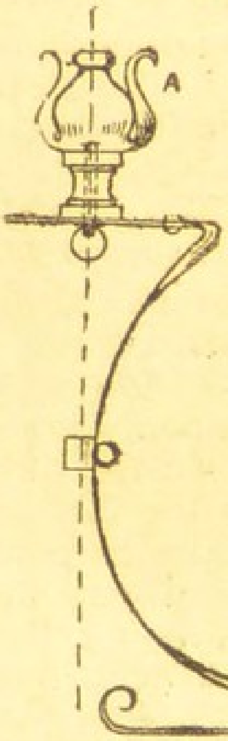


Fig. 3

Fig. 4

CANDLESTICKS. Figs. 1-4. Diagram of candlestick showing how parts are shaped and fitted together

Where candles are not a necessity, the candlestick is still treasured for its ornamental quality though the candles may never be actually lighted. The older types in pewter had a base shaped like a bell and a grease tray half-way down the stem. Later models of brass, copper, or silver had bases square, round, or oval, with columns surmounted with a capital to form the socket, or with grooved or spiral stems. Silvered or painted wood was also used, and there has been a revival of the taste for enamelled wooden candlesticks. This enamelling can very well be undertaken by the amateur and gives charming standards which can be used for candles or, if properly grooved, for electric light. Another popular variety is made of glass.

BEDROOM CANDLESTICKS. Portable candlesticks provided with a bell-glass shade are best for bedroom use, as they protect the wick from draughts, and also serve to arrest grease splashes. Their only disadvantage is that they become unsightly when badly splashed, and are troublesome to clean, the heat required for melting the grease often leading to breakages. Candlesticks which have no special fittings such as these should possess a wide tray to serve the dual purpose of catching the grease as it falls, and also to give stability to the candlestick itself.

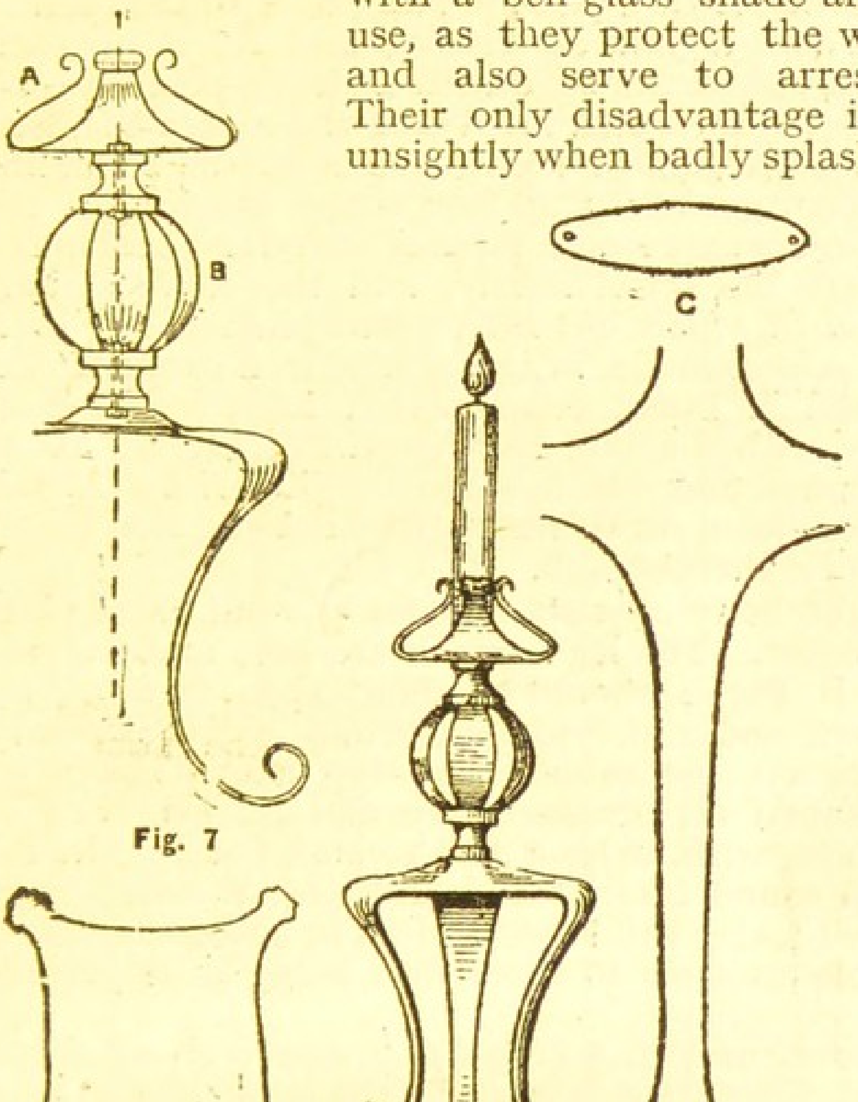


Fig. 6 Fig. 5 Fig. 8

CANDLESTICKS. Figs. 5-8. Further diagram showing the formation and fitting together of the parts of another type of candlestick

Figs. 1 and 5 show two candlesticks of pleasing design made out of sheet metal, as copper or brass. Full size drawings should be made as a guide to neat lines and curves, care being taken to draw the socket sufficiently large to take a candle of ordinary thickness. It must also be remembered that accuracy of measurement is particularly essential when preparing the patterns for cutting out from the flat sheet metal. All curves should be measured from the centre line of the drawing to the extreme end of the scroll. A piece of thin string is a useful article for this purpose. Begin at the centre line with the end of the string, and let it lie along the whole length of the scroll. This, when straightened out, will give the required length on the flat.

In Fig. 1 the socket has three scrolled members. Figs. 3 and 4 give outlines and details of construction. Allowing the candle to be 1 in. in diameter, and the socket $1\frac{1}{2}$ in. deep, we find, on running the string from the centre line to the tip of one of these members, that the length we must allow from the centre will make a radius of about $2\frac{3}{4}$ in. or, in other words, this will be the length of each member from the fixing hole to the end of the scroll. Having set the three lines out on the sheet metal, draw the outlines of the member on a piece of stiff paper to the correct shape; cut it out with a pair of scissors, and lay it on each line in turn, marking round the edge with a strong-pointed tool.

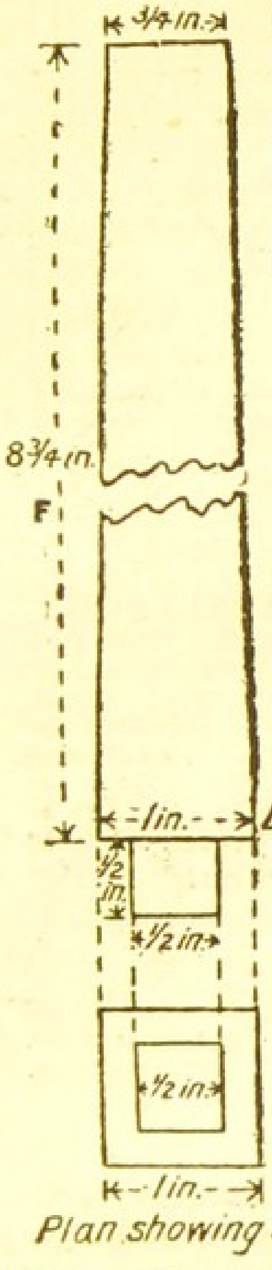
The shape will then be as Fig. 2. When the socket has been cut out, raise the widest part of each member to the shape indicated, and then turn gradually up into shape, starting at the end by hammering into a curve on a piece of round rod held in the vice. This will start the scroll neatly, and the curve is best finished with the aid of a pair of round-nosed pliers. The neck beneath the socket is best made, in the case of iron candlesticks, from gas barrel, and in brass, copper, etc., from solid round metal, filed concave with a small, half-round file, leaving about $\frac{1}{4}$ in. top and bottom, round which is fixed a ring of flat metal. The socket is screwed down on this neck, and if using iron barrel a ball bolt can run right through.

The top part of the body consists of a fairly stout sheet plate about 3 in. in diameter. The legs, which are best made separately to outline, as B, Fig. 4, should be about $1\frac{1}{4}$ in. at top, $\frac{3}{4}$ in. in the narrowest part, and 2 in. wide at bottom, giving it plenty of supporting space on the table. The top should have an extending piece, shaped off ornamentally and turned over, to fit neatly on the plate, with at least two rivets in each. In the waist of the body a round neck should be fitted, to which each leg should be screwed; this will keep the legs in position and will also add considerable strength to them, this being an important matter.

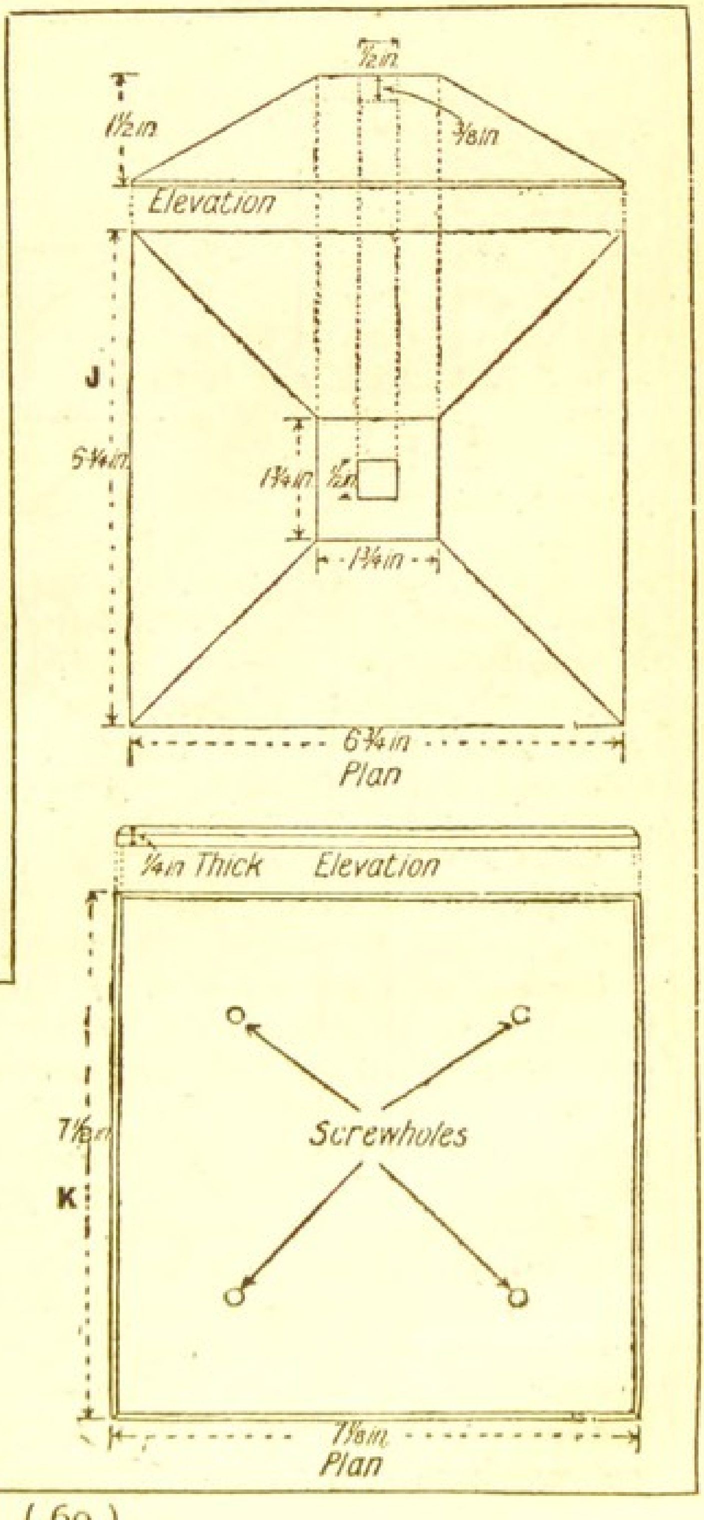
In the design shown in Fig. 5 (Figs. 6, 7, and 8 giving shape and details of parts), the socket is made in the same way as that in Fig. 1, Fig. 6 showing the outline of the piece. The dimensions of the socket, allowing 1 in. for candle and $1\frac{1}{2}$ in. depth, should be, from fixing hole in centre to tip of each member, 4 in. When each member is turned into position a flat surface should be left at the bottom about 3 in, square, It must be understood that these measurements will be sure to vary slightly according to the curves on the drawing,

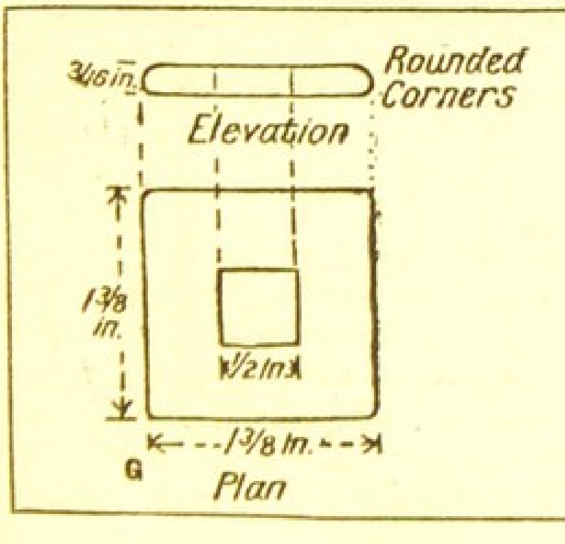
Here again are two necks, as previously described; between these necks we have a ball-shaped ornament, made up of four separate pieces, shaped as C, Fig, 8, Measure these pieces off with string, allowing about $\frac{3}{4}$ in., overlap at each end for fixing; the widest part, in centre, should be $1\frac{1}{2}$ in., and the ends gradually narrowed down to $\frac{3}{4}$ in. Through each neck fix a ball bolt. The feet will look best if made from one piece of sheet metal. Taking the height of the legs to be $5\frac{1}{2}$ in., describe a circle $3\frac{1}{2}$ in. in diameter, letting the legs leave this circle about $1\frac{3}{4}$ in. wide, and diminishing to about $\frac{3}{4}$ in. where the feet touch the table, opening out a little wider in the final scroll.

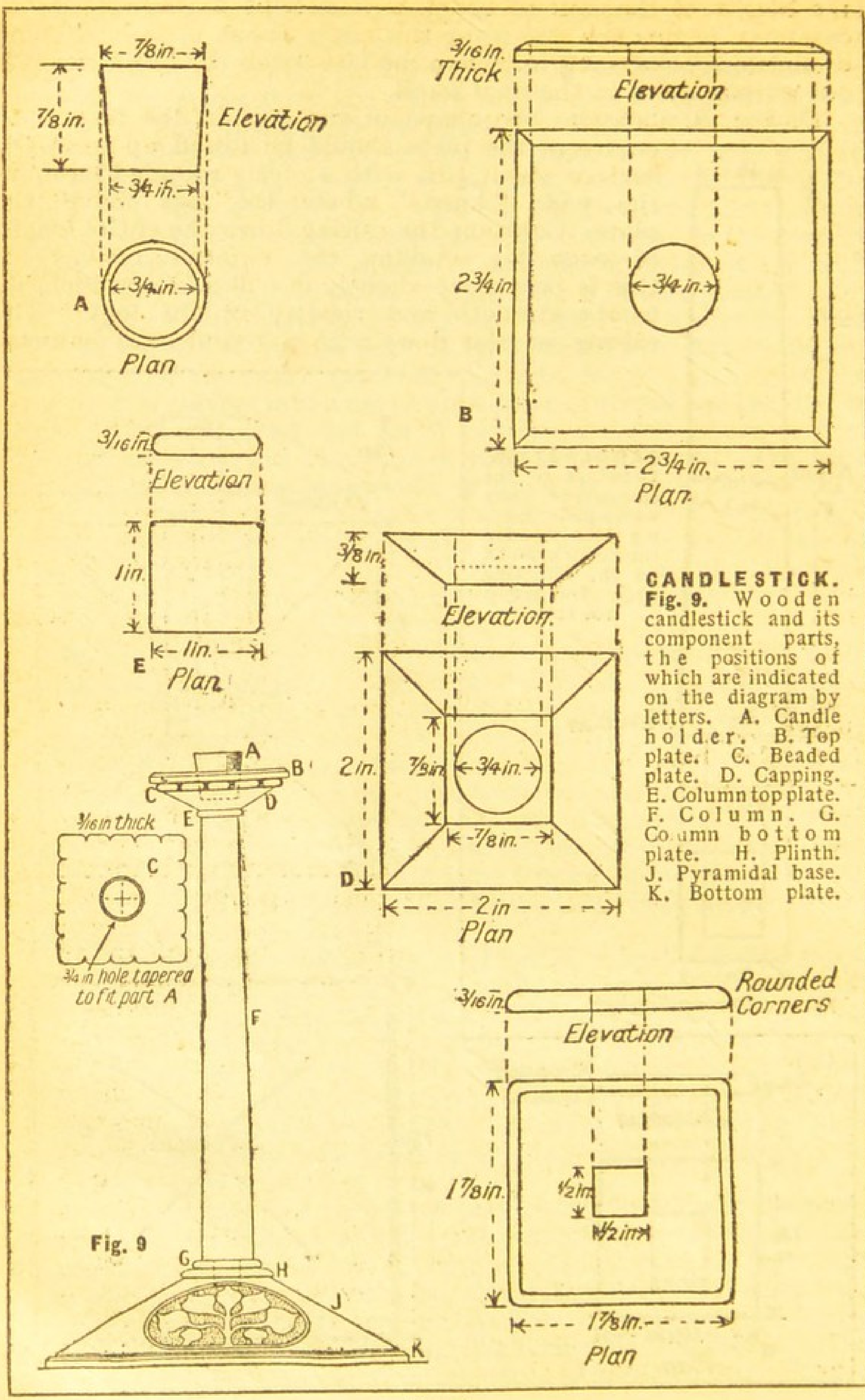
D, Fig. 8, indicates the shape of the legs in the flat. The centre of the plate should be raised up from the surface about $\frac{1}{2}$ in. with a nicely rounded bump in the wide "knee" where the legs leave the plate. Continue the raising down the entire length of each leg, making the exterior convex; if this is only done slightly it will add considerably to the strength and rigidity of the legs. The raising is best done with a round-head hammer



CANDLESTICK. Drawings of the component parts which go to make up the wooden candlestick shown on the following page. For details see text.







CANDLESTICK.
Fig. 9. Wooden candlestick and its component parts, the positions of which are indicated on the diagram by letters. A. Candle holder. B. Top plate. C. Beaded plate. D. Capping. E. Column top plate. F. Column. G. Column bottom plate. H. Plinth. J. Pyramidal base. K. Bottom plate.

on a lead block, and the grooving in the legs by hammering them on a piece of metal with a rounded end, fixed in a vice. Fig. 7 shows one leg which has been removed from the piece for the sake of clearness.

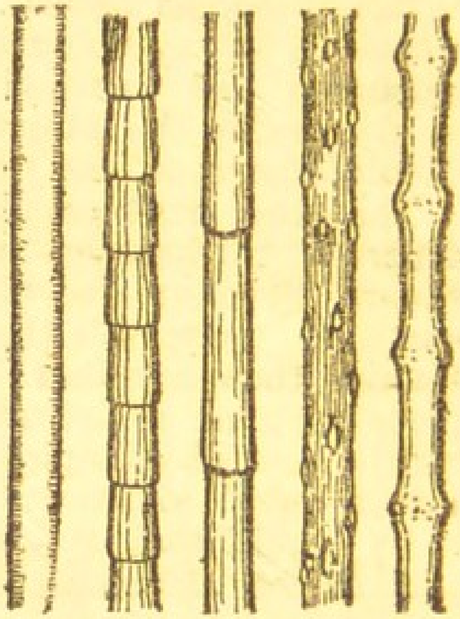
A simple design for a wooden candlestick is given in Fig. 9 and can be made in any wood. If produced in one of the ornamental woods, such as walnut, there will be no occasion to do more than finish it by polishing, but if ordinary deal or American whitewood is used, a good effect is produced by staining it black and applying the coloured design cut from a piece of wallpaper to the base, as shown. Alternatively this can be painted or stencilled in gay colours, and the beading at the top coloured in harmony. The method of construction is simple, and consists in planing up the standard to the required taper and sizes, and shouldering it at the bottom.

The other work consists of cutting a number of rectangles of different thicknesses, as shown, planing them up clean and square, bevelling the base, and cutting the square holes for the standard. Assemble these parts one above the other, glueing and pinning them together. To form the beading at the top, cut this piece to shape, round off the edges and notch it as shown, finishing off the beads by shaping them with a pocket knife. The candle fits into a ferrule of brass tube, $\frac{3}{4}$ in. diameter and 1 in. long; taper it by hammering it upon a tapered piece of iron of circular form.

A further development which the competent house-craftsman can carry out is the making of a simple candelabrum. The design suggested comprises a central standard mounted on a triangular base with three U-shaped supports for the lights attached at the summit. For the standard, use a 1 in. diameter brass tube 15 in. long, and at its base solder a collar to locate the tube in a central hole drilled in the triangular base. The latter is made of sheet brass $\frac{1}{16}$ in. thick and the sides, measuring 9 in., are bent over by hammering them carefully on a block of steel. At each corner a simple curved foot is attached by soldering; these are made of strip brass 1 in. wide and $\frac{3}{32}$ in. thick. The U-shaped supports are made of $\frac{3}{8}$ diameter tube, and after being bent to shape they are filed at a suitable angle at one end ready for attachment by pinning, and silver-soldered to the top of the central standard. At the other end of these supports the candle sockets and grease cups are fitted, the whole method of construction and assembly being on the lines already described in this article. When finally polished and cleaned up at all joints the candelabrum presents a neat and pleasing appearance. It should be noted, however, that lacquered brass candelabra should only be wiped with a soft cloth and sponged with warm soapy water, as polishing destroys the lacquer. The general effect can be enhanced by adding a finial to the top of the central standard. This is done by plugging the latter with a hardwood plug, and screwing into a finial of the type found at the ends of curtain rods.

CANE : The Material and its Uses. By reason of its qualities of lightness and strength, cane has many uses in preference to wood, whether in the form of circular rod or split into strips. Large diameters of rod are used for the framework of light chairs and tables, for cricket bat handles, and similar purposes. Walking-sticks and fishing-rods are often of cane. Small canes are used similarly to willow for wickerwork articles. Naturally flexible, cane is still more easily bent by soaking in hot or cold water, or by the application of dry heat, which prevents cracking and splitting when sharp bends have to be formed.

The split cane is used for purposes where the whole cane would not be sufficiently flexible or would be needlessly thick. One of its chief uses is for the seats of chairs. It can also be very closely woven to form a kind of fabric. The hard outer skin gives great tensile strength to very thin and narrow strips. The interior, or pulp cane, is also strong, and is used in strips for winding round the nailed-together framework of cane chairs and other articles.


CANE. Fig.1. Principal varieties of cane used for furniture

The woven fibre is manufactured into furniture which shows to great advantage when coloured. Besides its use as garden furniture, woven cane of this type can be utilised in nurseries, bedrooms, and country living-rooms, as it can be procured or painted to tone with any colour scheme.

Cane furniture has much to recommend it, for in addition to its durability it is easily and quickly cleaned. It does not collect dust so readily as upholstery, and may be washed with warm water and a scrubbing-brush, or with the garden hose. It is important that cane furniture should not be too springy, since the spring only lasts a short time, and in order to obtain it a good deal of strength has to be sacrificed.

The weight is another test of quality, the heavier furniture betokening a strong frame. When buying cane furniture special attention should be paid to the finish round the top and arms of the chairs, etc. In properly made cane all this is woven and has no plait or beading fixed on with tacks.

There are different varieties of cane, as seen in Fig. 1. The outer skin is retained for all purposes where strength is desired. The cane used for the back and seat of chairs is narrow strip, consisting chiefly of the outer skin, and can be bought from most basket makers and furniture repairers.

How to Re-cane Chairs. In the course of time chairs require re-caning, as the cane gets strained and slack and breaks in places. The new cane should be soaked in water for about 24 hours before using. This not only makes it more pliable,

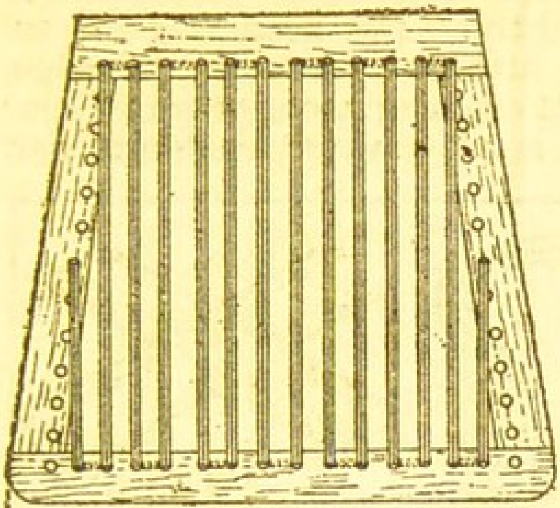


Fig.2

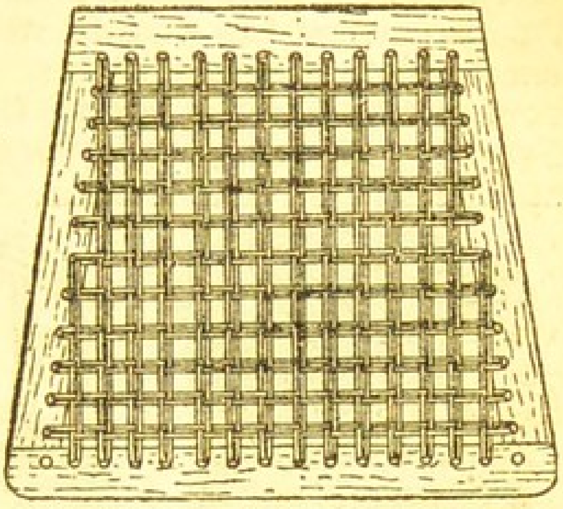


Fig. 4

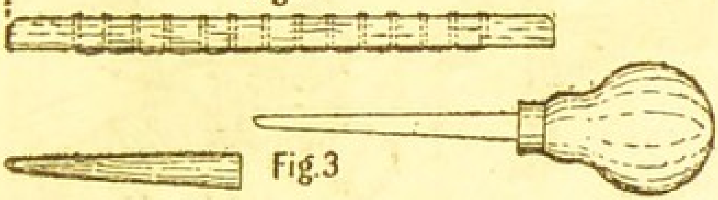


Fig.3

CANE. Figs. 2-8. Diagrams illustrating stages in re-caning a chair

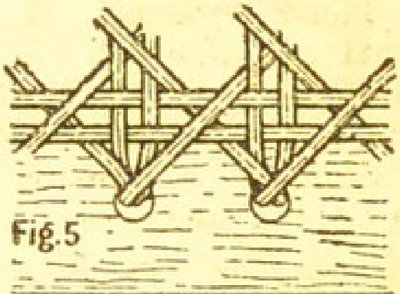


Fig.5

but it gets swollen by the water and dries and shrinks after the work is completed, and this strains it tighter than would otherwise be possible.

The work usually commences by removing the old cane from the seat. A portion may be cut out and kept as a pattern for reference in case there is trouble in lacing correctly. All round near its inner edge the seat has a row of holes, about $\frac{3}{16}$ in. diameter, and $\frac{5}{8}$ in. apart. In some of these wood pegs will be found wedging the cane, and these must be punched out.

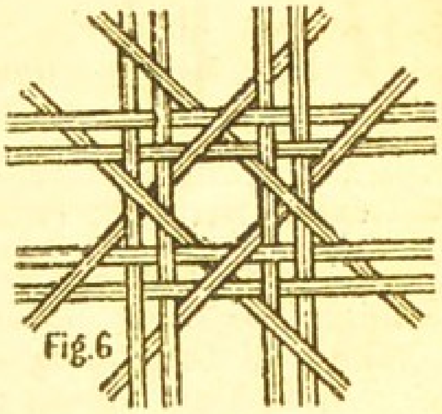


Fig.6

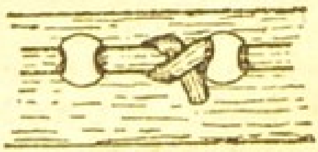


Fig.8

The worker should begin the new lacing by putting in double strips of cane from back to front of the seat, as in Fig. 2, the rounding or glossy side of the strips being kept uppermost. The dotted lines show how the strips pass beneath from one hole to the next. A steel awl and a

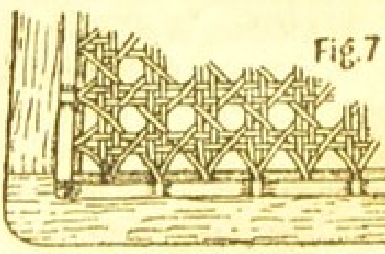
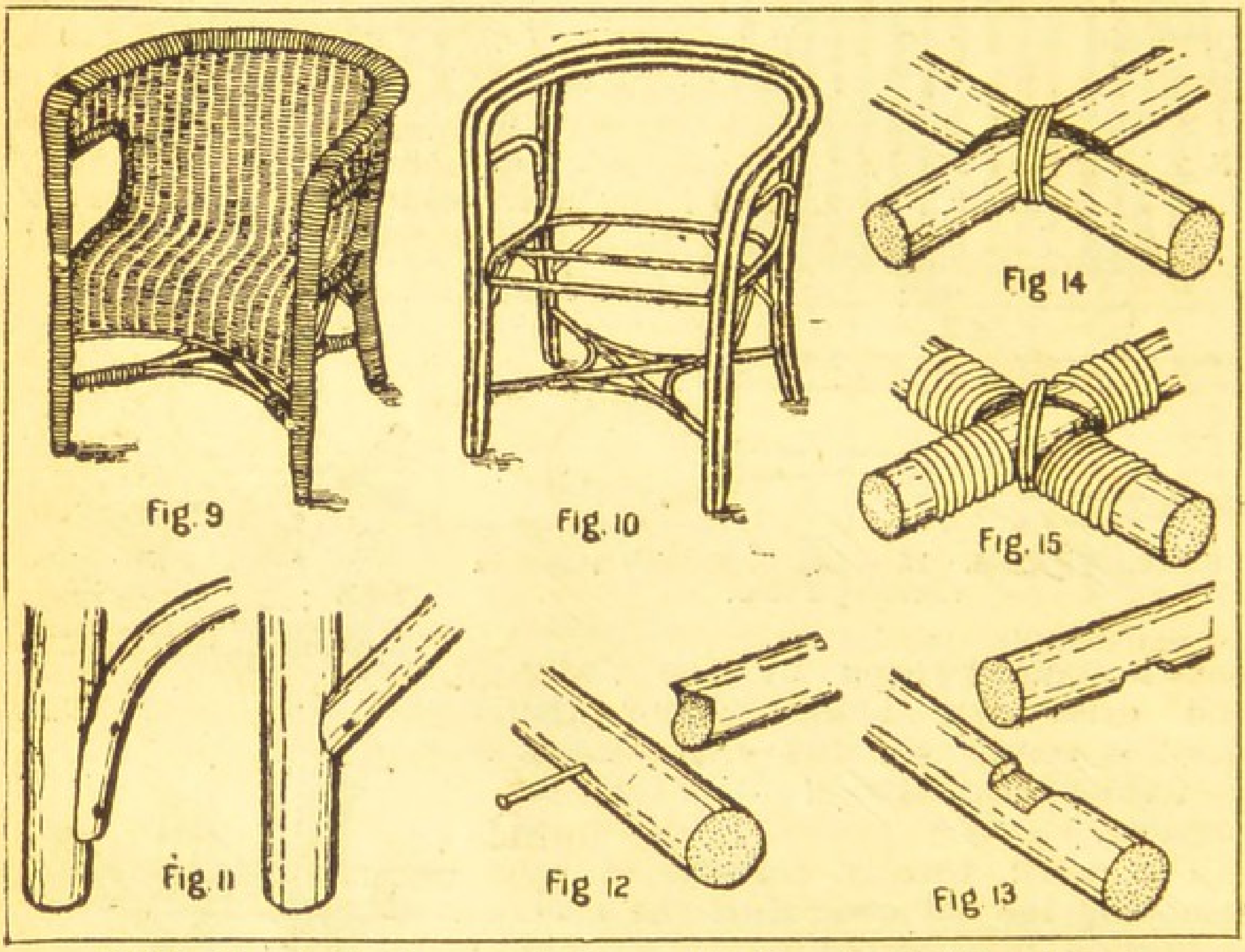


Fig.7

number of tapering wood pegs (Fig. 3) are used for temporarily holding the cane at each hole, while it is strained across the seat to the next.

Then the lacing at right angles to this is put in similarly, except that it goes under and over alternately, as shown in Fig. 5. This separates the double strips slightly. The next stage is to insert single diagonal strips. These also pass beneath the edge from one hole to the next. Details of crossing are shown in Figs. 5 and 6. As seats are not square, it is not always possible to get



CANE. Figs. 9–15. Processes in the construction of a chair in pulp cane

geometrical accuracy around the edges, and canes must be put through the most convenient holes.

When all the lacing is done, alternate holes are permanently pegged, and an edging of wider cane is put round on top of the seat to cover the holes. It is pegged in at the corner holes, and tied down (Fig. 7) with cane at the alternate holes, which have not been pegged, the cane passing from one hole to another beneath the seat. Where lengths have to be joined the cane is tied with an ordinary knot, as in Fig. 8.

Making a Pulp Cane Chair. The pulp cane chair in Fig. 9 consists of a framework, as in Fig. 10, of thick cane or willow rod, roughly fitted together and nailed in the first place and afterwards strengthened, as well as given a neat appearance, by the pulp cane binding which is wound around the joints and rods, and forms a woven or laced fabric in the spaces which have to be filled.

There is a great deal of variety in such chairs, both in design and details of construction.

In the framework of these chairs two rods are often used side by side instead of one. They need not depend entirely on the binding for holding them together, for they can be nailed. Smaller members joining main ones, as in Fig. 11, are nailed first and bound after.

Where joints occur, the parts are usually cut more or less to fit each other. Fig. 12 shows an end of one rod hollowed to fit the side of another. A nail would usually be driven as shown, and afterwards strands of split cane might be wound round both. Rods crossing each other at right angles would generally be notched as in Fig. 13. Sometimes they are brought into the same plane by cutting away half the thickness of each, but usually the amount cut away is less than half. They may be bound as in Fig. 14, with simple diagonal binding at the joint only, or the strand used may be continued along the rods, Fig. 15.

CANVAS : Its Domestic Uses. Many different kinds are made, and the name is loosely applied to many rough, heavy plain cloths woven from hemp, flax, and cotton fibres. In packing-canvas nothing beats the old-fashioned hemp for durability, but it is so much dearer than jute-hessian that it is little used. Jute frays more easily than hemp and does not stand sunlight or damp so well.

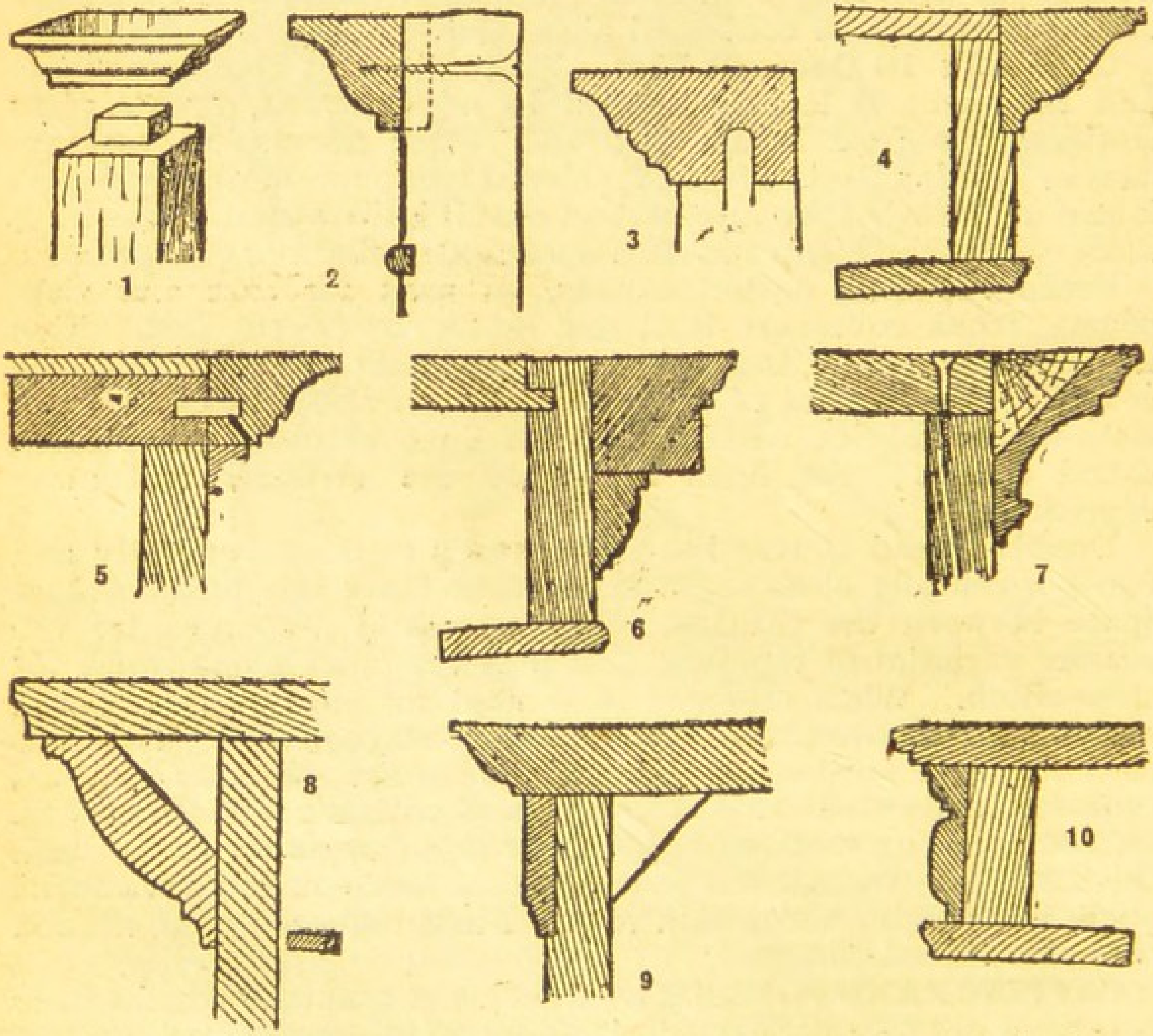
Green rot-proof cotton canvas, as used for cart and rick-covers, trunk coverings, boat and motor-car covers, in addition to being waterproof, is immune against insect pests, for its green colour is due to salts of copper. Sailcloth and tent-cloth, both close-woven fabrics, and made from linen or cotton, are often called canvas; the linen kinds are the stronger and more expensive.

Double-thread canvas has two threads running vertically and two horizontally close together, so that there is a small square space between the threads. This canvas is employed for the coarser varieties of tapestry, and it is the chief groundwork for cross-stitch. When stiffened it is used for tops of stools, and cushion covers, worked in silk and wool respectively. It is also used for bead purposes and bags. There are also two varieties used for home-made rugs, the first size with a mesh about ⅛ in. for ordinary rug wool, and the larger size canvas for cable wool. On the latter, though not much in use, home-made rugs can be made to resemble sheep-skin rugs. Finer embroidery is worked on single thread canvas.

CAPPINGS AND CORNICES. When the amateur woodworker is setting out an article which is about to be constructed, special regard must be paid to the finish that a suitable capping or cornice will give to the assembled effect. Too frequently any section that may be ready to hand is worked in without the slightest attention to its suitability.

In fitting cappings, these may be finished with plain square edges, or the edges may be rounded, nosed, or thumb-moulded ;

or, again, the edges may be beaded or have a bevel taken off the upper or lower edge according as this is below or above the edge when fixed in position. Generally speaking, however, a three or more membered mould will give a distinctly enhanced effect. The simplest form of capping is that used as a terminal finish for posts, and frequently employed in the construction of bedstead ends. As indicated in Fig. 1, the caps on a 2 in. by 2 in. post finish about 4 in. by 4 in. square by $\frac{7}{8}$ in. thick with a flat top. This portion is improved by a raised and rounded finish, for which purpose a 4 in. by 4 in. square of $\frac{1}{4}$ in. thickness is glued on to the flat, or the detail can be finished from material $1\frac{1}{4}$ in. thick net. These cappings are best fixed with a stub tenon cut on top of post to enter a corresponding mortise in capping, but three small dowels can be utilised instead. One dowel is a mistake, as the capping will be liable to twist out of the square.



CAPPING. Patterns described in the text, showing in section methods of attachment and other details

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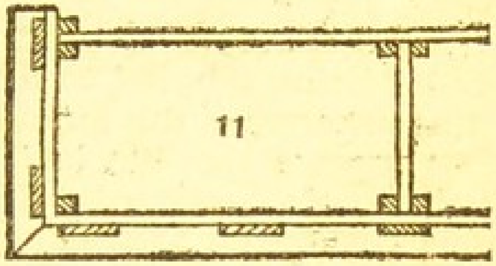
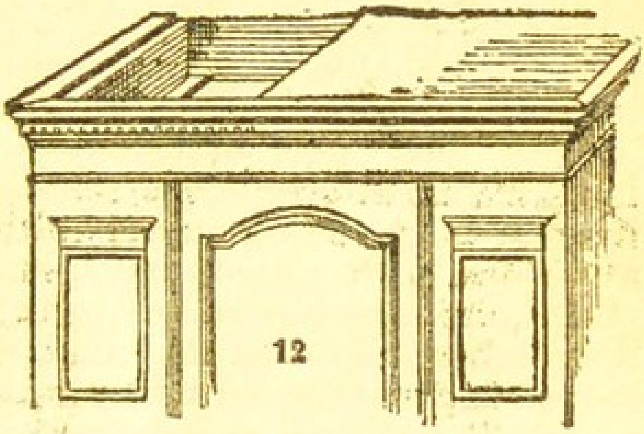
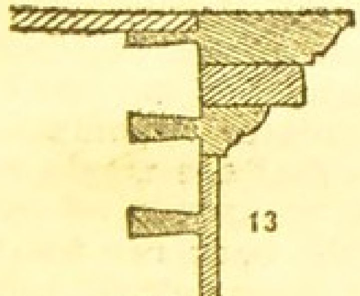
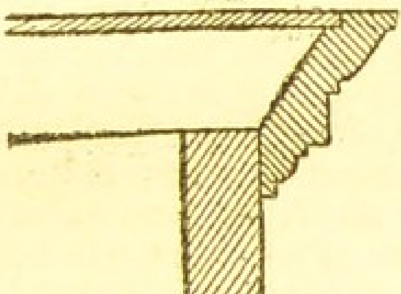
The capping mould, often seen at the back of a hall table or dinner wagon or on the top of a washing-stand back, is sometimes fixed to the face of the rail, and in other instances (when below the level of the eye) is fitted to the top edge of rail. In the former case it may be glued and pinned into position, but is better screwed from the back (Fig. 2), and either mitred or returned on itself at ends with the chisel. Better work may have the section rebated into the face of rail, as indicated by dotted line. When fitted to top edge, the capping is dowelled on as Fig. 3, flush at back, and with a projection of $\frac{3}{4}$ in. or $\frac{7}{8}$ in. at front, according to the section in use. The bead grooved in below the capping mould in Fig. 2 is often added when a shelf is not provided above the tiles or marble panel of a washstand back. If well above the eye, the capping (Fig. 3) might be screwed instead of being dowelled into position.

METHODS OF FIXING MOULDS. The cornice mould of a well-made article of minor dimensions would probably be worked on the edges of a solid top of $\frac{3}{4}$ in. or $\frac{7}{8}$ in. thickness, whilst in common, hastily constructed work it is often merely glued on or pinned on. A neat method is that indicated in the section, Fig. 4. The mould is let into the frieze rail about $\frac{1}{4}$ in., and a $\frac{3}{8}$ in. top fitted into the rebate formed by the rise of the mould beyond the top edge of rail. Another method is shown at Fig. 5, the mould being tongued to a lining slip behind it to form a rebate for a dustboard to drop in and be screwed. Either of these methods could be applied to a wall cabinet as well as to cupboards of larger size.









CAPPING. **Figs. 11-14.** Types of loose cornices for fixing on large furniture.

In some forms of cabinet work the cornice and frieze may be built up in the manner indicated at Fig. 6, the top being housed into the frieze rail, and the frieze mould mitred at corners out of slips about $2\frac{1}{4}$ in. by $\frac{1}{4}$ in., glued to under edge of frame. Stock moulds may be obtained from the furnishing wood yards, the whole section of which, as at Fig. 7, is cut out of 1 in. material or less, to be glued into position on the cornice framing. Such a section is sometimes completed by glueing a lining slip behind in the angle formed by the pitch of the mould;

in other instances it will be held by angle blocks at intervals of 9 in. or so apart. The top is shown as screwed down to the framing, and the method with lining slip is suitable for an article such as a china cabinet. Below eye-level a solid $\frac{3}{8}$ in. or $\frac{1}{2}$ in. top to overlap had best be provided, to be glue-blocked under into position. The entry-holes of screws are unsightly, and, even when well-stopped, tend to show through the surface finish owing to shrinkage of the wood.

Another fixing for the upper mould is that given at Fig. 8, the top being made to project beyond the carcass sufficiently to cover the pitch of the section below it, which is glued into position above and below. Such a section would be suitable for a dwarf linen cupboard of Jacobean type.

An instance of a solid top mould is given at Fig. 9, the rail under being rebated to receive a lining flat of $\frac{3}{8}$ in. material or so, thus extending the mould with a sort of frieze effect. Framing and top are glue-blocked behind, and the section is very suitable for an oak cupboard. In the section at Fig. 10 this method is developed, the arrangement being useful where it is desired to achieve a carved frieze effect after the Jacobean style.

LOOSE CORNICES. Loose cornices separately made to be easily detachable from bulky pieces of furniture (such as a wardrobe) are usually fixed into position by means of glued blocks on the upper part of carcass. Cornice and frieze moulds are mounted upon a separate framing. In cheap work the framing may be found to be merely mitred and nailed together at front and sides, with a glued block in the inner angle. A back rail is nailed and glue-blocked at back to hold the whole thing square, a stretcher rail being also similarly fitted in centre. The cornice mould is glue-blocked into position and nailed, and a dustboard is usually omitted, as indicated in the part plan (Fig. 11).

A sketch of a loose cornice is given at Fig. 12, showing it in position on wardrobe carcass as viewed from above. Height over all may work out at $4\frac{1}{2}$ in. to 6 in., according to detail. The method of dovetailing front and side rails of framing is given at Fig. 13, and from this it will be seen that the mould is mounted higher than the front and side rails to form a rebate for the dustboard top. The side rails have the back rail fixed to them by means of a housed dovetail, and the stretcher rail between front and back rails by means of a dovetail into each. If properly done the whole thing should be thoroughly firm when glued up. The through-dovetailing is masked by means of facing slips of the hardwood in use ($\frac{1}{4}$ in. thick or so), glued on after mitreing at corners. The width of these slips is determined by the height of the cornice mould which beds upon the top edge of them. Another effective method is to pitch the cornice high (Fig. 14) and rebate it to receive the dustboard.

When fixing a cornice mould, in cramping up after glueing it will be necessary to use a suitable block to fill the space caused by the pitch or projection of the members between the jaws of the hand-screw. Where the flat member, often dentilled, exists, a square slip of necessary size will suffice, but in other cases it may be necessary to scribe the block to prevent it slipping when pressure is applied. It may be found that use can be made of a spare cut of the mould in use for that purpose, possibly with a layer of felt between to avoid bruising any points of contact.

CARPETS, Repairing. When a carpet is in need of repair this work may be entrusted to the firm from which it was purchased; but if amateur workers should desire to attempt repairs themselves, the following hints may be useful. A supply of the raw material is necessary; cotton, linen, jute, and worsted or woollen yarns, the latter in the same shades and of approximately the same thickness as those used in the manufacture of the carpet, should be obtained, and stout needles of a suitable size.

If the back of the fabric has been destroyed, it will be necessary in the first instance to sew in carefully threads representing warp and weft. This done, the pile surface may be sewn on, in different styles, according to the nature of the fabric. Occasional stitches present no difficulty, but if a patch of even 2 or 4 sq. in. in a patterned pile carpet has been burnt, considerable care and skill will be required to restore the correct design and colour.

In the case of a Brussels or tapestry carpet the missing threads are replaced by others sewn round wires, which represent the original wires in the loom. With Wilton or Axminster the tufts are sewn into the back, and cut off with scissors on a level with the existing pile surface. Tapestry velvet can be treated similarly.

Chenille Axminster occasionally suffers from breakage of the fine cotton threads which hold down the fur of the pile. If the fur is not lost or destroyed, it can easily be sewn down again; but if it is lost, it is hardly possible to obtain any of the correct pattern of the fur, and the next best thing is to sew in tufts as in Wilton or Axminster.

Repairs to a machine-knotted carpet, or to one which shows the pattern on the back, to be done correctly involves sewing the tuft yarn right through the body of the fabric. Repairs to the coarser types of hand-tufted carpets may also be made in this way, but repairs to a fine Persian carpet should not be attempted by the amateur. For cleaning carpets special soaps are used. To revive the colour rub with a cloth wrung out in a solution of vinegar and warm water—a gill to a quart of water.

Small holes or scorch marks caused by burns from cigarettes, acids, etc., can often be mended at home with darning wools to match the colours of the pattern of the carpet. Sometimes this involves the use of several strands of different colours, but when carefully done the result is worth the trouble, since the darned portion can scarcely be distinguished from the rest of the carpet. A strong darning needle, or a small-sized carpet needle should be used, threaded with double strands of wool. A small back-stitch or tent-stitch is the most suitable for this purpose.

CASTING IN IRON, LEAD AND BRASS

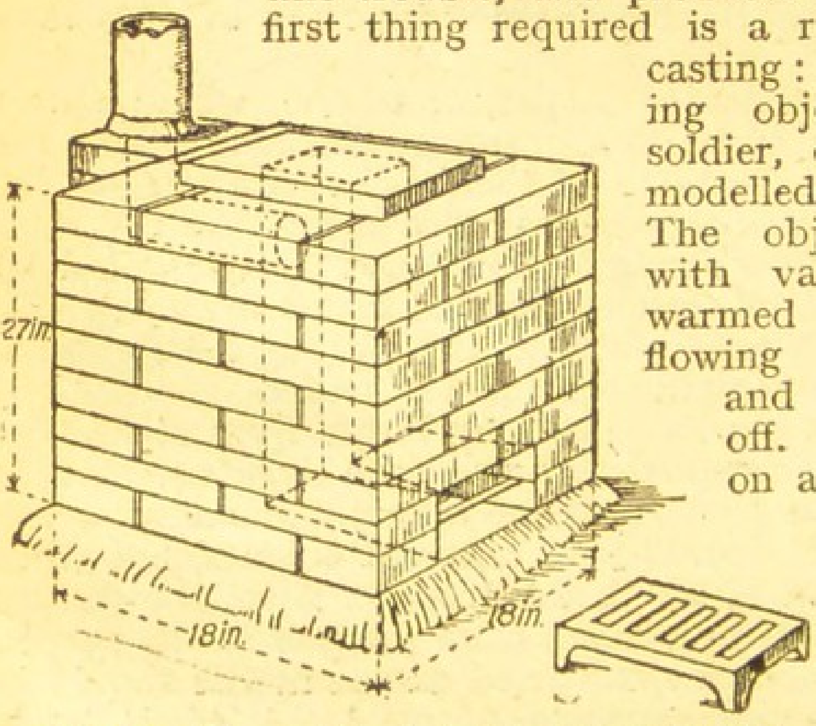
Methods and Equipment for the Amateur Metal Worker

A knowledge of this subject will help materially in making many of the articles described in other pages of this work

While casting in iron can only be done effectively in a foundry, the non-ferrous metals like lead and brass offer plenty of scope for the amateur who has provided himself with the necessary tools, which are neither numerous nor costly. For casting in lead, one or two iron ladles, a wire skimmer or spoon for removing the dross and a few simple modelling tools are all that are necessary. The lead can be purchased from most ironmongers or plumbers, as can the fine plaster of Paris used for the moulds. For casting in brass or aluminium a furnace is necessary. The addition of a few plumbago crucibles, a pair of crucible tongs, moulding sand, and flasks or moulding boxes, complete the equipment.

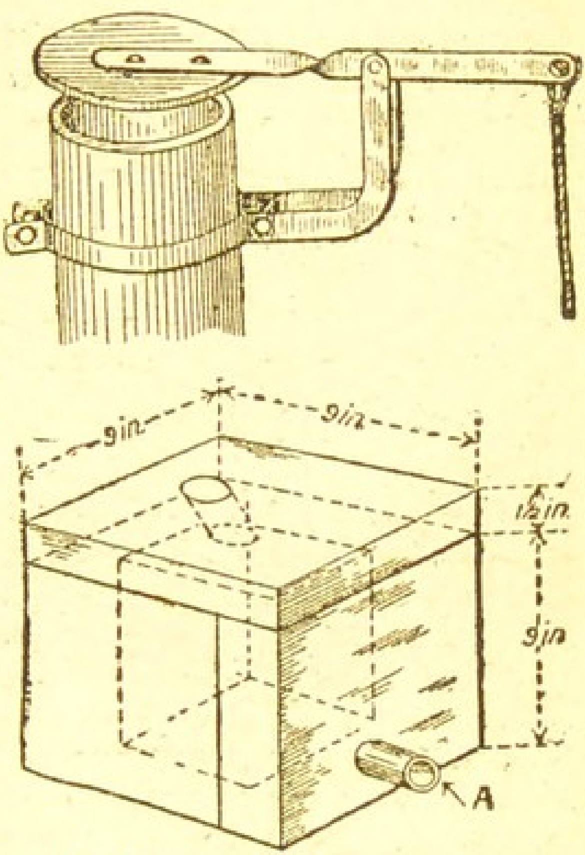
Casting in Lead. For first attempts at casting the amateur will be well advised to use lead or type-metal. Wooden moulds can be used, and the lead melted in an iron ladle over the kitchen fire. Cast lead panels or plaques can be modelled in wax or plasticine, and cast in plaster moulds, the lead casting being carefully scraped wherever any rough edges or faulty places develop. Almost any simple article can be made after first planing up some soft wooden blocks of appropriate size.

In making a wood mould of an article to be cast, some skill in woodworking is required, since the mould must be a replica of the article itself in reverse, and a core must be provided if the article is hollow. The following system avoids a great deal of this trouble, and produces excellent results. The first thing required is a replica of the desired casting: this can be an existing object, such as a toy soldier, or the article can be modelled in wax or plasticine. The object is rubbed over with vaseline, then slightly warmed to ensure the vaseline flowing into every crevice, and the surplus is wiped off. Next stand the object on a piece of glass, a tile, or a smooth board, well greased, and make up some plaster of Paris into a thick paste. This is best done by putting some cold



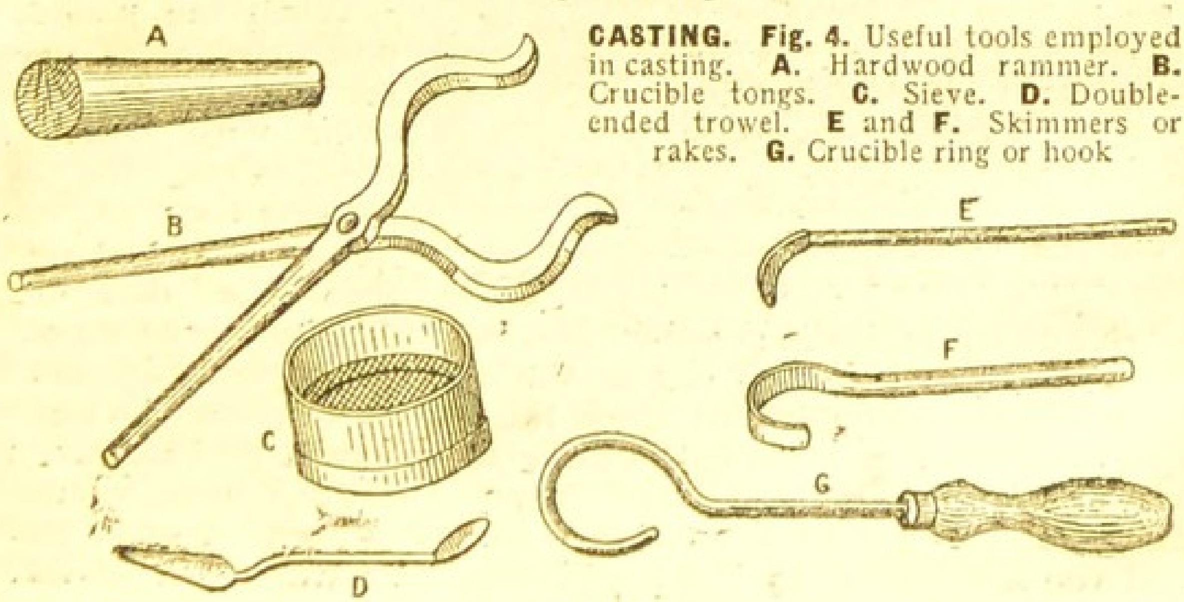
CASTING. Fig. 1. Simple brick furnace suitable for melting brass or small quantities of iron water in a bowl and sprinkling the plaster on to it, stirring the water gently all the time and always in the same direction. Continue adding plaster until the mixture is thick and sticky (like clotted cream, but not so thick).

Heap the plaster up and around one-half of the model, keeping the plaster in place with a temporary wall of clay or plasticine which has been previously built up. Allow the plaster to set, which will take about twenty minutes or less, remove the clay and the model, and clean up the surface of the plaster to a flat face, using an old table-knife. Drill two or three holes into the body of the plaster, and fix into it little wooden pegs with rounded ends. These should protrude about ½ in. from the face of the plaster, and enable the two halves of the plaster mould to be put together in proper register. Replace the model, vaseline the face of the plaster, and well vaseline the pegs. Then build up the other half of the mould with plaster as before.



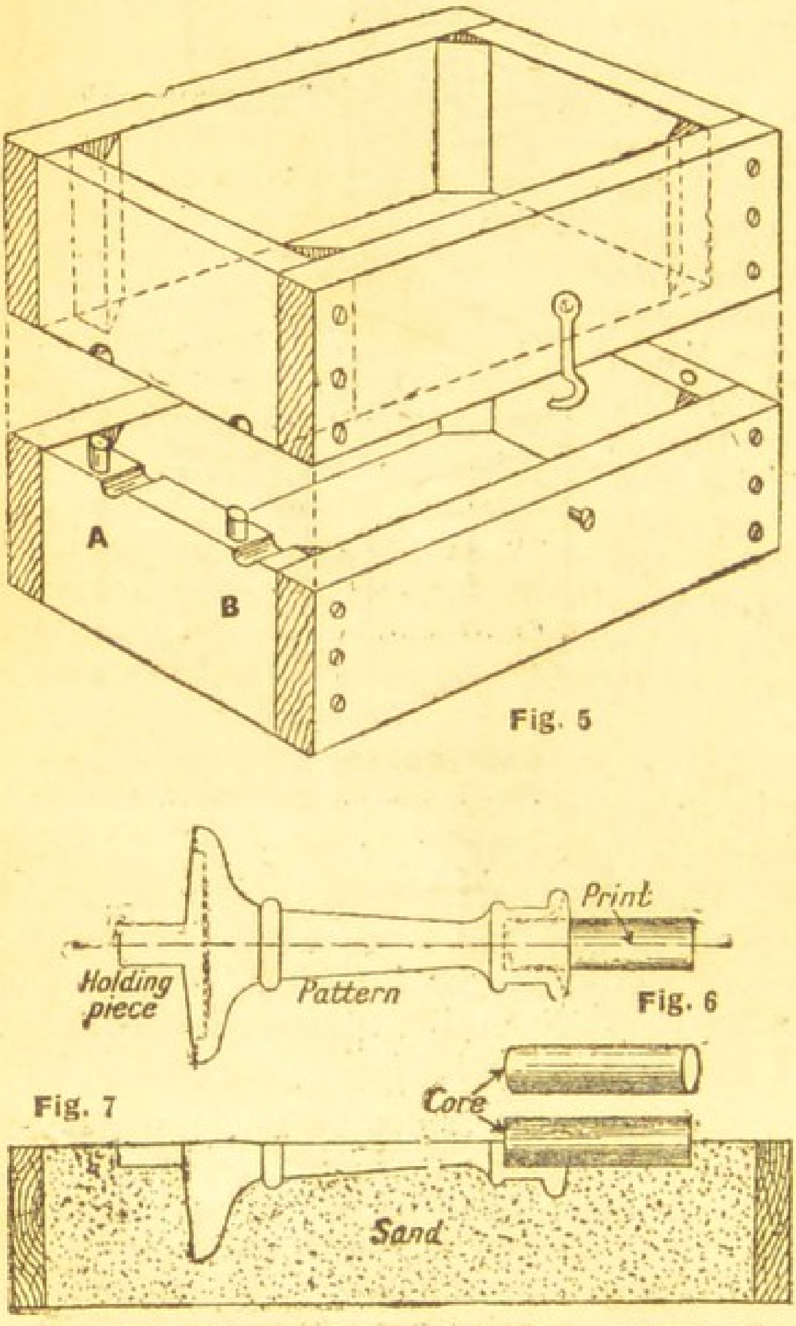
CASTING. Fig. 2. Furnace damper. **Fig. 3.** Simple gas-heated furnace

To cast from such moulds, remove the model, wipe off as much of the oil from the vaseline as possible, and coat the interior with powdered blacklead. Then tie the two pieces of the mould together with string and pour in the lead from what will be the bottom of the model. Some elaborate models will require the moulds in three, four, or more parts to enable them to be removed from the casting without being damaged.



CASTING. Fig. 4. Useful tools employed in casting. **A.** Hardwood rammer. **B.** Crucible tongs. **C.** Sieve. **D.** Double-ended trowel. **E** and **F.** Skimmers or rakes. **G.** Crucible ring or hook

When it is desired to make a hollow lead casting, it can be done in one or two ways. An ordinary mould can be made, the lead poured in, and immediately poured out again. As the skin or surface in contact with the mould is the first to chill and set, only the interior parts will be molten, hence a more or less hollow casting is the result. A similar method is used commercially for casting lead toys and for similar purposes. Disadvantages are unequal thickness in the casting, frequent distortion, and a tendency for holes to form in the outer surface.



CASTING. Figs. 5–7. Moulding box, pattern and core for casting an aluminium candlestick

A better plan is to make a rough plaster model, somewhat smaller than the finished model, then to coat the exterior with dental modelling wax, and shape this to the desired form with modelling tools. Three or four wires are then driven partly into the model in the least conspicuous places, and the composite model coated with plaster as before, except that the whole model is entirely covered, the only openings being the venthole for the exit of air and the gate for entrance for the molten metal.

When the plaster is quite dry it is placed in a dish in a hot oven with the gate downwards, the heat melting the wax, which flows out of the mould into the dish. The plaster core remains in position, as it is held firmly by the wires. A space must be hollowed out in the wall of the mould around the gate to form a trough into which the molten lead may be poured. The lead flows into the space hitherto occupied by the wax, and when cool the mould is broken open and the casting removed. The plaster in the interior can be chipped out with a small chisel, and the holes made by the pegs closed up with a spot of solder.

It will be seen that this system requires an opening somewhere in the casting to enable the plaster to be removed ; generally this can be arranged under the feet or at the back. When using plaster or metal moulds, it is desirable thoroughly to warm them before introducing the molten metal.

CASTING IN BRASS. A simple furnace suitable for melting brass or small quantities of iron is illustrated in Fig. 1, and can readily be made from bricks. The furnace is 18 in. square, built with nine courses of bricks set in cement on a concrete foundation 4 in. thick. The interior is lined with fireclay, poured in when wet, and is formed by means of a wooden core or box 6 in. square : the flue is similarly cored with a $3\frac{1}{4}$ in. diameter wooden block. At the back of the furnace other bricks are set up to support the chimney, which is made from 4 in. diameter stove pipe. and is 24 ft. high, for which reason it is desirable to place the furnace outside the house and against a solid brick wall to which the chimney is attached.

The grate is made from a regular stock cast iron fire grate and is supported on two bars of iron built into the brickwork. The top of the furnace is closed by a fire brick 12 in. square and 2 in. thick. All joints are made airtight with fireclay. In use, a fire is made with gas coke worked up thoroughly hot, the furnace again filled with coke, and the crucible set in position on top of the fire. The lid is then placed on the furnace top and luted or made airtight with fireclay. A damper at the top of the chimney is a convenience in regulating the fire, and is operated by a long wire, as in Fig. 2.

Such a furnace should melt 5 lb. of cast iron in $\frac{3}{4}$ of an hour, brass being melted in much less time. After every heat the fire grate must be pulled out and the slag cleaned away with a rake or scraper, as if allowed to cool off it will adhere to the lining of the furnace and be difficult to remove.

Where gas is available a very simple furnace can be rigged up by using the gas blow pipe as a heating medium. The furnace is simply built up from fireclay bricks, well jointed with fireclay and with a lid and a bottom of the same material, as in Fig. 3.

The lid has a small and slanting hole about $1\frac{1}{2}$ in. in diameter cored through, and a hole is left in the side of the furnace to receive the nozzle of the blow pipe. The gas is then turned on and lighted, the bellows operated steadily, and the gas adjusted until the flame entirely fills the furnace and flares out of the hole at the top.

Useful tools for handling the crucibles are illustrated in Fig. 4, and can all be made from wrought iron. The tongs have curved ends to encircle the crucible, the two rakes are for skimming the dross off the top of the metal, and the circular tool with a handle is used to assist in holding the crucible while pouring the metal into the mould. A fine wire mesh sieve is needed for sifting the sand before mixing, also a small trowel and a few modellers' spatulas are useful in order to make good damaged places on the mould.

Moulding sand can be bought ready for use, but some ordinary fine building sand obtained from a builder's yard can be used for early work. It is prepared by drying and sifting through very fine wire sieve, then damping with water and thoroughly mixing on a piece of clean board into a moist mass. As a test of suitability, take a lump of sand in the hand, squeeze it tight and on opening the hand if the mass shows no tendency to crack or fall to pieces, it can be used for moulding, otherwise add 5 per cent by weight of clean, thoroughly dried clay, which has previously been pounded with a hammer and sifted through the fine sieve. After mixing, damp the material to make it cling together. Moulding boxes can be made from wood 1 in. thick, just like an ordinary lidless box but with triangular corner pieces glued and nailed to the inner corners. (*See* Fig. 5.) They can be any suitable size and are made up solid and then sawn asunder. The ends should have dowel pins or guides to make them register properly; the parts are kept together with a hook and eye on each side. Note the holes (A and B) drilled to act as a gate for pouring in the metal, and for a vent which allows the steam or gases to escape.

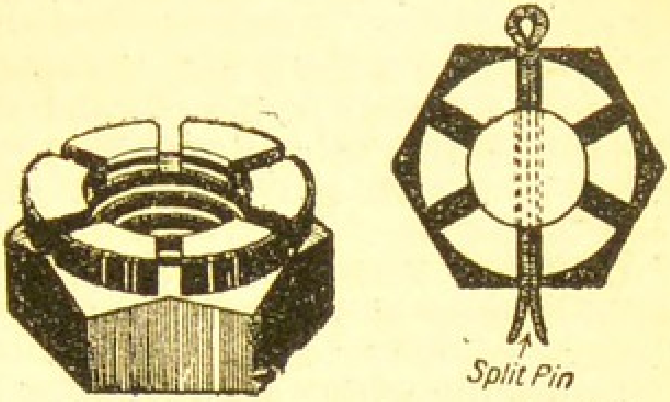
In use, the wooden frame is laid on a wooden baseboard and filled with damp moulding sand rammed in tight and levelled off flush with the sides. The model or pattern is now pressed into the sand until half the pattern is embedded, and the surface is then finished off level with the sides. Place the top box on the lower one, sprinkle the surface of the sand in the lower box with dry parting sand, that is finely powdered fire-brick dust, and then fill the top box and ram home the sand.

Preparing the Mould. Separate the two, remove the model or pattern by rapping it with a stick, dust the surfaces with fine charcoal, cut a passage way to the gate, and another to the vent, also drive a knitting needle through the sand in one or two places from the cavity formed by the pattern, these to act as additional air vents. Replace the top box, and clamp them both together, then pour in the molten metal. The brass casting will come out much cleaner if a little powdered resin is sprinkled over the mould faces prior to replacing the top box.

The amateur can use new brass obtained from the metal merchants. Ornamental drawer handles, door fastenings, keyhole plates, and similar cabinet fittings may be cast in brass. A number of small models might be cast together in the same box, the cavities being joined by a channel to allow the molten metal to flow from one to another. The thin bonding piece thus produced is easily removed when the casting is cold. Aluminium is cast in much the same way, but larger pouring gates and ample air vents are needed. The metal should not be overheated, and should be poured as soon as properly melted.

Plaster casts can be made in plaster or wood moulds. The plaster is mixed to the consistency of thin cream and poured in the same way as if it were metal. The moulds must be well oiled with lubricating oil prior to putting in the plaster. The surplus oil is poured out before casting.

In Fig. 6, there is shown a pattern of a short candlestick cast in aluminium. It should have the base recessed so that it will stand steadily on a surface that might not be quite flat; the top should be hollowed slightly, so that the melted grease will not run over the edge. In the sketch, the outline shows the pattern itself, and the heavy dotted lines show the details of recessing the base and candle holder. The candlestick is best finished by turning in a lathe, and therefore a piece is shown projecting from the base, to be held in a self-centring chuck; or for a carrier to be put on it and the candlestick held between the centres of the lathe.



CASTLE NUT. Left, nut removed. Right, nut in place on bolt with split pin inserted but not fully bent over

The projecting piece at the other end is termed a print, and will not appear in the casting, as it produces the hole for the candle. The faces of both ends are slightly conical to allow the pattern to leave the sand easily.

A core is now required. It should be of the diameter of the print, and its length should be that of the projecting print plus the depth of the hole required in the top of the candlestick, shown by the dotted lines. This core can be made out of ordinary bath-brick sawn and filed to the required shape. When the pattern has been taken from the sand, the core is placed in the impression which was left by the print, and butting against its end. The melted metal will flow round the core, and this will produce the hole for the candle. The print should not be made any shorter than shown, or the melted metal might float it up. When the casting is taken from the mould, a metal plug can be fitted to the hole, so that the work can be centred to run true in the lathe, and it can be turned all over. The base can be turned flat and recessed, and then with a pointed tool the projecting piece can be parted off. *See* Figs. 6 and 7.

CAST IRON. Although one of the cheapest metals, cast iron is of little use to the amateur worker, except in the form of small castings for the construction of little engines and other mechanism. It is widely used for all kinds of domestic appliances, from drain pipes to gas stoves, and, being brittle, must not be struck with a hammer. It can only be satisfactorily repaired by autogenous or acetylene welding. In drilling holes a hand-drill or brace and a sharp twist drill are employed, but no lubricant must be used upon the drill; if it shows a tendency to heat, it should be cooled with a few drops of water.

CASTLE NUT. This is the name that is given to an engineer's nut having a projecting portion which is slotted; it is secured by a split pin, inserted through a hole drilled in the bolt. The provision of six slots enables the nut to be tightened up to a nicety, $\frac{1}{6}$ of a turn sufficing to bring a slot opposite the hole in the bolt.

To unscrew a castle nut, the split pin must first be removed by bending the ends of the pin and straightening them as much as possible with the pliers. The pin is pulled out with a pair of pliers or a split pin extractor. The nut can then be removed with a spanner.

CASTOR, Fixing a. The castors mostly used comprise the socket, screw and plate sorts; to these may be added bedstead leg and truck castors and glides.

In dealing with a socket castor (Fig. 1), not only must height be carefully observed, but the diameter of the socket at its mouth, because any difference in this part will mean either packing for a size too large, or paring the wood if too small, in both cases inadvisable to attempt. It often occurs that a screw castor (Fig. 2) will break, and that the stump of the crew will remain in

CASTOR. Fig. 1. Socket castor. **Fig. 2.** Screw castor. **Fig. 3.** Roller-bearing plate castor. **Fig. 4.** Ball castor.

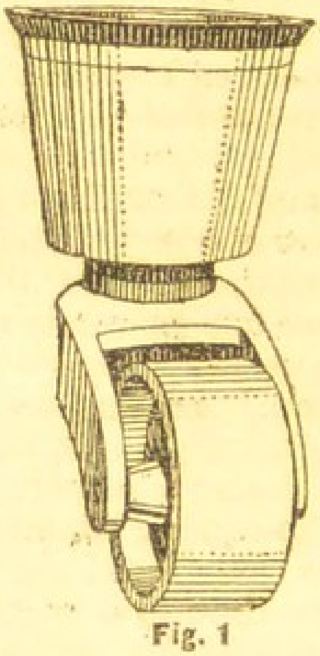


Fig. 1

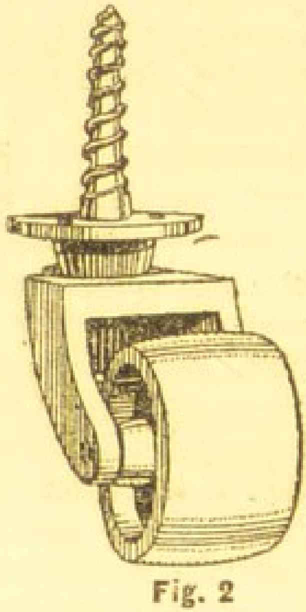


Fig. 2

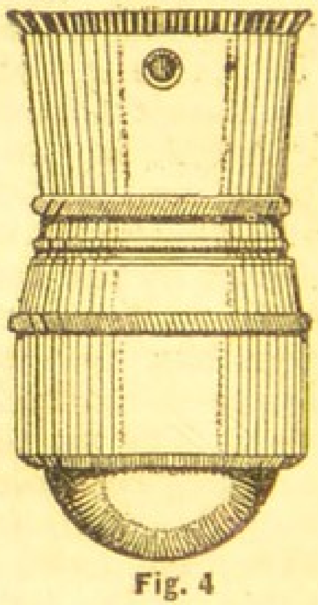


Fig. 4

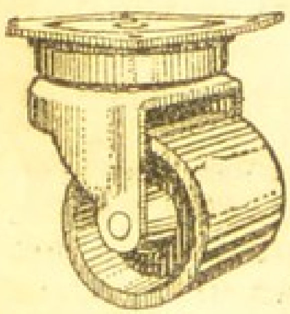


Fig. 3

the wood; this should be removed by the help of a strong pair of pincers.

Plate castors (Fig. 3) are standardised into sizes, and made with either iron bowl or wheel, or wood, the last named being better for domestic use. These, being attached by screws in the plate, are easily fixed, and simple to attach to any chest or piece of furniture for the first time.

Ball-bearing castors may be procured in either socket or screw patterns, the object of such being to make movement more rapid and easy; but whether such castors are satisfactory is an open question. Glides are extremely useful if in the correct position, and can be driven home by means of a hammer with a piece of wood to protect the glide. Glides are made circular or triangular, but the former is recommended as being best. Fig. 4 shows a common type of ball castor made in a number of sizes for chairs, tables, etc.

To replace a bedstead castor (Fig. 5), first remove the old castor, taking care that the pin of the bedstead is straight and the edge of the burr at the end filed off before attempting to fix the new castor. If the chill or casting at the foot has been allowed to become worn so as to have spoiled the seating against which the castor is to work, it may be found helpful to place an iron washer under the castor to form a new seating, but this should not be done unless absolutely necessary. The castor being in place, add a small washer on the top and then rivet over the peg, which will, if sufficient turnover be given, retain the castor in its working position.

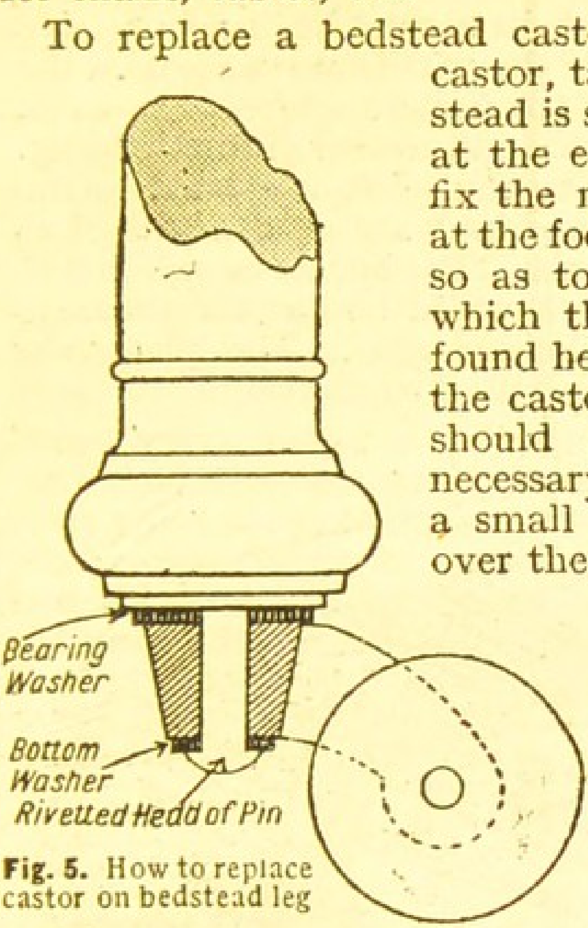


Fig. 5. How to replace castor on bedstead leg

To fix a set of socket castors where none has previously been used will need careful and accurate use of chisel and gouge, taking precaution that the tapered wood end of the leg, be it either table or chair, is exact in the length of the taper, as well as being correct in the extent of its tapering. Use a screw gimlet for each screw hole so as to give every screw a good start, and be careful. especially in dealing with oak and mahogany.

CEILINGS AND THEIR REPAIR

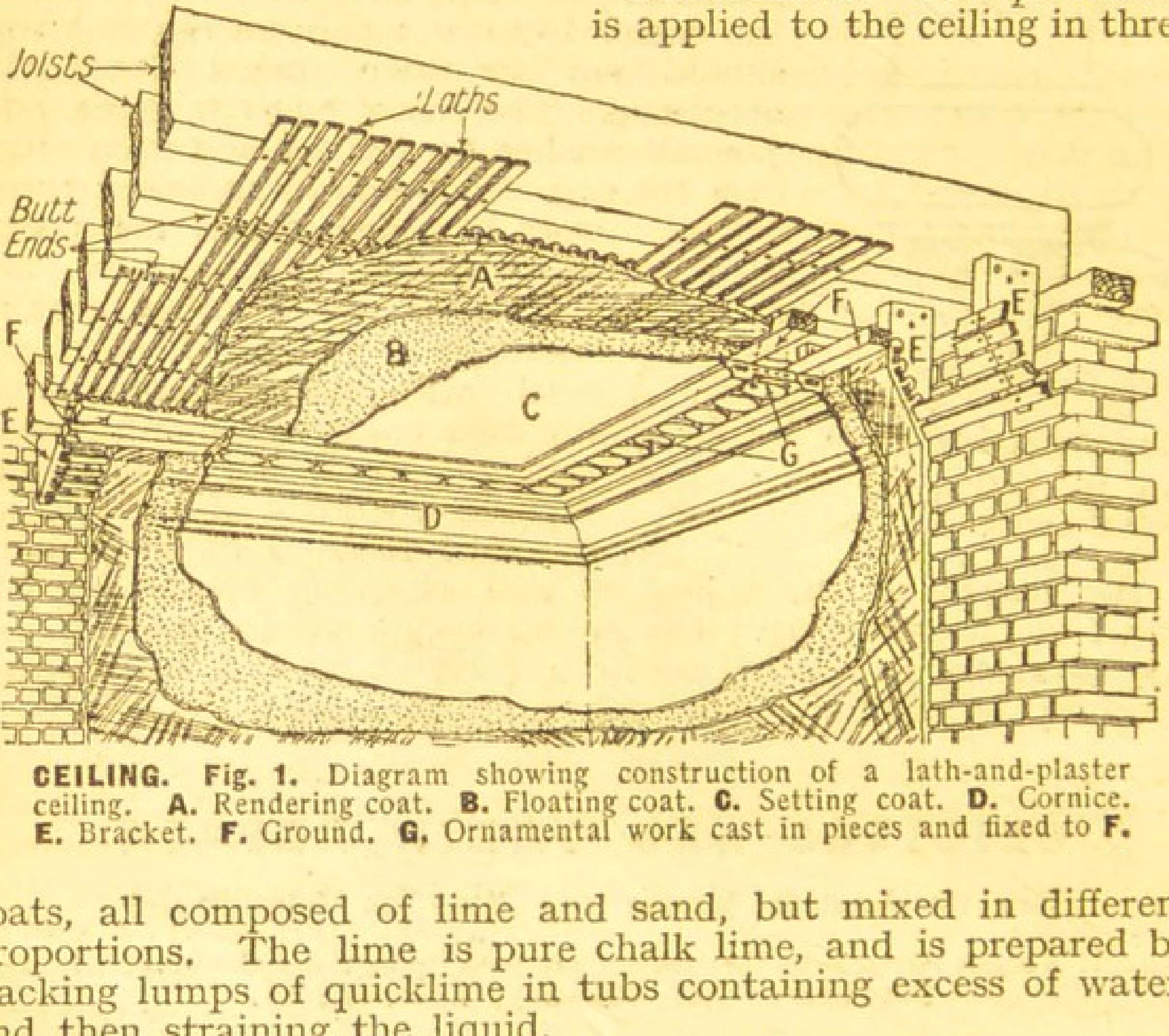
How the Amateur Worker can Make an Effective Job

Articles related to this subject are on Cappings and Cornices; Distemper; Frieze; Moulding; Plastering, etc.

A lath-and-plaster ceiling is formed by nailing laths to the underside of the joists, with a space of approximately $\frac{3}{8}$ in. between one lath and the next to form a key for the plaster, which should be pushed up through the spaces and grip the edges of the laths. It is important to have straight-grained, well-seasoned laths in order to avoid breakage or rotting after fixing. Rent laths, shaped by cleavage of the wood, are better than sawn, since they contain more continuous fibres, and are, therefore, stronger. Usually, however, sawn laths are employed, and those known as "lath and a half" in thickness should be obtained.

In commencing the work, some 10 or 12 laths, 4 ft. long, are nailed in position, then a similar number of 3 ft. laths, and so on. This is to prevent all the joints at the lath ends coming upon the same joist, as they would be more liable to tear away from their nails, and allow the ceiling to crack in a straight line from side to side of the room. In a new house the partitions running in the same direction as the joists are left incomplete wherever possible until the lathing has been carried from end to end of the building. Partitions running at right angles to the joists are built to the required height in the first instance, and are generally used as structural supports to the joist ends. The laths run parallel to these latter partitions, and do not have to be cut for them.

PLASTERING. The plastering is applied to the ceiling in three



CEILING. Fig. 1. Diagram showing construction of a lath-and-plaster ceiling. **A.** Rendering coat. **B.** Floating coat. **C.** Setting coat. **D.** Cornice. **E.** Bracket. **F.** Ground. **G.** Ornamental work cast in pieces and fixed to **F.**

coats, all composed of lime and sand, but mixed in different proportions. The lime is pure chalk lime, and is prepared by slacking lumps of quicklime in tubs containing excess of water, and then straining the liquid.

The first coat (A in the diagram), known as the scratch, pricking-up, or rendering coat, is made of coarse stuff composed of one part of lime with three parts of sand by measure, with 9 lb. of long, clean ox-hair to every cubic yard. In good work the floating, or second coat (B), is applied after the pricking-up coat is thoroughly dry, to avoid breaking the key of the mortar, i.e. the connexion between the mortar below the laths and that pricked up into the spaces between them. Floating and pricking-up are sometimes performed in one coat, but the attention devoted to obtaining a level surface (floating) detracts from the effort necessary in forming a good key by vigorous trowel work.

The third finishing, skim, or setting coat (C), is of fine stuff composed of lime putty and washed sand in equal proportions, and is applied after the under coats have dried and settled into position. A setting coat of gauged stuff is sometimes used containing plaster of Paris mixed with the lime putty to hasten its setting properties. The proportions of lime putty and plaster vary considerably at the discretion of the plasterer, but one part of plaster might be added to three of putty. No extra sand is added for the plaster of Paris, and in some cases the gauged stuff is left free of sand altogether, since plaster of Paris and other hard-setting gypsum plasters are not able to work with such large quantities of sand as lime mortar.

Non-plaster Ceilings. The employment of sheets of asbestos compounds, compressed wood pulp or three-ply boards, beaver board, and the like, permits of ceilings being formed without the delay involved in waiting for plaster to set and dry out. The sheets are cut to the required sizes, and nailed at their edges to small wooden battens fixed in position at suitable distances on the underside of the floor joists. The exposed surface of the ceiling sheets is usually whitened or distempered, and the joints covered with slats of wood, arranged to form panelled patterns of ribs across the surface.

Ceilings in country houses are frequently made with the plaster in narrow strips between the floor joists in order to present an old-fashioned appearance by contrasting the colour of the wood with that of the plaster. Small rough strips of wood are nailed to the sides of the joists to receive the ends of the laths, and after the plastering is complete small moulded strips are sometimes fixed to the joists to cover the joint between the wood and the plaster.

Where plastering has to be applied to a broad wooden surface, special precautions have to be taken to ensure a key. In cheap work the beam is roughened with a great number of small gashes made with the corner of a broad chisel, an adze, or a hatchet, in such a manner that the chip is not detached, but is forced to stand out from the surface. As an alternative, broad-headed or clout nails are partly driven into the beam. If laths are used they must not be fixed direct to the face of the beam, but to rough battens nailed upon it in such a manner as will keep the back of the lathing from $\frac{1}{4}$ to $\frac{1}{2}$ in. from the beam to allow room for the key of plaster which oozes round the lath.

Lathing should never be fixed direct to the underside of a boarded floor, but always to the joists, otherwise the spring of the flooring boards will crack the plaster. The laths must be supported at every 15 in. of their length, or the plaster will be apt to crack.

Repairing a Ceiling. Among the tools which will be found of use in making or repairing a ceiling is the hawk, a wooden board about 12 in. square with a short handle projecting beneath it, used for holding a supply of material preparatory to depositing it on the ceiling with a trowel. The setting coat is applied with a wooden hand float, which works better if it is kept thoroughly clean and wet, free from lumps of dried plaster. The angle float is used for working in the corners between the wall and ceiling. A lath hammer is useful if much of this work is to be done, as by its aid the laths can be trimmed to length.

First break away all loose plaster around the damaged part. Then examine the lathing, and if any of it is broken, cut the laths out by chopping them off with a chisel, half-way across a joist, to provide a fixing for the laths which are to take their place. These can then be cut and fitted. Next prepare the coarse stuff, and thoroughly brush away any dust and loose pieces of plaster, especially around the walls of the hole. Thoroughly damp the laths and the surrounding plaster work and then apply the coarse stuff with a trowel. The plaster has to be thrown at the laths rather than merely put up against them, the object being to force some of the coarse stuff through the spaces between the laths so that it can grip securely. The finishing coats are then applied. When applying the first, force it up hard against the existing work and keep it damp for some hours by brushing it with water.

When a moulded ceiling has broken away from the laths it can often be made good by strutting it up with uprights of wood, bearing upon boards placed on the ceiling, the whole driven up tight with wedges under the feet of the struts. Screws with large washers about 1 in, in diameter can then be driven into the joists about 10 in. apart. These will draw into the plaster work, and can be covered with plaster of Paris.

A better plan is to get up into the roof, brush off all loose and dirty material from the back of the ceiling and pour over it sufficient water to saturate the back of the ceiling. Then immediately apply a grouting of liquid plaster of Paris, pouring it all over the damaged parts. It will set very quickly and make a sound key to hold the ceiling in place. This method depends for success upon the complete removal of all dust and loose stuff from the ceiling. The strutting must not be moved until this plaster has thoroughly set, and is dry and hard.

Cracked ceilings are best repaired by scraping out the cracks with a chisel or scraper to enlarge the hole sufficiently to take the plaster or lime putty which is used to make good. The edges of the cracks must be saturated with water to ensure a sound joint. Spots and dirty marks on ceilings can be removed with a weak solution of starch and water, painted on, allowed to dry, and afterwards rubbed briskly with a coarse flannel.

The embellishment of an existing or a new ceiling can be carried out with fibrous plaster ornaments obtainable ready-made, and only requiring to be secured in place with strong plaster. Cornices and mouldings are generally worked in plaster.

CELLULOID. Largely used as an imitative substitute for ivory, celluloid is manufactured in rods and sheets, the latter more or less transparent. The material is elastic, readily machined and worked, takes a high polish and is capable of exhibiting very beautiful colourings ; it frequently takes the place of tortoiseshell and other valuable materials. Celluloid is highly inflammable. The Celluloid and Cinematograph Act, 1922, deals with the storage of celluloid.

Celluloid can be turned in a lathe. Sheet celluloid can be moulded to any desired form by softening it in boiling water ; it can be sawn with a fine tooth saw, or carved with chisels and gouges and generally treated by much the same methods as soft wood. For amateur purposes the solid rod and tubular celluloids in colours and the transparent sheet are most useful. The latter are sold in various thicknesses from a few thousandths of an inch upwards and about 50 in. by 20 in. in size. Ready prepared celluloid cement is obtainable from most electrical supply stores, and by its aid perfect joints can be made provided the two celluloid surfaces are perfectly clean.

CEMENT (Mending). For uniting the broken edges of china objects a cement such as the following is required. Soak 1 oz. of isinglass in 2 oz. of water overnight ; then place the mass in an earthenware jampot ; put this in a saucepan containing a small amount of water, and heat until the isinglass has dissolved. Next add 1 oz. of strong acetic acid, stir well, and pour the cement into small bottles.

For use, the bottle containing the cement is placed in hot water until the cement liquefies. The edges of the broken china object, having been warmed, are smeared with the cement, then brought together and kept in position until the cement has had time to set.

For mending knife handles, mix together flowers of sulphur 1 oz., powdered resin 2 oz., kaolin 1 oz., and fill the hollow handle. Next heat the tang of the knife nearly to redness, and press it into the handle, holding it in position until it is cold.

For sticking leather patches on boots the following cement is used. Dissolve by continuous shaking gutta-percha raspings, 1 oz., in carbon bisulphide 5 oz. The surfaces of the leather patch and the boot are cleaned by means of fine sand-paper, the cement is spread upon the surfaces to be united and allowed to evaporate. Then the patch is placed in position and smoothed with a knife handle or rubbed with a warm iron. *See* Crockery, etc.

CENTRE. Centres are used on lathes and other tools to assist in supporting the work, and to locate it truly on the centre line of the shaft. The centre itself is in various forms ; the point centre is pointed in shape, the cup or hollow centre is inverted, and the vee-centre has a V-shaped slot cut across at right-angles. Many small bench drilling machines are provided with such centres.

CENTRE TO CENTRE. This expression is frequently found in descriptions of "how to make" articles. It means that measurements are taken from the centre line of one part to the centre line of the other part. It is the most accurate way of marking out a job. For example, floor joists may be specified as being 15 in. centres, meaning that their centre lines are 15 in. apart. Such joists are frequently 2 in. thick, but as they are only rough sawn, it would not be satisfactory to measure the gap between two joists, as this would vary slightly one from another, and the ultimate result would be unsatisfactory.

CENTRE PUNCH. A centre punch is one having a sharp-pointed end, made of tool-steel, either hexagonal or circular in section. It is used for marking the centre of a hole, for dotting a line on metal prior to cutting it, and sundry other similar jobs. It is used by holding it erect upon the work, with the point exactly on the centre. A sharp blow is then struck with a hammer on the head of the punch; this makes an indentation in the metal and thus marks the centre. The point should be kept sharp by grinding.

An automatic centre punch has a spring-actuated self-contained hammer which strikes the blow when the punch is pressed hard on the work. They are very convenient in use. Bell centre punches are handy for marking the centre on the end of a metal bar. A centre punch or several of different sizes are essentials to almost everyone desirous of working in metal.

CHAIN STITCH. In needlework there are three varieties of chain stitch—namely, machine stitch, embroidery, and crochet; all of these have the common purpose of linking together stitches that are comprised in the form of a chain.

CHAIRS: HOW TO MEND THEM

Advice for the Amateur Craftsman

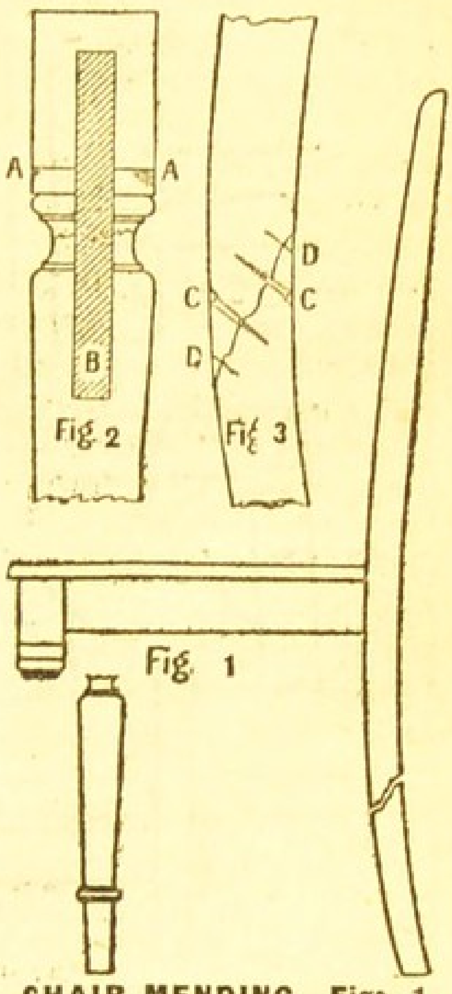
Here we have guidance in the repair of chairs, whereby a damaged article may oftentimes be made as good as new

Mending a broken chair is often easily done. At Fig. 1 two common leg breakages are shown. Always repair such breakages before the fractured edges have got rubbed. The parts will then fit closely; whereas, if there is delay, the ragged edges may get injured and a neat joint may be difficult to effect.

The front leg is repaired by means of a long dowel inserted (Fig. 2). First cut off the small turned fragment which is attached to the top square block of the leg. Use a fine tenon saw, and cut across A A. Warm the broken surfaces, glue the little part which has been removed to the main body of the leg, and lay the work aside till the glue is set. Now bore both parts of leg (square portion and turned piece) for a long dowel (B) which should be of beech or oak not less than $\frac{3}{4}$ in. in diameter. The dowel must go well up into the square block and at least 2 inches into the turned leg beyond the fracture. Glue everything well, and the leg will be stronger than before.

The back leg is repaired with screws, as at Fig. 3. If any of the splinters are loose, glue them down so that the parts will fit quite closely. Hold these together, and, at the angle indicated in the diagram, carefully bore holes for two screws, one at each side (*see* C C). Countersick for the heads. It is well to use a fine bradawl first, and then a gimlet. The screws must be of a fairly fine gauge, and either $1\frac{1}{4}$ in. or $1\frac{1}{2}$ in. in length. Try the screws, and, if all is right, warm the broken surfaces; apply thin hot glue and screw up. At the two ends of the joint (D D) insert a couple of needle-points.

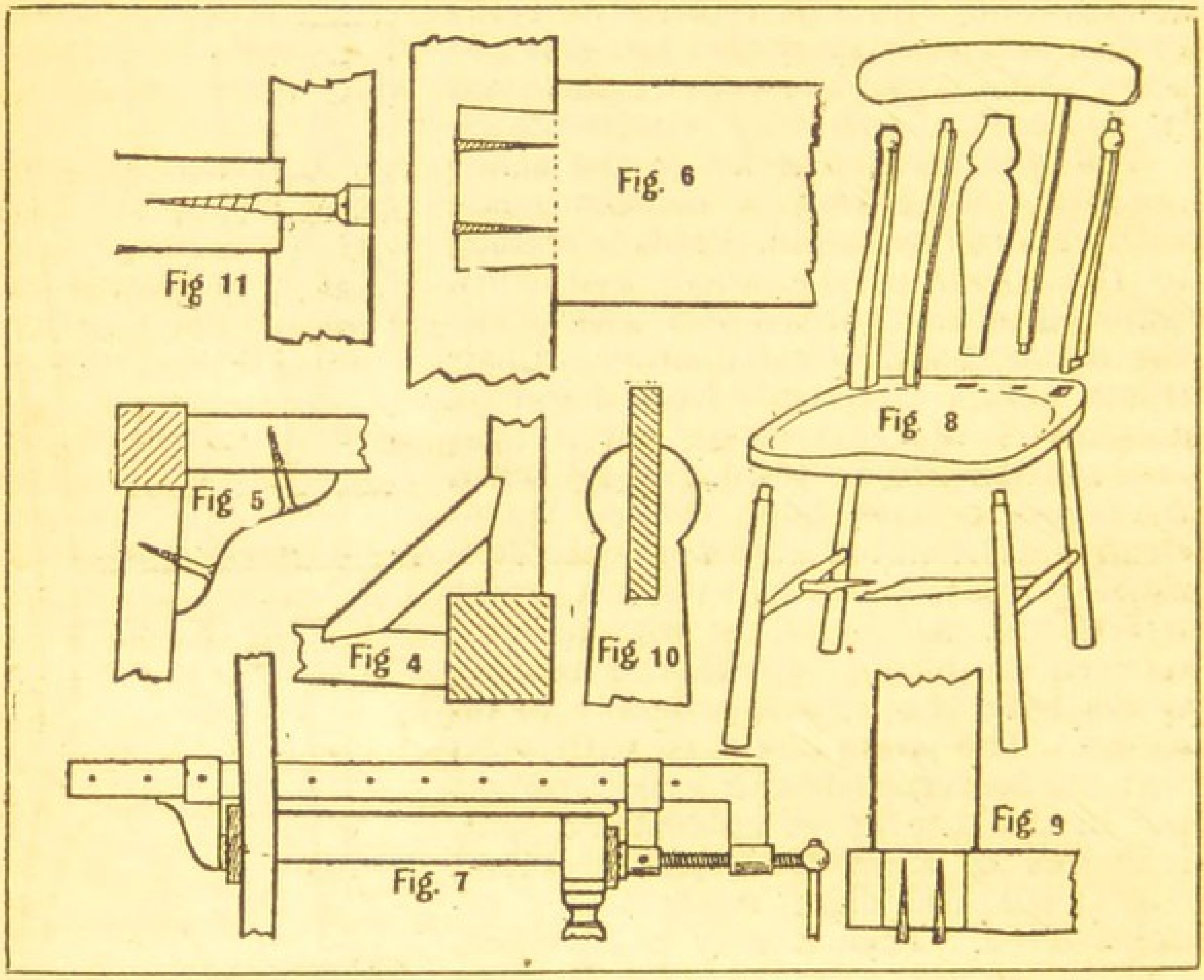
The holes countersunk for the screw heads are filled with a cement made with beeswax and resin. This is stained to the colour of the wood, and when trimmed off and rubbed over with polish the repair should be satisfactory. Chair frame joints frequently work loose on account of the glue giving way. Seat rails are tenoned to the legs, and when the tenons become loose the leg is unsteady. The inside angles of chairs are usually braced, either with a strut wedged in, as Fig. 4, or with a brace screwed on, as Fig. 5. If the bracing works loose the leg will probably be insecure. The joints of a chair with wood seat can be repaired with little trouble; but in the case of an upholstered seat, it is well to allow the repair to stand over until the chair needs to be re-upholstered. Then it may be stripped, and re-covered after the joints have been repaired.



CHAIR MENDING. Figs. 1, 2, 3. See text

Knock the parts loose and scrape off all the old glue. As the tenons may have become a little too small, owing to shrinkage, they should be wedged in order to tighten them. As the tenons do not go right through the leg they will have to be blind-wedged, as Fig 6. That is, two cuts are made in the tenon and narrow wedges inserted. When the tenon is glued and driven home with the mallet, the wedges increase its width and thus ensure a tight fit. The mortise holes in the leg may be gently pared to permit of the wedged tenon acting like a dovetailed joint. After the four seat rails have been glued up the braces or struts are glued and screwed in position. Work of this sort usually requires to be cramped up with a regular joiner's cramp, the method of using which is shown in Fig. 7. The cramping is very important, as the glue will not hold satisfactorily unless the parts have been put under heavy pressure.

Kitchen chairs, which are frequently used for purposes for which they were never intended, have a habit of falling to pieces, but if properly repaired they will be as good as new. Taking Fig. 8 as a typical example, the best plan is to knock all the parts separate, marking each, so that its correct place is known. Clean off the old glue, and, if any of the leg joints fit rather loose, take a paring off the ends, so that a thicker portion will make the entry. A broken stretcher rail may be repaired in the way



CHAIR MENDING. Figs. 4–11. Diagrams illustrating how various breakages may easily be mended

already described for a back leg (*see* Fig. 3). It may, however, be less trouble to make or buy a new stretcher. Glue the rails to legs, and then glue and knock the four legs into the seat, using the cramp if possible. See that all four legs are level.

Coming to the back, if the tenons of the two outer uprights are loose they will have to be wedged (Fig. 9). The wedges are driven in from the underside. If the top pin which enters the shaped rail is broken, cut it off, and bore the upright for a beech or oak dowel pin as Fig. 10. The back parts, including the central and two intermediate slats, are first fixed to the seat. The holes in the top rail are then glued, and this part coaxed on with the mallet. It is usual to wait and see that everything is correct and in line before driving in the wedges used to strengthen the outer uprights.

The arms of kitchen armchairs often come loose owing to the breaking of the screw which holds them. Punch out the head of this screw. The other end may be withdrawn with the screw-driver if a nick is first made across it with a file. The new screw should be inserted so that the smooth shank will pass the line of joint (*see* Fig. 11). It will then run no risk of breaking, and the countersunk hole may be filled with a stopping of some kind.

Chair Rail. Moulding suitable for chair rails can be obtained in the white, i.e. not stained or painted, and when ordering allowance should be made for waste in mitring corners. There will usually be at least 10 corners, and 2 ft. extra should be obtained.

Start on the longest lengths of wall first; the short lengths and odd corners can be fitted with the moulding left over. The mitres for the corners should be cut neatly with a tenon saw, and with the aid of mitre box or board. When making the joints for the fireplace and bay window corners, do not forget to cut outside corners, or some of the moulding will be wasted in re-cutting. If it is necessary to join some of the lengths, do not merely lay them end to end. Cut each end at an angle of 45°, so that they can be overlapped. Such a joint will scarcely be noticed when glass-papered and painted.

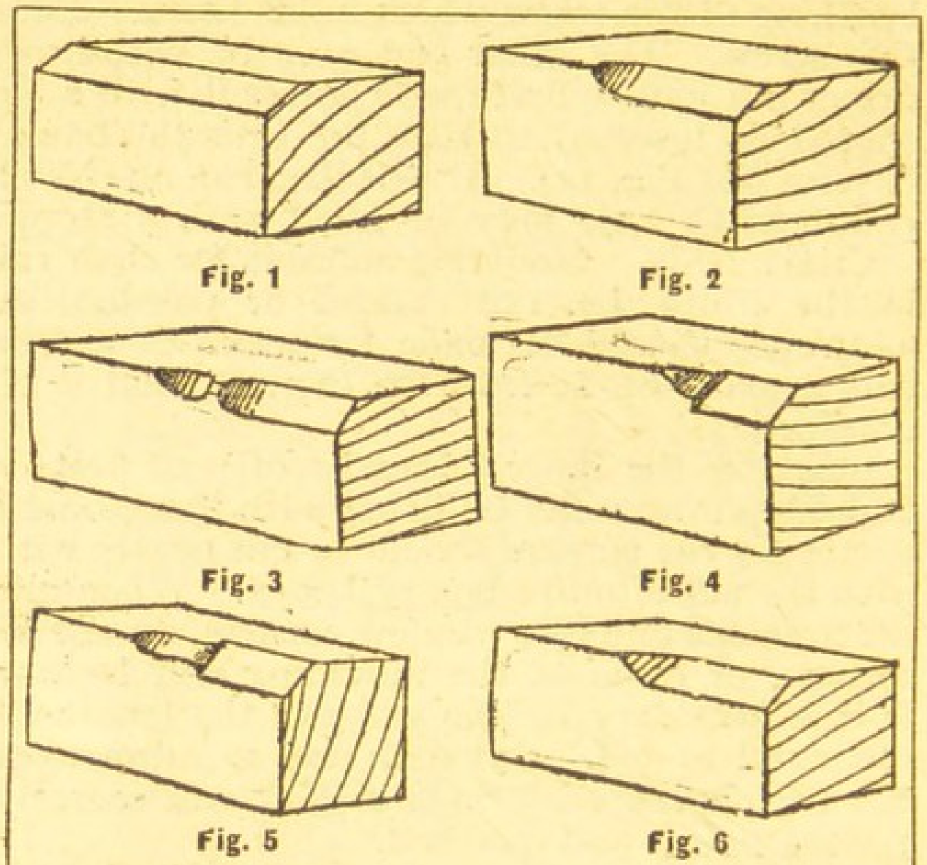
Cut nails should be used to fix the rail to the wall, and a suitable height is 36 to 39 in. from the floor. Punch the heads of the nails well in and cover with plaster of Paris; putty is sometimes used, but it shrinks in drying, and is unsightly. The rail should be treated to match the other woodwork of the room. The moulding can also be obtained in oak, mahogany, or walnut.

CHAMFERING. The object of chamfering may be either for decorative purposes or to lighten the appearance, or sometimes simply to remove a sharp edge. It is usually at an angle of 45° with the main surface, though it may be worked at any angle which the particular nature of the work requires.

The commonest form of chamfering and the quickest to carry out is when it is run along the entire edge without stopping (Fig. 1), in which case the work is done with an ordinary plane. In a type more frequently used the chamfer is run for a certain length and then stopped a short distance before reaching the end. Figs. 2 to 6 are typical examples of stops employed; Figs. 3 and 6 are more suitable for oak work. Frequent use is found on the inside edges of framings, such as panelling, and work for ecclesiastical purposes makes great use of chamfering.

In cases where the stop is flat, such as Fig. 6, the flat side of a chisel is used to cut the wood, and the reverse side for such as Figs. 2 or 3. As it is impossible to use an ordinary plane for the whole length of a stop chamfer, the ends have to be cut with a chisel or a bull-nose plane, which is capable of working very close to the ends, as there is only a very short distance between the cutter and the front of the plane. Where a great deal of chamfering is to be done, a special chamfer plane is often used, the advantage of which is that it can work right up to the stops, and automatically regulates the depth of the chamfer.

When a very deep chamfer has to be cut, it is advisable to make several saw cuts at various points along the edge (not quite down to the finished depth), to obviate the tendency of the wood to split out when removing the bulk of the waste with the chisel; for should the wood start to split, the split cannot run farther than the next saw cut. The chamfer is finished off with a chisel and plane. Finally a scraper is used, and then glasspaper.

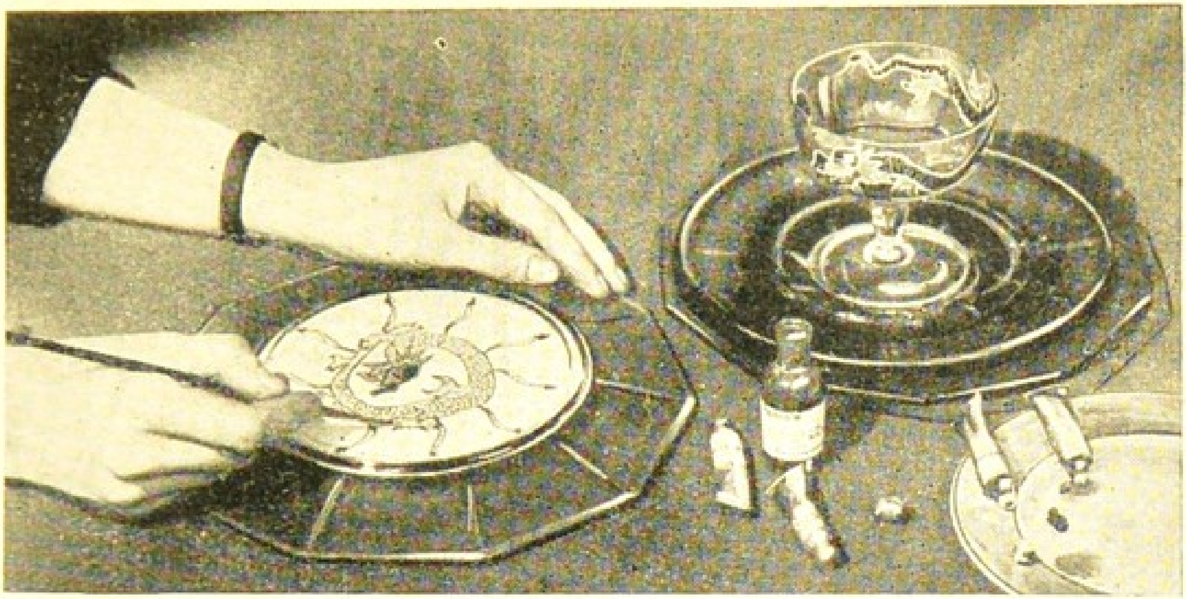


CHAMFERING. Figs. 1–6. Usual forms of chamfered edge and the principal stops employed for different purposes by the woodworker

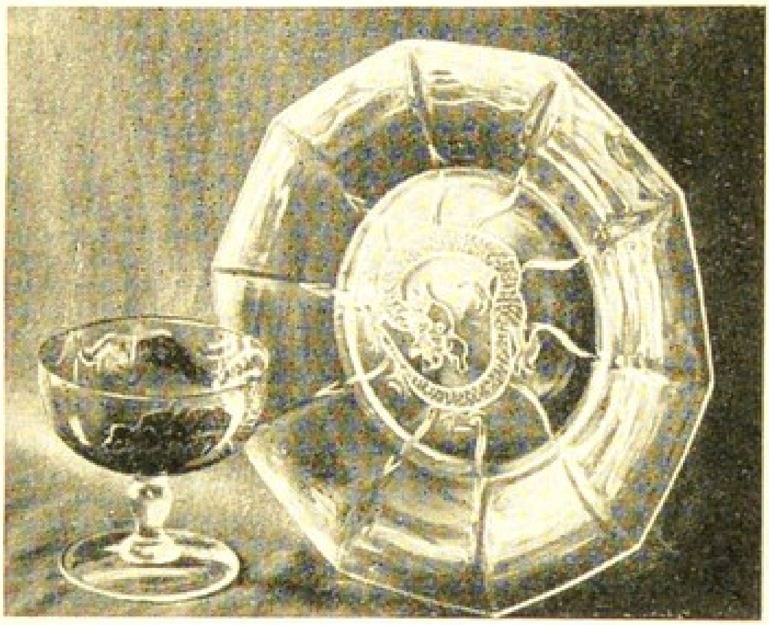
CHERRY WOOD. The chief uses for this wood is in making tobacco pipes and in small cabinet work. The colour of cherry wood is brown with a reddish tinge; it has a smooth and fine grain, easy to work, and takes a good polish. It is hard, but not very durable as it splits rather easily.

CHESS BOARD, Making a. Fig 1 shows a chess board which can be inexpensively made. The base of the board should be of three-ply wood surrounded by a fairly bold moulding; the base is rebated into the moulding, and the latter is mitred at the corner, while the face of the board is covered with the chequered playing squares.

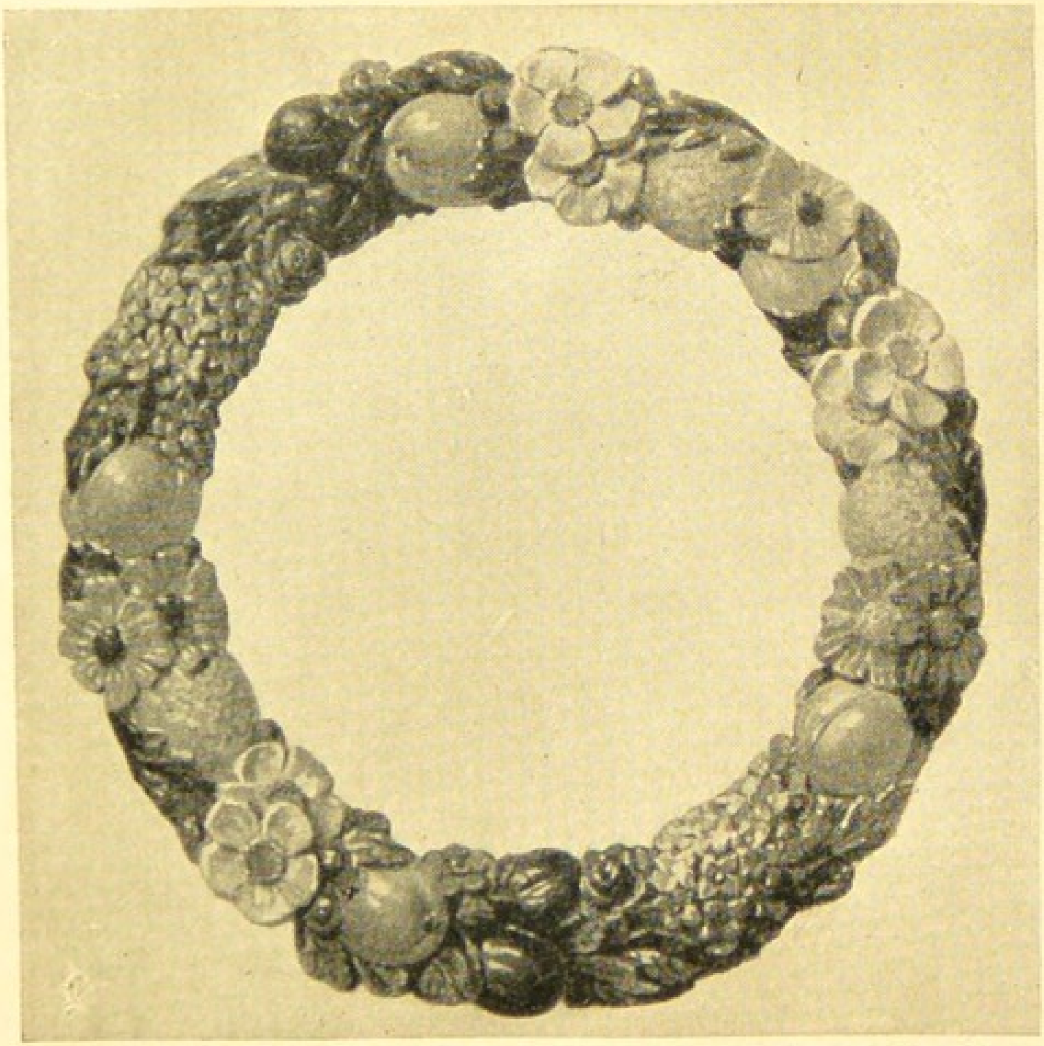
With the playing space formed with $1\frac{1}{2}$ in. chequered squares the base will be 1 ft. square, in addition to which allowance must be made for rebating the base into the moulding, so that the piece of three-ply wood required for the base must be $12\frac{1}{2}$ in. square, and it should be about $\frac{3}{8}$ in. thick. The playing space consists of eight rows of chequered squares with eight squares in each row, sixty-four in all. Half of the squares must be cut



GLASS WARE. Top. The plate is painted on its underside and the sundae glass on its outer surface, a transfer being pasted on the other side of the glass and the design traced with a fine brush. Centre. The finished articles, the designs being outlined in pale green and filled in with blue, green, and a little red for the dragon's head. Below. Simple design of lemons and green leaves for a lemonade set

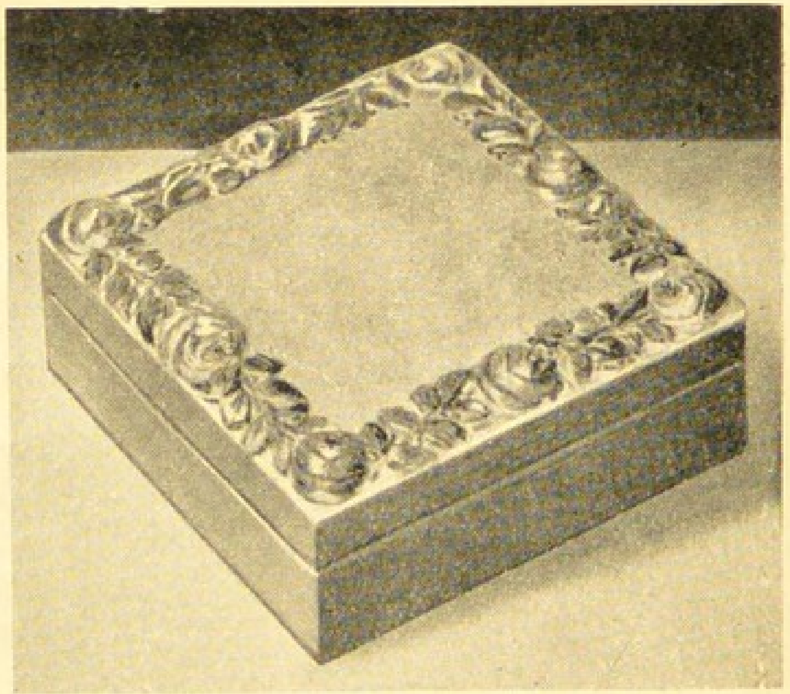


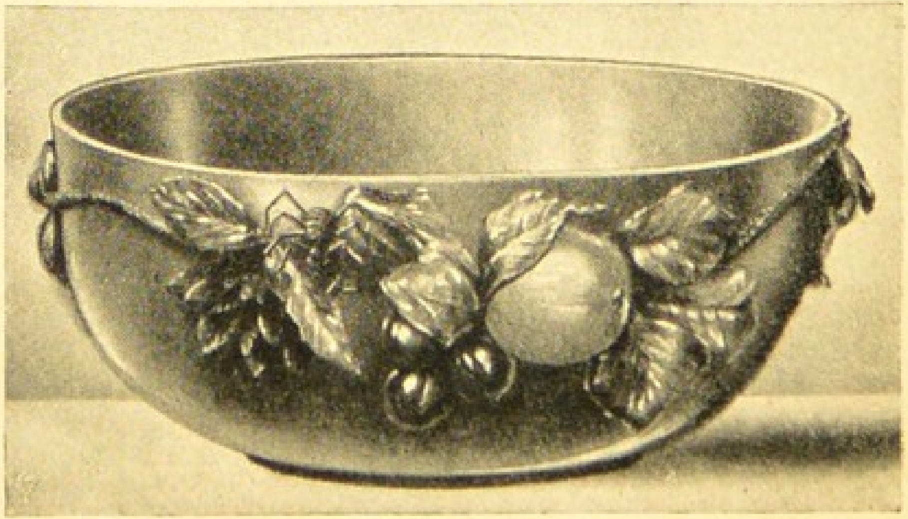
GLASSWARE DECORATED BY HAND



Coloured frame for mirror in Gesso Work. Top, right. Handkerchief box, with border of leaves and flowers

ATTRACTIVE PRODUCTS OF GESSO WORK





Bowl painted in coloured lacquers

from a light wood, and the other half from a dark wood. Holly and ebony will give the best effect.

To cut the chequered squares accurately and quickly, provide five strips of light wood, about 14 in. long by $1\frac{1}{2}$ in. wide by $\frac{1}{8}$ in. thick, and four dark strips of similar dimensions. The strips should then be glued up in the order shown at Fig. 2. After the glue is dry, one end of the glued-up strips should be cut quite square, and from it eight strips $1\frac{1}{2}$ in. wide are cut, from which the complete playing space may be formed. The chequered strips are fixed to the base with glue as shown at Fig. 3, care being taken to glue the edges of the strips together as well as to glue the strips to the base. When the chequered strips are arranged correctly, it will be found that there will be a surplus light square at one end of one strip and at the opposite end of the next strip, and so on, but these must be removed before the strips are glued to the base.

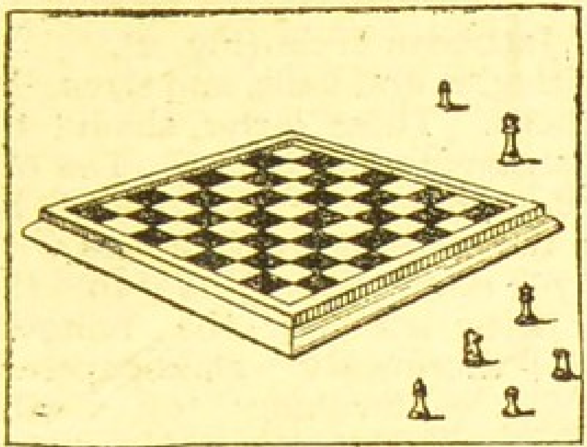


Fig. 1

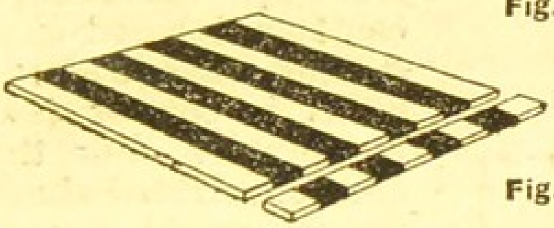


Fig. 2

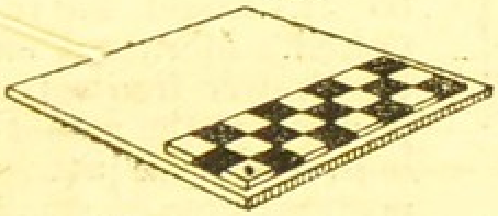


Fig. 3

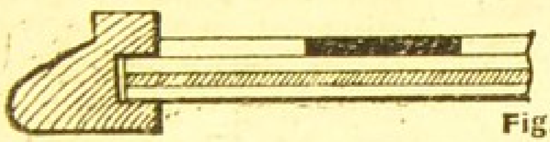


Fig. 4

CHESS BOARD. Figs. 1-4. Diagrams of board completed and in process of making

The moulding, which is mitred around the base, should be $1\frac{1}{4}$ in. wide by 1 in. deep, and of a section similar to that shown at Fig. 4. Mahogany could be used for the moulding, and a piece of the section shown could be very easily worked by hand. A rebate or a groove is cut in the inner edge of the moulding, into which the base fits ; the corners are mitred, and the moulding is fixed with glue. The best method of finishing the board will be by french polishing.

CHESTNUT. There are two varieties of wood, one from the horse chestnut and the other, Spanish chestnut. The first is a light, soft, spongy wood, which loses nearly half its weight and a considerable amount of its bulk in seasoning. It is used for turning bobbins, small articles for carving, and for packing cases. The sweet chestnut is a more valuable wood, and easy to work. Comparatively hard and heavy, it sometimes serves as a substitute for oak. In rough carpentry it is employed for palings, beams, ladders, and in cabinet making ; also for door and window sills, and for fretwork. Ladders, small casks and hoops are amongst the innumerable articles that are made with the wood of the Spanish chestnut.

CHEST OF DRAWERS

Practical Renovation and Small Repairs

The reader is referred to the articles dealing with the tools and methods of the amateur woodworker, while those on Cabinet; Drawer; Dressing Table; Wardrobe may also be found useful

An excellent scheme of renovating an old painted chest of drawers (Fig. 1) is to strip the paint off and mount the chest on a stand, decorating the drawer fronts with mitred mouldings, and thus producing an attractive Jacobean style (Fig. 2).

The plinth is usually attached with glue and nails, and strengthened underneath with corner blocks. These latter should be knocked off with a chisel before removing the plinth. The old handles, too, should be taken off. The paint should then be cleanly stripped off, using one of the well-known strippers.

Any necessary repairs may now be done to the chest, including filling in the holes left by the removal of handles, and the whole thoroughly glass-papered, finishing off with No. $1\frac{1}{2}$. Mouldings can be purchased at a cabinet maker's store; either in oak or deal is suitable. For the chest illustrated about 60 ft. would be required. Mark out on the drawer fronts the position of the mouldings, and at the jutting portions glue on small slips of wood $\frac{3}{16}$ in. thick, round which the moulding is mitred (Fig. 5). The moulding is glued and pinned, and care must be taken to remove all surplus glue. The drawer stops must be removed and fixed further back to allow the moulding to stand only slightly forward from the carcass of the chest.

The stand may now be proceeded with. Allowance must be made at the front and two sides for the moulding shown

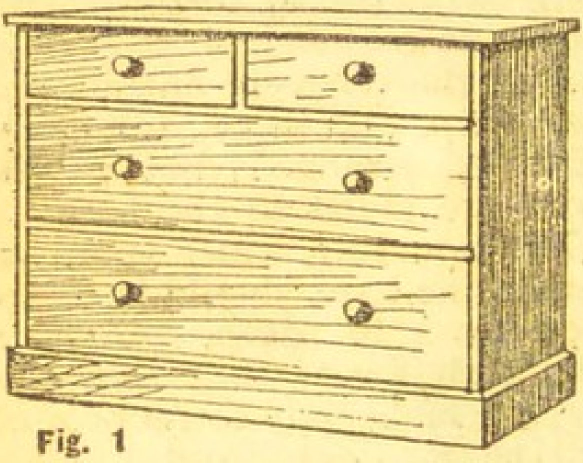


Fig. 1

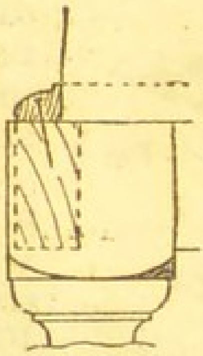


Fig. 4

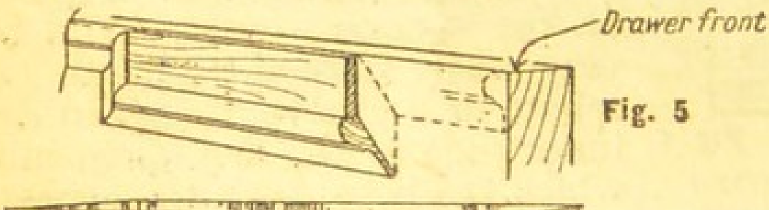


Fig. 5

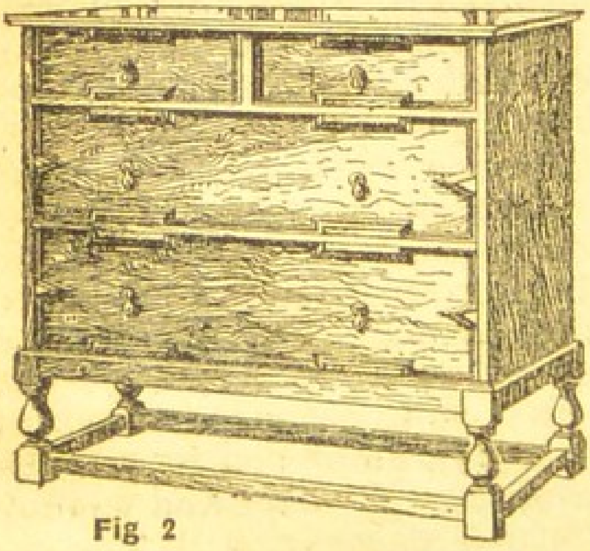
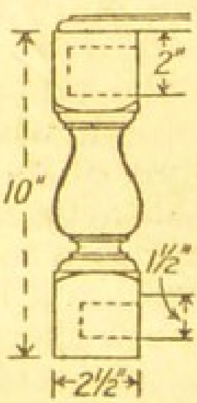


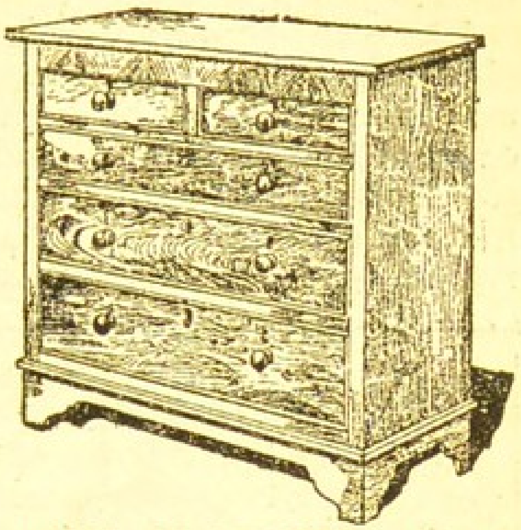
Fig 2

Fig. 3



CHEST OF DRAWERS. Fig. 1—5. Painted chest of drawers and diagrams showing how it can be transformed into a piece of furniture in Jacobean style

(Fig. 4), inside which the chest stands. The stand is mortised together as in Fig. 3, using 2 in. stuff for the top rails and $1\frac{1}{2}$ in. for the bottom rails. When this has been glued together and is quite dry, clean off the top and place the chest upon it in the required position, and fix the moulding round to ensure its fitting accurately. The moulding should be glued and pinned to the stand only, so that the chest is always free to be lifted off. The job is now ready for staining; dark walnut water stain is the best to use. Afterwards polish it with wax, and finally fix the brass drop handles.

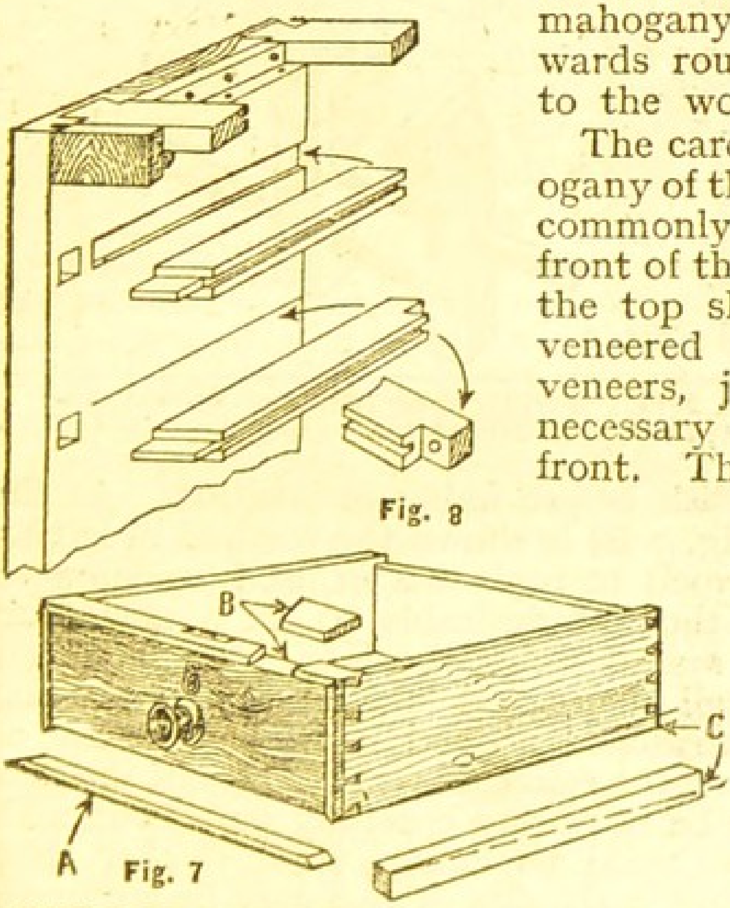


CHEST OF DRAWERS. Fig. 6. Old Mahogany veneered chest. A fine antique piece

REPAIRING A CHEST. The illustration (Fig. 6) is an example of an old mahogany chest of drawers, in which the top is veneered with one sheet of mottled mahogany, the grain of which runs lengthways of the chest. The veneer is laid upon a yellow pine top (or core, as it is termed), and this top has clamped ends similar to a drawing board. The edges of the top are cross-banded by glueing on $\frac{3}{8}$ in. solid mahogany strips, these being afterwards rounded off to give a finish to the work.

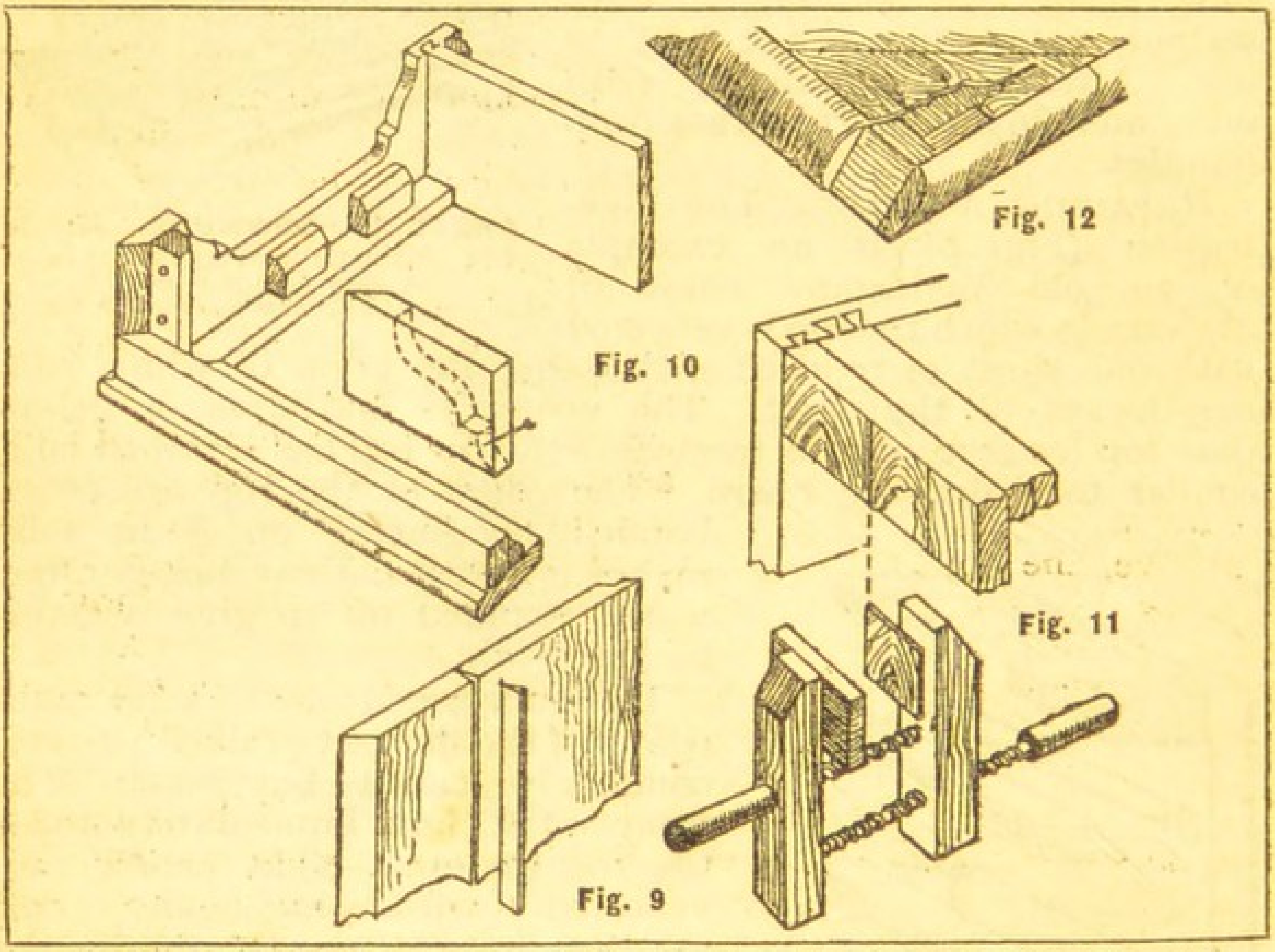
The carcass ends are of solid mahogany of the straight-grained variety, commonly called bay-wood. The front of the chest immediately under the top shows a wide bearer rail, veneered with mahogany curl veneers, jointed up to obtain the necessary width across the carcass front. The drawers have their fronts veneered with mahogany curls, and small projecting cock beads have been fitted into rebates at the ends, but are simply glued on to the top and bottom edges. The plinth or lower part of the chest has been made in a separate portion, screwed to the carcass.

One of the commonest repairs to an old chest of



CHEST OF DRAWERS. Figs. 7-8. Diagrams illustrating how various simple repairs can be effected drawers is the renewal of a cock bead which has accidentally become damaged by splintering a piece out of the drawer, or the replacing of a small portion which has perhaps been broken during some removal operations.

Fig. 7 (A) shows a new length of beading made out of a piece of old mahogany. It is ready to be glued to the bottom, and its mitred ends have been cut and tried in position. The lower edge of the drawer should be carefully scraped to remove all trace of the old glue. The necessary pressure to hold the bead in position whilst the glue hardens would be obtained by using two handscrews or G cramps. The edge of the bead should be



CHEST OF DRAWERS. Figs. 9-12. Further diagrams showing how some simple repairs can be carried out

bodied up with french polish before fixing in position. At the top edge of the drawer (Fig. 7 B) is shown the method of letting in a small piece of new wood to replace a bruised or damaged portion, where it is not thought desirable to fix a new bead on account of disturbing and re-fixing the lock, etc. The new piece is made to a dovetail shape and laid on to the existing bead; then a mark is scratched around it with a needle or sharp penknife point to give the exact size and angles of the new piece, and the recess may be sawn and carefully pared out with a chisel. The new piece should be made rather thicker than required, so that, after fixing, a shaving or two may be removed, thus leaving all flush. The top edge will then have to be glass-papered, stained and polished.

Owing to constant friction, the lower edge of the drawer sides becomes worn away as indicated in Fig. 7 (C) and causes the drawer to run badly. Drawers that are thus worn should be turned bottom upwards on the bench and the worn portions planed away as indicated by the line at Fig. 7. The planing will not interfere with the drawer bottom, which stands clear of the lower edge of the side by anything from $\frac{3}{8}$ in. to $\frac{5}{8}$ in. A new piece, preferably of hardwood, is glued on to the existing drawer side and cramped in position. After, say, 24 hours, the surplus material may be planed off the newly-jointed piece, making it parallel to the top edge of the drawer.

In other cases it may be found that the runner that supports the drawer is worn, and the remedy is to fit a new one. Runners are fixed in two ways, and it will be found that in most of the old chests a groove has been cut across the carcass end, as illustrated in Fig. 8, to receive the entire thickness of the edge of runner. This groove is generally about $\frac{1}{4}$ in. deep, and the runner is simply glued into it. The end of the runner has a small tenon for engaging the back edge of the front bearer. The partitions or dust-boards fit into the grooved edges of bearer and runners, and prevent the runners working out of the grooves.

The lower part of Fig. 8 illustrates the second method of fixing a new runner, and in this case no groove has been cut in the carcass end. The tenon of the runner is glued into the bearer groove, the opposite end notched out and prepared to receive a screw. A dab of glue is applied to the carcass end as indicated by the arrow. If the back edge of the runner be glued along its entire length, it does not allow for any contraction or expansion in the carcass end, and this will often cause a fractured or open end joint.

Fig. 9 shows such a fractured end, and, as it is practically impossible to knock the chest asunder and re-joint the end, it is necessary to glue into the crack or joint a small strip of wood with its end section wedge-shaped. If the fracture follows the general contour of the grain and a straight strip cannot be conveniently applied, the strip will have to be cut into short lengths of say, 6 in., so that they can be easily bent to the shape. Carefully joint up the ends of the strips. The job is then cleaned off level and polished.

Another common repair is a broken foot. Fig. 10 is a part sketch of a plinth taken off the carcass and turned upside down. Cut away the broken portion of the old foot, until the new joint is in alinement with the top of the straight portion. This will allow the bull-nose plane to be brought into operation, so as to plane up the major portion of the joint, after which the existing mitre and corner block are scraped by using a toothing plane blade which has been temporarily removed from its stock. A new piece of wood is planed true on its lower edge, and the end is mitred. This piece is glued in position and handscrewed down whilst two ordinary screws are inserted from the back of the corner block to secure it. When the glue has thoroughly set, the new piece is cut to the desired shape with a bow saw, as shown by the dotted line. A fine sprig or panel pin may be driven in the edge of the shaping, as suggested in sketch, after the foot has been cut to shape.

Fig. 11 shows how to repair a piece of broken veneer which has formed a cross-band on the wide top bearer of the chest. Using a steel rule as a guide to the penknife blade, a deep incision is made and the old piece of veneer removed. This may be accomplished by damping a piece of rag and placing it upon the damaged veneer. A hot iron is now applied to the rag, and the steam so generated will soften the glue so that it may be peeled away.

A new piece of mahogany curl veneer is fitted to replace the damaged part and is laid by the caul method. The caul in this case may be a piece of yellow pine wood which has been planed up and rubbed over with raw linseed oil. It is heated in front of a fire, and a piece of clean white paper is placed between the caul and the glued veneer. The pressure is applied to the work by the handscrew, as shown. The work will in due course be levelled up with the steel scraper, after which it is glass-papered and polished. If old curl veneers which have been cut for some years be used, it will save much time and matching up when the polishing is commenced.

Fig. 12 represents one corner of the chest where the cross-banded mould and the veneered top have been broken away. To repair this a cut is made across the corner and the old veneer removed by the method above described. A suitably grained piece of veneer is selected and laid in position by the caul and handscrew method. A day later, a piece is glued to the cross-banded edge, and in due course it is rounded off to shape with a block plane. The polishing and colouring up of the repaired portions of antique furniture call for great care on the part of the worker.

CHIMNEY. A smoky chimney is a defect which occurs in most houses from time to time. There are several causes of this nuisance. If the trouble is persistent, the design of the flue may be at fault as, for instance, when the stack is too short. Another cause is found in a quantity of mortar within the flue becoming dislodged, so partly choking the chimney and impeding the up draught. In the latter case the services of a chimney-sweep will rectify matters. An insufficient supply of air to the fire in a room is a common cause of a smoky chimney; it is discovered by opening a door or window, which is effective in curing the trouble by introducing a current of cold air.

For such cases there are various remedies which are quite effective such as the fitting of ventilating bricks near the ceiling and through an outside wall to admit a current of air into the room. A ventilating flue under the floor and terminating in a grating, provided with a regulating shutter, in the hearth is also suggested.

Cold air in the chimney causes a down-draught and being heavier than air, the smoke can only be carried through the chimney if the draught caused by the heated air rising in the chimney is strong enough to carry it away. Excess of cold air must be stopped, and the means for doing this include attention to the pointing in the brickwork to make it airtight. Treatment of the chimney in the region around the fireplace may include the partial bricking up of the flue, reducing the actual opening to a space not larger than 9 in. square.

If the chimney stack is short, extend the height of a chimney above the level of the surrounding roofs, as a roof sets up currents in the air which have a tendency to blow down a chimney. Many shapes of pots have been devised, the louver and bent top type of revolving cowls being quite effective.

CHINTZ. Being a glazed cotton material, printed in several colours, usually 31 in. in width, and dust-resistant, chintz is suitable for bedroom upholstery. It may be used for linings for hanging wardrobes, and ottomans.

Being a stiff material, chintz requires much manipulation in upholstery work, especially when making loose covers. Careful planning is therefore advisable before starting to cut it out. A dart should be made by cutting away the material where any fullness occurs and sewing the edges into a fine point.

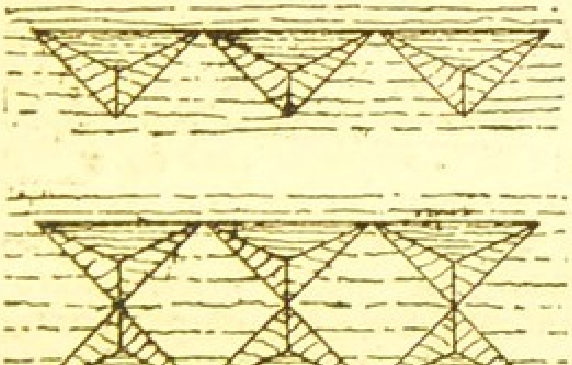


Fig. 1

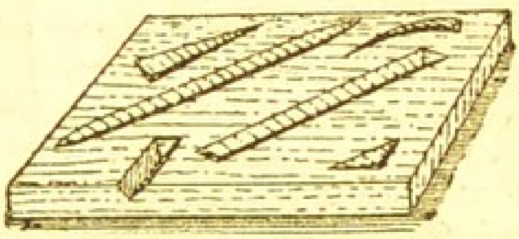


Fig. 2

CHIP CARVING. Fig. 1. Various V-shaped cuts. **Fig. 2.** Carved trenches and triangles adapted from the V-shaped cut

CHIP CARVING. This art is done with a sharp-pointed knife, and consists of cutting patterns of simple V-shaped grooves or excavations in the surface, just as lettering or figures may be cut in a flat surface of stone. Designs are produced in this way in order to ornament what would otherwise be plain surfaces of wood. Straight lines are used rather than curves.

Examples of various cuts are illustrated in Fig. 2. As seen in Fig. 2, the V-shaped trench may have square ends, sloping down at the same angle as the sides, or may curve or narrow up to a point at the ends. In other cases the excavation may be a small triangle with its three sides sloping to a point at the bottom. A number of these are generally cut in a series forming straight lines of the pattern. Examples are shown in Fig. 1.

More elaborate forms of chip carving are shown in Fig. 3. The method is the same in detail, but the complexity of the design is increased.

After the design has been drawn on the wood the lines are followed with the knife sloping, so that when at the correct depth the edge of the knife is midway between the surface lines. First one side is cut, and then the slope of the tool is reversed for cutting the other. Instead of reversing the knife it is often more convenient to turn the work round.

Material for chip carving should be evenly grained, quite free from knots or splits, and soft enough to cut easily. Lime and American whitewood are excellent for the purpose; they are light in colour, pleasant to handle, and the whitewood is particularly amenable to treatment with water stain. Articles adapted for chip carving include wall brackets, cabinets and occasional tables. Varieties of knives are shown in Fig. 4, the one most commonly employed being that which is bent in relation to the handle.

A straight cut may run with the grain or across it diagonally, and in either case the knife can travel along it in the direction which suits the grain. In following a curved line it may be necessary to reverse the direction of cutting

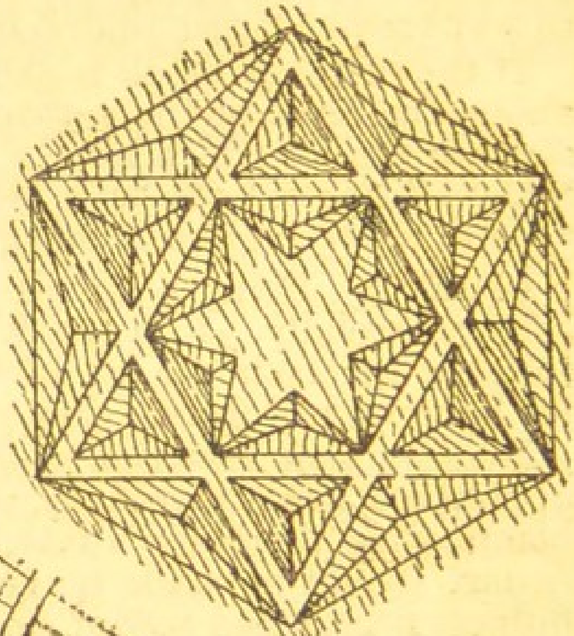


Fig. 3

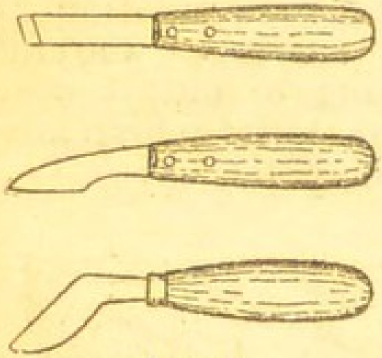


Fig. 4

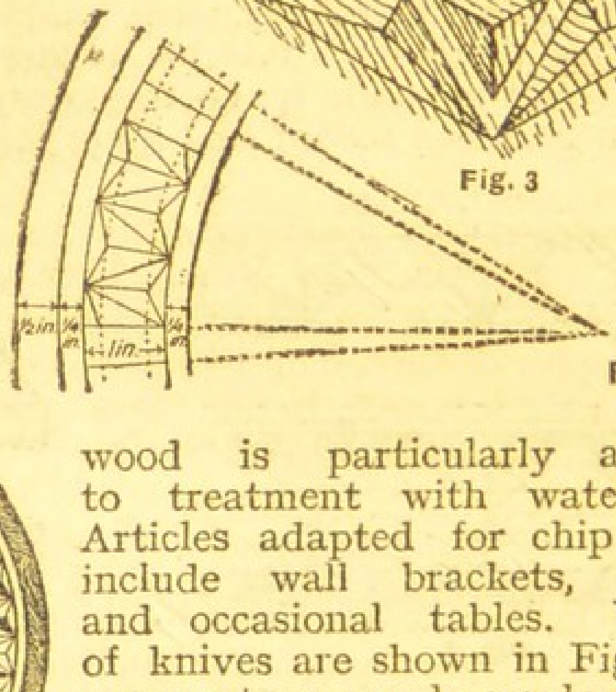


Fig. 6

Fig. 5

CHIP CARVING. Fig. 3. Geometrical design. **Fig. 4.** Chip carving knives. **Fig. 5.** Circular bread board with carved border. **Fig. 6.** Detail of pattern which is used in the border once or twice to avoid tearing up the grain. In a diagonal cut the knife must travel one way on one side of the trench and come back the opposite way on the other.

The bread board shown in Fig. 5 is a simple example of chip carving; it measures 1 ft. 2 in. over all, and should be cut from $\frac{3}{4}$ in. or 1 in. material, sycamore or beech being suitable. The full size design may be set out from the particulars given at Fig. 6, the main lines running to the centre as shown. It is transferred to the wood by means of carbon paper. The principal lines should be veined, and the edges finished with a pronounced chamfer.

CHISEL. In woodwork chisels are most important among the cutting tools. Those known as firmer chisels are most generally employed, and are sold in eleven sizes, from $\frac{1}{16}$ in. to $1\frac{1}{2}$ in. wide, the most useful being $\frac{1}{4}$, $\frac{3}{8}$, $\frac{1}{2}$, $\frac{3}{4}$, and 1 in. and $1\frac{1}{4}$ in. wide. A variety of the same class is a long, thin paring chisel intended for paring or cutting across the grain and working in deep holes. Both are rectangular in section, and are also made with bevelled edges.

Mortise chisels are extra strong, and made from $\frac{3}{8}$ in. to $\frac{1}{2}$ in. in width, for cutting mortises. A drawer-lock chisel is an all-steel double-ended tool.

Before a chisel can be used it must be sharpened or set by first grinding the bevel to a uniformly flat surface and square at the end. When grinding a chisel the grindstone should be turned towards the operator. The chisel should be held firmly and squarely on the stone near enough to the top edge of the latter to allow the tool to be in a nearly horizontal position, with the bevel lying flat upon it.

The chisel should be constantly moved across the edge of the stone to wear the latter evenly. It is then rubbed along an oilstone, at a slightly steeper angle than that of the bevel. This produces a shorter bevel, terminating in a clean, sharp edge, but the pressure upon the tool will have turned up a tiny ragged edge on the flat side. This is removed by placing the chisel flat on its back on the oilstone and rubbing it off. A few strokes on both sides, putting on little pressure, will result in a perfectly clean and sharp edge. Chisels are maintained in this state by rubbing on the oilstone as they become blunt.

The quality of work done with a chisel depends upon the correct handling of the tool. A chisel should be used with both hands. The right grasps the handle and directs the course of the tool, and also supplies the energy for its propulsion. The left is used to grasp the blade near to the cutting part further to control and direct the cut. By far the greatest amount of work is done in one of four ways. These are: chiselling with the grain of the wood, paring across the grain, paring across the end grain and at right angles, and by oblique cutting partly across and partly with the grain.

In chiselling with the grain the tool is held at a small angle and simply propelled forwards, taking care not to let it dig in, by making judicious use of the left hand. In paring horizontally across the grain, work from one side of the job towards the centre; reverse the job and work from the other side, and finally clean up the surface flat and true, making diagonal cuts to aid in the flattening. Test the work with a square at frequent intervals.

When paring across the end grain the tool is held upright and the cutting edge applied near the end and side of the wood, starting the cut with a slight side-tilt on the chisel, and bringing it up straight as the cut proceeds. The right shoulder should be close to the top of the chisel handle, and the whole strength of the arm, shoulder, and back put into the cut. Never attempt to cut off too much at a time; repeated light strokes produce better results. In oblique paring always work downhill—that is, cut with and across the grain.

CIGAR BOX. Empty cigar boxes can be turned to many uses, especially those of cedar wood. An attractive treatment is by the addition of metal hinges and clasps of an ornamental character. The thin metal-work can be largely shaped by means of a strong pair of scissors. Finish the shaping by means of files and emery paper. Raised patterns can be formed by pressing them up with hardwood tools shaped for the purpose. The metal is so thin that it is easily indented and modelled in this way. The ornamental work is then secured to the box with pinheads, made by cutting off a part of an ordinary domestic pin.

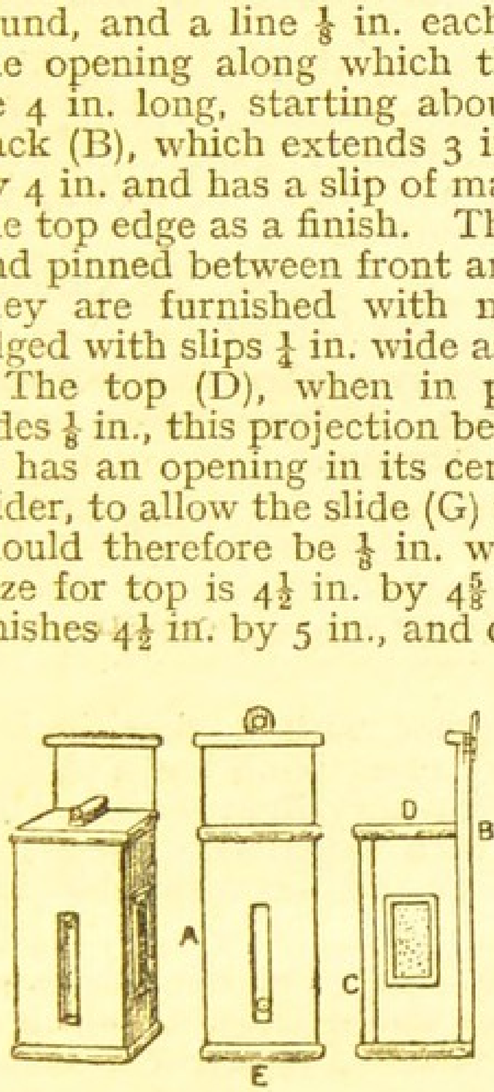
If the boxes be carefully taken apart the resulting pieces of wood are suitable for fretwork, for making little ornamental panels, and for numerous other purposes where a dry piece of well-seasoned mahogany or cedar is needed. A chest of drawers for small articles can be made from several cigar boxes of uniform width, arranged to slide on bearers between the boxes, and fixed to the inner sides of a simple casing built around them.

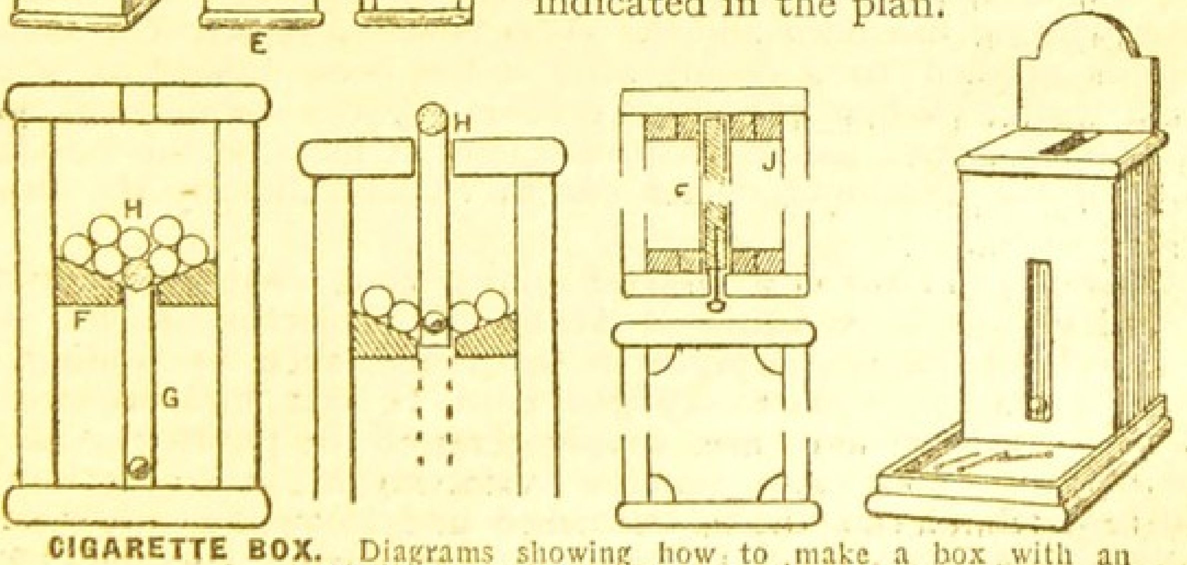
CIGARETTE BOX, Making a. The automatic cigarette box here illustrated is a serviceable little device. The construction is of the simplest and could be tackled readily by anyone with elementary tools at hand. Deal may be used, but basswood would be preferable, whilst oak, walnut, mahogany, or especially cedar, would be better. Deal should be $\frac{1}{8}$ in. thicker than the harder woods.

The dimensions may vary according to requirements. A small size, such as that sketched, might be worked out to, say, 8 in. by 4 in. for the box, whilst one to take 100 cigarettes might be allowed 12 in. by $7\frac{1}{2}$ in. The depth, back to front, will be governed by the length of cigarette and thickness of material used. For a 3 in. cigarette the depth may be $4\frac{3}{4}$ in. Reference to the diagrams will make clear the method of raising the cigarette for delivery. The compartment containing the cigarettes (H) has the bottom formed by two bevelled slips or blocks (F), between which a slide (G) is made to travel up and down. This slide has the top edge recessed or hollowed out, and when down the edge should rest on a level or a shade below the top edge of blocks. This will enable a cigarette always to be lying in the edge grooved for it, so that when the slide is raised by means of the small knob above the top of the box, the cigarette is in the position indicated at H. On being released the slide drops back into its original position.

Slide and Mechanism. The front (A) finishes $7\frac{1}{2}$ in. long by 4 in. wide, and material $\frac{3}{8}$ in. thick will answer quite well in basswood or cedar. The vertical centre of the front should be found, and a line $\frac{1}{8}$ in. each side of this will give the width for the opening along which the knob travels. This opening can be 4 in. long, starting about $\frac{3}{4}$ in. from bottom of front. The back (B), which extends 3 in. higher than the top, is thus 11 in. by 4 in. and has a slip of material in use $4\frac{3}{4}$ in. long pinned along the top edge as a finish. The sides (C) are 4 in. wide, to be glued and pinned between front and back. As indicated in the sketch, they are furnished with match strikers, being glued on and edged with slips $\frac{1}{4}$ in. wide as a finish.

The top (D), when in position, will overset the front and sides $\frac{1}{8}$ in., this projection being neatly rounded off when finishing. It has an opening in its centre similar to that in the front, but wider, to allow the slide (G) to push through freely. The opening should therefore be $\frac{1}{8}$ in. wider than the thickness of the slide. Size for top is $4\frac{1}{2}$ in. by $4\frac{5}{8}$ in., back to front. The bottom (E) finishes $4\frac{1}{2}$ in. by 5 in., and can be screwed or nailed into position like the top, the holes of entry being slightly countersunk and stopped with wood dust and glue. The slide can be $\frac{3}{8}$ in. thick, 4 in. high, and $3\frac{7}{8}$ in. wide, i.e. $\frac{1}{8}$ in. less in width than the sides, as allowance for clearance. Near the lower end of the front edge a knob with screw about 1 in. long is entered, as indicated in the plan.





CIGARETTE BOX. Diagrams showing how to make a box with an ingenious device for automatic delivery.

The interior shows the front and back lined with slips of $\frac{3}{8}$ in. material (J) between which the bevelled blocks (F) are seen. These slips can be of deal, if other wood is used for the case. The blocks should be cut to butt up to the lining slips and cross grain to agree with the vertical grain of the sides, to which they will be glued. The clearance, $\frac{1}{16}$ in. each side of slide, should be maintained, and no hitch will occur in the working. The cigarette compartment may be filled through a suitable hole bored in the back, with a brace and twist bit. This hole must be near the top, to fill the box properly.

An additional suggestion is to fit a match tray to the bottom part of box. A projection of 3 in. can be allowed, making the bottom 8 in. back to front. Slips, $\frac{1}{4}$ in. wide by $\frac{1}{8}$ in. thick, can be glued and pinned along the front and sides, as shown, to form the tray, and the device will be complete.

CLAMP. The word is largely used to describe the various forms of cramps used in many trades. *See* Cramp.

CLAP BOARD. This name is frequently applied to a feather-edged board used as a weather boarding. It is also given to an inferior quality of oak imported from Norway.

CLASP NAIL. Used for general woodwork, the clasp nail is of cut steel from 1 in. to 6 in. long. A smaller type, with barb, holds firmly and is difficult to withdraw. Clasp nails should be driven in with the wide part of the nail the same way as the grain of the wood.

CLAW HAMMER. This is a hammer with a claw-shaped tail for extracting nails. The ordinary cheap kind has a malleable cast head, and is only adapted for very light work. The Kent or Canterbury is of solid steel, with forged side straps; a medium size weighing 1 lb. is perhaps the most suitable for ordinary household use.

CLEAR COLE. Before distempering wood or plaster the pores are first filled with a coating of medium strength size to which a little whiting has been added. This is called clear cole. Clear cole is applied to a ceiling after it has been washed off with clean water. When the clear cole is dry the ceilings will not look much better for its treatment, but it has laid the foundation for the distemper, which can be applied directly the clear cole is dry.

CLEAT. A cleat is a kind of double hook used for securing a cord or line by twisting it about its projecting horns. It is useful for many purposes in the home, such as holding a fanlight or greenhouse skylight cord. Cleats measure from $2\frac{1}{2}$ to 6 in. long, and are simply screwed in position. They are made of cast iron, superior varieties in malleable iron; the best are of cast brass, burnished and lacquered or electro-plated.

CLOCK CASE, Making a. For the amateur woodworker or the amateur mechanic there is no more simple job than that of constructing a case for an existing clock. The ordinary cheap American alarm clock can easily be converted into a handsome looking mantelpiece clock by the use of wood obtained from soap boxes and the like, by suitable methods of varnishing and staining ; or by using the wood from cigar boxes, which requires very little treatment.

Fig. 1 shows a clock case which is easily designed by the amateur mechanic and which converts an ordinary alarm clock into a much more attractive-looking article. The case is made of decorated sheet tin-plate, and must be varied to suit the size of clock.

The construction is simple, and only calls for the use of a pair of tinman's snips and soldering iron, the decoration being performed with paint and stencils. The front (Fig. 2) is cut first, and the clock fitted to the circular aperture cut for the purpose. In some cases the clock will simply butt up against the inside face of the metal, in others it will be better to let it protrude. This having been accomplished, provide a metal ring, or separate pieces of tin-plate, and solder them to the inside

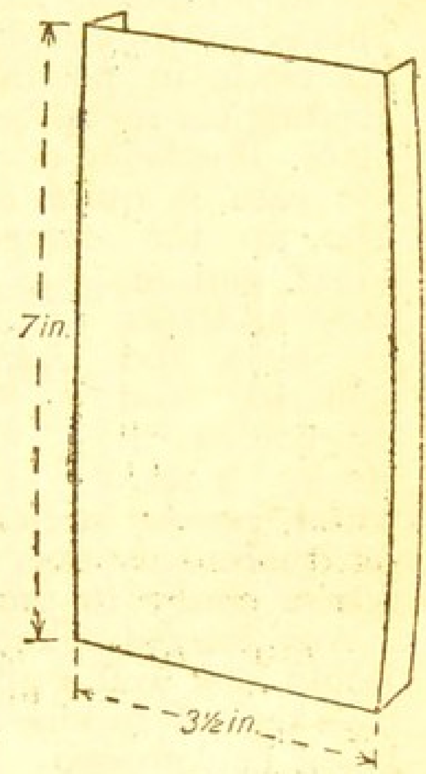


Fig. 3

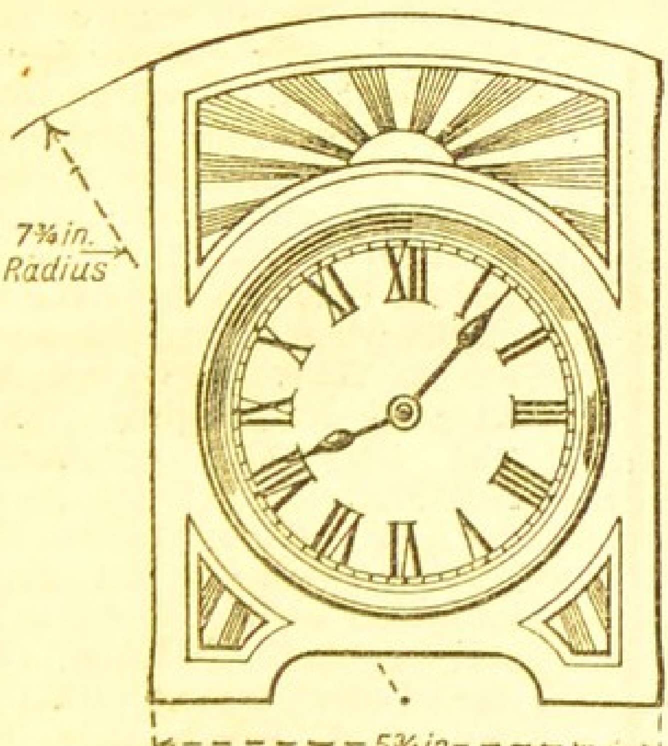


Fig. 1

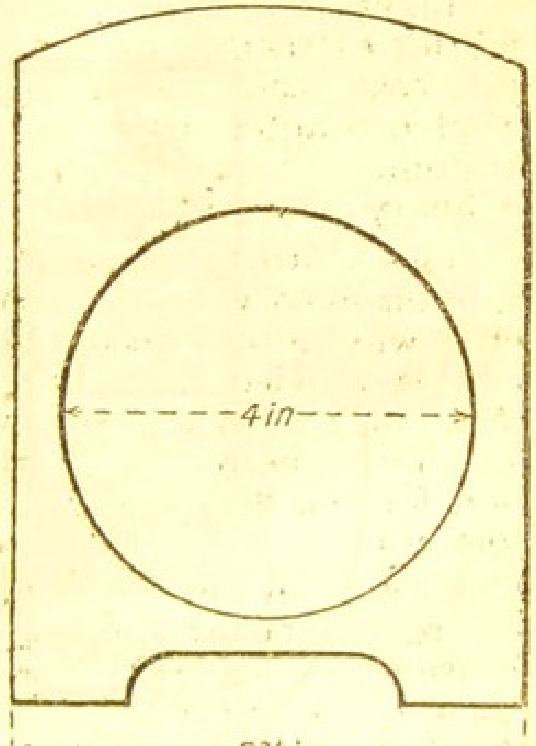
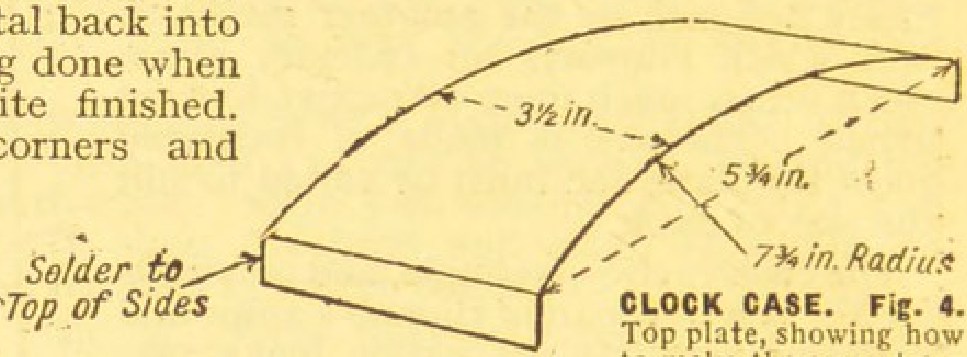


Fig. 2

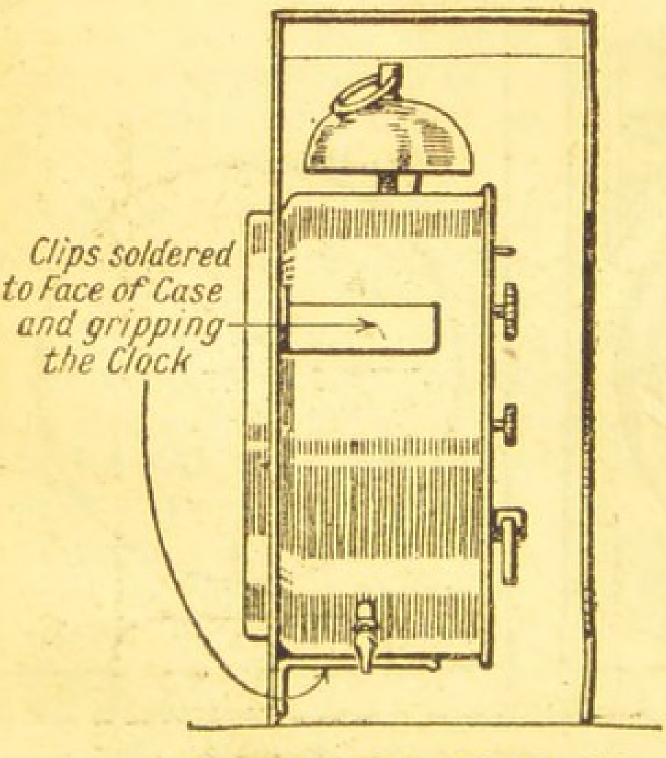
CLOCK CASE. **Fig. 1.** Metal case for holding a round or American alarm bedroom clock. **Figs. 2 and 3.** Particulars of plates for the metal clock case of the case to support the clock. Cut a similar-shaped piece of plate for the back, leaving an opening large enough to provide access to the winding keys and the alarm controls. The side pieces (Fig. 3) and top (Fig. 4) can now be cut to shape, the edges bent over by knocking them over on the edge of a board, and then soldered in place.

The bottom is left open to enable the clock to be inserted. This is accomplished by bending the tin-plate clips aside, putting the clock in position, and bending the metal back into place, this being done when the case is quite finished. File up the corners and edges, and remove all traces of solder and soldering acid by boiling in strong soda water, rinsing in clean hot water, and allowing the case to dry off thoroughly over a slow fire. Rub the case all over with coarse emery to provide a key for the paint.



CLOCK CASE. Fig. 4. Top plate, showing how to make the correct arc

Any desired colour schemes can be followed. The rising sun would look well if gilded, or in bright yellow, with lighter yellow rays on a deep-blue ground, framed in maroon, the whole on a black background. The first coats should be of flat colour to build up a solid background or base. The design can be stencilled (*q.v.*) or painted on by hand, using ordinary artist's oil-colours. Finish with a coat of good, clear varnish (*q.v.*), set aside in a warm, dry place free from dust, and allow it to stand for a week or more until the varnish is really hard, otherwise it will be liable to show finger-marks when fitting the clock to it. This idea can be adapted to hanging clocks and long case or stand clocks.



CLOCK CASE. Fig. 5. Side view in section, showing how the clock is fixed in the case

Light and useful cases for mantel clocks of the type indicated at Fig. 6 or Fig. 9 can be made at home, the size of case varying with the movement, which may be procured through any clock dealer. The dial diameter (over flange) is the important

Fig. 6

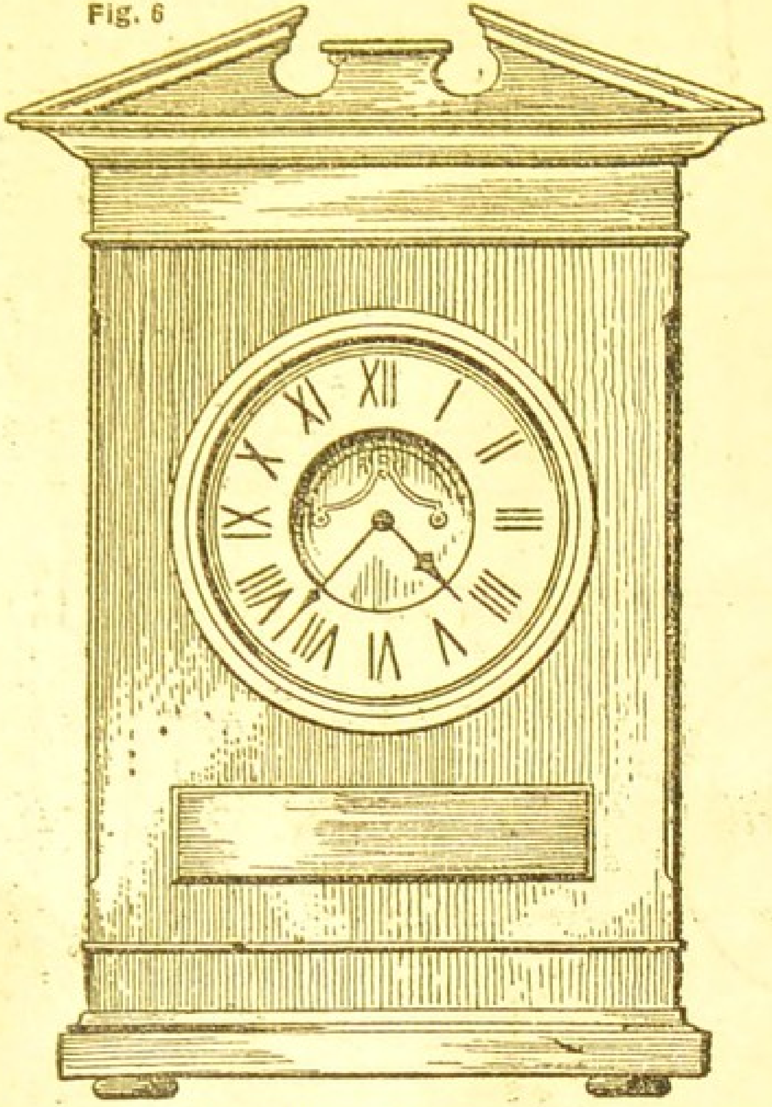


Fig. 7

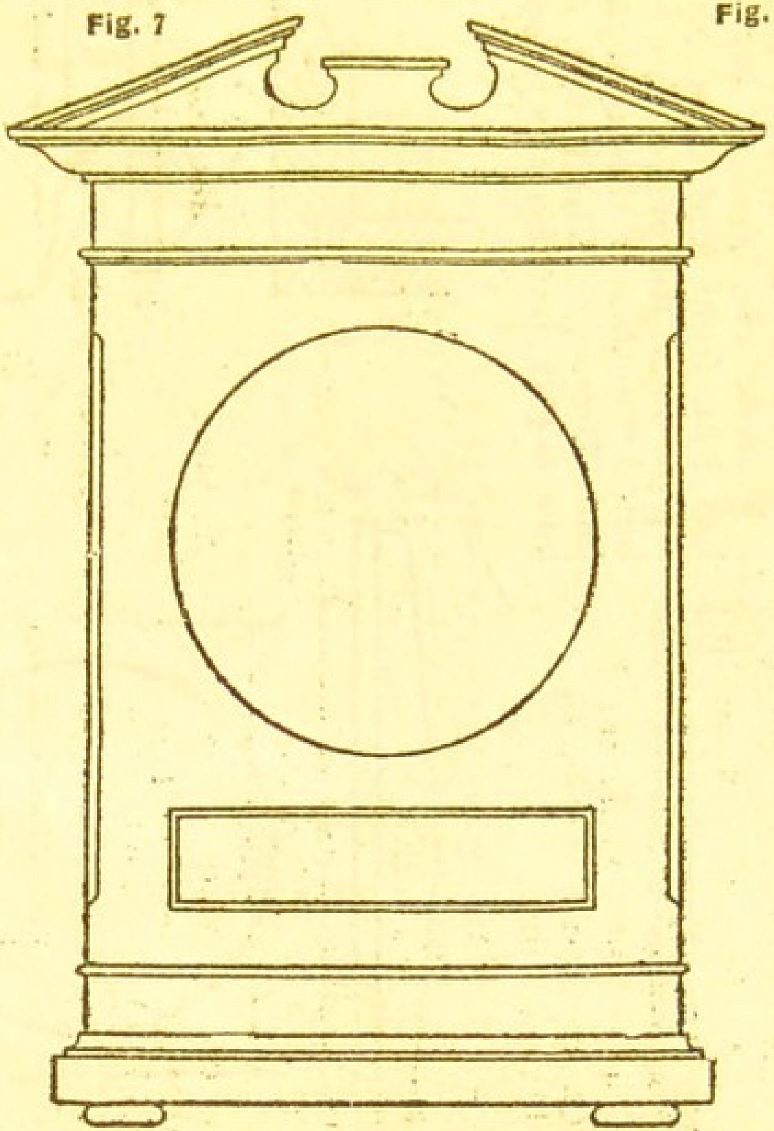
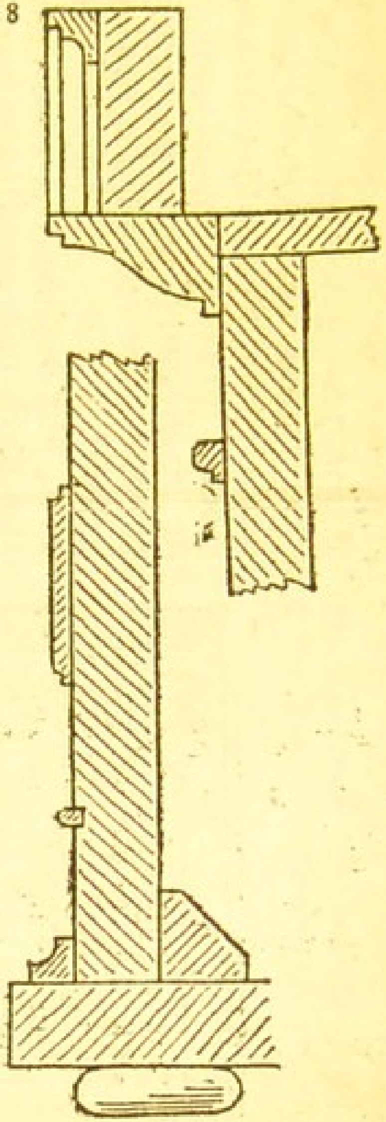


Fig. 8



CLOCK CASE. **Fig. 6.** Wooden clock case suitable for an eight-day mantel clock. **Fig. 7.** Elevation and plan of the wooden clock case shown above. **Fig. 8.** Sectional view of front dimension so far as appearance is concerned, but the depth (back to front) of the case is partly determined by the size and make of movement. Eight-day movements should be chosen if possible, and it will be found that either case is large enough to hold a striking clock. For Fig. 6 oak, walnut, or mahogany may be taken. In the case of Fig. 9 waxed walnut will perhaps look best, but mahogany, rosewood, and dark oak are also suitable.

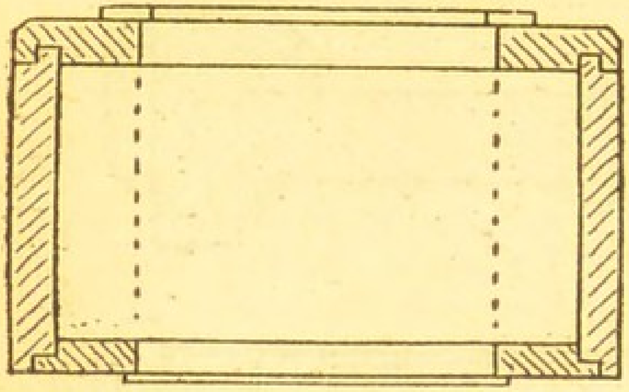
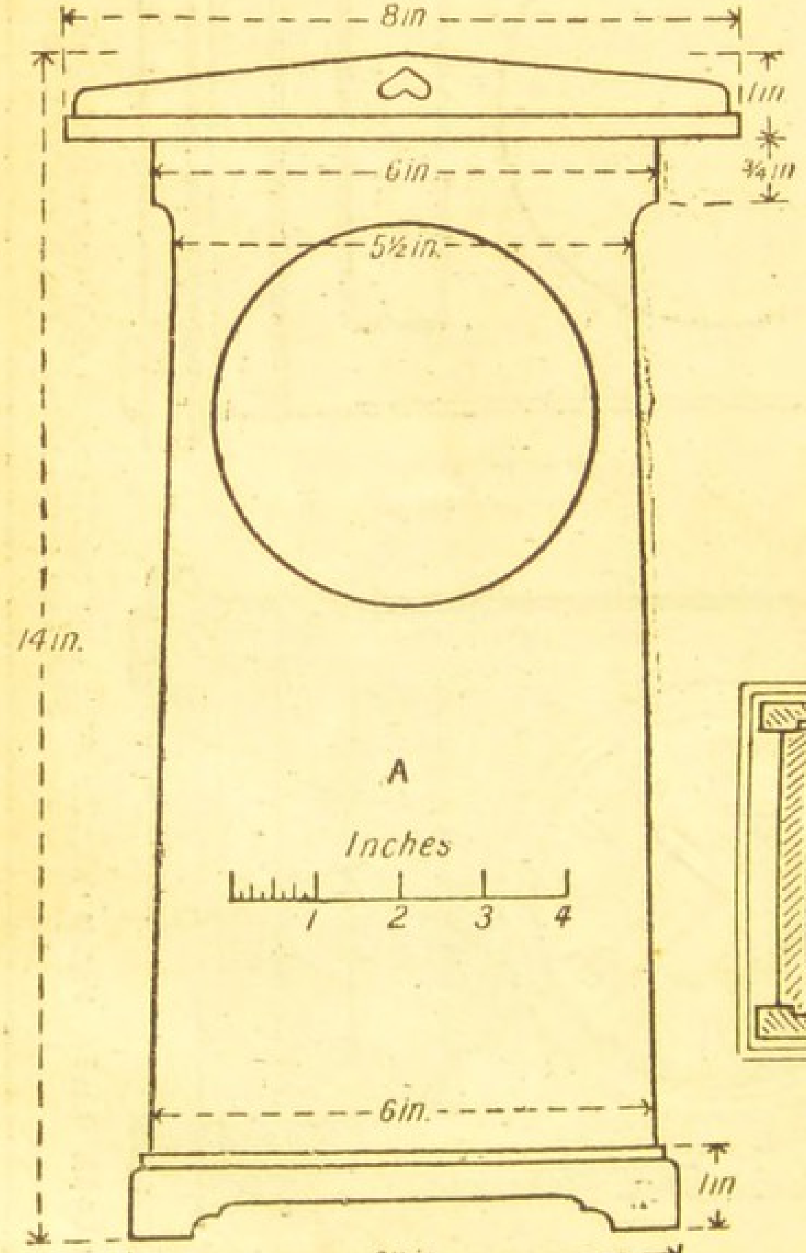
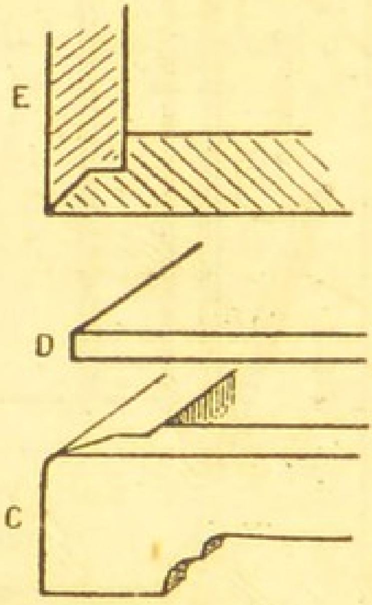


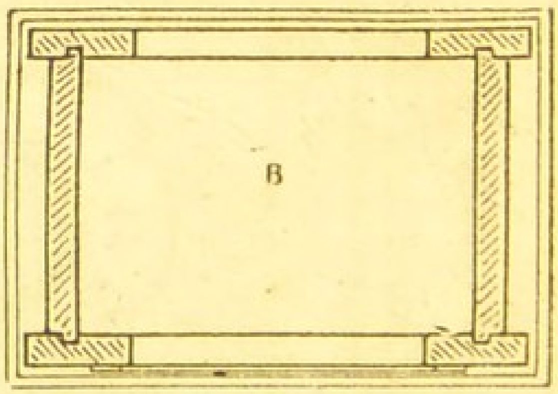
Fig. 9

Fig. 9. Plan of case shown in Fig. 7

PLINTH AND SIDES. Fig. 6 has $\frac{1}{2}$ in. front and sides, and a $\frac{3}{8}$-in. back, the parts being rebated together as shown in the plan (Fig. 7). The plinth, or base is $\frac{1}{2}$ in., but this is increased





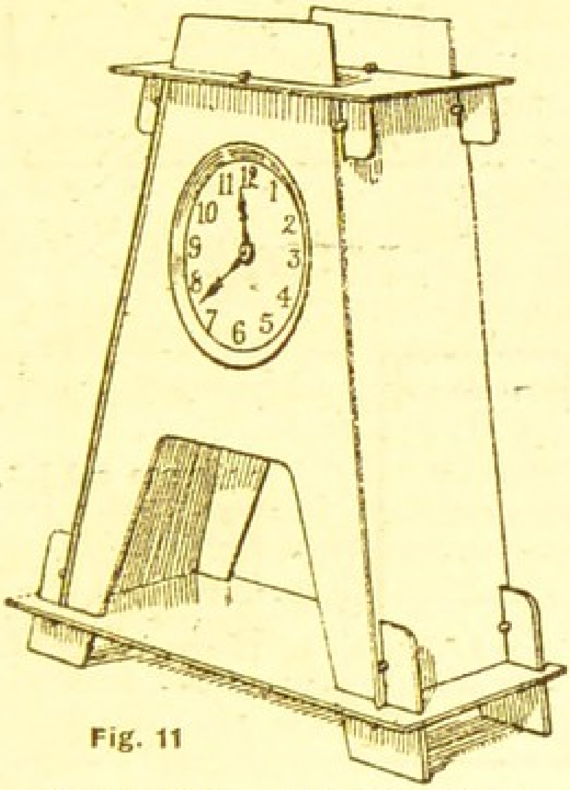


CLOCK CASE. Fig. 10. Diagrams and details for an alternative pattern of wooden clock case. See text

Fig. 10.

to $\frac{3}{4}$ in. by planting on a little mould, $\frac{1}{4}$ in. by $\frac{1}{4}$ in., which is mitred and glued around. The section at Fig. 8 indicates how the moulds, etc., are schemed. The sides of clock case may be screwed to the base, or glued with angle blocks as suggested in the section. Round toes, 1 in. in diameter and $\frac{1}{4}$ in. thick, are screwed on below. A little bead mould is shown about $\frac{3}{4}$ in. above the base; this may be let in as indicated, but the beads should not exceed $\frac{3}{16}$ in. or $\frac{1}{8}$ in. in width.

The $\frac{1}{4}$ in. top is glued on, and the cornice mould and frieze mould are mitred and glued (Fig. 8). The pediment is a shaped piece, $\frac{1}{2}$ in. thick, with a moulding glued on the face. The outer ends of this mould must be carefully mitred to the cornice, the inner ends being returned in the solid with chisel and gouge. The flat ledge in the middle may be $\frac{1}{4}$ in. thick, and should project $\frac{1}{8}$ in. in front. The front edges of the case are indicated as stop-chamfered. If this suggestion is carried out the width of chamfer should not exceed $\frac{1}{4}$ in. The raised panel on front will work out at 5 in. by $1\frac{1}{4}$ in. Thickness may be $\frac{1}{8}$ in., the edges being gently hollowed as shown at Fig. 8. in section. If the clock is carried out in mahogany the panel may be indicated by narrow inlaid lines; or, if preferred, a shallow sunk panel may be substituted. Before cutting out the wood, the reader should set out his elevation and plan full size.



CLOCK CASE. Fig. 11. Simple metal clock stand which can be easily constructed

The clock at Fig. 9 forms a beautiful ornament if care is taken in the selection of wood and in following the proportions suggested. Fumed oak will give a good effect, the inlay being in some soft whitewood. Alternatively, mahogany, stained and polished, will make a pleasing case. An effective inlay of copper strips is a simple alternative method of ornamental treatment.

As regards Fig. 9 the principal sizes are marked on Fig. 10, and with the aid of the scale no difficulty should be found in making a full-size set-out. The base is made up of four pieces C, $\frac{7}{8}$ in. wide by $\frac{1}{2}$ in. thick, which are shaped on their under edges and which should, if possible, be mitre-rebated at the corners E. made 4 in. deep, the top should be cut 8 in. by 5 in., and $\frac{1}{4}$ in. thick. The shaped pediment is fixed so that it comes about

$\frac{1}{8}$ in. from the front edge. Whether a similar pediment is cut for the back is optional. It is well to fix the clock movement so that there is a space of exactly 1 in. between the outer edge of flange and the underside of top. On Fig. 9 the suggestion for a straight line inlay is shown.

Constructed from sheet metal, a decorative clock stand or case has the effect of converting a commonplace timepiece into a handsome article of furniture. The design given in Fig. 11 is suggestive of the possibilities in this direction.

A simple and effective method is to use sheet brass and etch a pattern upon it. The whole of the case can then be constructed

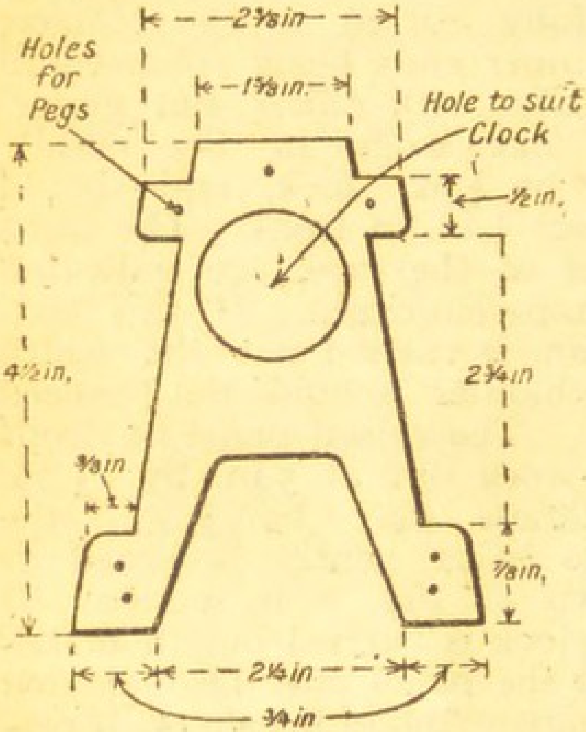


Fig. 12

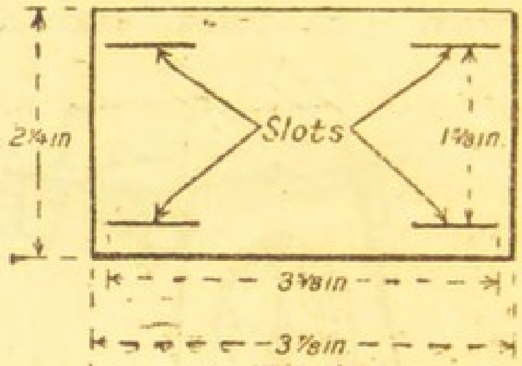


Fig. 13

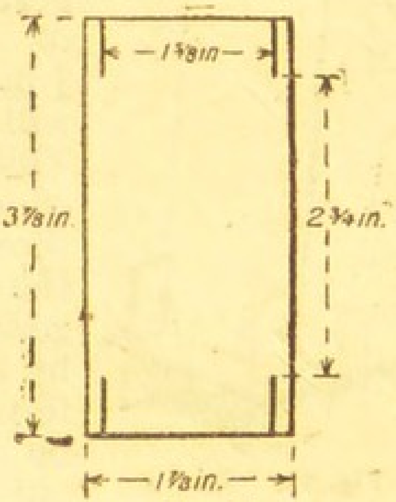


Fig. 14

CLOCK CASE.
Figs. 12-15. Diagrams showing how the various parts of the clock stand illustrated in **Fig. 11** are cut out and fitted together

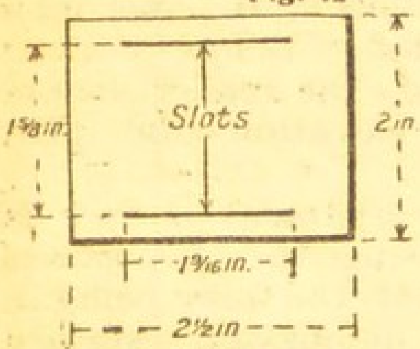


Fig. 15

from flat sheets cut to correct size and shape and jointed where necessary. The joints can be made by silver soldering, but a pleasing variation is suggested in the design by making slots in the one part and cutting a projecting tongue upon the other. By passing the tongue through the slot the two parts are held together by a wedge-shaped piece of metal. The abutting surfaces must be flat.

Commence by making the bottom plate (Fig. 13) from sheet brass $\frac{1}{16}$ in. thick; the front and back pieces (Fig. 12) are prepared and fitted to the slotted base the sides (Fig. 14) cut and fitted and the top piece (Fig. 15) prepared. The sides and front may be cut from sheet brass $\frac{1}{32}$ in. thick, and may either be sawn to shape or the parts to be removed may be cut out with a cold chisel and the edges finished off flat and true with smooth files. The small slots will have to be drilled out, and then turned into the form of a slot by the use of a round file and small knife file, those known as jewellers' needle files being the best for this purpose.

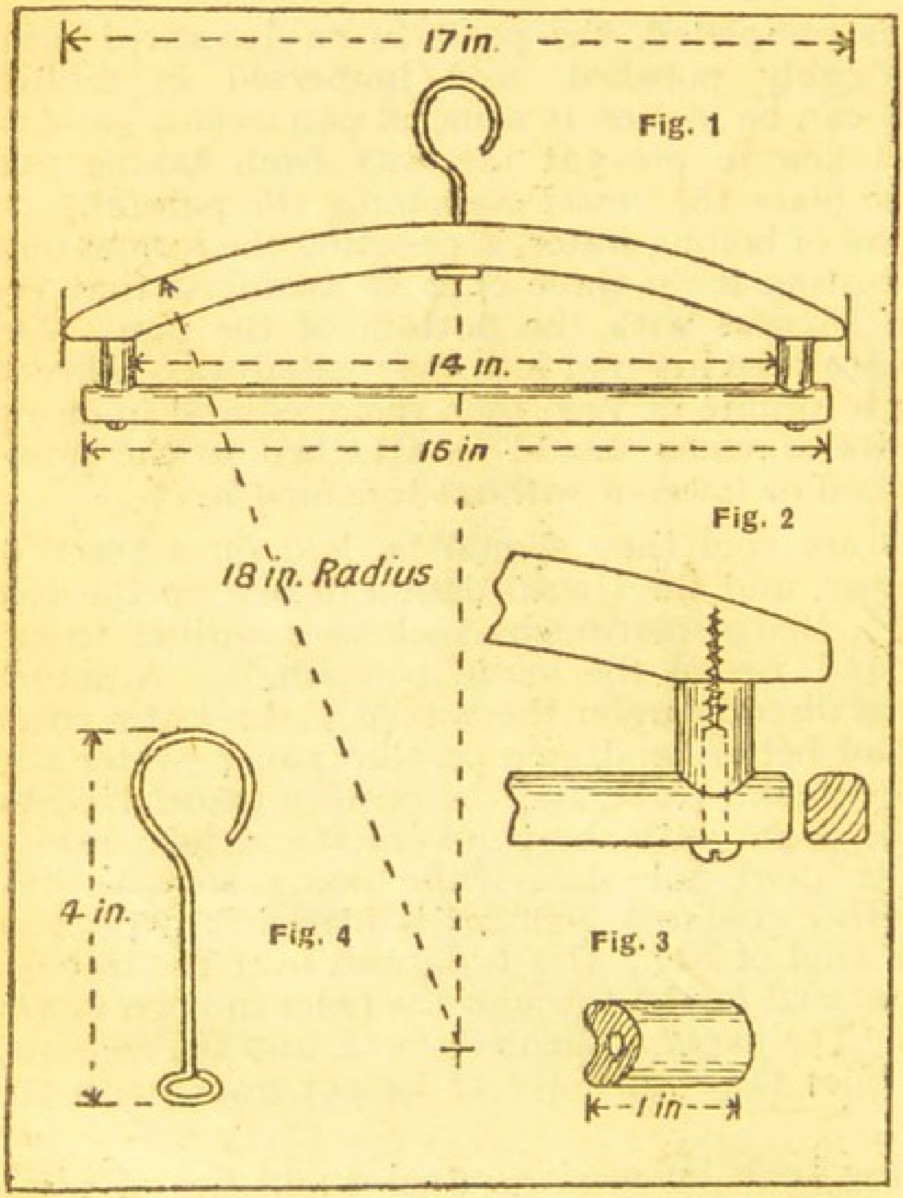
The wedges may be made from flat strip brass filed to shape and driven through holes drilled through the tongues and then finished to shape. The clock itself is fitted by removing the bezel or front ring, cutting a hole through the front case, inserting the clock case through it and replacing the bezel. When the clock case is stamped from the solid, as it is with some of the cheaper clocks, it is necessary to remove the feet and any other projections and pass the clock case bodily through the hole; it can be secured by three little angle-pieces soldered to the back of the plate. To provide access to the winding keys, etc., an opening may be cut in the back plate and provided with a little door hung on wire hinges and secured with a little turn-button.

When the work is completed, the parts to be decorated must be removed, thoroughly polished, and immersed in molten paraffin-wax. This can be melted in a metal pan over a gas-fire, precautions being taken to prevent the wax from taking fire. The safest plan is to place the vessel containing the paraffin-wax into a larger saucepan of boiling water, supporting the former on a piece of wood, or resting it on three cups so arranged that the boiling water is in contact with the bottom of the pan. The plates to be coated are then lowered into the melted wax, allowed to remain there for a minute or two, then removed and hung up to cool. A thin wire or wires should be attached to the plate, so that it can be raised or lowered without touching it.

When the plates are cool they should be laid on a piece of cloth or smooth paper, and the traced design drawn on the face of the work, using a sharp instrument such as a scriber to cut through the wax and reveal the metal beneath it. A simple design can be drawn directly upon the waxed plate, but a more elaborate pattern had better be drawn on thin paper, which can then be laid over the waxed plate, and the pattern transferred by pricking through the paper with the points of the scriber, taking care that the paper does not shift while doing so. A little powdered blue or other coloured pigment is placed in a piece of soft linen to form a kind of bag; this is dabbed over the tracing, and the coloured material forced through the holes in it on to the surface of the wax. The paper is then removed, and the coloured spots indicate the lines that will have to be cut away with the scriber.

Prepare an etching bath by mixing equal quantities of nitric acid and cold water. Use an earthenware jar, and add the acid to the water; do not get it upon the hands, and avoid inhaling the fumes. As soon as the solution is cool, it can be poured into a flat earthenware dish and one of the metal plates placed in it. The acid will then attack the exposed parts of the metal, and eat it away. After the plate has been in the solution for a minute or two, remove it, rinse it in cold water, and examine it to see that all parts of the design are being attacked. Remove any wax which may be preventing this, replace the plate in the bath, and leave it until it is etched sufficiently deep. Rinse it thoroughly in cold water, heat the plate, melt off the paraffin-wax and finish by careful polishing, unless it is desired to colour the etched work. In that case, it must be rinsed in cold water, allowed to dry, then immersed in a bath of bronzing acid, after which the wax may be melted off, all the separate pieces polished, lacquered, and finally assembled.

CLOTHES HANGER. The terms clothes hanger and coat hanger are used somewhat interchangeably; but, strictly speaking, the clothes hanger is used for a suit of clothes or for a costume, while a coat hanger holds only the coat.



CLOTHES HANGER. Figs. 1-4. Diagrams showing how to make a simple hanger for a complete suit

The clothes hanger illustrated on this page resembles the ordinary coat hanger, but whereas a coat, or at most a coat and vest, may only be hung on the latter, the former will accomodate a whole suit. The top tail is used for hanging a coat and vest, and the trousers are folded over the lower rail. Beech, birch, or a similar hardwood is best to use in making the hanger, but those who cannotobtain such wood may use a softwood, which should not be less than ¾ in. thick.

The top rail is set out to the radius of 18 in., as shown at Fig. 2. The length of the rail is 17 in. and 1 in. deep, with the top edge neatly rounded over. A hook (Fig. 5) is fitted to the top rail for suspending the hanger. It could be of ordinary wire, fairly stout, bent to the shape shown. A hole is provided in the rail in which the hook should work freely and a small bow is formed at the bottom of the hook to prevent it passing through the rail. The bottom rail is 16 in. long by $\frac{3}{4}$ in. deep, with the top edge rounded over (Fig. 3). The top and bottom rails are screwed together at the ends, but to increase the space between them small uprights $\frac{3}{4}$ in. in diameter, and similar to Fig. 4, are inserted before fixing the screws. The screws pass through the bottom rail and uprights, and are driven into the top rail, as shown in Fig. 3. When complete a coat of varnish will give a finish.

CLOTHES LINE. When clothes are hung up to dry they are suspended from lines which may be made of hemp, jute, or galvanised iron stranded wire. The hemp lines are generally put up in 18 to 20 yd. lengths with a ring at each end.

The lines are supported by wooden posts $2\frac{1}{2}$ to 3 in. square and 8 ft. long. The upper end has wooden pegs for attaching the lines on all four faces; the lower end has a fillet A to support the post as it rests in the wooden socket B (Fig. 1). The latter should be tarred and buried in the ground, preferably in a lump of concrete built round it as a foundation. With this arrangement the posts can readily be lifted out of the sockets and stored away when not in use.

The socket shown in Fig. 2 is made of cast iron; it is sunk into the ground and bedded in concrete. The posts used for this socket should have tapered ends to fit tightly into the hole in the socket. However carefully the sockets are fixed, the post is seldom rigid; it is a good plan to provide a hook low down on an adjacent wall, or screwed into a wooden post driven into the ground, and to attach one end of the line to this hook, then

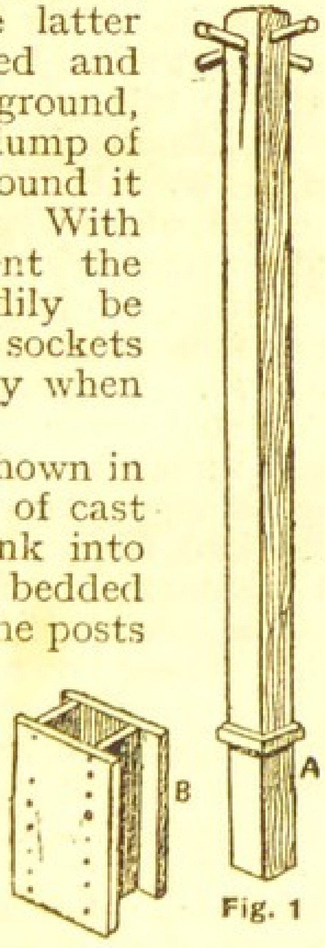


Fig. 1

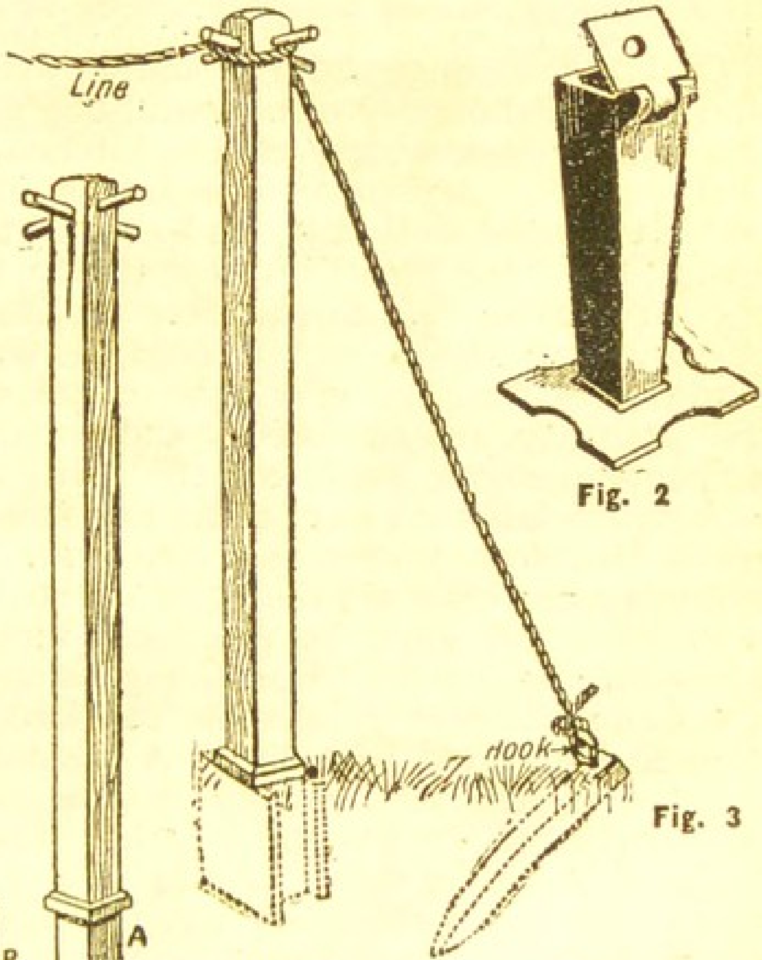


Fig. 3

Fig. 2

CLOTHES LINE. Fig. 1. Post with four wooden pegs and fillet, **A**, for insertion into the socket shown at **B**. **Fig. 2.** Cast iron socket bedded in concrete. **Fig. 3.** Method of keeping post rigid twisting it around the post. The line thus acts as a guy or stay and keeps the post rigid. (*See* Fig. 3.)

When a wall or the side of the house is available it is best to fix a hook or an eye-bolt securely into the brickwork and to provide a pulley for the line. A clothes line should always be brought indoors when not in use. It is unsightly, and exposure to wet rots the rope. Frequently in towns, and occasionally even in the country, the line should be cleansed in hot soda and water, otherwise it will collect smuts and leave dirty marks on the clean linen. Fine, light clothes lines, which fold up very small and are easily set up in an ordinary room, with small pegs to suit, are sold for travellers and women who live in bachelor flats, and are a help in the laundering of light articles.

COAL BOXES OF WOOD AND METAL

Simple and Ornamental Types for Various Rooms

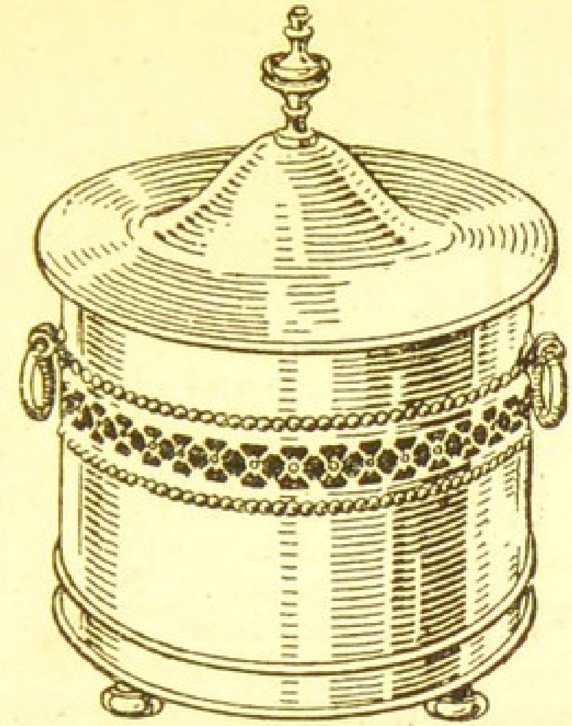
This article describes in detail the making of several types of coal box. Coal scuttle is the subject of a separate entry. Further information on the practical side can be obtained from such articles as Brazing; Joints; Soldering

Coal boxes range from a simple article made of galvanized iron to an elaborately ornamental one in oxidized silver or brass. The simple ones, widely used in kitchens, are generally known as coal scuttles. A popular form is square save for its sloping front, which is hinged so that it can be raised to admit and remove the coal. The loose metal interior can be taken out when the box needs replenishing. Such boxes are usually fitted with a handle and a groove at the back to hold the shovel. Some of them are made of galvanized iron or other metal, often japanned black, but the majority are of wood. Oak, mahogany, and walnut are among the woods used, and the fittings are frequently of brass.

A more elaborate form takes the shape of a vase, and is sometimes, therefore, known as a coal vase. These are less suited for everyday use than are the ordinary coal boxes. Some are fitted with lids, and some have a loose metal lining. One type, of pierced brass, with an iron lining, is supported on legs. Others are made of brass, copper, or oxidized silver, beautifully ornamented and fitted with lids. A plainer lidless form is made of wood strengthened by metal bands. Another coal vase is an elaboration of the kitchen scuttle. These are made of brass or copper. Another type consists of a square box, fitted with a hinged lid and a loose interior, the former constituting the top of the box. These are made in beautiful designs of iron, brass, or oxidized silver, and in some the top is made to slope, but in others the box is quite square.

The oval coal box shown in Fig. 1 can be constructed by the amateur worker in metals. The exterior is made from sheet brass or copper, the interior lined with stout sheet iron, to prevent the coal damaging the brasswork.

The inner lining should be made first by cutting some 20-gauge charcoal iron sheet to sizes and shapes shown in Figs. 2-4. Rivet



COAL BOX. Fig. 1. Oval box in sheet brass or copper, with embossed pattern

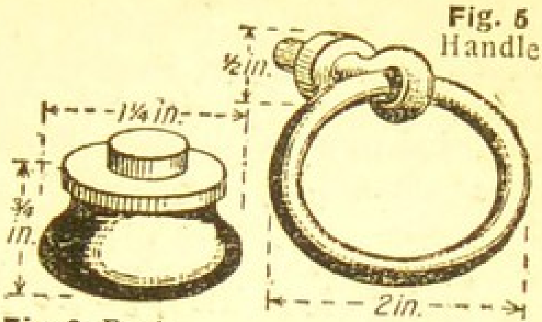


Fig. 6. Foot

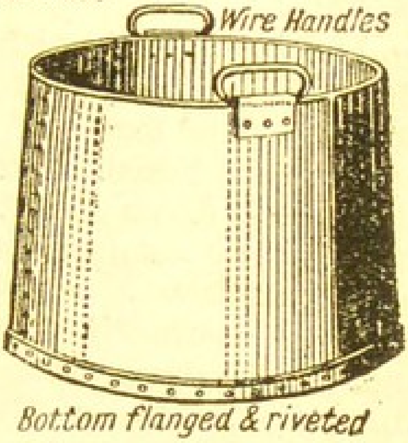


Fig. 2. Lining complete

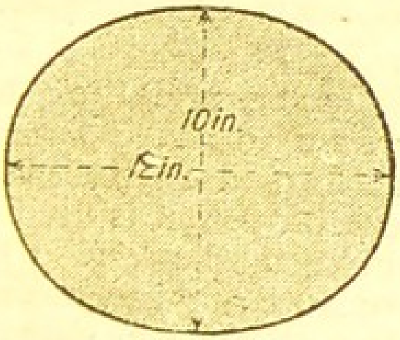


Fig. 4. Bottom

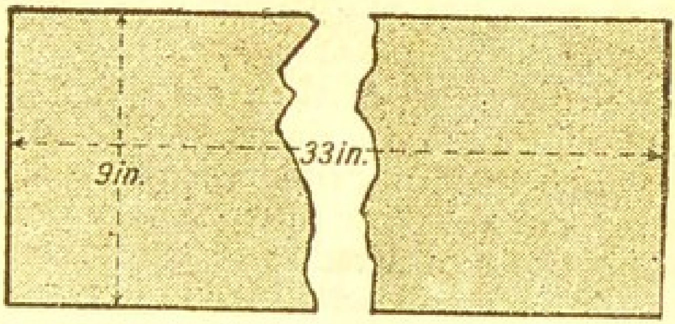
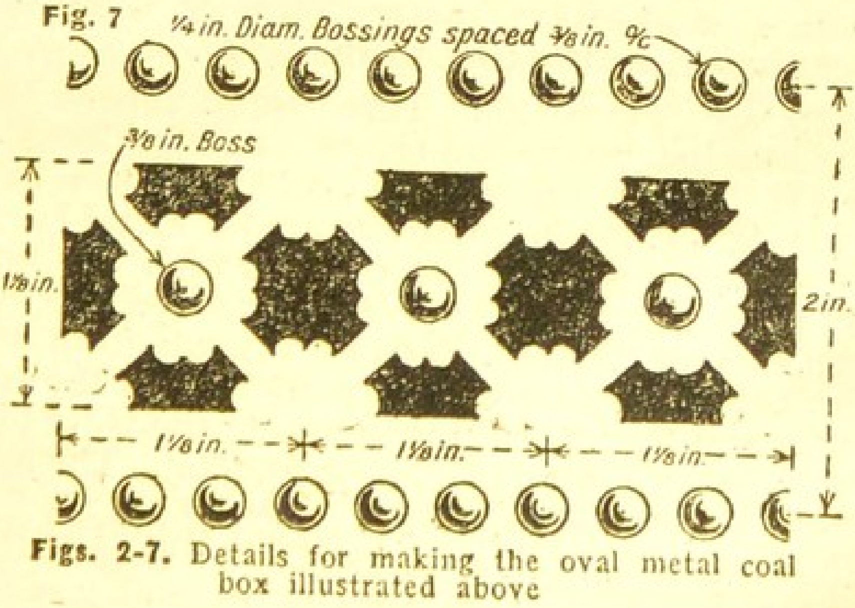


Fig. 3. Inner lining

Fig. 7



COAL BOX. The completed article together with diagrams giving particulars necessary for its construction

Figs. 2-7. Details for making the oval metal coal box illustrated above the sides to the bottom (Fig. 4), flanging the latter for this purpose. Make two stout iron wire handles to enable the lining to be lifted out of the casing. The outer casing has to be made from sheet brass, cutting a piece of sufficient size to the dimensions given, and about $\frac{1}{32}$ in. thick. Cut a stencil plate of the repeat of the ornamental pierced design, using oiled paper or thin sheet metal for the stencil. Now draw parallel pencil lines at $1\frac{1}{2}$ in., $3\frac{1}{2}$ in., and $7\frac{1}{2}$ in. distances from the upper edge of the brass plate, and work the raised and beaded mouldings above and below the pierced part, doing the embossing before the piercing.

The embossing is done with a round-ended punch and a hammer, using the punch on the back of the sheet, and supporting the latter on a block of lead. A strip of wood can be used as a guide for the punch, to assist in keeping the indentations in line. The band near the bottom is a continuous ring, and is worked up in the same way by using a long, round-ended punch. The plate will probably show a tendency to buckle and twist, which is corrected by hammering it flat on an anvil and by frequent annealing. The design for the pierced work can be stencilled on to the outside face of the sheet and the spaces cut out with sharp cold chisels and trimmed to shape with files, or they may be sawn out with a metal piercing saw (Fig. 7). The metal should be cleaned with old worn emery powder, all burrs and roughness being removed.

The upper edge is then carefully beaded over, and the plate curved and bent to shape, taking every care to avoid sudden jerks while bending, otherwise flats will be formed on the plate. A broad, curved piece of wood is of great assistance ; it is used by pressing the metal on to it, and then rubbing and pressing the metal with a small solid block of wood, to remove any inequalities and form a smooth and continuous curve. When the sheet is satisfactorily shaped the joint is brazed or silver-soldered. The bottom is made from another piece of sheet brass about $\frac{1}{32}$ in. thick, flanged and brazed to the body.

Feet and Handles. Three small turned brass feet (Fig. 6) must now be procured, riveted and soldered in place on the bottom. The handles can be made from $\frac{1}{4}$ in. diameter brass rod, hammered to circular shape around a metal bar, the ends brazed together after passing the ring through the hole in the turned brass boss (Fig. 5). The latter is riveted and brazed in position at the ends of the box. The lid is made from an oval brass plate $\frac{1}{32}$ in. thick, hammered and embossed in the centre, the bossing being raised by carefully hammering the plate on a block of hard-wood, a heavy piece of lead or a sandbag. The metal will probably require frequent annealing.

The plate will need occasional flattening as the work proceeds. When the boss is satisfactorily shaped, remove all traces of hammer marks by careful filing on the outside with dead smooth files, and by vigorous application of well-worn emery paper. True up the rim and round off the edge; obtain a length of $\frac{3}{8}$ in. by $\frac{3}{32}$ in. strip brass, bend it to fit easily into the inside of the vase, and then braze it to the underside of the lid. Clean up the whole job and polish and lacquer it, or finish in any desired manner as by bronzing (q.v.) or by electro-plating or oxidizing.

Another type of coal vase can be made at small cost and in an attractive form by any amateur capable of plain soldering and able to cut a piece of metal to shape with tinman's snips. The design given in Fig. 8 is appropriate to easy construction by any amateur.

The materials chosen will be governed by individual preference. Sheet brass is the most suitable; aluminium or copper could be used, but are not so desirable as they are more readily bruised by the coals. Sheet-iron is as good as anything, is inexpensive, and amenable to hard wear. Alternatively, a combination of these metals can be employed, as by using sheet-iron for the body and trimming it with copper or aluminium the construction is the same in all cases. Commence by marking out the work, using a sharp-pointed scriber to incise lines as a guide for cutting. The parts with their measurements are shown in the diagrams.

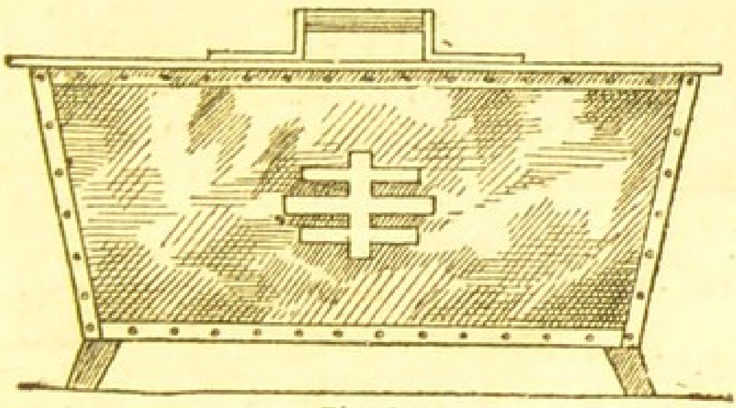


Fig. 8

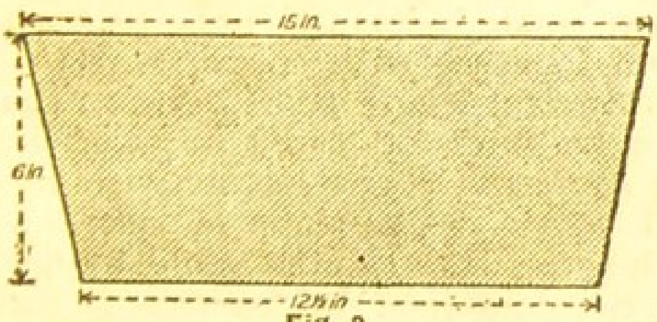


Fig. 9

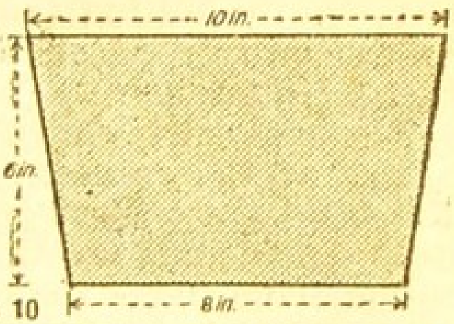


Fig. 10

Fig. 11

COAL BOX. Fig. 8. Metal coal box of simple design. Figs. 9-11. Diagrams giving measurements of side end and bottom respectively

Fig. 8 shows the appearance of the completed side, and Fig. 9 the dimensions, 15 in. across the top edge, 12½ in. along the bottom, and a height of 6 in. Fig. 10 gives the dimensions of the end, 10 in. across the top, 8 in. across the bottom, and the same height as the sides. The bottom (Fig. 11), is 8 in. by 12½ in., and the lid (Fig. 12) 11 in. by 16 in.

Then, with the aid of strong tinman's snips or shears, cut the sheet metal to shape. No. 20 gauge will be stout enough, and cuts without difficulty. Next clean up the edges with a smooth file, making them as straight as possible; then drill $\frac{3}{32}$ in. diameter holes, spaced 1 in. apart, and $\frac{1}{8}$ in. from the edges, as indicated in Fig. 8. Now cut 4 long strips of metal 1 in. wide, or purchase some strip metal of this width and about No. 20 gauge in thickness. Double it over at right angles to form a length of angle, and drill a corresponding number of holes in each face, spacing them so that they agree with those drilled in the sheets. Provide eight lengths of angle, four being required for the bottom joints and four for the corners. Assemble the sides and bottom of the vase by temporarily bolting the angle strips to the outside edges, using two small bolts and nuts to each corner; alternatively, wire them together with copper wire.

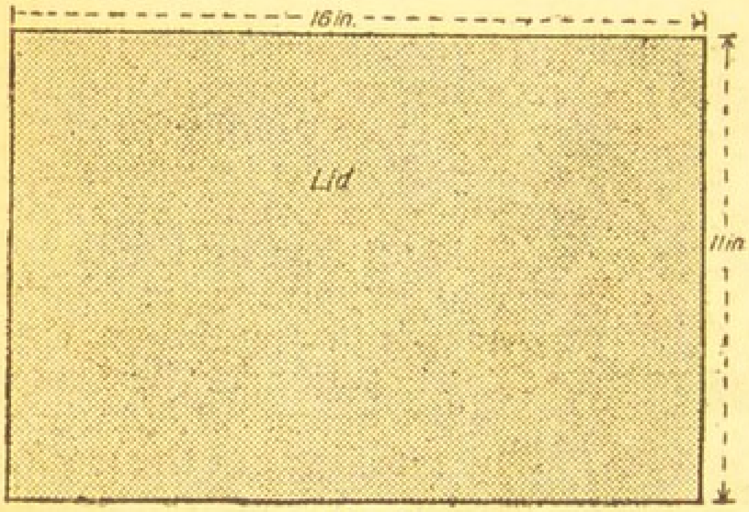


Fig. 12

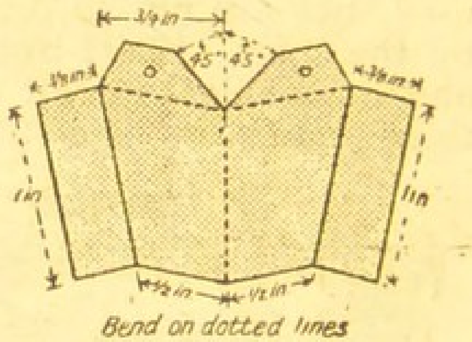


Fig. 13

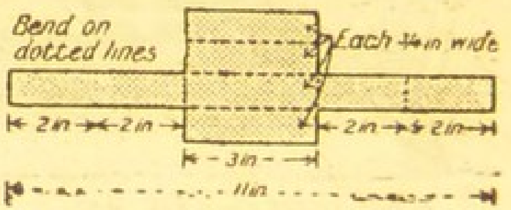


Fig. 14

COAL BOX. Fig. 12. Lid, giving dimensions. **Fig. 13.** Bending the feet. **Fig. 14.** Binding strip for lid

The angle strips must be cut to exact length to fit between the angles at the corners, and can be similarly wired in position. Rivet up the corners by using snaphead copper rivets with the head outside and riveting on the inside. The secret of success is to have the rivets the correct length; the shank should be not more than $\frac{1}{16}$ in. longer than the combined thicknesses of the pieces of metal to be riveted. Use a light hammer with a long, thin shaft, and hit the rivet a sharp blow, while taking care the head is supported on an anvil or heavy piece of iron. If the rivet or holes are not exactly linable, they can be reamed out with a fine broach with a reamer. When several rivets have been completed in each joint, remove the temporary fastenings and replace them with copper rivets. Remove any surplus ends of angle at the corners by filing them flush, and this part of the work is complete.

The 4 feet can be cut to shape and bent along the dotted lines in Fig. 13 and riveted to the bottom, as shown in Fig. 8. The top edge of the vase has now to be covered with a strip of metal 1 in. wide, doubled over along its length and inserted in the edge of the vase, cut to exact lengths and riveted as before, spacing the rivets so that one comes at each of the ends and passes through the angle pieces. The lid is cut to shape, and the edges finished with a binding strip shaped as shown in the illustration (Fig. 14) and then riveted on as before. The handle is cut from the sheet metal, riveted together, and then riveted to the centre of the lid.

As a decoration, a thinner piece of different coloured metal, such as aluminium, is cut to shape with the shears, cleaned up true on the edges with a file, and then secured to the vase with fine rivets, placing them in as inconspicuous a manner as possible. An excellent way of finishing the iron work is by painting it a dull black. Afterwards, the decorative pieces, whether they are of aluminium or of copper, may be added, as may the angle pieces, which should be made in similar material. The result will be a handsome and serviceable piece of furniture, very suitable for the home.

A gipsy type of cauldron is illustrated in Fig. 15. A wood pattern can easily be made, with the needful coreboxes and an iron casting obtained from an iron foundry. The casting would incorporate the legs and the lugs for the handles. It only requires

Fig. 15

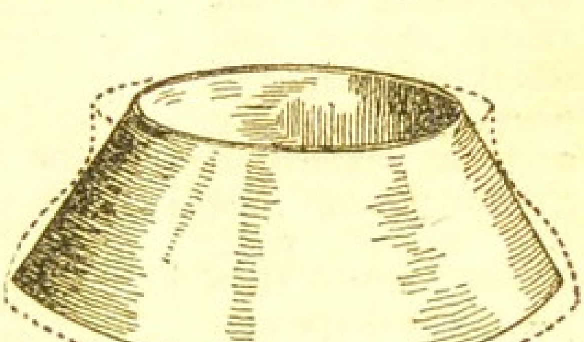


Fig. 16

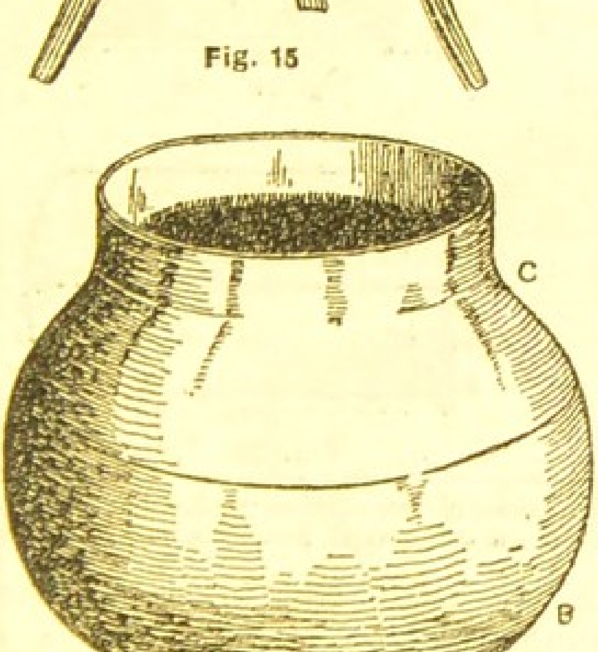


Fig: 17

COAL BOX. Figs. 15-17. Gipsy coal cauldron and diagrams showing how the metal is bent filing up reasonably smooth and painting a dull black. The copper band at the top is simply a strip of thin copper carefully bent around the casting, the ends soldered together, and secured by round-headed copper rivets.

The drop handles can be made from $\frac{3}{16}$ in. or $\frac{1}{4}$ in. diameter copper rod, coiled round a bar of metal, one complete coil cut off with a hack saw, and the ends brazed together after the ring has been put through the hole in the handle lug. When a powerful lathe is available this type of coal scuttle can be made by spinning in two parts and uniting them on the centre line. The legs can be cast or turned and riveted in position. Handle lugs are made from flat strip metal, and the rings as already described in this article.

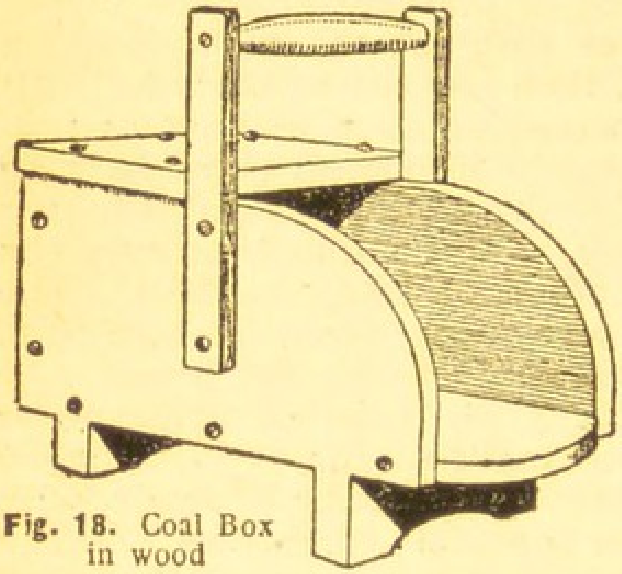


Fig. 18. Coal Box in wood

It is possible to hammer the cauldron to shape from a single sheet of metal, but this requires considerable skill. The amateur would probably do better to make it in three pieces (Fig. 16), one circular plate, A, for the bottom part, one conical-shape piece, B, for the lower half; made by bending a piece cut from the sheet to the shape shown, and silver-soldering or brazing the ends, and a somewhat similar piece, C, for the upper part. These are then beaten to shape separately, as shown in the dotted lines, working partly on one piece and then on the others, so that all will ultimately fit together, when the joints can be brazed (Fig. 17), cleaned up, the whole carefully annealed and given a final touch up with the hammer, the separate legs and handles then being fitted.

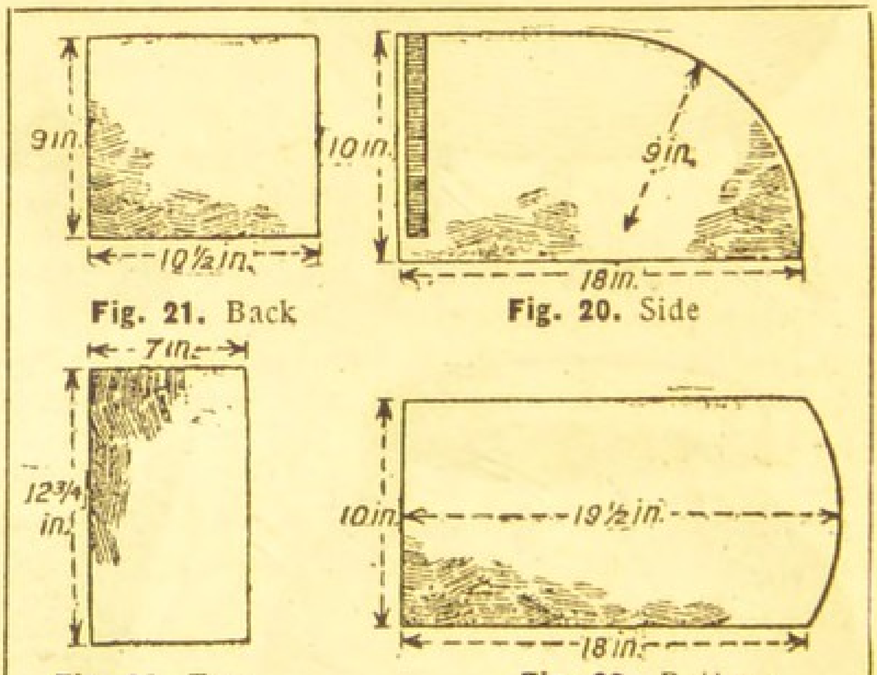
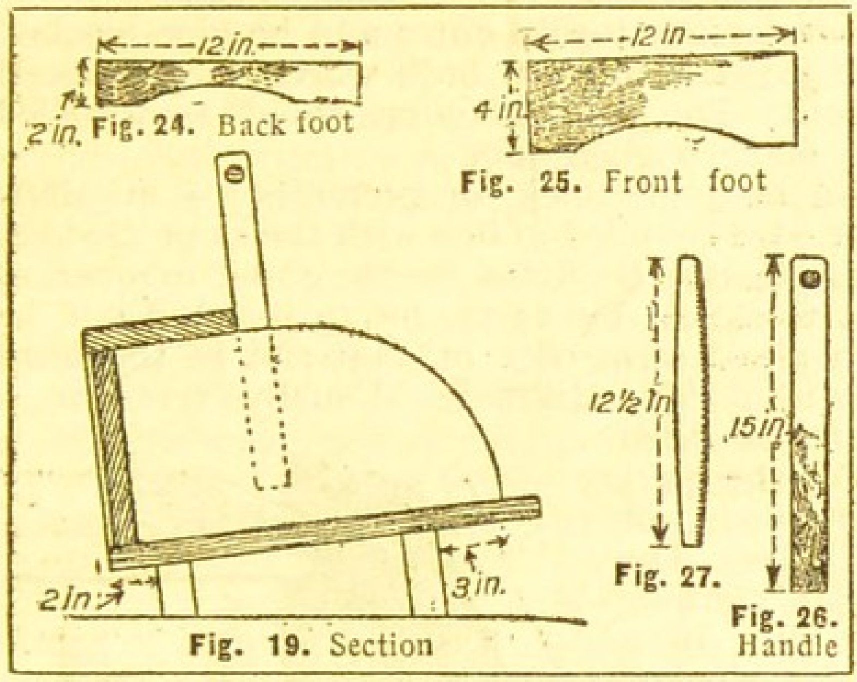


Fig. 21. Back **Fig. 20.** Side **Fig. 23.** Top **Fig. 22.** Bottom

COAL BOX. Dimensions of the various parts which, when assembled, make the wooden coal box illustrated above

The coal box shown in Fig. 18 is made entirely of wood, and is of very simple construction. A hardwood, such as elm or oak, finished by waxing or varnishing, is desirable. The sides (Fig. 20), back (Fig. 21), bottom (Fig. 22), and top (Fig. 23), are all 1 in. thick, cut to the dimensions shown. The parts are just fitted together and screwed with the exception that the back is grooved ¼ in. into the sides, the grooves being cut ¼ in. from the back edges (Fig. 20). The back and bottom are screwed through the sides; the top is screwed to the edges of the back and sides. For this purpose round-headed brass screws will be found to give a good decorative effect.



COAL BOX. Above. Further diagrams for the wooden coal box illustrated on preceding page, and a coal box of a more ambitious design

The scuttle stands on two feet. The back foot (Fig. 24) and front foot (Fig. 25) are both 1½ in. thick, and are fixed in the positions shown at Fig. 19, with screws driven through the bottom. The handle (Figs. 26 and 27) is made with two side pieces 1½ in. wide by ½ in. thick, and a cross-piece 1¼ in. diameter in the middle, tapering to ¾ in. at the ends. The cross-piece is bored ¼ in. into the side pieces and fixed with screws. The side pieces are screwed to the sides of the scuttle.

Fig. 28 shows an elaboration of the previous coal box. The extreme dimensions are 15 in. high, 15 in. wide, and 16 in. from back to front. Suitable woods are oak, walnut, mahogany, ash, and satin walnut, but, in the absence of other furniture to be matched, preference may be given to the first-named hardwood, fumigated to a nice medium shade and polished.

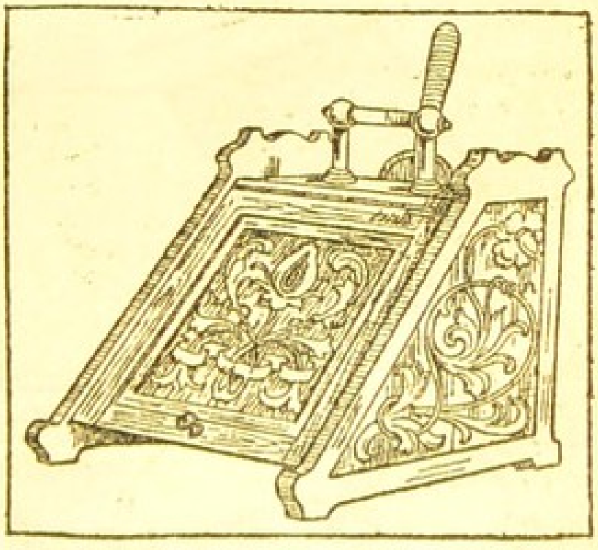


Fig. 28. Coal box in carved oak

The sides may be first taken in hand. These should be of 1 in. material to finish ⅞ in. thick by 15 in. high, by 16 in. wide, cut to shape from material previously tongued and glued up to the required size. The outline border line and carved detail can be traced from the working drawing of box side by laying the wood flat on the bench and fastening the sheet in the required position, a sheet of carbon paper being placed between the wood and sheet when lining in with a hard pencil.

The amateur worker should take great care to keep the edges square when cutting to shape, the grain being vertical. About 2 in. below the upper shaping the top of box will require fitting, and the strongest method is to dovetail-groove or half-dovetail the parts together, as indicated at B (Fig. 29), which, if properly done, will make the part as firm as a rock. The sides may, however, be simply housed for the top to enter and be glue-blocked under, as at B (Fig. 30), the joint in both cases being stopped back ½ in. from the front. The parts, of course, should be dowelled together in order to make a good job.

The top (B) should be ¾ in. thick, or preferably ⅞ in. thick net, and has the front edge bevelled in line with the slope of sides. The bottom (C, Fig. 30) can be fitted in the same manner as the top, of ½ in. net thickness by 15 in. by 13 in., and will be stiffened by fitting a glued strip of 1 in. material to the front edge (C^1), where the front fall strikes it. Usually, however, a rail of 1 in. material is filled in the cant as at C^2, the part being stubbed, dowelled, or housed into the sides. The bottom, with the grain running from front to back, lies in a rebate cut for it, and is blocked under to provide the extra stiffening which is required. The front fall, or lid, is framed of wood, not less than ½ in. net, and preferably ⅞ in. Stiles and rails are 1¾ in. wide, mortised

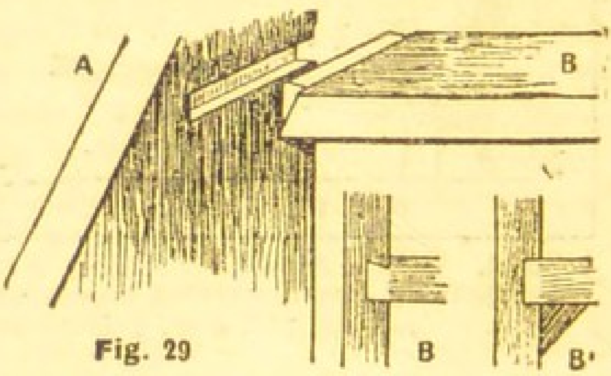
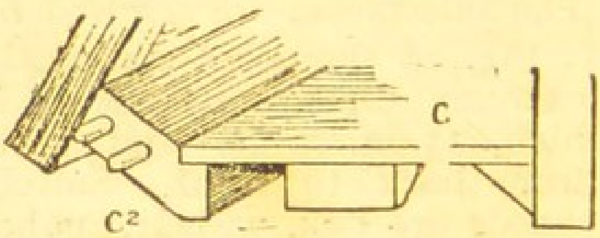


Fig. 29



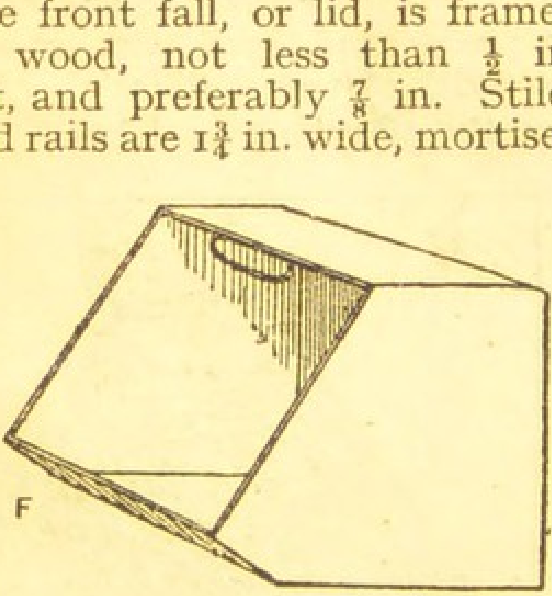


Fig. 31

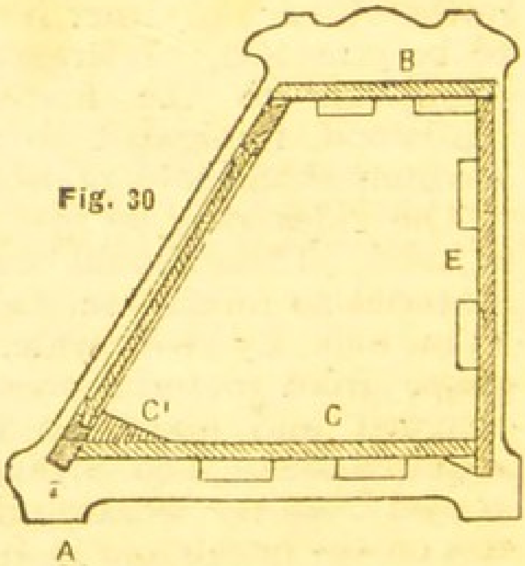
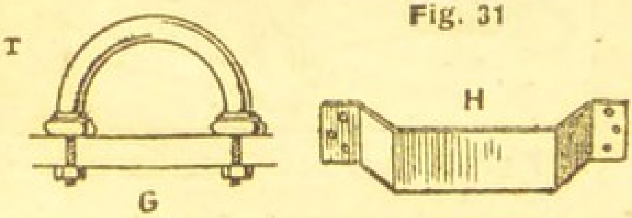


Fig. 30



COAL BOX. Figs. 29-31. Details for making the wooden case and metal lining of the box shown above and tenoned right through and wedged; they are also rebated and grooved for the panel to enter, the latter being of $\frac{1}{2}$ in. to $\frac{5}{8}$ in. thickness. Ordinary brass butts may serve for hinging the fall to the underside of top, but a special hinge similar to that on the keyboard fall of a piano is more often used.

The back (E) may be in one piece, which should be $13\frac{1}{2}$ in. by 11 in. by $\frac{3}{4}$ in. or $\frac{7}{8}$ in., this extra thickness being not out of the way as a stiffening against the impact of the coal container when being jerked in when full. The back may, however, be framed up of stiles and rails $1\frac{1}{2}$ in. or $1\frac{3}{4}$ in. wide, with a grooved-in panel of $\frac{1}{2}$ in. net thickness. The frame may be mortised and tenoned or dowelled together and dowelled to sides, the holding being stiffened by glue-blocking in the inner angles, as indicated at Fig. 29.

Fig. 31 gives a sketch of the coal container (F) of galvanized or japanned iron. The front edge of top is fitted with a stout wire handle for carrying, and fair clearance should be allowed for facilitating its removal when refilling with coal. A square or semicircular brass or oxidized handle of the kind indicated at G is usually fitted for lifting the whole thing; the attachment being by means of bolt and nut through the top. An ornamental knob will also be required in order to lift the ornamental lid. The coal scoop should be supported at the back of the box by means of a strip of sheet brass bent to shape, as shown at H, and screwed into position, but many prefer to have handy a small pair of tongs for taking up the coal and putting it on the fire.

COAL SCOOP, Making a. A coal scoop can be made from stout sheet-iron about No. 18 gauge. First cut a piece for the bottom to the shape shown in the drawing, and another piece for the rim. Bend this to shape, and flange over the bottom edge, accomplishing this by careful hammering on the beak of an

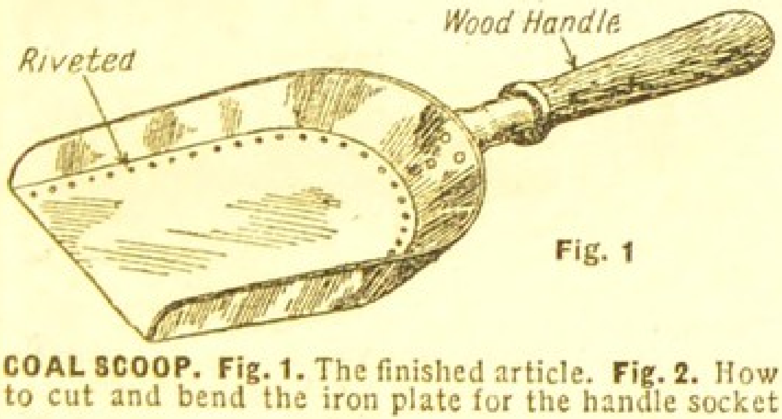


Fig. 1

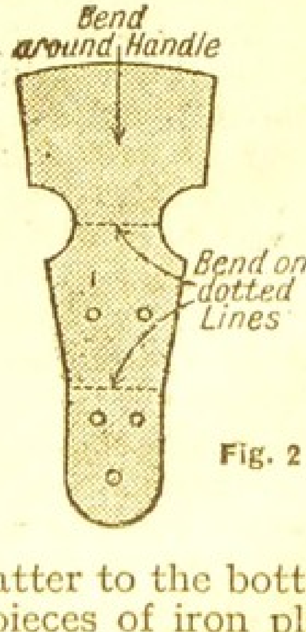


Fig. 2

COAL SCOOP. Fig. 1. The finished article. **Fig. 2.** How to cut and bend the iron plate for the handle socket

anvil or on a tinman's stake. Drill through the bottom plate a number of $\frac{1}{8}$ in. diameter holes about $\frac{3}{16}$ in. from the edge, and after drilling other holes in the rim rivet the latter to the bottom with copper rivets. Cut and bend the two pieces of iron plate for the handle socket, and rivet them together. Then rivet them both to the scoop, file up the edges until they are smooth to the touch, and fashion the handle from a piece of hardwood such as may be obtained for broom handles. Fit this neatly into the socket and secure it with a couple of round-headed

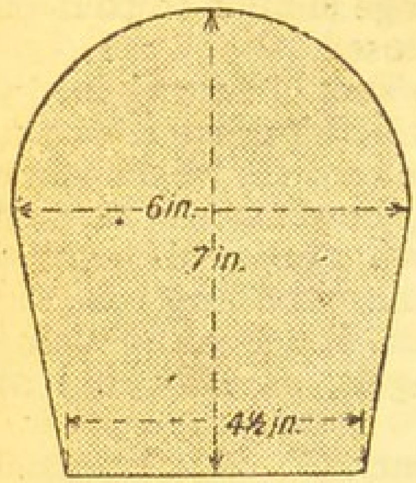


Fig. 3

COAL SCOOP. A strong metal shovel, with diagrams showing how it is made

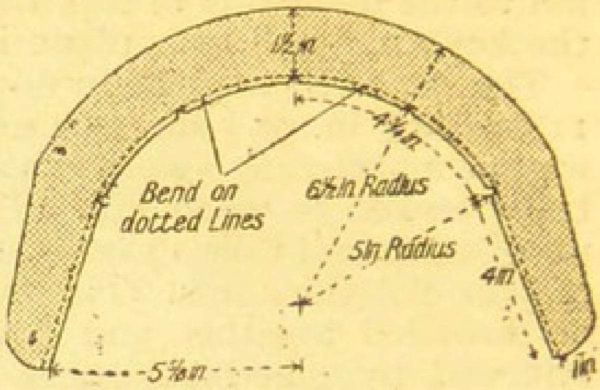


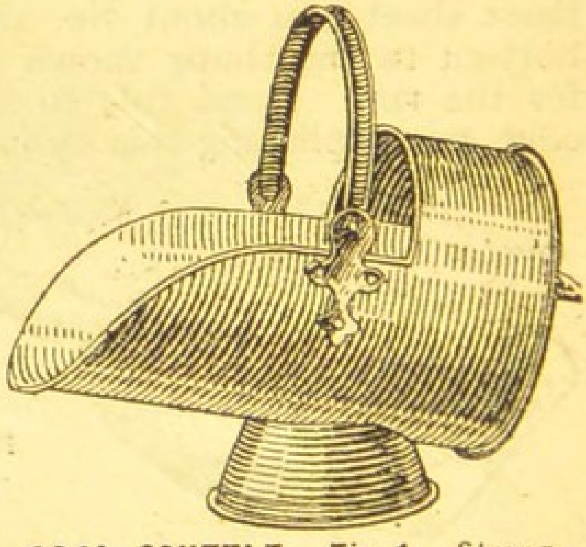
Fig. 4

COAL SCOOP. Figs. 3 and 4. Diagrams showing how the iron plate is cut and bent into shape

wood screws passed through holes drilled in the metal socket. The handle may then be stained to any desired colour. The result is a serviceable scoop and should last for many years.

COAL SCUTTLE. The strong kitchen coal scuttle illustrated in Fig. 1 is made from stout sheet-iron; a suitable kind is charcoal iron, about No. 20 gauge. A stouter piece about $\frac{3}{32}$ in. thick is needed for the ear pieces, and a few feet of $\frac{3}{4}$ in. wide and $\frac{1}{8}$ in. thick iron bar for the handle.

Mark out the sheet-iron and cut it to shape with heavy snips, or by means of a cold chisel and hammer. Fig. 2 shows the shape to which it should be cut. The two ends have then to be drawn upwards and towards each other, and the whole sheet worked into an oval shape, resembling a very large scoop in appearance. Drill or punch holes through the overlapping edges and rivet them together with $\frac{1}{8}$ in. soft iron rivets spaced 1 in. apart. The edges of this scoop piece must be beaded over, preferably enclosing an iron wire $\frac{3}{16}$ in. diameter bent to shape, the whole serving to greatly stiffen and strengthen the scuttle.

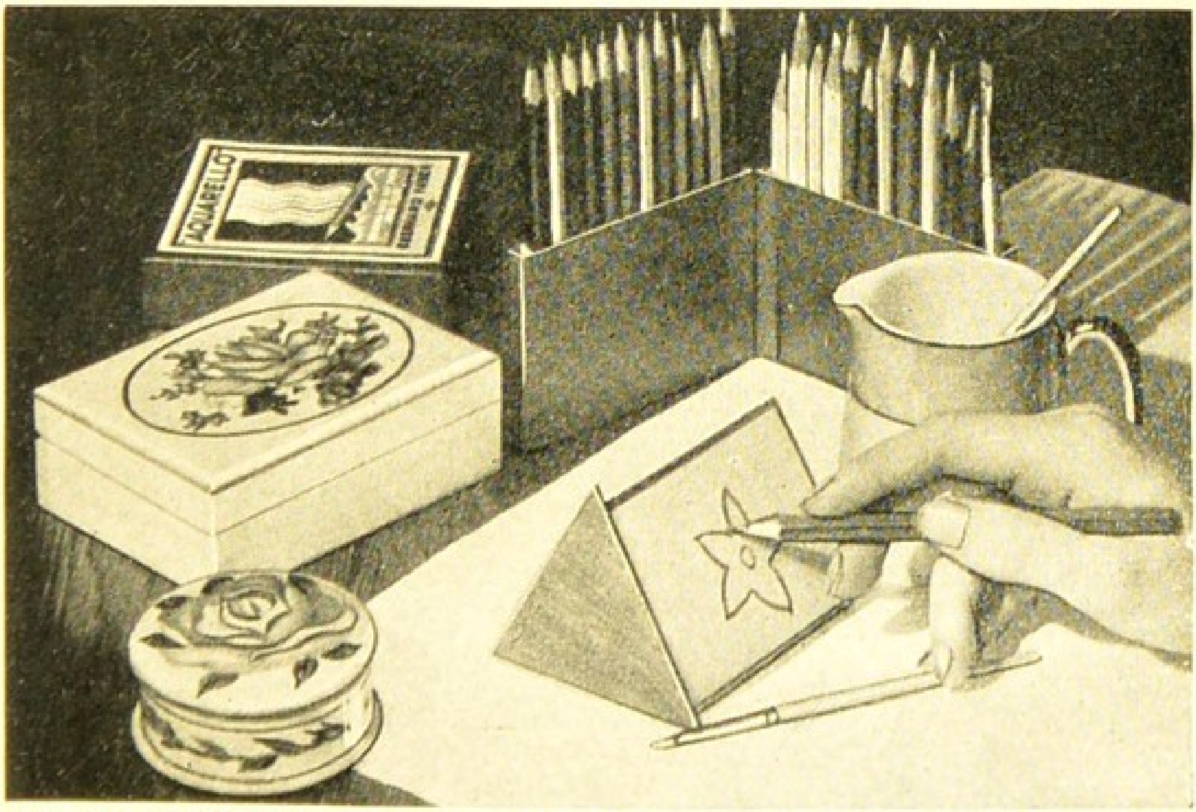


COAL SCUTTLE. Fig. 1. Strong scuttle made from sheet iron

To make the back or end plate, cut a piece of the sheet of iron to an oval shape (Fig. 3), flange the edges and rivet it to the scoop. Prepare a handle from the $\frac{3}{4}$ in. bar metal and securely rivet it to the back. Cut the two ears (Fig. 4) from the $\frac{3}{32}$ in. plate, drill for the pivot or hinge pins, and rivet the ears to the sides of the scoop as shown. The swinging handle is obtained by cutting a piece of the $\frac{3}{4}$ in. bar 16 in. long, the ends drilled to

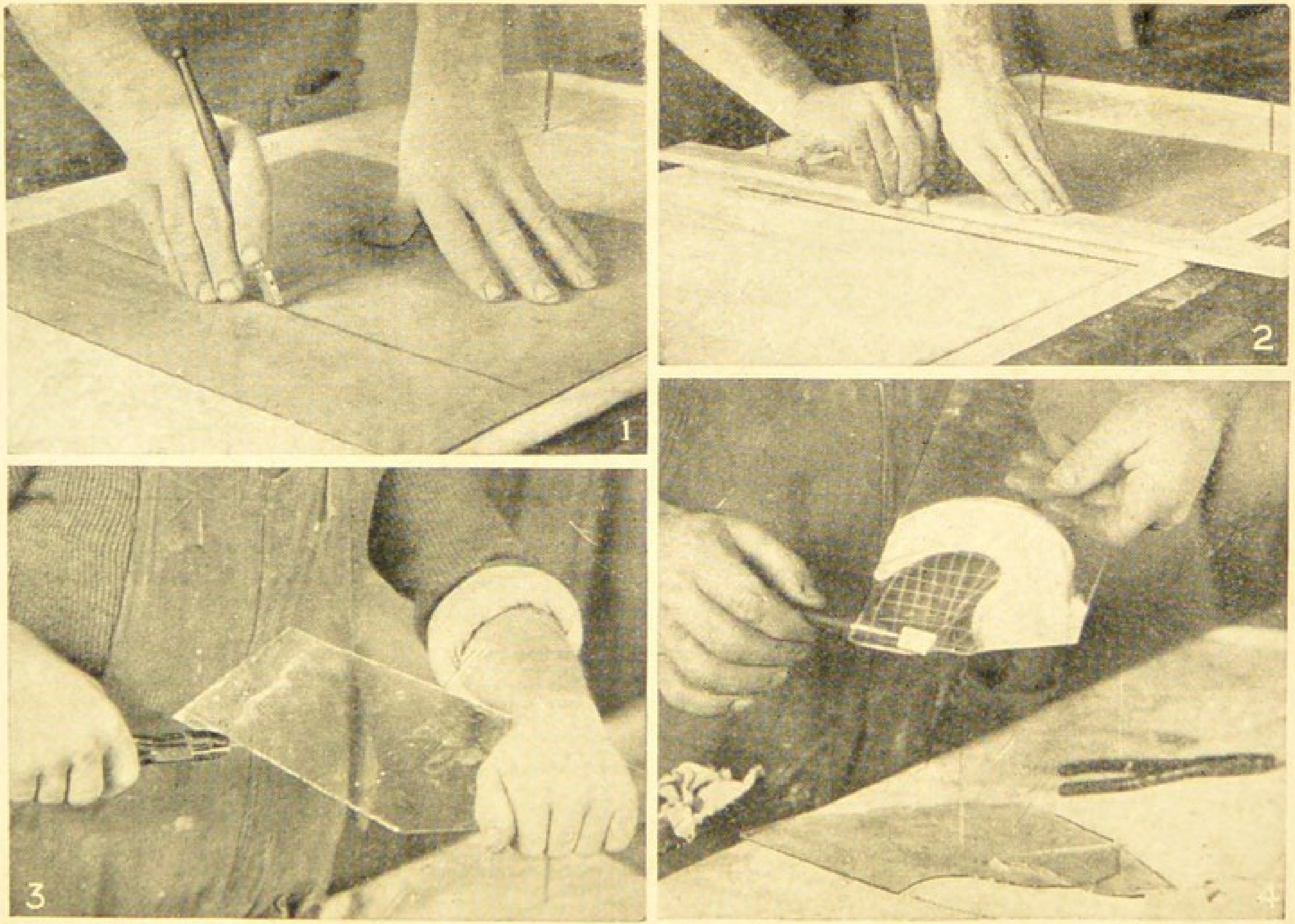
GLASS WARE. Some beautiful pieces of a modern English hand-cut crystal table service

Courtesy of Webb & Corbett



PENCIL PAINTING. Outlining the design with a water colour pencil. The boxes are decorated with colours applied dry and spread with a brush dipped in water.

MODERN GLASS AND A MODERN HANDICRAFT



GLASS CUTTING. Fig. 1. How to hold the diamond. Fig. 2. Bench arrangement of battens and nails for guiding the cutter. Fig. 3. Breaking away the glass with pliers. Fig. 4. How to cut a hollow, curved piece of glass. Note criss-cross cuts and use of diamond to tap out the pieces.

CUTTING GLASS WITH THE DIAMOND : THE STEPS ILLUSTRATED

correspond with the pivot holes in the ears. Then, with the aid of a ball-peine hammer, or a smith's fuller and swage, work the metal into a hollow U-shape in cross section, and rivet it to the ears with $\frac{3}{16}$ in. diameter iron rivets, sufficiently tightly to hold the handle from falling, but leaving it free to move as required.

The foot is made from another piece of the sheet-iron, cut to shape as in Fig. 5, and bent into a conical shape; flange the upper part so that the scoop can sit fairly upon it, and after the bottom edge has been trued up, wired and beaded in a similar manner to the scoop, it can be riveted together and then riveted into place on the scoop. The exact shape of this part is difficult to determine accurately and will probably need a little humouring to get it to fit nicely.

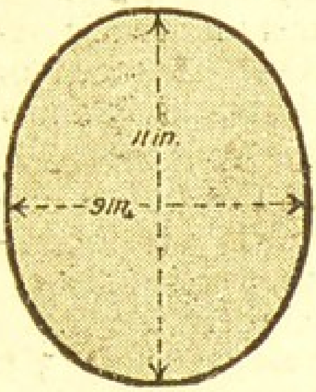


Fig. 3

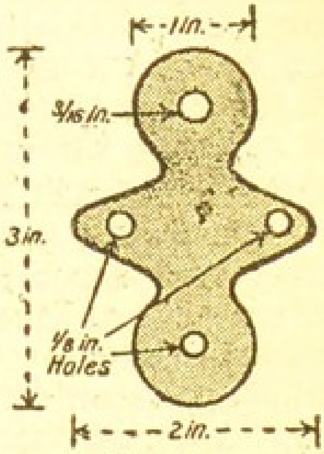


Fig. 4

COAL SCUTTLE. Fig. 3. Making the back or end plate. **Fig. 4.** Fixing the ears

The scuttle is now complete, and if the instructions have been carried out carefully, the result should be a really good substantial coal scuttle, capable of standing any amount of hard wear. It is advisable to paint the finished article with two coats of paint, otherwise it will, of course, rust. An alternative method of finishing, however, is to have it galvanized, and although this may perhaps be a little more expensive than painting it, the appearance is, if anything, rather smarter. Paint, however, covers up any faults or blemishes which may have occurred during the manufacture.

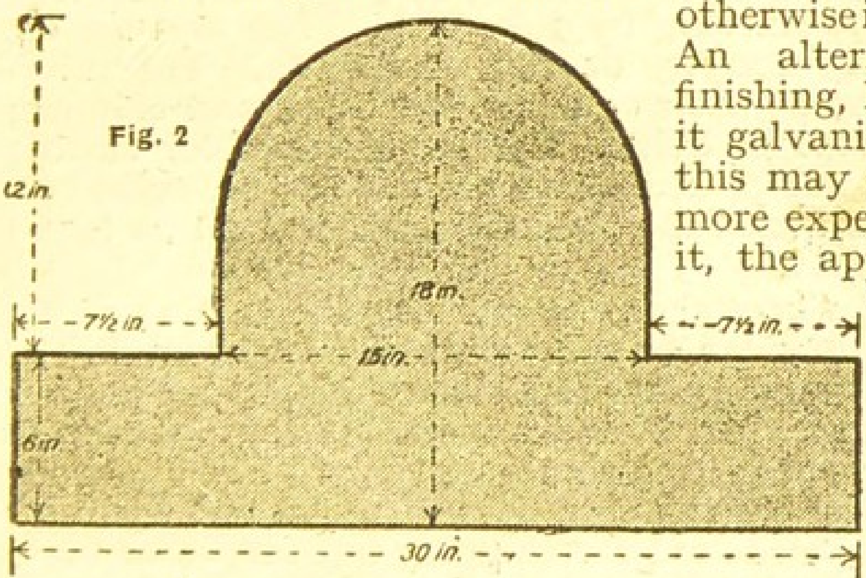


Fig. 2

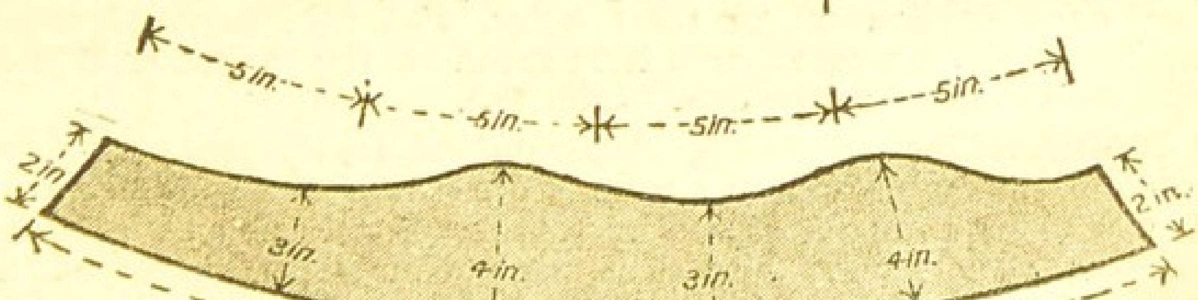


Fig. 5

COAL SCUTTLE. Figs. 2-5. Diagrams showing how the metal should be cut to make the scuttle illustrated on previous page

COAL HOPPER. Where circumstances permit, a good plan is to construct a hopper, which should be provided with an exterior door sliding in strong grooves.

The upper part of the front of the hopper may be provided with a hinged flap or with removable boards having runners similar to those at the bottom. This provides for the introduction of the coal, which can be withdrawn by opening the door at the bottom and allowing the coal to fall out directly into the coal scuttle. A stout poker will be found convenient for raking the coal should it show any tendency to jam.

COARSE STUFF. A mixture of lime, sand, and hair is used in plastering under the name of coarse stuff, generally for the first and second coats on internal surfaces. The proportions are 1 part of lime to 3 parts clean, coarse, sharp sand, gauged by measure, not by weight. To this is added about 1 lb. by weight of long, clean ox hair to every 3 cubic ft. of the coarse stuff or, say, 3 oz. of hair to a pailful of mixture.

COLD CHISEL. The name cold chisel is applied to all kinds of metal cutting and chipping chisels, which are used for cutting cold metal, but have other applications in the house. The cheapest and commonest type is a round steel bar flattened and sharpened at one end. Such a tool is only fit for use as a case opener, or for breaking down old brickwork.

Those which are of real use to the home worker are the flat chipping chisels, in three sizes, 6 in. long by $\frac{3}{8}$ in. wide, 8 in. long by $\frac{3}{4}$ in. wide, and 18 in. long by 1 in. wide. The first are for small work in brass, copper, or thin sheet-iron. The intermediate size is for such jobs as cutting sheet-iron and chipping off the projecting ends of bolts. The large size is for cutting brickwork and all kinds of demolition work. A 6 in. cross cut, a 5 in. diamond point, and a 4 in. half-round will all be found worth their trifling cost.

The chisels must be kept sharp by grinding the cutting edges. For very fine work they can be sharpened on an oilstone in the same way as carpenters' chisels. Bricklayers' chisels are ground rather finer and thinner than those for metal cutting. A round-ended chisel is handy for cutting corrugated iron. The diamond-point chisels are useful for chipping lines on metal and squaring up corners, and the half-round for chipping out screws or bolts that have broken off in their holes, and for shaping curved surfaces. A wise precaution is to grind off the ragged ends that form on the head of the chisel after use.

COMPASSES. These are mathematical instruments used for drawing circles, or arcs of circles. Variations of this instrument are the chalk compasses used by teachers in schools and by scene painters and others, also the wing compasses employed in carpentry and for metal work.

Essential features are rigidity, freedom of action at the joint, and all detachable parts secured with a clamping screw acting between two jaws and holding the removable part as in a vice. Other requirements are a knee joint above the pen or pencil point, and some means of adjusting the needle, as in all good drawing work the needle and the pen or pencil point must be vertical when drawing the lines.

Spring bow compasses are excellent for small work and to be preferred for circles up to $1\frac{1}{4}$ in. diameter.

Beam compasses are used for drawing large radius circles, such as occur in surveyor's work or in laying out a garden plan. A typical set consists of a jointed metal beam 24 in. long in four sections, with pen and pencil points, two steel points, and a shouldered needle point.

COMPASS SAW. For curved shapes the compass saw is invaluable. It is stronger than the keyhole saw, but can often be used when lock fitting or on any internal sawing where the curves are not too sharp.

When sawing a curved shape always take care to keep the saw blade at right angles to the face of the work, unless a bevelled edge is the objective. Work with a steady sawing stroke, avoiding heavy pressure on the teeth, or the saw will wander away from the line.

COMPO. This is a mortar composed of Portland cement and sand, or a mortar containing a proportion of Portland cement in addition to the usual mixture of lime and sand. A sound compo mortar for general house-building purposes should contain : one part by measure of grey lime (measured before being slaked) and one part by measure of Portland cement to seven parts by measure of clean sharp sand.

Owing to the extreme difference in the time taken by lime and cement in setting, special precautions have to be used in the mixing and using of the compo. The lime and sand should be mixed and made up as mortar in advance in order to ensure that no hot, i.e. unslaked, particles of lime remain to expand in the finished work.

The proportion of cement is only added just before the compo mortar is required for use. Three pailfuls of lime mortar are taken from the heap, and to them one pailful of cement is added and well worked into the mass with a shovel. If necessary a little water is added. The compo mortar must be used immediately after mixing.

COOKING BOX. When long and gentle cooking is required a cooking box will be found useful, the food being brought to the boil before being placed in the box. To make a cooking box, line a packing-case or sugar box with two or three thicknesses of newspaper, covering the latter with flannel or the type of felting used under stair carpets. Nail this on neatly, and line the lid in the same manner. Make some balls of newspaper, pack them tightly into the bottom of the box to a depth of 3 in., and place the saucepan or casserole on top of them, packing it round with more newspaper balls so that, when it is lifted out, a nest is formed. Should there be room for two saucepans, stand both on the layer of paper, but put a thick padding of paper balls between the two. The cushion or cushions placed over the top can be made of flannel or felting stuffed with paper torn into small shreds.

COPPER, Hints on Using. Copper is easily bent, curved, or beaten to any desired shape or bent to acute angles without fear of cracking. For ornamental purposes it is embossed and worked up into plaques and decorative panels. When a plain lathe is available sheet copper can be spun into circular forms, such as flower-bowls. But the metal is difficult to machine, as it is liable to tear: drilling and sawing are more troublesome than with brass. Copper adheres to and clogs the cutting edges of tools, and it is therefore necessary to use a lubricant, either milk or tallow or a mixture of lard, oil, and turpentine. To file copper without tearing the surface French chalk should be employed as a lubricant.

Do not use copper for bearings or on working surfaces, as it is difficult to keep it from seizing, and it would speedily wear away. Copper wire is useful for binding metal fittings to hose pipes, for the fastening of rods and canes, and any purpose where a secure joint is needed more durable than one made with string. A difficulty sometimes is the selection of a suitable gauge of metal for a particular job. In general copper pipes are satisfactory in Nos. 18 or 16 gauge; sheet copper for spinning in No. 22 gauge; for beaten metal work about No. 24 to No. 20 gauges will be found to answer very well.

Copper nails and rooves are used for making joints between the planks of small boats, and can be used for other purposes where an iron or steel nail would be objectionable on account of rusting, as for lead flushings or gutters. Small copper rivets and washers, or burrs, are invaluable for making riveted joints in sheet metal, and are available in convenient sizes at most ironmongers. Thin sheets of copper can be pierced by sawing with a fine metal-cutting fret-saw, by punching, or by cutting with very keen cold chisels.

Sometimes the amateur is confronted with a damaged piece of copper, such as a cracked pipe. In general the best method of repair is by silver soldering or brazing. To solder copper with ordinary soft solder, it is first necessary to tin the surfaces to be united. When hard or silver solder is used the borax is generally applied to the joint, and the silver solder melted by means of a blow pipe, heat being applied until the solder has flowed properly into the joint. The brazing of copper requires care, as the melting-points of the copper and the spelter are very nearly alike. For all ordinary small pipe joints, such as those found in motor vehicles or in hot-water installations, silver soldering is preferable to brazing.

Bending Copper Pipes. The bending of small copper pipes can often be satisfactorily carried out with the hands alone, especially if the copper be soft or well annealed. If the bends are very sharp it will be desirable to grasp the pipe between two pieces of wood held in the vice, and tight enough to hold the pipe, but not so tight as to crush it. The object is to prevent the tube from buckling or flattening. The pipe can then be pulled into shape by slipping a larger-size pipe over the outside where it is desired to keep it straight. This localises the pressure and whereabouts of the bend. Pipes about $\frac{1}{2}$ in. diameter and upwards are generally bent in a pipe-bending machine, or are filled with sand, which must be rammed hard and the ends securely plugged.

The annealing of copper for amateur use is a very simple matter; merely heat the copper to a uniform dull red heat and immediately plunge it into cold water, and leave it to cool. If any hollow work has to be annealed, take special care to avoid the escaping steam.

CORK. The light, porous bark of the cork-oak is chiefly found in the domestic sphere in the form of stoppers for bottles, floats for fishing-lines, and cork mats. For the latter purpose it is prepared as a composition. The amateur can repair cracks and bad places in cork linoleum by using a paste composed of finely powdered cork and shellac varnish or hot beeswax. This is pressed into the cracks and smoothed off with an iron bar, warmed to prevent the shellac chilling too quickly. Colouring pigments may be added.

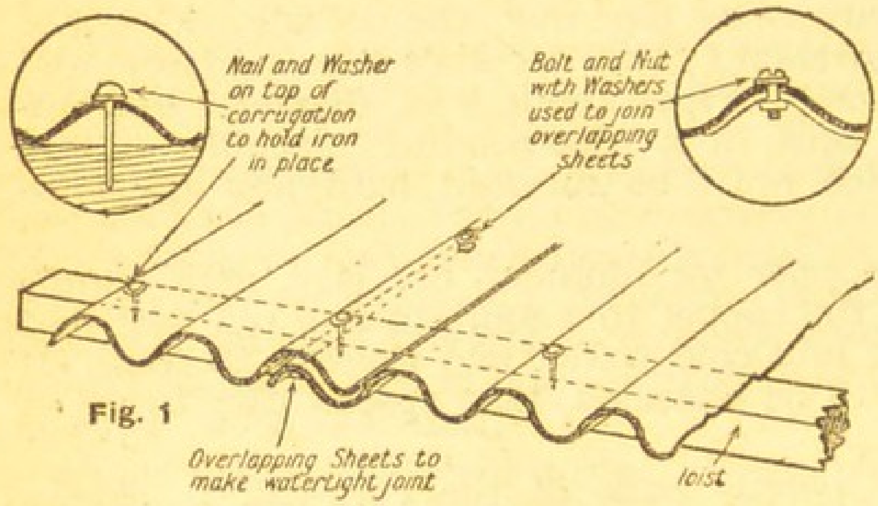
A cork that is a little too large for the bottle may be made to fit by rolling the cork on the floor and pressing steadily upon it with the sole of the boot. When a cork becomes lodged in the neck of a bottle an effective way of loosening it is to hold the neck before a fire, or to wrap it up tightly in a thick piece of cloth which has been previously heated. This will have the effect of expanding the glass slightly, and the cork will then come out readily.

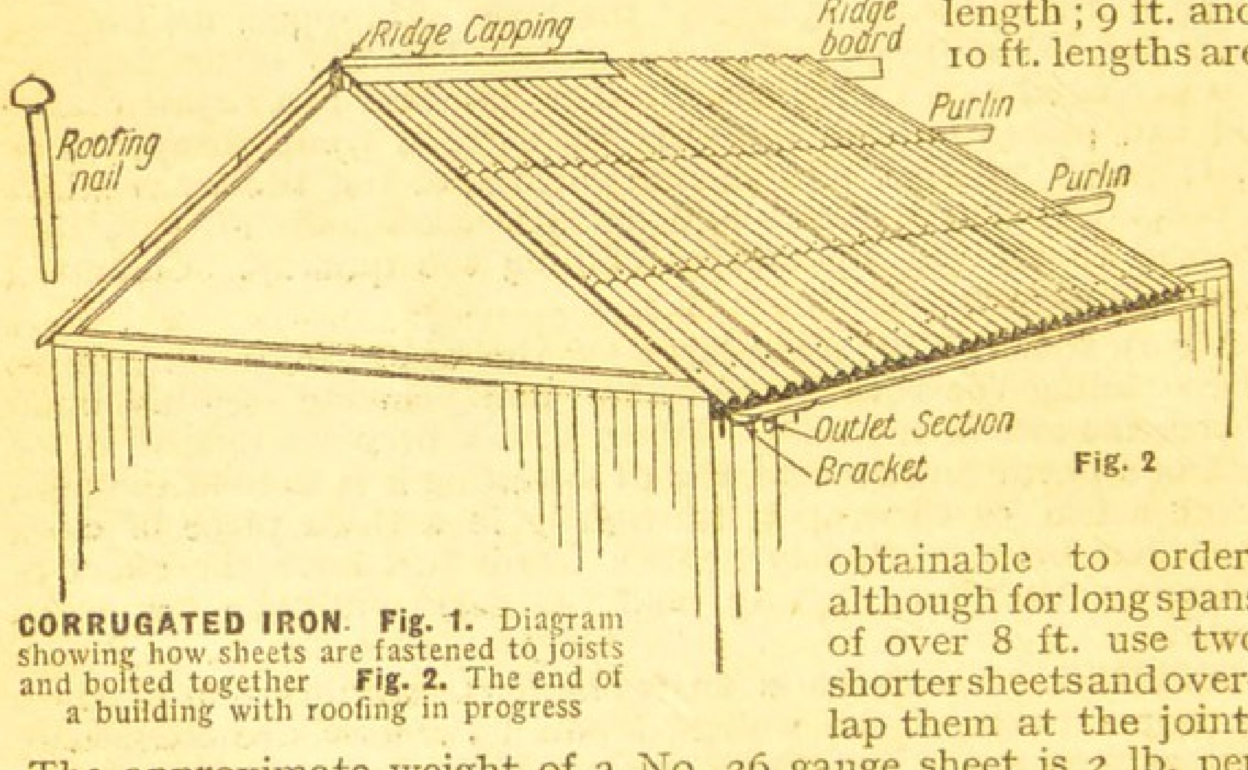
CORNICE. A cornice is an ornamental moulding applied to the upper parts of the walls. Modern cornices are frequently used as decoration without practical significance, and may be made in several different materials, such as stone, brick, stucco, Portland and other artificial cements. In cabinet and other work, the moulded top, as of a wardrobe, is also known as a cornice.

Cornices for the ceilings of rooms are composed of plaster and cement. They are sometimes produced by casting in moulds and screwed to wood grounds fixed in the building. Plaster cornices are, however, usually run on the work itself. The backing for the cornice is first built in brick or stone roughly hacked to the shape of the moulding, or is constructed in wood with rough brackets, lathed as if for a ceiling. *See* Cappings.

CORRUGATED IRON. This useful material is made from sheets of iron, by a machine which bends it into a series of parallel ridges or corrugations, thus greatly increasing the effective strength of the material. As generally used for domestic work, the iron is galvanised to render it rust-proof; but there are many qualities on the market. When comparing prices be certain of the gauge or thickness of the sheets; a few pence more expended at the outset will often save pounds in the long run.

A medium gauge is known as No. 24, a light or thin sheet as No. 26, and a heavy as No. 22 gauge. The sheets measure 2 ft. 3 in. wide, and are generally stocked from 4 ft. to 8 ft. in length; 9 ft. and 10 ft. lengths are obtainable to order, although for long spans of over 8 ft. use two shorter sheets and overlap them at the joint.





CORRUGATED IRON. Fig. 1. Diagram showing how sheets are fastened to joists and bolted together **Fig. 2.** The end of a building with roofing in progress

The approximate weight of a No. 26 gauge sheet is 2 lb. per foot run, a 6 ft. length thus weighing 12 lb. The 24 gauge sheets go a little under 3 lb. per foot run, a 6 ft. sheet weighing 17 lb., an 8 ft. sheet 23 lb. In conjunction with corrugated iron, it is well to use a few sundries made for the purpose. These comprise galvanised ridge capping, to finish a span roof at the top or ridge; galvanised nails and washers for fastening the iron sheets to the rafters; and, when required, galvanished shuting to collect the rain water, together with the needful stop ends, angles, brackets, and outlet pieces for use with the shuting.

Corrugated iron is admirable for outbuildings, stables, and other erections. The objections to its use for dwelling-houses include lack of durability as compared with tiles or slates, the noise it makes in a heavy rain, and a peculiarity known as sweating. It is also cold in winter and hot in summer, unless special precautions be taken when designing and building the roof. Against these objections are the advantages of cheapness, lightness, and ease of erection. Durability can be gained by repeated and regular coating with preservative paints. When the iron is laid over a boarded and felted roof, with an air gap, the objections of noise and sweating are largely eliminated. This material is satisfactory, when properly applied, as a roof covering for bungalows, etc.

When laying corrugated iron always reckon that a sheet only covers a width of 2 ft., as the odd 3 in. has to be lapped over the top and edge of the next sheet. Always endeavour to use the iron in its stock length, as it is difficult to cut. The best way to do this is to cut it lengthways with stout tinman's shears or snips. To cut across the corrugations, use the proper kind of chisel, and cut the iron by laying it flat on a solid support, with a hollowed block of lead immediately beneath the chisel. An alternative method is to saw it across with an old hand saw, exactly as if cutting a piece of wood, using plenty of oil as lubricant.

When covering a roof, if the length of the sheet is sufficient to reach from ridge to eaves in one piece, work from the ridge downwards. If two or more sheets are needed, begin by planning out the best arrangement by placing one sheet at the eaves, with its proper projection, temporarily fix another sheet from the ridge, and fill in the gaps by overlapping equally on each sheet above and below. Then fix the sheet next above the eaves course, follow this with the next above, and so on, finishing at the ridge.

It is generally more convenient to lay the sheets from eaves to ridge, and then the next set from ridge to eaves. When three such sets have been laid, fix those on the other side of the roof, if a span roof, then fix the ridge capping. Then do the next sets, and so on to the other end of the roof. By these means it is easier to get at the sheets than by laying the whole eaves course first. Use a line stretched taut to keep the courses level, especially at the eaves, unless the roof has been boarded, when the line is not needed.

The proper way of fixing corrugated iron is to drive the nails or screws through the ridge and not in the trough of the material, the object being to keep the nail as far as possible out of the water, which naturally runs down in the troughs or hollows.

COUNTERBORE. This tool consists of a central peg, or pilot, and a larger diameter cutting part, rotated in a lathe or drill press. The tool is fed into the work until the desired depth has been attained. A good counterbore should be capable of turning out a neatly finished hole or recess having square corners, such as are required for the reception of a screw head that has to be sunk below the surface of the surrounding metal.

The same result is gained in woodwork by using an auger bit, drilling out the larger diameter hole first and following with the smaller one, otherwise there would be no material to guide the auger, unless the small hole be temporarily plugged for the purpose.

COUNTERSINK. This is a type of brace bit used to form a conical-shaped recess in wood or metal, etc., whereby the head of a screw or rivet can be let in flush with the surface.

COVERS : For Furniture. Loose covers of chintz, cretonne, etc., afford protection for furniture and are also useful for bringing odd chairs into a harmonious colour scheme or for placing over worn chairs or settees. These should be cleansed throughly before the new covers are put on. An armchair should be rubbed with stale bread, and if this fails to remove the marks, benzoline will probably be successful. This is best applied out of doors, as benzoline is highly inflammable.

A plain rep fabric or one with a small pattern can be chosen for a cover because it is easily fitted, but if a distinct pattern is selected for decorative value care must be taken to see that it is correctly placed. Hang the fabric wrong side out over the chair, so that any pins used in fitting can remain until the cover is sewn. Allow at least 1 in. all round for the hem at the bottom, and, when fitting, tuck the material well in at the back of the seat. Since the covers are not to be tight fitting, a certain amount of fullness should be allowed at the back and front, and plenty of material used for tucking in at the sides, where if possible, all joins should be arranged.

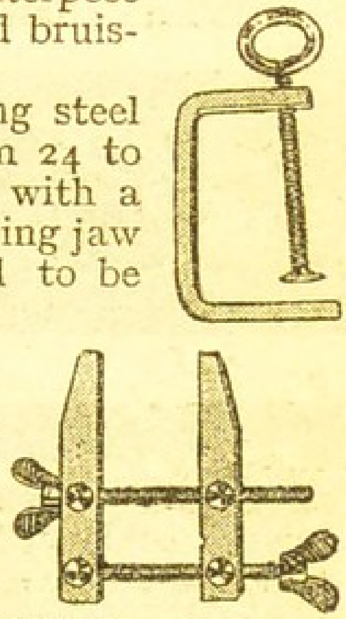
If necessary, pieces should be let in at the front of the arms. Having fitted the chair, cut the materials to the required shape, remove the fabric, and the cover is ready to be sewn up. In doing this leave the necessary opening at the back, make a false hem for the buttons, and an inside flap for the buttonholes. The seams and lining edges of the furniture should be piped. Use strong cotton for the sewing, and oversew each corner firmly. Turn up the hem and thread a tape through it from end to end. The tape will draw the cover neatly round the frame, and can be hidden by a flounce reaching to the floor. For a chesterfield or large settee double width material about 50 in. wide is best.

CRAMP. The tool named a cramp is used for tightening the joint between two pieces of wood or other material, and it frequently forms an integral part of a small machine such as a mincing machine, which can thus be readily attached to a table. It is sometimes called a clamp.

Ordinary woodworkers' cramps are made in a very light pattern, comprising a light steel bar bent to shape, and one leg screwed and fitted with a clamping screw. A superior pattern called the G-cramp is made of solid cast metal, and will last for years, especially if fitted with a clamping screw having a square-sectioned thread. Such cramps are made to hold from 2 in. to 12 in. in width. Parallel cramps are made with two hard steel jaws, which are drawn together by two hand screws. They are very useful for small metal work of all kinds, and will hold work up to $1\frac{3}{4}$ in. in thickness. Corner cramps are used to hold the two parts of a picture-frame or other mitred work while the joint is being fastened. Sometimes four of these cramps are used with a tensioning bar between them, and adapted especially for picture-framing. With all types it is desirable to interpose wood between the work and the jaws, to avoid bruising the surface.

Sash cramps or bar cramps consist of a long steel bar about $1\frac{1}{4}$ in. deep and $\frac{1}{4}$ in. thick, from 24 to 48 in. long. At one end is a strong upright with a square-thread cramp screw which pushes a sliding jaw along the bar. A movable jaw is arranged to be fixed by means of a steel pin to any desired position on the bar, and by this means all classes of work can readily be held, up to the capacity of the cramp. It is of great use to the amateur who undertakes the construction of doors, cabinets, and other large work.

A bench cramp is useful to carvers and other woodworkers, as by its aid the work is held down on the bench. The tool comprises a circular bar that is inserted into a hole bored in the bench top. The cramp screw presses the long bar tightly on to the work, which is thus securely held in position.



CRAMP. Above, G-cramp. Below, toolmakers' parallel cramp

CROCHET WORK. Crochet derives its name from the French word croc, meaning hook, as it is performed with a hook of steel for fine work and bone for coarser work. The first stitch is chain-stitch, generally given in directions as the foundation chain, and all crochet work must have a foundation chain.

The first loop is made with the fingers, thus: Hold the end of the thread with the thumb and forefinger of the left hand, and with the right hand pass the main thread over the end to form a loop, holding both down under the left thumb. Insert the crochet hook from right to left through this loop, and draw the thread through. Draw the loop up close, when the first chain will be made. *Pass the thread round the hook, and draw it through the chain-stitch on the hook, then repeat from * for succession of chain-stitches (Fig. 1).

Single crochet or slipstitch (Fig. 2) is the same stitch under two names. It is sometimes used to join one stitch to another, such as at the end of a round, when the last stitch is slipstitched to the first to join; sometimes it is employed to get from one position to another without breaking off the cotton and restarting. To make this stitch, simply put the hook in the stitch and draw the cotton through the stitch and the loop on the hook in one action.

This stitch is employed in every form of crochet, from the finest Irish lace (where it forms a length of chain into a picot) to big garments. When working the latter in rounds instead of rows, a slipstitch joins the last stitch to the first.

Double Crochet. Double crochet is a very useful stitch, and there are two varieies, ribbed and flat, both worked in the same manner, but the hook is placed differently at the beginning. For ribbed double crochet (Fig. 3) put the hook in the back loop of the two seen at the top of the stitch after working one row (in the first row it just goes through the chain), cotton over hook, and draw through the stitch, making another loop on the hook, cotton over, and draw through two loops, completing one double crochet. For flat double crochet (Fig. 4) take up both the loops seen at the top of the stitch, and work as just described.

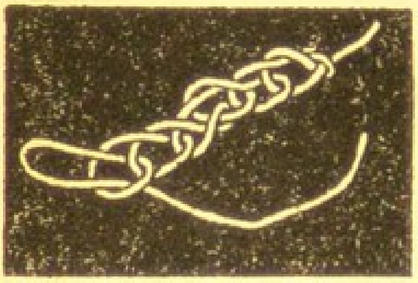
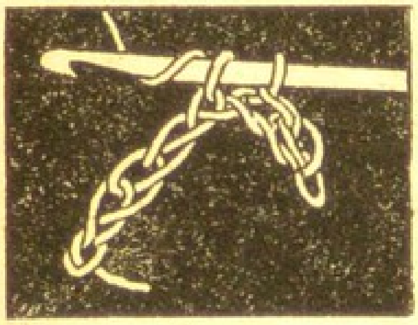


Fig. 1



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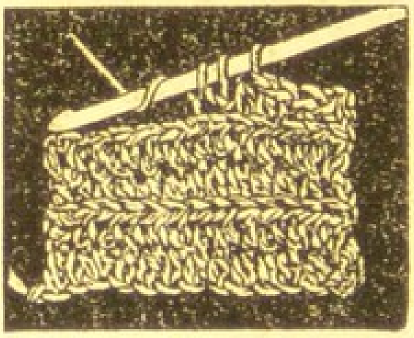
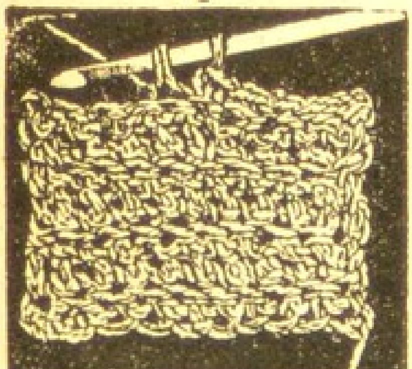


Fig. 5



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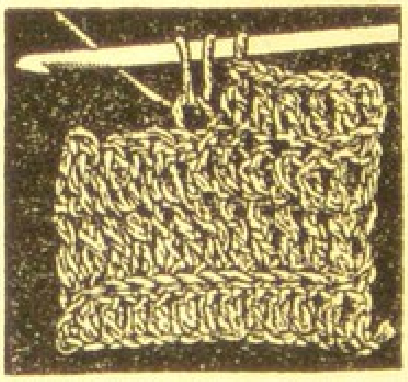


Fig. 6

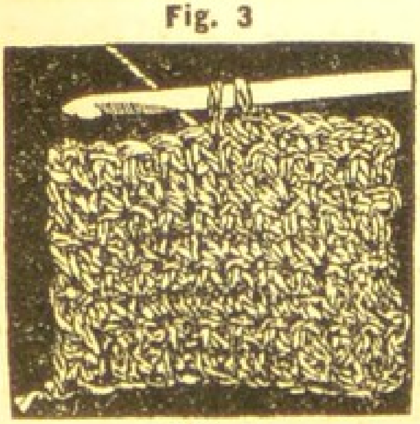


Fig. 4

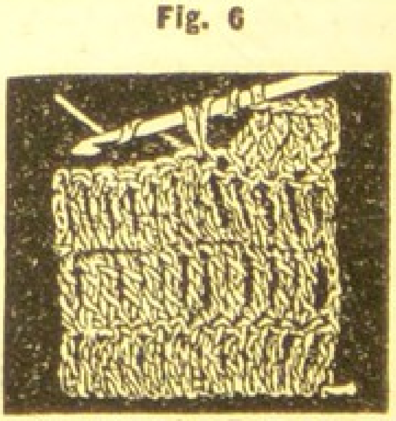


Fig. 7

CROCHET. Figs. 1-7. How some of the principal stitches are made

Short treble is shown in Fig. 5. First put the thread round the hook, then hook in one of the foundation chains, wool over hook, and draw through. There will now be three loops on the hook; wool over, and draw through all the loops on the hook at once. When this stitch is worked in rows, always put the hook in the loop at the back of the stitch, when there will be a chain-stitch running along the surface of the ridges. This is clearly shown in Fig. 5, and is essential to the finished appearance of the work.

Treble stitch (Fig. 6) is worked in two varieties, ribbed and flat. To work ribbed treble, put wool over hook, hook in stitch, and draw the wool through, wool over hook, and draw through two stitches, wool over again, and draw through the last two stitches. There will be two loops at the top of this stitch, and in ribbed treble the hook is put under the back loop. For flat treble put the hook through both loops at the top of the stitch, as shown in Fig. 4 for flat double crochet.

Double treble (Fig. 7) is similar to treble, but the cotton is put twice round the hook at the beginning, then all the loops worked off by twos. Sometimes long treble is obtained when the cotton is taken round the hook three and four times, but the number is generally given in the directions.

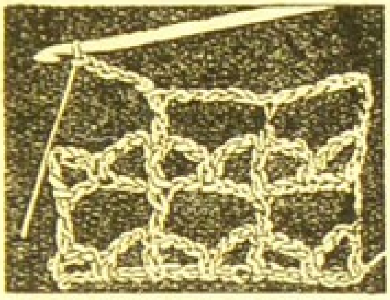


Fig. 8

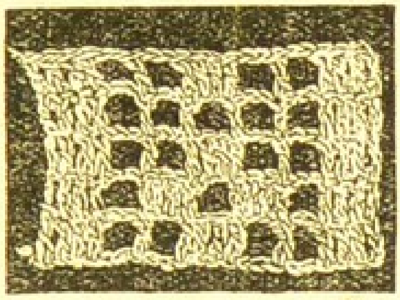


Fig. 9

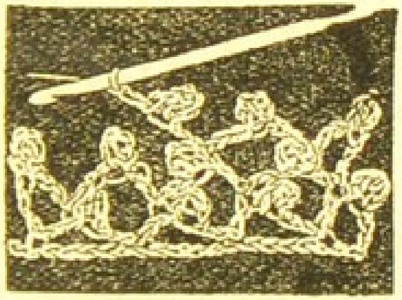


Fig. 10

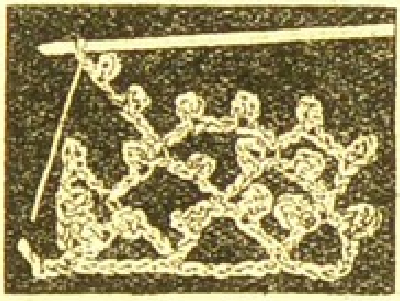


Fig. 11

CROCHET. Fig. 8. How to make lacets and bars. **Fig. 9.** Filet crochet. **Fig. 10.** Single picot stitch. **Fig. 11.** Double picot stitch.

Lacets and bars (Fig. 8) are used chiefly to form a background. Sometimes there is a row of lacets, then a row of bars, each bar spanning over a lacet. A lacet is 3 chain, miss 2 stitches, 1 double crochet in next stitch, 3 chain, miss 2 stitches, 1 treble in next stitch. A bar is 5 chain, miss 5 stitches, a treble on next stitch. When it spans over a lacet it is necessary to miss the 3 chain, 1 double crochet, and 3 chain, and put the treble on the treble at end of lacet. Lacets and bars are often used alternately along the row forming a pretty background.

Filet Crochet. Filet crochet (Fig. 9) consists of groups of trebles and open spaces. The spaces are made thus : * 2 chain, miss 2 stitches, 1 treble on the next stitch, and repeat from * for as many spaces as required. Where a group of treble is given, 1 treble is put into each stitch consecutively along the row, whether that stitch be a chain or treble, and these groups form the solid part of the design, the spaces around being left to form the background.

Note that the treble finishing the last space before a group is not counted in the group of trebles, because it is already counted in the last space, and if counted twice the symmetry of the design is spoiled. The actual number of trebles should be divisible by 3, besides the one at beginning of the group which finishes the last space or lacet, as the case may be.

When working the first row of filet crochet, the first treble is put into the 8th chain from hook to form the first space, this making 2 chain for the foundation, 3 chain for the treble, and 2 chain for the top of the space. If the work has a treble border, then the row is turned with 3 chain, and this stands for the first treble of the following row. The treble over which this chain stands is not worked into, and when the end of a row is reached always work the last stitch into the top of the 3 chain which is at beginning of previous row. If there is a space at end of row instead, then work into the third chain. When there are directions in brackets, this portion is always worked the number of times stated immediately after the brackets. Note the word worked, not repeated. The brackets show which part to repeat.

Picot (Fig. 10) is a little loop of chain stitches formed into a ring with a slipstitch, and forms the background of Irish crochet. It usually consists of 5 chain, and slipstitch into the 5th chain from the hook to form a picot. A single picot loop is made thus: 7 chain, slipstitch into 5th chain from hook, 2 chain, then 1 double crochet on the foundation to fasten down the picot loop. A double picot loop has 2 picots of 5 chain with 2 chain after each.

THE CROCHET HOOK. It is advisable to buy well-made hooks as any roughness in steel or bone may destroy the texture of fine silk or wool. The blade, throat and hook parts should all be made in one piece in bone crochet hooks, and the throat parts hould be of even thickness.

Steel hooks run in sizes 00, 0, 1, 1½, mounting in ½ sizes up to 8. No. 00 up to 1 are often used for the finer makes of wool and for artificial silk instead of bone. The finer sizes, 6½ to 8, are only used for very fine Irish crochet, while No. 8 is chiefly used for catching the thread in real Carrickmacross lace. Bone crochet hooks are numbered 1 to 12; 1 and 2 are seldom used except for very coarse rug making. A No. 12 bone is employed with very fine Shetland wool.

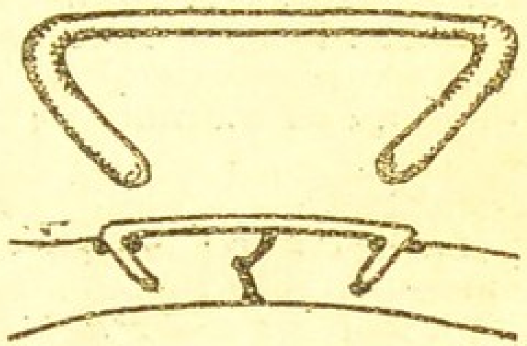
CROCKERY, Repair of. The usual method employed is to coat the edges with the adhesive and press the parts together, holding them in contact while the glue sets, or blocking them up, or strapping the parts together with bands of linen or paper.

This method will generally keep the parts in contact, although it seldom results in a thoroughly satisfactory job. Either the joints give when the article is put into service, or the thin film of glue becomes conspicuous by the coating of dust that always accumulates along the line of fracture.

When restoring a valued piece that has broken into many fragments only two pieces should be joined together at a time, allowing the joints to set hard before attempting to complete the whole piece of work. If a few tiny parts are missing they can often be moulded in fine plaster of Paris made into a cement with liquid glue and just sufficient warm water to make the material into a workable paste. When thoroughly dry it can be smoothed with sandpaper, and coloured to match the original work.

THE USE OF RIVETS. The most effective way of repairing crockery is by riveting. For this purpose a drill stock specially devised for such work is indispensable. They are made with a diamond point. To use the drill, the spindle is twisted so that the cord is wound round the stem; when the crossbar is pressed downwards the cord untwists and rotates the drill. The hand is then raised quickly and the momentum of the drill again winds the cord around the stem, so that by regular and repeated movements of the crossbar the drill can be kept in motion.

First moisten the drill point with oil, and then drill a slanting hole downwards into the china and about $\frac{1}{4}$ in. away from the edge of the fracture. The rivets are simply bent to shape from soft brass wire about $\frac{1}{16}$ in. diameter. Some judgement is needed in placing the rivets so that the fewest number accomplish the required result. On plates and dishes the rivets are best applied to the back, where they are out of sight, but on a jug with a broken spout there is little chance to do more than insert some of the rivets on the inside and the remainder on the outside.



CROCKERY. Diagrams illustrating a china rivet bent for use and the method by which it is inserted in the drilled holes

To insert a rivet, take care to flatten the inner surface of the wire a little so that it bears more effectively on the china, and see that the legs are not too long; they should not quite reach the bottom of the hole, otherwise they will never be flat on the surface of the china. When all is in order the rivet is bedded into the holes with a little plaster of Paris made into a paste with water and a trace of glue.

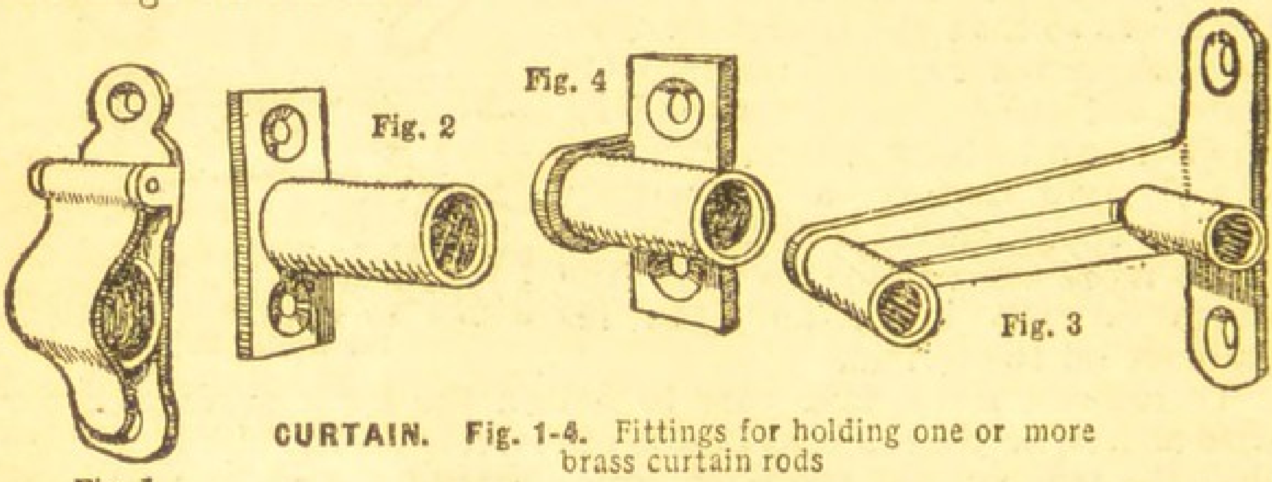
CROSSBANDING. In furniture design this is a method of using veneered strips at the outer boundaries of the panels. It is done so that the grain runs at right angles to the constructional edges.

CROSS GARNET HINGE. These are used for the commoner variety of doors both indoors and for external work. The ordinary type is made from pressed steel, japanned black, and from 6 in. to 24 in. long. The T-shaped end is screwed to the upright, the long part to the door. Cross garnets are easy to hang, as they are generally screwed on flush with the door and the post. The Lancashire cross garnet type is a superior quality made of wrought iron with a wrought eye at the extremity; they are preferable for heavier doors. Best heavy Lancashire cross garnets are desirable for doors such as those on a garage or stable. They are made from 12 in. to 24 in. long. The 12 in. weigh about $2\frac{1}{4}$ lb. per pair, the 24 in. about 10 lb. per pair.

In hanging a door on ordinary cross garnets always fix the hinges to the doorpost first, block up the door so that it is tight up against the lintel, then fix the straps of the hinge to the door. On removing the blocks the door will drop slightly on the hinges, and it will then swing properly.

Cross Stitch. *See* Embroidery.

CURTAINS, Making. Several labour-saving devices are on the market which simplify making and washing. A heading tape can be obtained in three sizes for light, medium and heavy curtains which only requires to be machined to the back of the curtain heading and then drawn up to the width required when finished. Rings and hooks are sold with it which may be detached or fixed in a moment, while the headings can be let out so that when the curtains are washed and ironed they are straight. A curtain gliding rail is also obtainable which simplifies hanging light or heavy curtains and can be supplied with a valance extension; the hooks on the heading tape fit into the rings on the rail.



CURTAIN. Fig. 1-4. Fittings for holding one or more brass curtain rods

Flexible wires with rings at the ends which fix on to small hooks on the window frame are a means for hanging lace and net glass curtains. The wires should measure 2 in. less than width of frame. They are simply threaded through a hem and, being stretched to the width of the windows, keep the top of the curtains taut.

POLES AND RODS. Curtain poles averaging 1 in. or more in diameter are adapted for large windows, doorways and openings. Curtain rods are of smaller diameter. Curtain rod brackets may be used for supporting rods up to $\frac{3}{4}$ in. diameter.

When it is only possible to fit the rod between the jambs of a window opening, the fitting shown in Fig. 2 is especially useful. The brass ferrule is arranged to unscrew from the base to facilitate removal of the curtain rod. This type of fitting is available for rods from $\frac{1}{2}$ in. to $\frac{3}{4}$ in. diameter.

For fitting two curtain rods parallel to each other, one for the curtain and the other for the valance, a double bracket fitting, as in Fig. 3, is most convenient. It is adjustable, and the inner rod can be $\frac{3}{8}$ in. from the window frame, while the outer rod extends another 3 in. The other ends of the rods are carried in simple projecting brackets, as shown in Fig. 4. All these fittings are screwed to the window frame with countersunk brass screws. The fitting of curtains to a small bay window or oriel is greatly simplified by using spring wire, bought by the foot from any ironmonger, with the hooks for supporting the wire and the eyes for screwing into the ends of the spring wire. The hooks are fixed at each angle of the window frame, the spring wire passing over them.

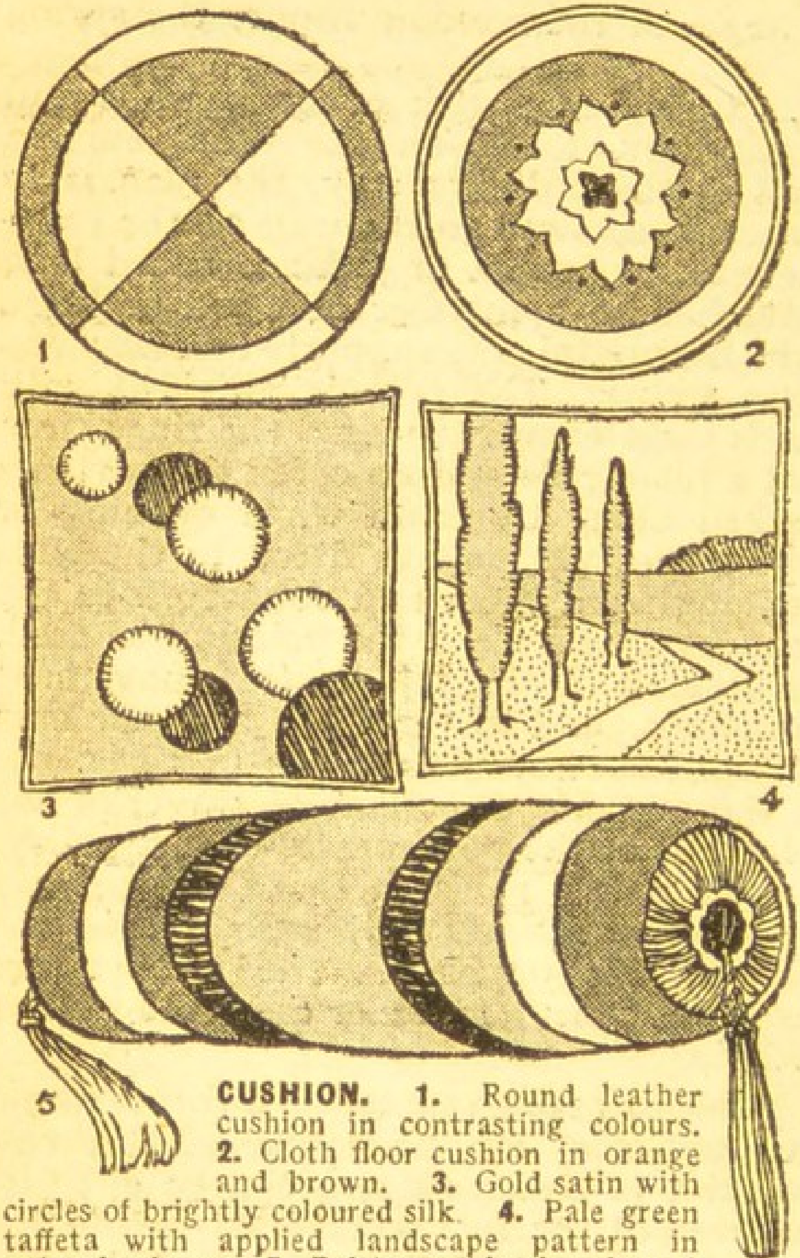
The Valance Board. In a house with concrete walls and metal-framed casement windows, to which the usual curtain fittings cannot be screwed in the ordinary way, the plan is to fix a valance board on brackets screwed to the wall on the rawl-plug system. Where there is no pelmet or valance board long curtains are generally attached to a number of wood or brass rings, free to slide along the horizontal pole supported on brackets at the top of the window frame. The pole is provided with detachable ornamental ends large enough to keep the rings from sliding off. In the case of a plain pole and no cords the curtains have to be pulled or jerked along by hand when opening or closing. An improvement is to have pulleys fitted to the ends of the pole and cords hanging from them and connected to the rings, so that the latter can be drawn along the pole by the cord. With a pair of curtains divided in the middle this movement must be in opposite directions, and the pulleys are arranged so that the pulling of one cord accomplishes this. (*See* Fig. 5.)

This is done by using the opposite directions of travel of the cord, which goes to the far end of the pole, passes over a pulley, and comes back. The middle two rings, A B, of the set are attached to the cord, so that in its travel it pulls one in one direction and the other in the opposite. The pulleys are generally fitted into slots in the pole. In other cases the pulleys are attached to the brackets.

CUSHIONS. With 1¼ yards of 31-inch material, either a round or square cushion of average size can be covered. Cut two circles, 21½ inches in diameter (a paper pattern can be cut first from the cushion to be covered), or two squares of 21½ inches each, and also a band 4 inches deep to be set all round the side to make the cushions mattress shape. The seams may be piped to match or with a contrasting colour. If to be appliquéd or embroidered one side will be worked before making up.

For living room, lounge or dining-room where the furniture is upholstered in velvet, silk rep, leather, or damask rich materials are needed for suitable cushions. On a dining-room settee with brown velvet loose seat cushions, large round brown velvet extra cushions will look well trimmed with leather panels in a contrasting colour. Round cushions (Fig. 1) are also often particularly suitable for a window seat, as they help to reduce the apparent squareness of an old-fashioned window. Oval and pillow-shaped satin cushions look right with 18th century styles. Floor cushions give a luxuriously comfortable look to the hearthrug in winter. These should be large, deep and made of a suitable heavy material such as damask, furnishing velours or rep. Cloth may also be utilised bound with gold galon and ornamented in the centre, as shown in Fig. 2.

Although cushions for rooms in period or special styles should be of rich materials they need not be costly. Setting aside for the fine needlewoman the beautifully embroidered designs, there are some effective methods of trimming which demand no special skill. For a room with lacquer pieces of furniture Chinese strips, rounds or squares of embroidery can be used, either placed to form a pattern on a plain coloured or black cushion and applied by means of a narrow galon, or (as in the case of rounds and squares) laid flat in the centre of the cushion, and the silk or other material with which the cushion is to be covered gathered round it on a gauging cord.



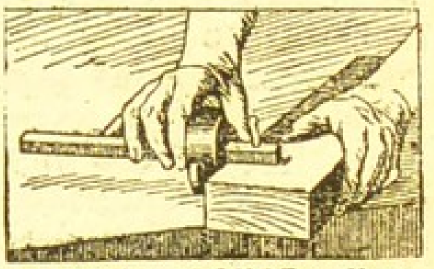
CUSHION. 1. Round leather cushion in contrasting colours. **2.** Cloth floor cushion in orange and brown. **3.** Gold satin with circles of brightly coloured silk. **4.** Pale green taffeta with applied landscape pattern in natural colours. **5.** Bolster cushion in coloured velvets with large tassel at each end

Round, square or bolster cushions covered with satin or shot taffeta are ornamental when trimmed with appliqué work, or covered with patchwork in modern geometrical patterns. This work costs nothing where there is a scrap drawer containing odd pieces of silks, satins, ribbons and tinsel brocades. The simpler the designs the better. They are cut out first piece by piece in paper, pinned on the cushion cover to judge the effect, and then cut out in the various materials. The designs may be traced by means of tracing paper or drawn freehand before cutting out. Figs. 3 and 4 show effective patterns which are applied by buttonhole stitch. For the former three colours should be used to make the circles, the stitchery matching the piping. In the latter design the path should be outlined in stem stitch.

A bolster cushion shape can be bought and covered in strips of velvet, with ends either cut into rounds and piped to fit the bolster and tasselled ornament applied (Fig. 5), or pleated into a bunch of padded flowers to hold the folds in place.

CUTTING GAUGE. This tool is for cutting lines on woodwork, making small rebates and for similar purposes, and serves the same purpose as a marking gauge. It consists of a steel cutter fixed to a hardwood stock or bar by means of a wedge. A sliding head moves on the bar, and is fixed at any desired position from the cutter by means of a wooden thumbscrew.

Its general form is seen in the illustration. It is used by grasping the stock with the left hand when marking out work, in the right hand when cutting a rebate. The method is to adjust the distance between the cutter and the face of the head, which determines the width of the rebate. The cutter is set to the requisite depth by loosening the wedge, pushing the cutter through the stock as far as needed, and firmly wedging it in place. A rebate is formed by backward and forward strokes with the gauge, cutting on the forward stroke. When one face of the work has been so cut, it is turned over, and the same procedure repeated. The cutter should be ground and sharpened in the same way as a chisel.



CUTTING GAUGE. How the tool is employed

DARNING. Too heavy a mending yarn pulls and strains the material to be darned, and soon leads to further holes; too fine a one only fills the rents with twice as much labour as is necessary, and does not last long. The idea is to counterfeit the weaving of the material, first one way and then the other, till the hole is filled with closely interlaced threads going over and under each other at right angles.

Start on sound material well outside the edges of the hole, running the needle (threaded double for all but small repairs) in and out of the stuff in a straight line. Return as close as possible to the first line, going under the stuff where that went over, and vice versa, *see* Plate 4. At end of each line do not pull thread tight, but leave a tiny loop. This allows for the shrinking of the new thread in the wash. Continue darning up and down till well outside the hole on the far side and on sound stuff again. Then darn closely across at right angles, alternately under and over the original lines of stitches until the whole is completely filled. Thin places should never be allowed to run into holes. If they are darned one way only they will last for a long time

When mending a ladder stop the dropped stitch from running with a temporary stitch. An ordinary crochet hook will assist the repair, as shown on Plate 4. Note that the hook draws each line of thread through the stitch separately and restores the actual pattern. Darning balls or eggs, over which the hole can be stretched smoothly while in course of repair, make the work easier and less cramping to the hand. Anything of a delicate nature should be repaired before being laundered, or the cleaning processes may make the damage much worse.

On woollen garments of a uniform colour a piece of canvas large enough to overlap the edges of the hole should be cut out and tacked in place on the wrong side of the material, so that the lines of the canvas run exactly parallel with those of the weaving. This may be coarse or fine, according to the texture of the material. The raw edges of the tear are cut away to form a square, and the wool is darned across, backwards and forwards, stitches being caught into the material on either side, as shown in Plate 4.

DARNING STITCH. The rule for straight darning stitch used in embroidery is to take up half as much material as that passed over, the latter forming the length of stitch. In fancy darning the stitches are spaced to suit the design, as illustrated, where the material taken up and missed is of equal length. This figure also shows how darning stitch can be adapted to fancy designs, with the aid of a few satin stitches for the solid part.

DEAL. The wood obtained from the pine or fir tree is called deal, and is generally of three varieties—red, white, or yellow. Planks 2 in. to 3 in. thick by 7 in. to 11 in. wide are known as deals. Most of these come from the Baltic ports. Deal is the cheapest and most commonly used wood, and is soft and light, but very durable. It is employed in house building for joists, rafters, floorboards, doors, window frames, match boarding, outdoor structures of all kinds, also for the cheaper kinds of furniture.

Red deal, which has a slightly reddish tinge, is considered a little superior to white, which is often called spruce. Yellow pine is a superior class of wood, and is not generally regarded as deal. It is not stronger nor more durable, but it has fewer knots, is easier to work, and less liable to warp. Spruce generally has many knots, which makes the wood troublesome to plane.

DISTEMPER, Applying. Before the walls of a room are distempered they must be freed from nail holes and similar blemishes. Wallpaper must be stripped off.

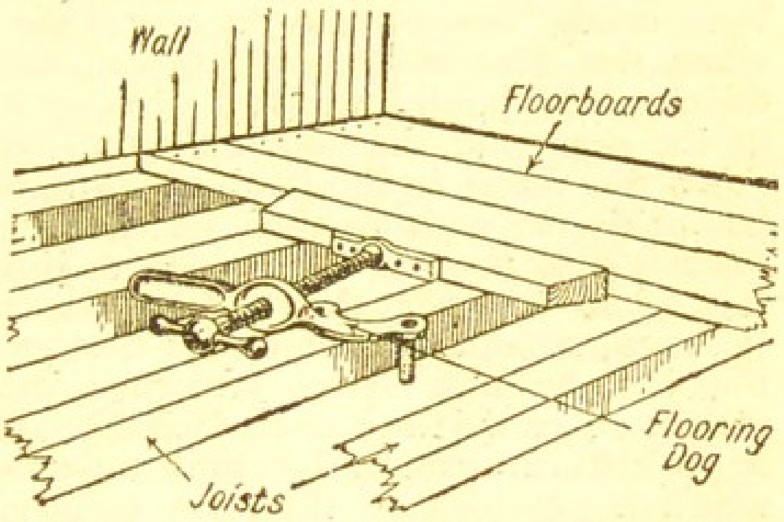
Having done this, mix some plaster of Paris with water to the consistency of thick cream, and with it stop all the nail holes, cracks, etc., in the surface of the plaster.

The distemper may be purchased loose from any oil and colourman, but it is more satisfactory to purchase a well-advertised brand of washable distemper. To mix, three-parts fill an old bucket with cold water, and add the powder a little at a time; stir well with a stick. Do not add all the package at once, or put the distemper in first and add the water. The liquid should be of the consistency of whitewash when ready for use, and the first coat should be applied evenly with a distemper brush. Make the strokes horizontally and work the distemper well into the wall. The distemper should be stirred well during use.

DIVIDERS. These are precision measuring instruments, comprising two legs of equal length, joined together at one end, and finished with a fine point at the others. They are frequently fitted with a fine adjustment device, which moves one leg towards or away from the other. Dividers are used to set out and measure a piece of work, and accurately to determine limits and proportions of a design.

DOG (in Woodwork). Employed for temporarily holding two pieces of woodwork together, a dog consists of a bar of steel bent over and pointed at each end. The ends are driven into the wood. The dog is placed so that one end is fixed into the standing part and the other end into the other piece, so far as possible in a diagonal manner.

Many otherwise difficult jobs can be put together with dogs, such as the erection of a framed building; the first section is erected, and the next held in place with the dogs while the bolts are adjusted.



DOG. Flooring dog, showing how it is used to close up floor boards

Dogs, employed when laying a flooring of boards, have two prongs formed on the end of a bar, which is tapped to take a screwed rod having a handle at one end and a pad piece at the other. The prongs grip the floor joists, and the screw is used to tighten the boards in the manner shown in the diagram.

DOORS, Repairing. Inside many houses badly made and badly proportioned doors have to be endured or camouflaged. Such a door may be rendered unobtrusive by painting it the same colour as the walls and placing a draught screen so that it is partially hidden; apart from this, small improvements can be made without much trouble. Where panels are shallow, strips of narrow picture moulding can be applied all round inside the panels. They are held in place by tiny pins. A good idea is to use a different colour for the moulding, contrasting with the door and matching the frame, or the mouldings may be painted in gold or silver metallic paint, the panels in a deeper shade of the door colour, and the metallic paint used to outline the frame.

USE OF PLYWOOD. An insignificant door in a room of fair height can be remedied by the use of a plywood pediment and pilasters made of thin boards. Applied mouldings are used to border the pediment and to ornament the pilasters, picked out with a contrasting colour.

Another improvement which can be carried out is even simpler. The door is cased in plywood and is thus made panelless and flush. This treatment is suitable when a brilliant enamelled surface is given to the plywood and a rich colour is used, the architrave of the door being in a paler shade which matches the skirting and cornice of the room. Coloured glass or painted china door furniture to tone make such a door highly decorative.

Inferior doors tend to drop and drag, being susceptible to damp, and they stick when shut. Passing a piece of paper all along the crack between the top of the closed door and the lintel, and between the edge of the door and the jamb, working from inside the room, will reveal the region of contact, since the paper cannot be passed along the crack there.

Sticking can be cured without planing if there is a good wide crack between the door and the jamb on the hinge side when the door is shut. If the sticking region is between the door and the jamb towards the top, or if it is between the bottom of the door and the floor or carpet, the door should be taken down, the recess in the jamb which receives the top hinge should be cut deeper with a chisel, and the door replaced. If the tight place is over the top of the door, or if it is between the door and the jamb towards the bottom, the same procedure is to be followed, except that it is the bottom hinge, not the top one, that is to be sunk further into the jamb. A door that will not stay shut, or that has to be forced to make it latch or that cannot be locked, can usually be cured by moving the perforated plate which is provided on the jamb to receive latch and bolt.

The latch trouble may be due also to a broken spring or excessive friction in the lock; the latch should spring out freely when the handle is turned and released with the door open. If faulty, the lock should be taken off the door and dismantled.

When a door yields at the joints, take it down, drill out any dowels, and take the door to pieces. Then refit all the joints, glue and wedge it up as if it were a new door, using new wedges in place of the old ones. If a proper cramp is not available the door can be assembled and glued up, all wedges driven in tight and flush, and the door placed in the frame. The door is fixed in the frame first of all without the hinges. Thin wedges are then driven in between the door and the frame, and the whole left to set hard. The joints can be repinned while in this position to ensure a permanent tight fit.

DRAINS. Rectifying stoppages is one that brooks of no delay, and if it is the sink or lavatory basin that is choked, the stoppage will probably be found in the waste trap. This should have a screw plug at the bottom, and a bucket should be placed beneath it, the plug removed with a spanner, and with a cane or soft wire the obstruction removed.

Should the stoppage be below the trap, it can be removed by plunging with a force cup, first replacing the plug. Sometimes the palm of the hand cupped and pressed down over the outlet will force water down the pipe and in this way get rid of the obstruction.

When a water-closet is choked up, the obstruction is almost always in the trap at the bottom and back of the pan. This can sometimes be cleared with a flexible cane, by using the force cup, or plunging.

When there is a stoppage in any of the drain pipes, take off the manhole cover and ascertain where the stoppage occurs. This is tested by pouring water down the pipes and noting which one is choked. It can then be cleared by pushing a drain rod through and at the same time pouring in liberal quantities of water at the highest available point of the system. When this fails, a screw end can be attached to the rods and worked in, and the obstruction cleared by drawing it backwards. These rods are screwed together, consequently they must be twisted to the right or the joints may unscrew.

A drain that is only partially obstructed can sometimes be cleared by plugging the outlet into the manhole with sacking and then allowing the pipes to fill with water. When the sacking is suddenly removed, the rush of water will often dislodge the obstruction.

Should there be any suspicion that a drain is leaking, as evidenced by an unpleasant smell, the drains should be tested by a competent person, the seat of the trouble ascertained, and the cause remedied. This in dry weather may be nothing more serious than evaporation of the water in a trapped gully. In this case the remedy is to fill the gully with clean water.

DRAUGHT, Prevention of. The most effective cure for a draught is to give attention to the adequate ventilation of the room, as by opening a window at the top, by the provision of air bricks or any means that admit sufficient fresh air at a low velocity. Adequate treatment on these lines is more in the nature of building construction and should have attention when the house is being built.

Conditions are somewhat different in boisterous weather, as a strong wind will force air through a crevice in a door or window that would otherwise be draughtproof. The remedy is simple and effective. India-rubber draught tube with a canvas flange can be glued or nailed round the window frame so that it seals the joints or cracks. Felt or cloth strips are more durable, as they never crack ; rubber is prone to dry up and split in hot weather. Sash windows are protected by cloth-covered sandbags made in the form of long rolls.

Draught Excluder. Fittings of various kinds are obtainable to close the gap between door and floor. Fig. 1 shows a device consisting of a cloth or plush-covered roller loosely mounted in brass brackets screwed to the door. This rolls over the floor when the door is opened or closed, but when at rest the roller lies upon the ground and checks the draught. One type of automatic device is shown in Figs. 2 and 3, and comprises a moulded strip attached near the bottom of the door. The end of a sliding member projects and is pushed back by the door frame, thus forcing the movable strip down on to the floor. A tight joint is ensured by means of a flexible rubber strip at the extremity of the slide. A concealed spring lifts the strip clear of the floor as the door is opened. Owing to the method of cutting the

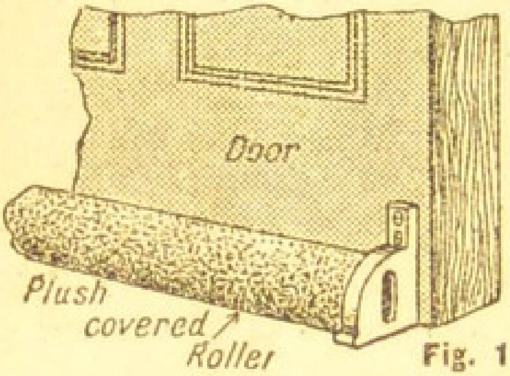


Fig. 1

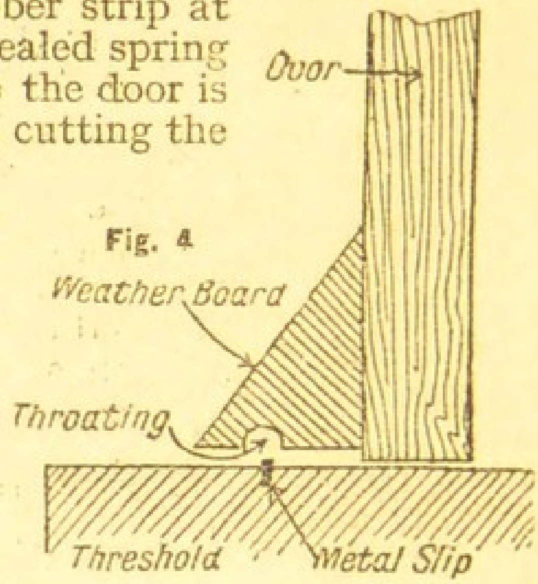


Fig. 4

diagonal slots, this type of excluder may be readily reversed, to suit the hang of the door.

When considering the application of draught-excluding devices it is best to inspect the door-frames and to make sure the door shuts up tight against the door-stop. If it does not, the stopping can be removed and replaced so that it abuts against the door, and this will stop the draught.

Outside doors are often improved by the addition of a weather-board (Fig. 4), but this must be throated or grooved as shown. A narrow metal slip projecting slightly above the surface of the threshold will often check a draught.

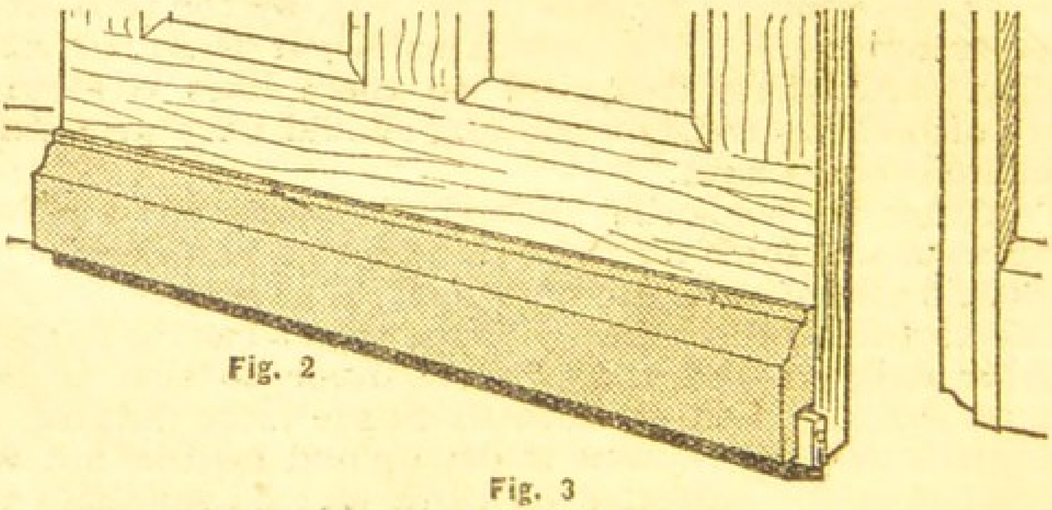
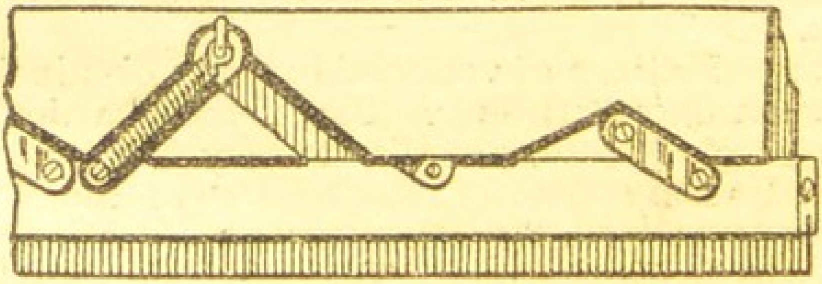


Fig. 2

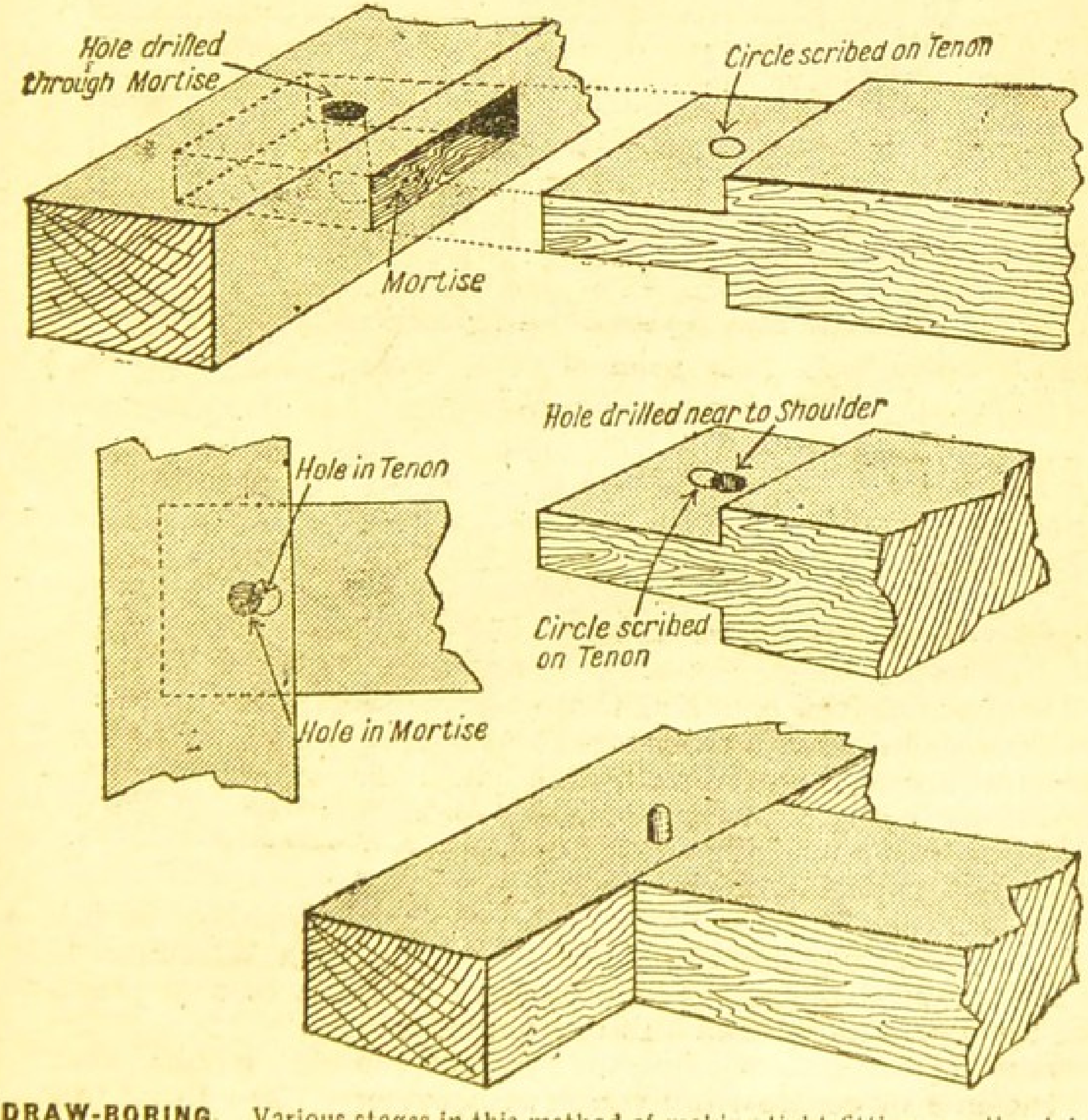
Fig. 3



DRAUGHT EXCLUDER. Figs. 1–3. Devices for closing the gap between door and floor. **Fig. 4.** Weatherboard fitted to an outside door

DRAW-BORING. This method is employed for pegging the components of a mortise and tenon joint so that the joint faces are drawn tightly together. The method consists in drilling a hole through and at right angles to the mortise. The next proceeding is to put the tenon into the mortise, and drive it home ; then mark on the tenon the position of the hole in the mortise, by scribing a circle on the tenon, using the hole in the mortise as a guide.

Remove the tenon, and, supporting it on a block of waste wood, drill a hole, the same size as that in the mortise, but nearer the shoulder of the tenon, the usual amount being slightly less than half the diameter. Prepare a tapered hardwood pin of a size to suit the hole, put the joint together after removing any ragged edges around the holes and drive the pin home with a hammer or mallet. The peg then acts as a wedge and draws the shoulders of the tenon very tightly against the mortise, and to a certain extent obviates the need for a cramp. If the joint is to be permanent it can be secured with glue and the peg glued in as well. When the glue is dry the projecting ends are cleaned off smooth and flush.



DRAW-BORING. Various stages in this method of making tight-fitting mortise joints

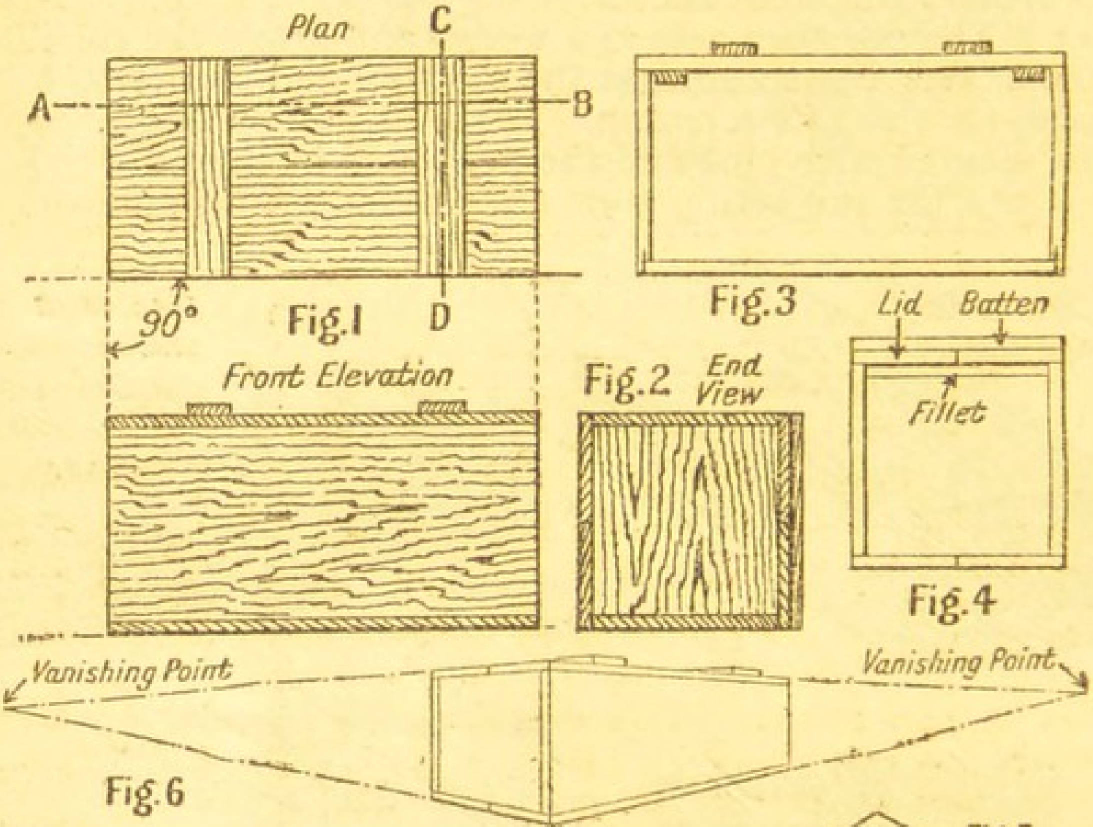
DRAWINGS: THEIR PREPARATION AND USE

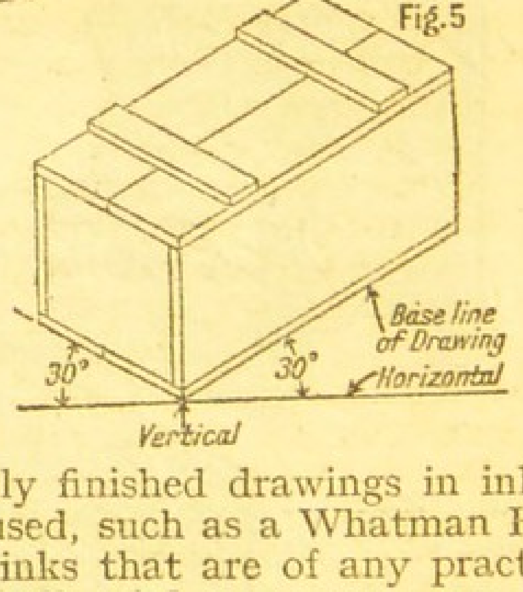
Some Practical Hints for the Amateur Craftsman

This article will be of material assistance to the cabinet-maker, woodworker and metalworker

The ability to produce an intelligible drawing is of great value to all amateur constructors. A minimum outfit for the purpose comprises a drawing-board, tee square, set squares with angles of 45°, 60°, and 30°, ruling pens and a 6-in. half set of drawing instruments.

For all-round use the imperial-size drawing board, measuring 32 ins. by 23 ins., left side truly square, is the most convenient.





DRAWING. Figs. 1 and **2.** Elevations and plan of a simple wooden box. **Fig. 3.** Sectional view at A B. **Fig. 4.** Section at C D. **Fig. 5.** Isometric projection. **Fig. 6.** Perspective drawing of box

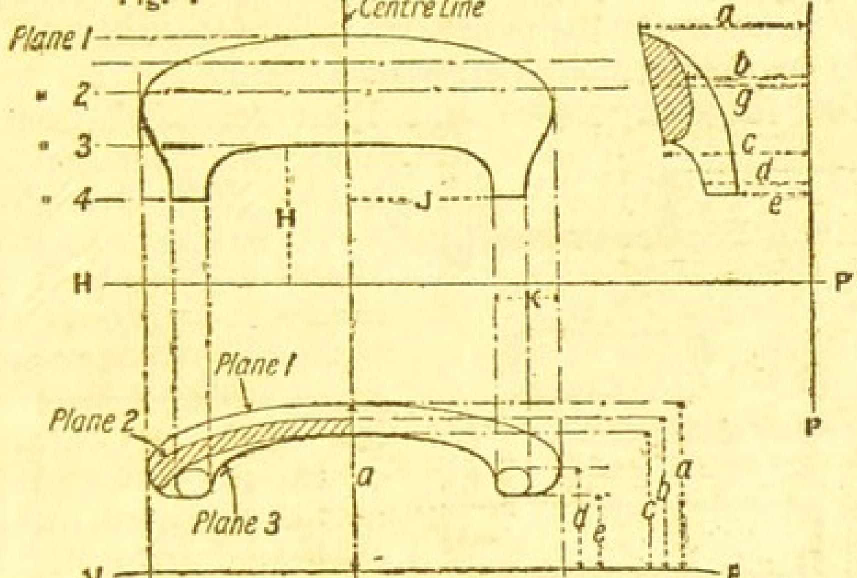
In choosing set squares, those made of celluloid or a transparent material are to be preferred, and should have one edge bevelled.

For ordinary working drawings cartridge paper will be found quite suitable, but for more highly finished drawings in ink, a smooth-surface paper should be used, such as a Whatman H.P. or hot pressed paper. The only inks that are of any practical use for mechanical drawings are Indian inks.

In using compasses or dividers, place the metal point exactly on the line or centre from which measurements are to be taken.

If equal on both sides of a centre line, mark them by rotating the dividers or compasses while the needle point rests exactly upon the centre line ; as far as possible take all dimensions from a few centre lines. When using ruling pens or the pen points in the compasses, charge them with ink from a brush or pen, wipe the points of the blades clean with a piece of rag, and before ruling long lines see that the blades have sufficient ink between them, as it is difficult to join up the two parts of a straight line. The pen should travel at an even speed over the paper, be held nearly upright, and always at the same angle to the paper. Before laying the pens aside, wipe off the ink with a piece of rag or blotting paper. The points of all drawing pens should be kept sharp but perfectly smooth by setting them occasionally on a piece of fine oil stone. Other instruments used in mechanical drawing comprise proportional compasses, French curves, parallel rulers, scales, and other special appliances. For examples of elementary exercises the amateur is advised to study an elementary handbook on mechanical drawing and the use of dividers, etc.

Fig. 7



DRAWING. Fig. 7. How to set out the working drawing of a chair back. Fig. 8. The curves shown in Fig. 7 transferred to the wood

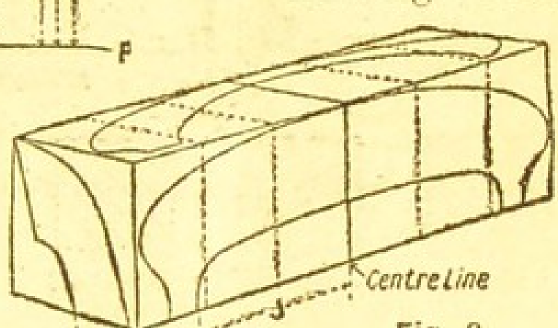


Fig. 8

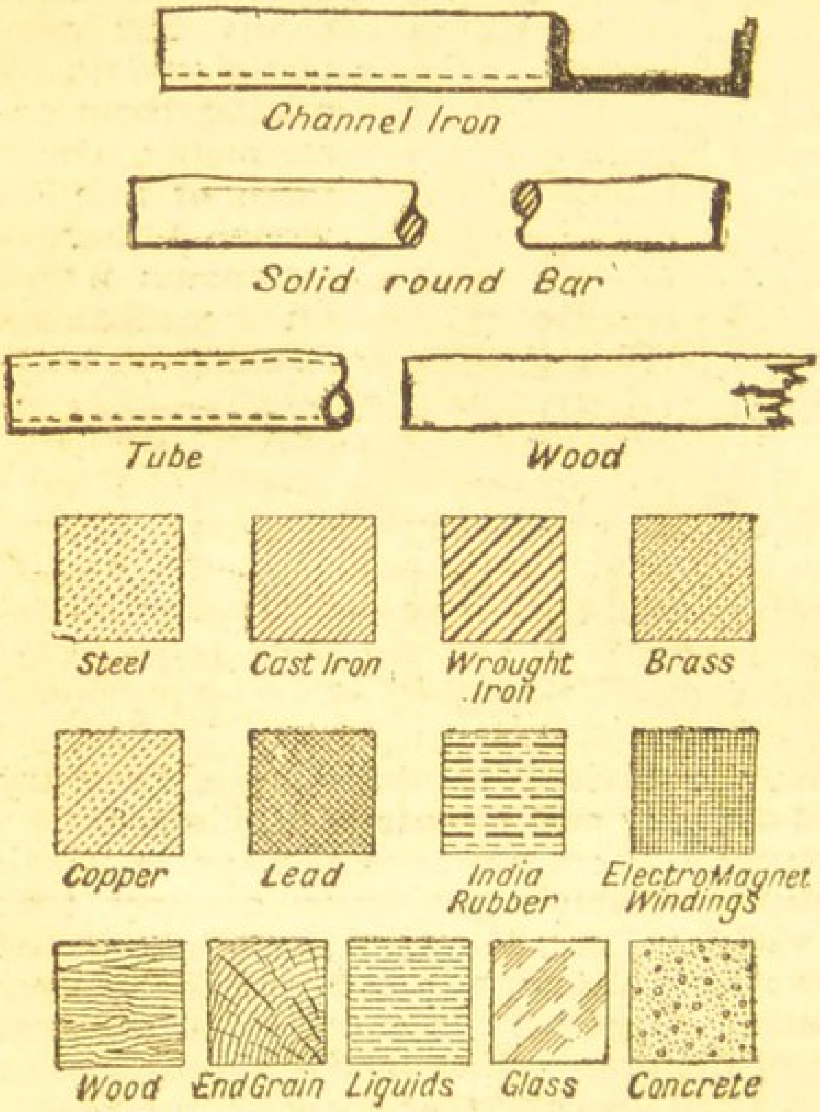
METHODS OF PROJECTION. There are several ways in which an object may be depicted. Simple projection assumes that every part of the object visible in, say, a vertical plane is projected upon an imaginary flat surface, although in fact, the object may be curved or of any other shape. It is usual in mechanical drawing to show a plan of the object, that is, the appearance as seen from above, and a front elevation or view of the object as seen from the front and projected upon a plane at right angles to that of the plan ; an end view is also drawn upon a plane at right angles to that of the plan and also at right angles to that of the front elevation.

Where the object is differently shaped on both sides and both ends, elevations are given of all these four sides. Suppose now the object were hollow and that the cavity could not be seen from the exterior, this would be depicted by means of a section, which is nothing more nor less than projections on a vertical or horizontal plane imagined as passing through the object.

Isometric projection is a method of showing three surfaces of an object simultaneously, whereas plain projection shows only one face on any one elevation. In drawing an object in isometric projection, all horizontal lines are measured from one centre point along lines inclined at 30° to the horizontal. Vertical dimensions are taken at any necessary place along these inclined base lines.

In Figs. 1 and 2 a simple wooden box with the planes marked on the drawing shows the various elevations. The sections through the box are shown in Figs. 3 and 4. The same box has been drawn to the same scale by isometric projection in Fig. 5, and in Fig. 6 again in mechanical perspective.

Comparison of the three processes and their relative advantages can therefore be made. By the first system the actual shape and size of the object is depicted. The isometric projection gives a better impression of the appearance of the finished object, and dimensions can be scaled off from it. In the third illustration the appearance of the article is extremely good, but it is not practicable conveniently to take any dimensions from the drawing. The second system is very good, as it indicates something of the external appearance of the object and provides the necessary means of measurement. The third system is of value in showing the correct appearance of the article when it is finished.

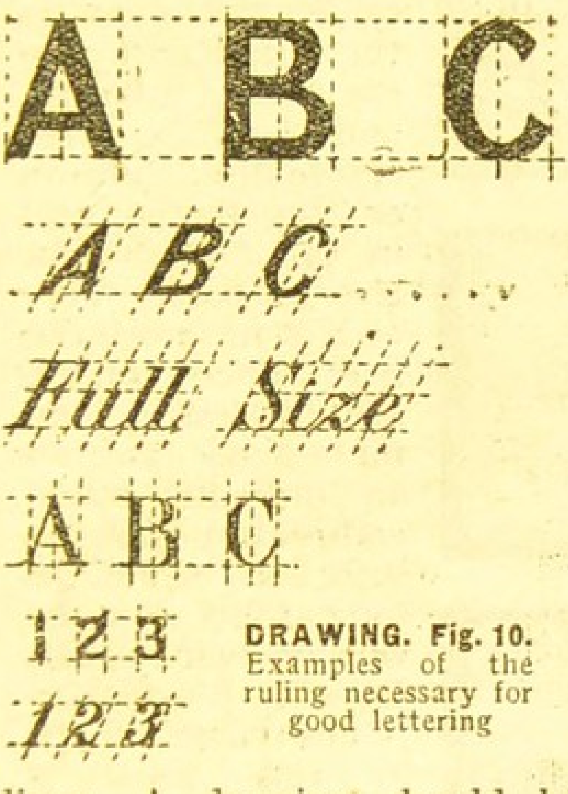


DRAWING. Fig. 9. Conventional methods of treating various materials in mechanical drawing

No special instructions are required for the preparation of drawings of objects that are made from flat material with straight or angular surfaces and edges. It is in drawing curved surfaces that greater difficulty is met with, and as an example Fig. 7 shows one method of drawing part of a chair back. To transfer the curves to the work it is desirable to draw lines at right angles to one or more of the edges of the piece of wood from which the chair back is to be made; and to set off the distances along these lines and transfer them to similar lines drawn upon the wood, drawing the curve through the points thus found (Fig. 8).

SCALE DRAWINGS. The amateur cabinet maker should try his hand at a scale drawing of the article he is about to construct, practising until he is able to draw mouldings or other details full size from a scale sketch; it is a matter of knowing how to use the T-square and rule, and rarely involves freehand drawing. The great advantage of a scale drawing is that it shows at once whether the proportions are good.

In making a full-sized drawing of some detail, squares may be ruled on the small sketch and the drawing transferred square by square to paper similarly ruled on the enlarged scale. By numbering the squares vertically and horizontally error may be eliminated.



DRAWING. Fig. 10. Examples of the ruling necessary for good lettering

Certain conventional treatments are generally followed in draughtsmanship to indicate sections, different materials, screw threads, and the internal shape of an object, examples of all of which are given in Fig. 9 in the previous page.

FINISHING TOUCHES. Drawings are usually finished after completion in pencil by going over all essential lines with Indian ink, using the ruling pens and ink points on the compasses, after which the dimensions are given and the points from which they are taken indicated by dotted lines. A drawing should be neatly lettered; simple sloping letters are easier to draw than those which are upright, and larger letters can be stencilled.

When a drawing has to be copied, it is as well to make the finished drawing on tracing paper or linen. The latter is wiped over with French chalk to clean the surface. Subsequent work is performed as if on paper, the pencil lines showing through the tracing cloth and acting as a guide. Blue prints or black line prints can be made from the completed drawing by the amateur himself in sunny weather, or by any firm of photo-engravers.

DRAW KNIFE. This is a tool used by carpenters for roughing out along the grain. It consists of a chisel-edged blade to which two wooden handles are fitted. When using a draw knife the operator stands astride of the wood to be cut and, holding the knife by the two handles, draws it towards him along the wood, while keeping the blade at an angle to the wood. The result is to draw off massive shavings slowly and steadily. The action should be one of drawing, not chopping, except for cutting knots.

DRAWN THREAD WORK. This work is mostly executed on linen of an open weave, which allows the threads to be easily drawn, and is suitable for afternoon teacloths, table centres, and all kinds of house linen. The soft canvases used for duchesse sets and runners, and also silks, can be decorated with drawn thread work.

The outlay in materials is small, as, apart from the material, working thread, crewel needles and a sharp pair of embroidery scissors are the only other things necessary. The thread should be about the same thickness as the ravellings of the ground material, and it can be either embroidery cotton or flax thread sold in small skeins for the purpose. Very elaborate work is best done on a special frame, but for small corners an ordinary round embroidery frame is sufficient, while the long rows can be worked over the left fingers.

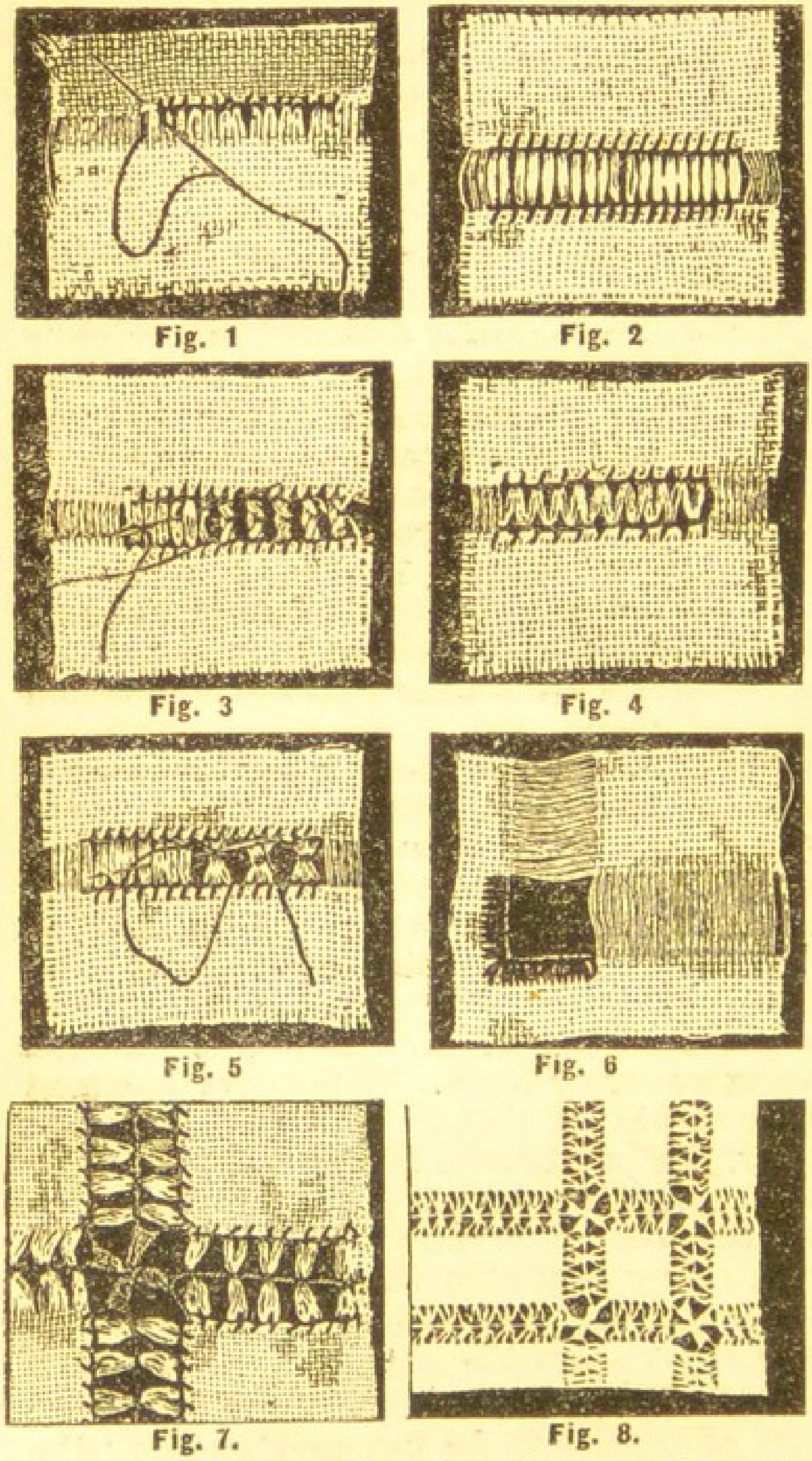


Fig. 1 Fig. 2 Fig. 3 Fig. 4 Fig. 5 Fig. 6 Fig. 7. Fig. 8.

DRAWN THREAD. Figs. 1–5. Simple and more involved forms of hemstitching. **Figs. 6-7.** Stages in working the drawn thread work, corner shown in **Fig. 8**

The first stitch in this work is s i m p l e hemstitch. The hem itself will vary in width according to the article, and this must be measured off before drawing the threads, which come immediately under the hem (*see* Fig. 1 in this page). If a single thread is drawn exactly where the hem is to turn at the top, and about ¼ in. from the edge for the little turn up, a perfectly straight and flat hem will result. Join the thread just under the hem and bring it through to the right side. Pass the needle from right to left under three or four threads, according to thickness, and draw the thread through. Insert the needle in the same place and bring it up again through the hem just above the place where it was brought out before. Insert the needle under the next three threads and repeat, Fig. 1. Fig. 2 shows the hemstitch used as an insertion.

Fig. 3 gives the pattern of a single crossing evolved from Fig. 2 after hemstitching both edges. The threads are crossed thus : Put the point of the needle from left to right under the second cluster, then let the point travel from right to left under the first cluster, still keeping the second cluster under the needle, and bring the needle up to the left of the first cluster. Repeat along the line, turning every second cluster over the preceding one, and this will give a running thread through all the clusters. Fig. 3 shows the needle in position for beginning this stitch. Fig. 4 depicts trellis hemstitch. Hemstitch one edge as at Fig. 1, but when doing the opposite edge, take half the strands from one cluster and half from the next.

THE FAGGOT-STITCH. Fig. 5 introduces faggot-stitch and the punto tirato knot. Prepare the hemstitch insertion as in Fig. 1, then three or four clusters are bound together with the knot, when they resemble faggots of wood. The thread should be joined at the end of the work, or where there is not a hem it can be tied to the first three clusters to make the first faggot. The knot resembles chain-stitch in embroidery with a slightly different placing of the needle. Take sufficient length of thread to do the whole length of insertion.

Now, working down the line of insertion, turn the cotton towards the left and hold it down with the left thumb ; bring the point of the needle over to the left of the cotton held down and insert it down the upper part of the space between the faggot just tied and the next faggot. Pass it behind the three clusters that will form the next faggot and bring the point up over the cotton that is held down by the thumb. Draw the needle through with sufficient tightness to bind the faggot and let the thread lie in a straight line between the faggots. Fig. 5 shows the accurate position of the needle and thread.

Fig. 6 shows how to finish a corner so that the threads are not drawn right to the hem. Buttonhole the two outside edges of a square along exactly the number of threads that will be drawn on each side, then cut the threads under the pearl edge of the buttonhole stitches and draw out the threads on both sides, when a square hole will appear, as in Fig. 6. This can be filled with a fancy pattern as in Fig. 7, or with the spider web. Fig. 7 shows a corner where two insertions of faggots cross each other. The working thread crosses the square hole from both sides, then two other threads are laid obliquely across these from corner to corner and secured firmly on the linen. Now join a new working thread in the very centre of the star of threads and work point de reprise under two threads, a corner one and a side one. This stitch is like simple darning - stitch, and goes over one thread and under the other until the spokes are nearly covered.

Point de reprise forms the groundwork of the most beautiful drawn-thread designs, where a large number of spokes are laid and the stitch darned in and out all the threads according to formation of design. A spider's web can be worked on the spokes by weaving round and round the threads, taking care to keep them flat against each other so that they do not overlap. Fig. 8 shows a completed centre with two rows of faggot insertion and point de reprise fillings at the corners. In this case the threads are drawn right to the hem of the cloth.

DRIERS. Driers is the name given to a group of preparations used to ensure the proper drying of the fatty oils in paints and varnishes. Litharge (oxide of lead), minium (red lead), and white lead are those usually employed in commercial preparations. Care should be taken not to use them to excess. A safe proportion is 10 per cent of the total bulk.

Driers are sold by the colourman in two forms, liquid and patent driers. Liquid driers, known as terebine, have as a basis oils in which metallic salts have been boiled, and may be purchased ready mixed or prepared for use as required. Patent driers are sold ready ground in oil, and when purchasing it is as well to see that no brittle skin is formed on the top of the colourman's keg. This is an indication that the drying agent is too active, and the paint in which such driers are used will be spoiled.

DRILL, Use of. A drill is a small, sharp-pointed instrument with cutting edges, fixed in a stock which is revolved to pierce a hole in metal. For all round use the best is the twist drill, with double helical fluting, made from $\frac{1}{16}$ in. to 1 in. or more in diameter. For drilling holes in thin sheet metal and any holes in brass or copper, the straight fluted drill is preferable. The flat, arrow head, and diamond point drills are useful, especially in the larger sizes, for drilling holes with a ratchet brace, and are equally effective


Fig. 1

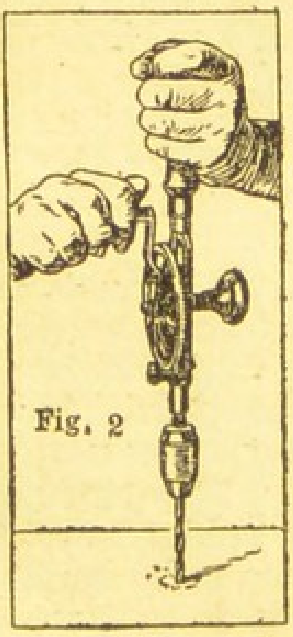


Fig. 2

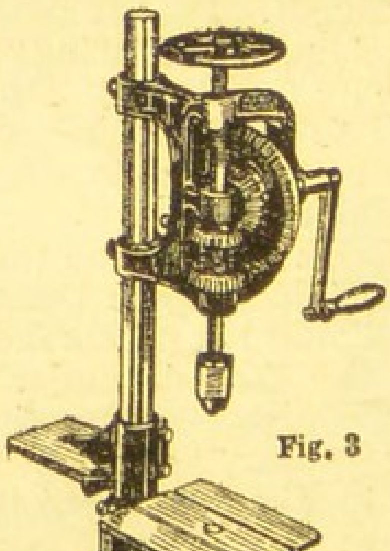


Fig. 3

DRILL. Figs. 1-3, explained in page 159.

on iron, steel, or brass. They are also convenient for use in a lathe, especially those made from flat strip metal.

Expansion drills comprise a short twist drill fixed in a shank, and an adjustable cutter, for drilling large diamond holes in sheet metal. Pin drills have a central pin or pilot, which guides the drill while it counter-bores or enlarges a hole already drilled. Drills are purchasable in millimetre sizes, in letter sizes corresponding to the gauge sizes of wire, and in ordinary fractions of an inch, the latter being the best for general purposes.

There are a number of different types of stock; a hand drill as illustrated at Fig. 2 is effective up to $\frac{1}{8}$ or $\frac{3}{16}$ in. diameter holes, and a wall or bench drilling machine is shown at Fig. 3. A reciprocating drill on the Archimedean principle drives the drill both on the upward and downward stroke, since it has both right and left hand threads formed upon the spindle.

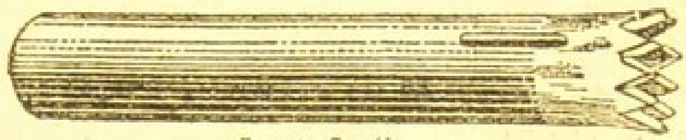


Fig. 4 *Brick Drill*

Fig. 5 *Section of Paper Drill*

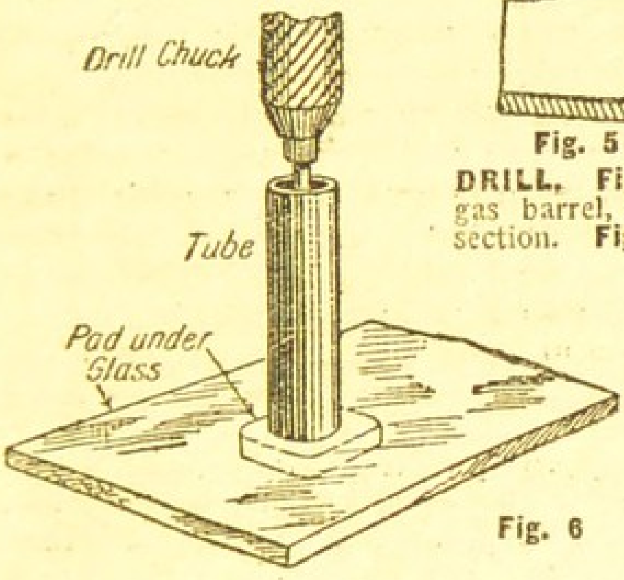


Fig. 6

DRILL. Fig. 4. Diagram of drill made from iron gas barrel, for brick work. **Fig. 5.** Paper drill in section. **Fig. 6.** Method of drilling through glass

Having selected the right drill for the size hole, place it in the chuck and screw it up tightly. Next make a centre punch mark exactly on the centre for the desired hole. Then, using a hand drill, hold this so that the drill is perpendicular and in an axial line with the position of the hole (Fig. 2). It is necessary to hold the drill stock steadily, and to rotate the drill at the correct speed, which varies with the size of drill and the nature of the material. Drills should be lubricated with light machine oil while working, except on cast iron, which drills dry.

Breast Drill. Breast drills are used in the same way, but pressure is brought to bear by leaning the weight of the body on the pad at the top of the stock, and holding the guide handle with the left hand. Drills should not be used to enlarge a hole that is only a little smaller than the drill, as the hole is then apt to jam or tear, or smash the drill. A reamer is the proper tool to use for this purpose. If a large hole has to be made, drill a small pilot hole first.

The correct shape of the cutting edges can only be maintained by accurate grinding, Essentials are that the angles of both cutting edges are alike, that their length is uniform, and that both faces slope back at the same angle.

Paper is drilled with a tubular drill shaped as shown in Fig. 5. A serviceable drill for making holes in brickwork is made from iron gas barrel, shaped as in Fig. 4. Marble can be drilled with a twist drill.

Glass is drilled by taking a piece of brass tube of the desired diameter and equal to that of the hole. Revolve the tube slowly, and use carborundum powder moistened with oil, applying the drill tube to the abrasive, which should be spread out evenly and thinly on a piece of wood, and not put on the glass. The glass must be supported on a felt or rubber pad only a little larger than the size of the hole. When possible, drill from one side half-way through, and then reverse the glass and drill from the opposite side.

Drilling in a lathe is accomplished by holding the drill in a chuck on the mandrel, or by revolving the work and holding the drill in a chuck on the tailstock. Flat drills are generally used in a special holder held in the slide-rest.

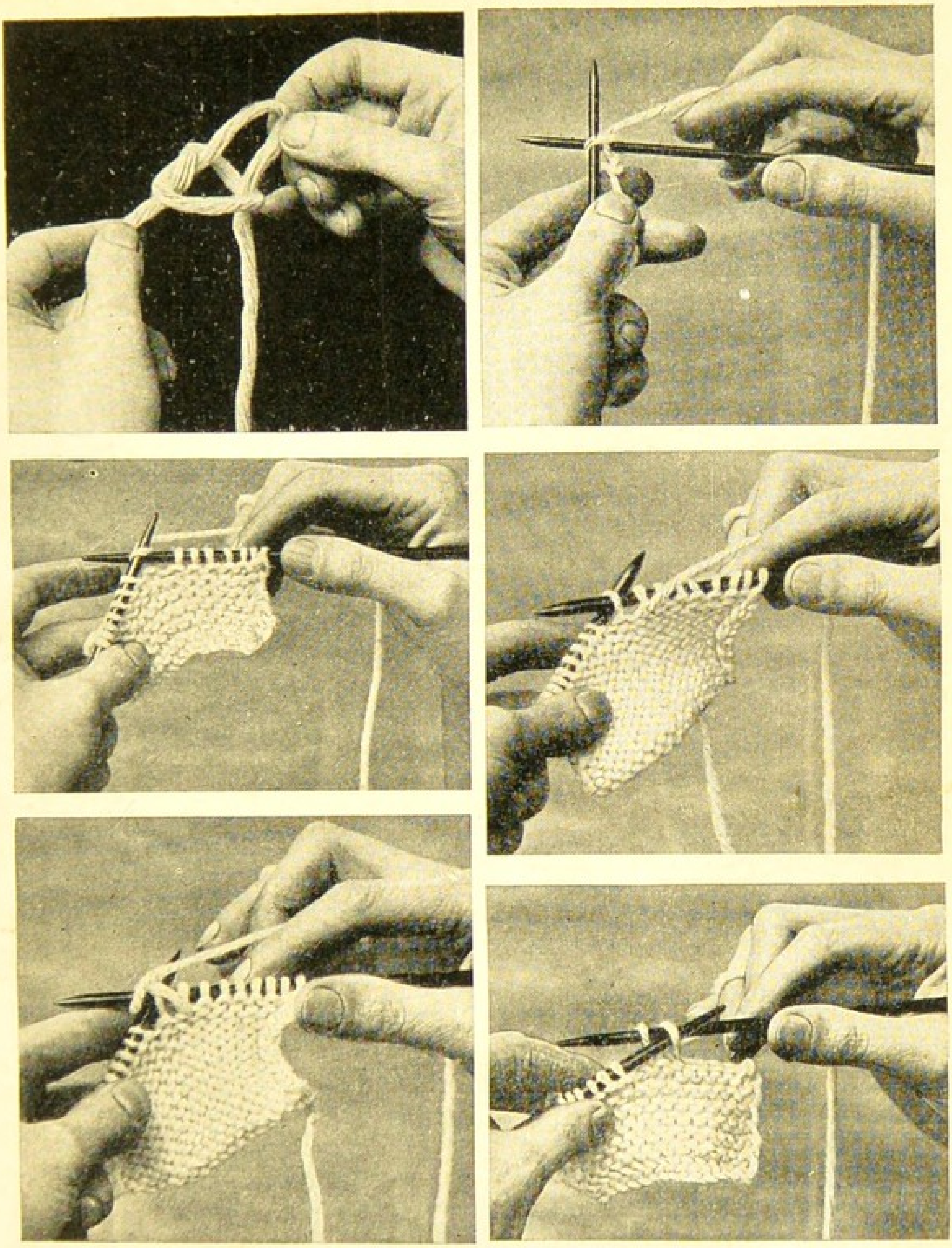
DRY ROT. The most prolific cause of dry rot is the use of timber in a wet condition, such as might be seen on new buildings when the timber is on the site but lies uncovered perhaps for months before it is used.

Combined with the above cause the ground on which the building is taking place is often made up; that is, it has been used as a public tip.

The house is kept down to as low a level as possible to save expense, and perhaps no earth is carted away from under the floors. The consequence is that the wet wood and the foul earth encourage fungus to start.

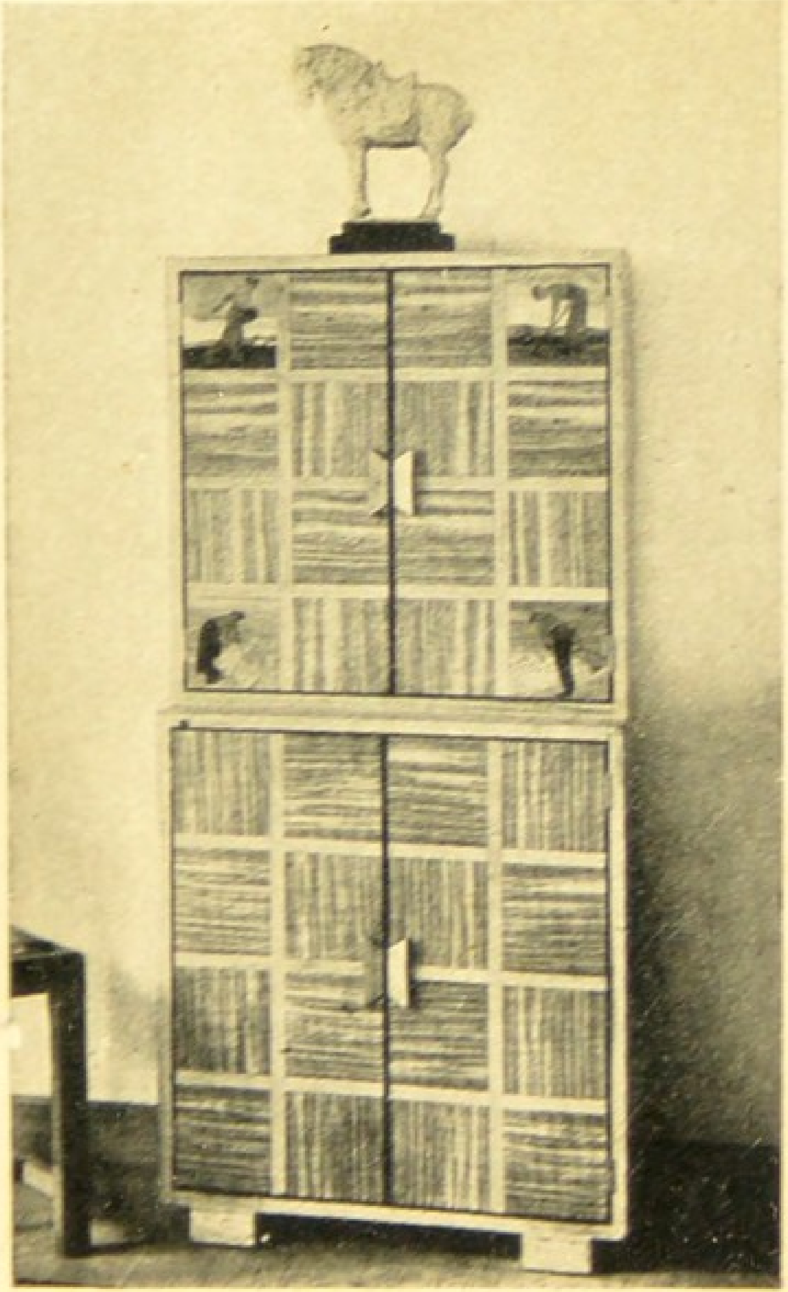
To prevent dry rot the timber should be kept as dry as possible, and if it cannot be kept under cover it should be so piled that the water will run off instead of soaking in. When timber is built into walls, allow it to lie on the bricks; any bricks which are built up to it or which lie on it should have no mortar intervening. Not only does mortar encourage the growth of fungus, but if the bricks come to the wood they will fit sufficiently slack to allow a certain air-space between. The mortar does not do this. Avoid the use of wood bricks. Even if put in dry they are unsatisfactory, but when cut out of the odds and ends on the job, usually soaking wet, and bedded in mortar like ordinary bricks, they are a fruitful source of trouble. It is better to plug the walls after; the risk will be practically nil.

Dry rot cannot be cured, but where the fungus has already got a hold it may be destroyed. Take out every piece of wood which shows the least sign of being affected. The disease runs farther on the inside of the wood than it does on the surface, and unless every trace is cut away it will certainly start again. Next clear out the fungus from the adjoining brickwork, from



KNITTING. Fig. 1. How to make the first stitch out of a loop in casting on. Fig. 2. Making the second stitch with the needles. This also shows how the right-hand fingers regulate the tension of the wool during work. Fig. 3. Plain knitting, producing garter stitch, in progress. Fig. 4. Purl stitch, first stage, with working thread in front of needle. Fig. 5. Purl stitch, second stage. Fig. 6. Casting off

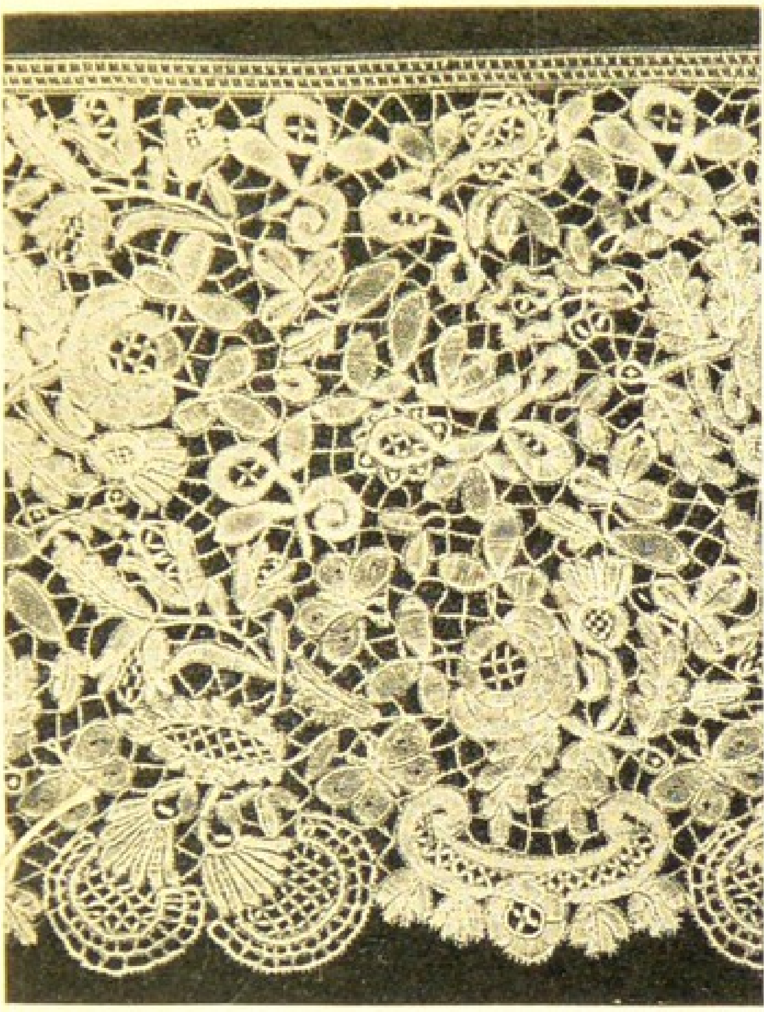
STAGES IN THE PROCESS OF KNITTING



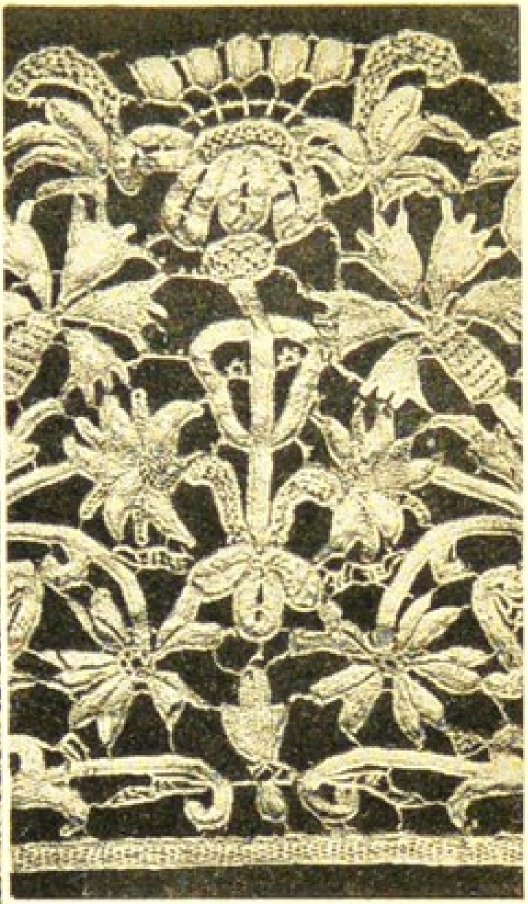
INLAYING. Examples of modern pieces. Oak sideboard inlaid with fancy banding in ebony and satinwood. Left. Cabinet in figured oak with inlaid lines and applied marquetry panels

EXAMPLES OF EXQUISITE CRAFTSMANSHIP BY ENGLISH WORKERS

Rowley Gallery, Kensington



HONITON. In this beautiful example the design of flowers and butterflies is connected, not by a net foundation, but by bars of twisted thread



GUIPURE. Specimen of 17th cent. punto in aria, a type seen in many of Vandyk's pictures

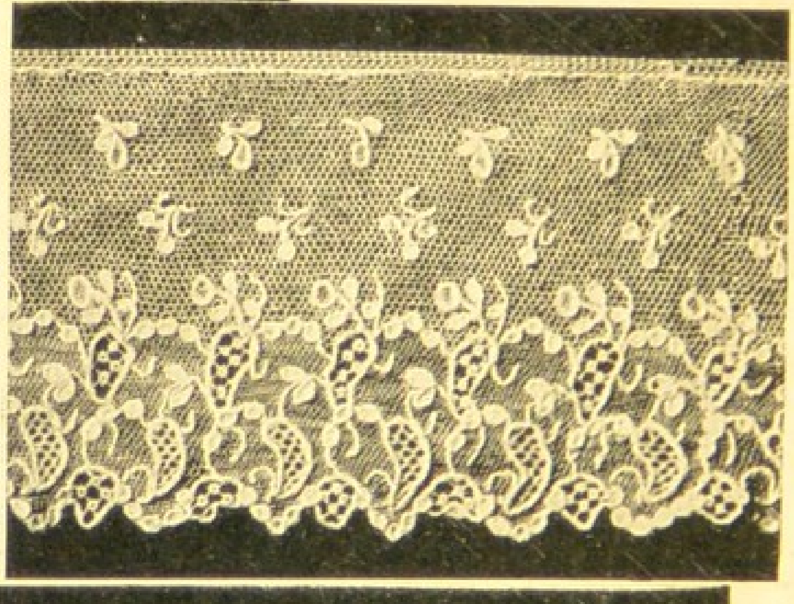
LACE. Specimen of point de gaze, an exquisite needle-lace with powdered ground and raised cord outline to the pattern

THREE SPECIMENS OF BEAUTIFUL LACE

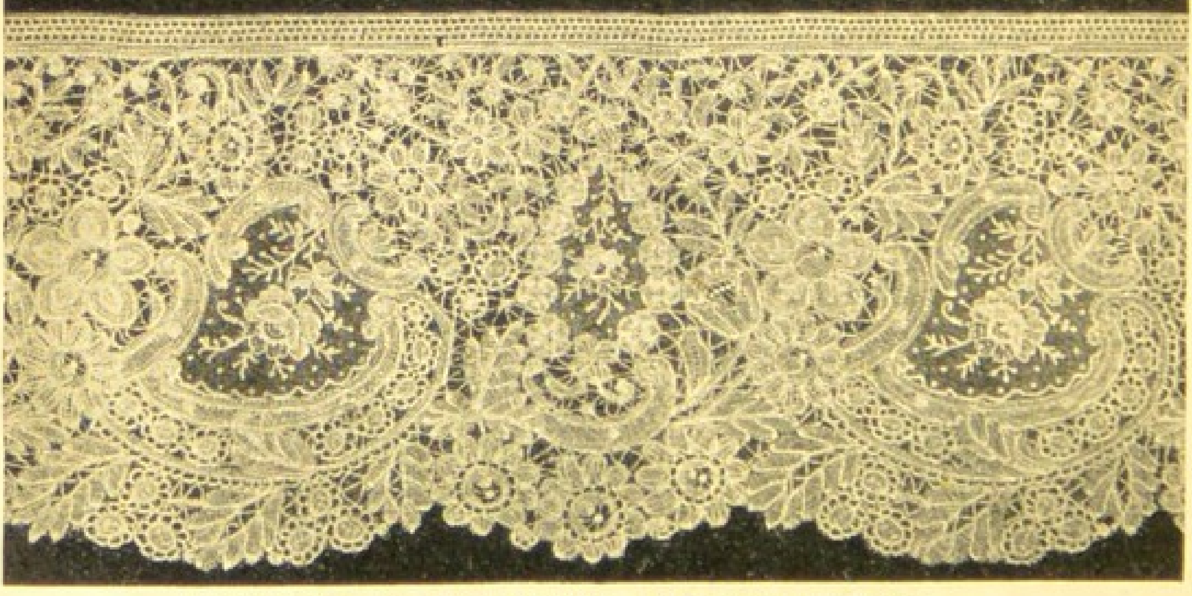
Courtesy of Haywards (Bond Street), Ltd.

Left. Carrickmacross. Characteristic design with pattern appliqué upon net

Below. Part of a border of Alençon lace, an example of 17th cent. French needle-point



Below. Duchesse lace. Strip of delicate real lace, showing a characteristic and beautiful floral pattern



FURTHER SPECIMENS OF BEAUTIFUL LACE

Courtesy of Haywards (Bond Street), Ltd.

openings in the walls, and from the bedding of all bonds, etc. The fungus and the affected wood should all be swept up and burnt to prevent the new wood from being attacked.

Before any old wood is replaced with new, the surrounding walls, the old wood left in, and all the new wood should be coated with an antiseptic solution, such as corrosive sublimate (bi-chloride of mercury), dissolved in methylated spirit and mixed fairly strong. This can be obtained from any chemist and must be used carefully, since it is a deadly poison.

DUTCH METAL. This is a copper zinc alloy with a high proportion of copper ; it is so ductile that it can be worked down to a thickness comparable to that of gold leaf. This fact, coupled with its yellow colour, leads to its use as a cheap substitute for genuine gold leaf in gilding work ; it is also sometimes used in powder form for so-called gilding.

DUVETYN. The cloth known as duvetyn derives its name from the French word for down, *duvet*, and it emulates the downy softness of peach skin or the skin of young animals. Silk duvetyns are the best known, and their surface approaches that of hatter's plush. Ornamented with stencilling or embroidery this cloth is suitable for such articles as blotters and floor cushions.

EASEL, How to Construct. An easel is a self-supporting framework, generally in the form of a tripod, and is obtainable in many sizes, the smallest suitable for the support of small photographs, a heavy erection for studio purposes, but more commonly a tripod-like structure about 4 ft. 6 in. in height.

Another variety of easel can be made from lath $1\frac{1}{4}$ in. wide and $\frac{1}{4}$ in. thick. It comprises top and bottom pieces, three connecting struts, and a back rest composed of two parts, all screwed together. This easel is intended to be used by a person while sitting down, is rested on the knees, and supported by a strut, which may be about 3 ft. long, and made from deal 1 in. wide and $\frac{3}{4}$ in. thick. It is hinged to the centre strut, and for convenience this hinge may have the centre pin punched out and be replaced by a longer one with a knob at one end, tapered at the other end, so that it can be put into position or removed without difficulty.

Another type of easel can be constructed from mahogany, or any fretwood, cut into struts $\frac{1}{2}$ in. wide and $\frac{3}{16}$in. thick. The two side pieces, are rounded at the top, and cut to an angle at the bottom, so that the easel will stand upright. The rest is made from similar material screwed and pinned to the side pieces, and supported by a cross piece similarly attached.

EBONITE. Ebonite is a hard usually black material made by incorporating rubber with other ingredients. It is amenable to a high finish, and has insulating properties. It is procurable in the form of rods, sheet or tubing from ironmongers and dealers in electrical apparatus.

Ebonite can be cut with a hack saw in the ordinary way. When drilling holes in it, the drill is apt to clog, and should be backed out frequently ; soft soap can be used as a lubricant. Filing is best accomplished with rough files.

EBONY. There are several kinds of ebony, which is a hard, dense and heavy wood, often quite black in colour Generally the heartwood is black, or nearly so, and the sapwood yellowish grey or brown, or nearly white. It is often streaked with shades of lighter or darker colour.

Ebony is valued by carpenters chiefly for its unique black colour ; it is used for veneer, for inlaying, for small turned articles, and for small cabinet work ; being a scarce wood, it is often imitated. The artificial sort, known as German ebony, is mostly stained sycamore, pear, or boxwood, and is used for the backs of certain brushes of the cheaper sort.

Ebony which has become dull may be restored by the application of olive oil. If it has lost its polish, it is best treated with a preparation consisting of vinegar, 3 oz., linseed oil, 6 oz., methylated spirit, 3 oz., and butter of antimony, ½ oz.

ÉCRU. Silk before it has been boiled and cotton and linen before being bleached are écru, which in French signifies the natural colour. Écru lace has a slightly brownish shade.

ELECTRIC MOTOR, Care of. Small electric motors are employed for many domestic purposes.

As a rule, the household appliances—vacuum cleaner, washing machine, refrigerator, etc.—are covered by the maker's guarantee, and the motor or machinery is serviced by them. It is an advantage, however, to know how to deal with minor defects on other small motors.

The essentials are to keep the oil reservoirs for the bearings properly cleaned and filled with good oil ; to see that the lubricating rings are carrying oil to the shaft ; to keep the brush gear, commutator and windings free from dust, dirt and oil ; to make sure that the commutator is clean, and that the brushes are properly bedded to the curvature of its circumference.

To clean an oil lubricated bearing, first remove the drain plug, where this is provided, and draw off the old oil. Replace the plug and fill the reservoir with paraffin until it reaches the top of the overflow pipe. After a while this can be drained away again. After refitting the plug fill the reservoir with fresh oil, and replace all oil-hole caps.

A motor fitted with ball bearings need not usually be disturbed more often than once every twelve months. The wisest plan is to get an electrical engineer to repack the ball race with grease, since the bearings require properly fitting and adjusting.

Oil must be wiped away from brush gear, commutator and windings, and all dust and dirt either blown out with a bellows or otherwise removed.

A careful inspection of the commutator should be made before this part is touched. If it is of a coppery colour its condition is healthy, and no more should be done than just wipe it with a clean rag. Otherwise, the surface can be polished with fine carborundum cloth wrapped round a piece of wood and held against it while the armature is revolved. Care must be exercised with a commutator that is ventilated or has undercut micas, to ensure that copper dust does not fall between the segments and set up short circuits.

To bed carbon brushes properly to the commutator surface a strip of carborundum cloth should be inserted between the brush and the commutator (with the cutting face towards the brush) and carefully drawn backwards and forwards until the whole of the carbon face has been shaped.

ELECTRO-PLATING. The process of electrically depositing one metal upon another is known as electro-plating. A great deal can be done with an inexpensive outfit, provided only small articles have to be plated, and it is done as follows: When an electric current is allowed to flow from one immersed terminal to another through a metallic solution (the electrolyte), and the anode, or terminal at which the current enters the solution, is of the same kind of metal as that in the solution, the metal will be conducted from the anode and deposited on the cathode. This ultimately results in the cathode becoming heavily coated with the metal and the anode being either reduced in size or entirely dispersed. If metal articles to be plated are connected so as to form the cathode, they will therefore become coated with metal.

Deal with articles of brass or copper as follows. First clean and polish with fine emery-paper, or on a buff; then attach a fine wire to the object and immerse it in a solution of potash. The solution is composed of 2 oz. of caustic potash to $1\frac{1}{2}$ pints of water. This must be brought to boiling point and the articles immersed until perfectly clean. Rinse them in clean hot water, and then place them in a potassium cyanide solution, composed of 4 oz. potassium cyanide to 6 pints water.

The cyanide is an extremely poisonous substance, and the greatest care should be taken in using it. The hands and arms must be kept well away from these solutions, and the fumes must not be inhaled. The articles must be wired so that they need not be touched with the hands.

Batteries and Bath. Assuming that only small articles are to be dealt with, the following outfit may be suggested. The source of electric current can be a 4-volt accumulator of, say, 40 ampère capacity; or a Bunsen battery or Daniell cells may be used. The bath can be a glazed earthenware jar, deep glass bowl, or a wood vat. Some stout brass or copper rods $\frac{1}{8}$ to $\frac{3}{16}$ in. diameter, and long enough to span across the mouth of the jar, are needed on which to hang the articles to be plated. These rods are most conveniently provided with binding screws or terminal nuts at one end for easy attachment of the electric conductor or wire. Copper wire of 24 to 16 gauge is needed, the fine wire for wiring small articles and the stout 16 gauge for the larger ones.

The next requirements are the metals and solutions. Iron and steel articles must be coated with copper, and a solution for plating is composed of 4 oz. of copper sulphate dissolved in 12 oz. of distilled water. Add a strong solution of ammonia until no more green crystals are precipitated ; add more ammonia solution, until the green crystals are re-dissolved, resulting in an intense blue-coloured solution. Then add slowly a strong solution of potassium cyanide until the solution is clear. Add $\frac{1}{4}$ as much again of the same potassium solution, and water to make 2 quarts. The anode may be a perfectly clean piece of copper plate or bar.

Silver Plating. For silver the solution is prepared by dissolving $\frac{3}{4}$ oz. of silver nitrate in 8 oz. of water, and adding slowly a strong solution of potassium cyanide. Pour off the liquid and wash the white precipitate carefully by putting it in a corked bottle, partly filled with water. Shake it well, stand it aside and allow the precipitate to settle. Pour away the water, refill, shake up and allow to settle as before until the precipitate is clean.

After this washing, add a solution of potassium cyanide until the precipitate is entirely dissolved. Then add about $\frac{1}{4}$ as much again of the same potassium cyanide solution, and make up to 1 quart with water. This kind of plating requires from 2 to 4 volts, and a pure silver anode must be used. Iron, steel, zinc, lead, and pewter should be copper-plated immediately before the silver plating is effected.

A quickening solution of 1 oz. of potassium-mercury-cyanide, 1 oz. of potassium cyanide, and 1 quart of water should be prepared. Articles that have been copper-plated are first cleaned and pickled, immersed directly into the quickening solution, and left there until the surface is uniformly covered with mercury, when it is rinsed in clean water and placed in the silver plating bath.

Iron and steel articles should be kept moving while being plated. The silver will be deposited in from 20 to 30 min., and if all is correct, the article will appear dull or lifeless and nearly white, and must be polished with scratch brushes, rouge, and buffs. Gold can be deposited in the same way.

Nickel Plating. Nickel plating is similar to copper plating, and a suitable solution for it is composed of nickel ammonium sulphate, $1\frac{1}{2}$ oz. ; ammonium sulphate, $1\frac{1}{2}$ oz. ; water, 1 quart. Hot water will hasten the dissolution of the crystals. An electric current of 2 volts, and density of $5\frac{1}{2}$ ampères per sq. ft. of area of the article to be plated, is required for this solution. Pure nickel is used for the anode.

Electrical connexions are completed directly the objects are placed in the bath of solution ; the anode is connected to the carbon of a battery, or the + sign of an accumulator, and the cathode is connected to the zinc of the battery, or to the — sign of an accumulator. Do not allow any article being plated to touch the anode or the sides of the vat, or a short circuit will result. Place the objects into the vat and see they are all clear of each other before switching on the current.

Plate as many objects as possible at one time. Prepare the objects by cleaning, etc., immediately before plating; do not leave them hanging about, or they will get dirty and the result will be failure.

ELM. This is a hardwood with rather limited uses, though excellent for some purposes. The English variety is a dark brown colour with curly and plaited grain, which does not split easily. It is tough and flexible and often takes the place of ash. It is very durable under water, and is often employed in the construction of boats, and is largely used by wheelwrights.

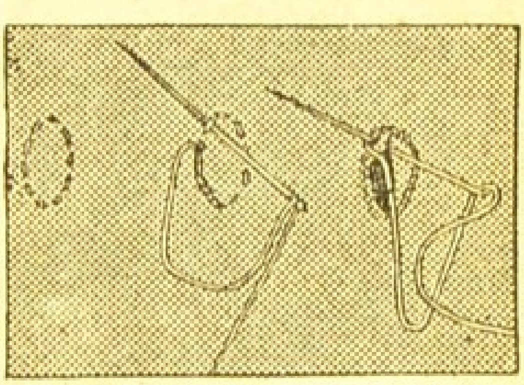
EMBROIDERY FOR HOUSEHOLD FABRICS

Decorative Needlework Described in Detail

For related information see Appliqué, Canvas, Darning, Drawn Thread, etc.

The subject of embroidery is here divided into six main classes, embroidery on white materials, linen embroidery, embroidery on silk and velvet, gold embroidery, embroidered laces, and appliqué embroidery. These are again subdivided into many kinds of work, and many of the stitches are adapted from one class of work to another.

Embroidery is usually worked on a background of toile cirée (waxed cloth), in an oblong frame specially made for large pieces of work, or in a tambour frame. Designs can be bought already traced on material, or on transfers. The latter is placed on the material ink side downwards, and the wrong side firmly pressed with a moderately hot iron, when the whole design should be clearly seen on the material. The iron should not be rubbed up and down; a firm pressure on each part of the design should be quite sufficient if the transfer is a good one. Another method is to trace a design from a drawing, when it is given in the required actual size, or to draw an original design.

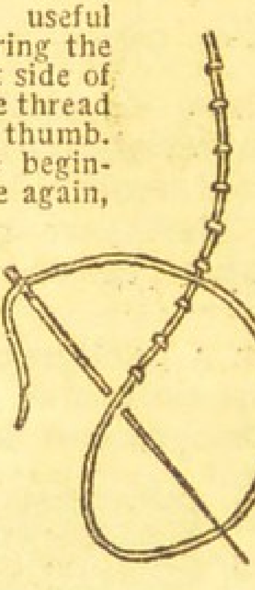


EMBROIDERY. Three stages in making an eyelet hole

Place a piece of semi-carbon paper, inked on one side only, on the material in position where the design is wanted. Put the tracing of design right side upwards over this and secure at corners with drawing-pins to prevent slipping, but first put a tiny piece of paper between the material and the carbon where the drawing-pin goes in, to prevent the material from being marked with carbon ink. Now go firmly over the lines of the design with a blunt knitting needle or sharp lead pencil, and when the carbon is removed the design will be seen clearly on the material. For transferring designs on dark material use a white or red carbon, but as this rubs off with much handling it is necessary to follow the outline of the design with running stitches, which can be worked over afterwards.

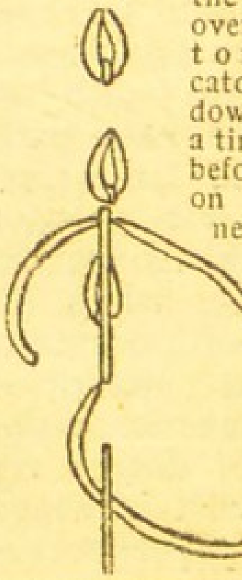
EMBROIDERY ON WHITE MATERIALS. Madeira work is known by its working thread of greenish blue on a white background, and much of the finest Swiss embroidery is worked with a blue-grey thread. This class of work on the whole is executed with embroidery cotton, some less twisted than others, to cover the surface quickly and give a smooth finish, such as floss embroidery cotton, flax threads for working on linen, and very fine threads for Swiss embroidery and lace stitches. A coarser cotton is used for padding raised work, while Venetian, Richelieu and Renaissance employ several kinds in one piece of work, the buttonholing

SNAIL-TRAIL. A useful stitch for stems. Bring the needle up to the right side of the material. Hold the thread beneath the left thumb. About ¼ inch from the beginning put in the needle again, to the left of the thread (putting the needle over the thread which is still under the thumb). Bring the needle up again the other side of the thread, and draw the thread through. A straight stitch and knot will have been formed. Continue in this way

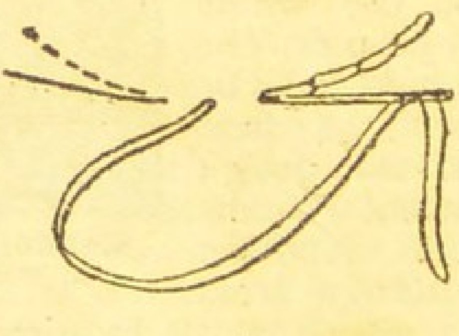


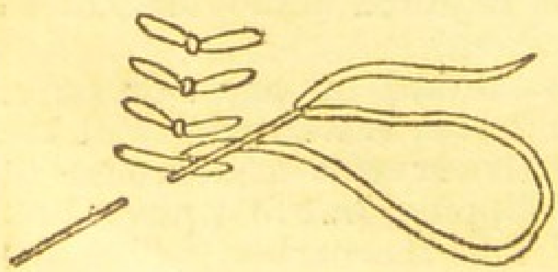
STEM STITCH. Take up a little of the material, throw the thread over to the left, and draw it through. Bring the needle out to the right at the top of the last stitch, so that the stitches overlap slightly. Continue working in this way

LOOP STITCH. This is similar to chain stitch, the needle passing down the centre over the cotton, but catching it down with a tiny stitch before going on to the next loop

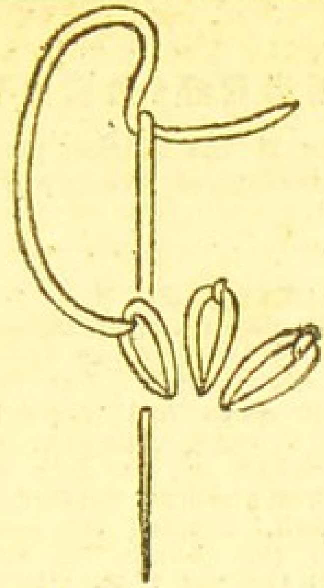


BACK STITCH. Take a running stitch, but with the next stitch the needle passes behind the last stitch to fill in the gap. Bring the needle out, leaving a similar space and proceed as before

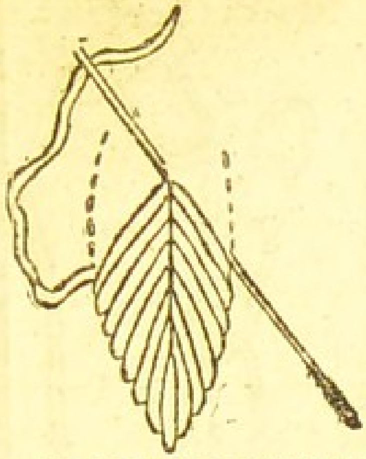




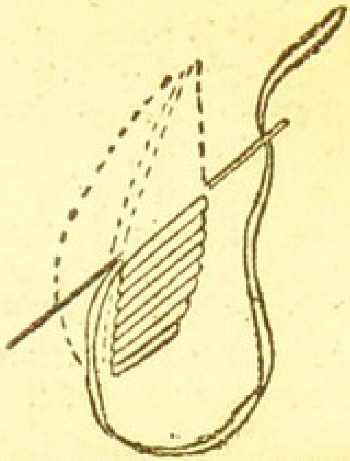
FLY-STITCH. Make a long stitch and catch it down with a tiny one at the centre



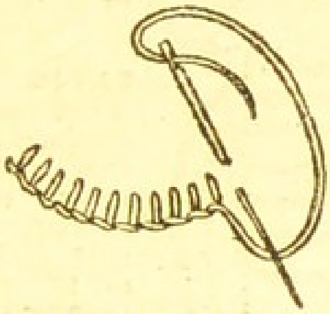
LAZY DAISY STITCH. Bring the needle up in the centre of the flower, hold the thread under the left thumb, put the needle back in the same hole as before, bringing it out about half an inch below. Draw the thread through, keeping it under the point of the needle. Put the needle back about $\frac{1}{8}$ inch below to fasten the loop down, bringing it up where the next daisy loop begins



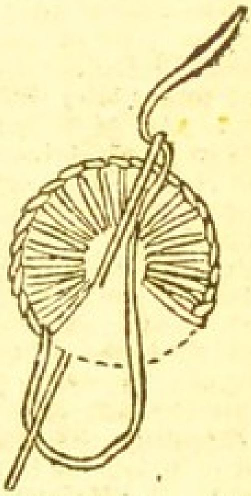
SLOPING SATIN STITCH. This is worked from the base upwards from the outside to the centre of the leaf



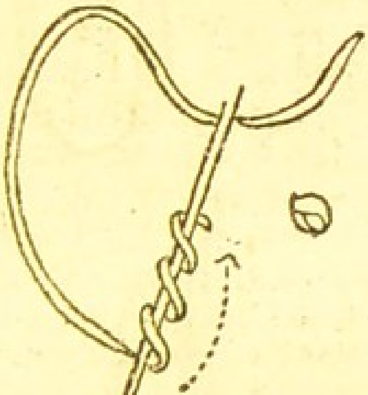
FISHBONE STITCH. This is like sloping satin-stitch, but the needle passes alternately from left to right from the centre to the outside, each stitch being a little above the previous one



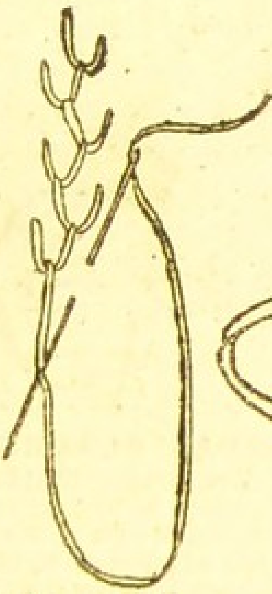
BUTTONHOLE STITCH. Working from left to right, the needle is passed downwards over the thread



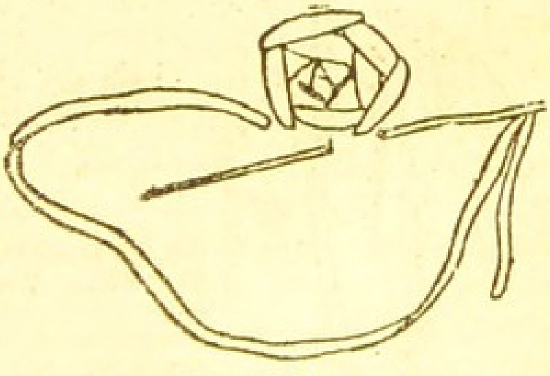
BUTTONHOLE RING. This is worked in the same way as ordinary buttonhole stitch, but radiating from one centre



FRENCH KNOT. Twist the thread round the needle, holding thread with the left thumb while drawing the needle through. Pass the needle down close to where it first came out



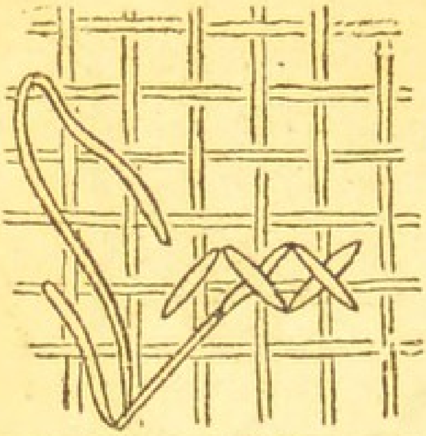
FEATHER STITCH. Bring the needle up on the centre line from left to right, and then vice versa. Hold the cotton down with the left thumb so that the needle passes over it each time



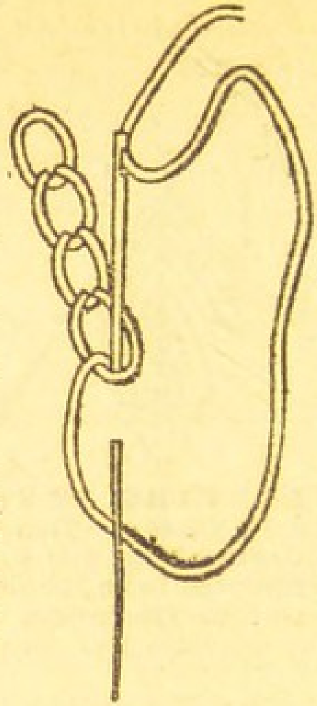
ROSE STITCH. Make a French knot and then work a series of stitches round and round it, beginning in the middle and proceeding outwards

EMBROIDERY

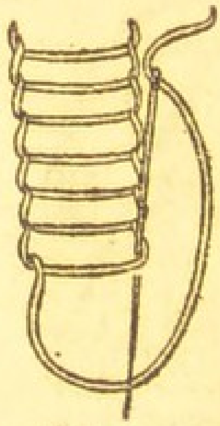
Some of the stitches used in Decorative Needlework



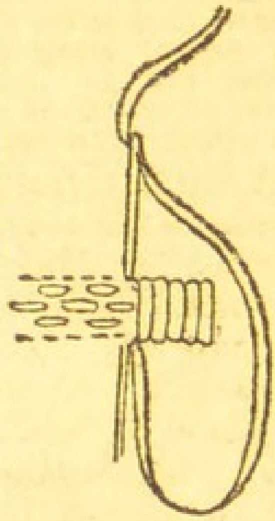
CROSS STITCH. Work a slanting stitch and then another one back to cross it. The top stitches in a row must always lie the same way



CHAIN STITCH. Bring the needle through the material, hold the thread down under the left thumb. Put the needle down just where it came through, then take up one-eighth of an inch of material and draw the thread through, keeping the loop under the thumb till you get to the end of the stitch. Continue working in this way

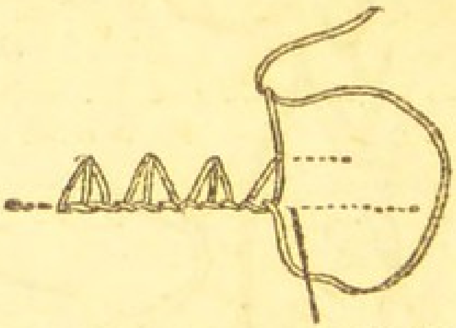


LADDER STITCH. Bring the needle up to the right side of the material. Hold the thread under the left thumb, and put the needle in again ¼ inch to the right. Take up ⅛ inch of material (pointing the needle downwards) still with the thread under the thumb, and pull the thread through. Put the needle in again ¼ inch to the left of where it last came out (holding the thread under the thumb) Continue in this way from left to right. A quick stitch for semi-filling

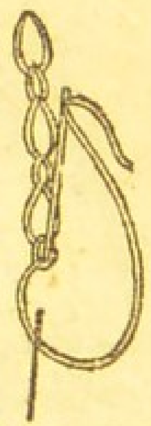


SATIN STITCH. Work the stitches across, placing them close together to cover the fabric without overlapping. To get a raised effect tiny running stitches can be put in first for padding. This stitch can be worked from right to left or left to right

LONG AND SHORT STITCH. One long and one short stitch taken alternately

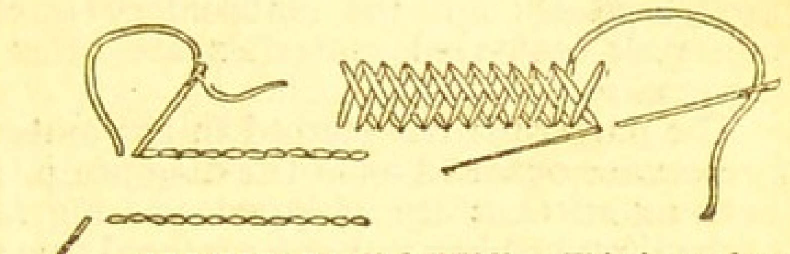


ORNAMENTAL BLANKET STITCH. Work like button-hole stitch, from left to right; but pass the needle two or three times into the same hole at the top, thus making little pyramids



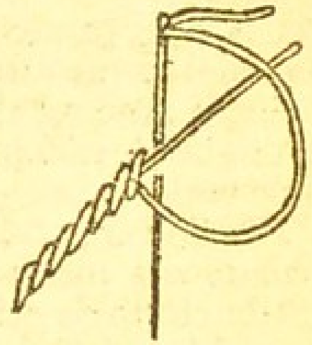
FANCY CHAIN STITCH. For this make alternate large and small loops. The stitch can be varied by working two small loops and then one large one or by grouping them in threes being executed in a firm twisted thread, and the bars, picots and lace stitches in a softer thread. Hedebo or Danish cut work should be done with linen thread for the main outlines, and ordinary sewing needles and crewel needles are employed in the process.

Some designs have to be outlined before the actual fancy stitches begin, and where this is so it is important to be exact in following the design, as the effect of a piece of work can be spoiled by careless or slovenly outlining. The thread should be fastened on the material by means of a few running stitches, never with a knot, and this also applies when doing the actual embroidery. Only in very special instances (and these are very infrequent) is a knot allowed.



CROSSED BACK STITCH. This is used on transparent materials; it makes a close line of cross stitch on the wrong side, and two rows of back stitch on the right. It is worked on the right side. Put in the needle as if for ordinary back stitch, pass it under the material, sloping it a little down to the second line. Draw it out and make a back stitch on the second line. Bring the needle up again under the material, leaving enough space to make a back stitch on the top line as before

When finishing off a thread the end should be taken through some of the stitches at the back, or hidden inside a completed part of the design, so that there are not any untidy ends at the back of the work. When a raised effect is wanted the spaces inside the outline must be filled with solid stitches, and this is known as padding, for which a soft, thick thread is specially sold. The stitches are piled high towards the centre and shaded off at the sides according to the shape of leaf or flower, and to get good round embroidery it is necessary to make the padding quite firm. The stitches most commonly in use in embroidery are illustrated and details given for working them.



RAISED STEM STITCH. Work this stem stitch as before, but first lay along the line you are working a thick thread of cotton as a foundation, and take the stem stitches over it

The chief stitches used in white embroidery are scalloping, made with buttonhole stitch, stem stitch, crewel stitch (the difference between these last two stitches is that for the former the thread is thrown over to the left, while for crewel stitch it is thrown over to the right), back stitch, crossed back stitch or herring-bone, French knots, eyelet work for Madeira and broderie anglaise, straight and sloping satin stitch for leaves and solid designs. Initials and monograms can be carried out with the above stitches, with many varieties in fillings for the main stems of the letters.

Openwork Embroidery. Real Madeira work consists of eyelets worked in groups to form a design. They are all circular and distinguish this work from broderie anglaise, the latter having ovals as well as circles. Broderie anglaise is not limited to eyelet work, but often has solid stitches mixed with it to suit the design. Good materials should be used such as linen, crêpe de Chine, lawn and heavy Japanese silk. Either white or coloured thread is used, and though the embroidery is classed as one on white materials, coloured materials are often chosen for its modern expression.

The pattern is transferred to the material, the ovals or circular eyelets are outlined as in the diagram p. 165 (see first oval); these running stitches are whipped, passing the needle through under each stitch but not through material (see second oval). Now with sharp embroidery scissors a clean cut is made up the centre of the oval (see third oval) and beginning at the bottom left-hand side the whipped stitches are overcast, completely covering the outline of the design and also taking in part of the material which is folded back from the centre of the oval. The edge of the work is usually finished by scalloping. Sometimes the scallops have eyelet holes worked along the edges ; sometimes they are plainly buttonholed. Renaissance work has the outlines in buttonholing and the pieces are connected with buttonholed bars, under which the material is cut away at the back. The buttonholing is done over a single tracing thread and the same width is evenly maintained throughout except on the outer edge, where it may be made a little wider.

The flowers and leaves may be ornamented on the outside edges with picots made by putting the needle half its length into the last buttonhole stitch, twisting the thread 10 to 12 times round it, pushing the needle through the twists, pulling up the thread so that the spiral forms a semicircle, and then continuing the buttonholed edging. The details of flowers and leaves are often worked out in raised satin and stem stitch, and knots are used for centres. Richelieu work is similar, but the connecting bars are ornamented with picots, while in Renaissance the bars are buttonholed without picots.

Having finished the embroidery, cut away the material underneath the worked bars, leaving these intact, and using a sharp pair of small scissors so that the cutting may be most carefully done. Venetian embroidery has buttonholed edges and bars, the inside of the design being filled in with fancy stitches and fillings such as those used in needle-made laces, instead of the plain linen spaces being left as they are in Richelieu work.

Danish hedebo work has openwork designs overcast and the material cut away at the back. Open spaces are crossed with threads, and these in turn are overcast or rolled. It is combined with open lace stitches worked as a background independently of the material background, as this is afterwards cut away. Satin stitch is often applied between the cut work on the solid portions to embellish the design. Piqué embroidery is work done on a firm background, as the main outlines of design are covered with a cord, sewn along the line, or they are overcast closely, while the centres are filled in with fancy stitches, to represent figured materials and damasks, or something of that kind.

LINEN EMBROIDERY. Linen embroidery has two varieties, all those done on counted threads, and embroidery done over a design which has been transferred to the material irrespective of lines. Old embroideries of this class were worked on very fine linen, but modern work is done on linen specially woven with rounded threads, which are easily counted and drawn.

Cross-stitch is the simplest form of this work, besides numerous geometrical designs which can be carried out by counting the threads. Two-sided line stitches are used in which the needle passes alternately over and under the threads of the material and in returning covers the threads previously left uncovered. Square stitch is formed in this manner, while chain, long and short stitch, stem stitch, and other ordinary embroidery stitches are used for floral designs. In one variety of linen embroidery the background is darned, leaving the design in the plain material. The background having been filled in, the design is back-stitched to obtain it and the centres of flowers are filled with clusters of French knots. Khetha work is the reverse of this, having a bold floral design outlined in stem stitch and filled with rice stitch or darning stitch. Such work is quickly done and most effective for cushions or house linen.

Hardanger work is done on loosely woven canvas, on which the threads can easily be counted. Buttonhole and picot bars are employed where the material is cut away, or the bars are done in darning stitch and loop stitch and the pattern in straight stitch, which is really satin stitch without padding, the stitches covering in this case the requisite number of threads.

Punch work produces a drawn thread effect by means of a special punch needle, without the trouble of drawing threads. Various outline stitches may be used for the pattern and satin stitch for flower centres, the punched holes of the background being worked with tiny hem stitches.

Hungarian embroidery is worked on coarse unbleached linen, the rougher the better, in gay colours and bold designs.

SILK AND VELVET EMBROIDERY. Embroidery on silk and velvet requires special care. The design cannot be satisfactorily marked on the right side of velvet; it must be lightly traced on the back and the outline followed with white tacking thread, so that the tacking stitches are prominent on the right side of the material. If the work is too big to hold over the finger, an oblong frame must be used, as a pile material cannot be pressed into a round frame. A piece of stout calico should be sewn round the edges of the velvet, and by this it should be laced to the frame with long stitches, the top and the bottom edges first, getting them quite taut, and the sides last. Ordinary embroidery stitches are employed, but in the case of chenille, which cannot be drawn through the material, it must be couched down as in laid work.

GOLD EMBROIDERY. This includes all embroidery done with gold and silver threads. It is expensive work, and is only employed where very rich effects are desired, as on ecclesiastical ornaments and vestments. It requires a strong foundation, such as brocade, velvet, or thick cloth. The padding for bold designs is done with ordinary white padding cotton, only the surface stitches being worked with gold thread. The working threads should be handled as little as possible, and a fine stiletto is a great help in making small holes for coarse threads to pass through.

APPLIQUÉ EMBROIDERY. This consists of the laying of pieces of one kind of material on a foundation of another kind to form a pattern, giving the effect of patchwork, but carrying out a definite design. The designs are sometimes attached by means of buttonhole and fancy embroidery stitches, while the centres are filled with ornamental stitches and lace fillings instead of the old corded edge or plain fell stitch. It stands out in bold relief, and is quick work in comparison with ordinary needle embroidery. Hence its popularity for the decoration of cushions, curtains and bedspreads.

The small pieces that form the design should be tacked down in position before working, putting the tacking threads near the edge of the top piece and working over them when doing the embroidery. They can be drawn out afterwards from the back of the work. In the case of floral designs the veinings of leaves and the special outlines of flowers can be worked afterwards through the two materials.

Embroidered laces come under the same heading as canvas embroideries, where the background is of a loose texture, and all kinds of fancy lace stitches and fillings are used, and others producing a drawn-thread effect. Colbert embroidery comes in this class, and includes imitations of Dresden lace stitches and damask stitches and open fillings.

EMERY. Emery is a very hard mineral, a variety of corundum. Owing to this quality, it is used for abrasive purposes. Emery cloth and emery sticks are made, like emery paper, by coating the particular material with powdered emery mixed with glue or with some other adhesive substance.

ENAMELS, Use and Application of. In the use of enamel for woodwork, etc., preparation of the work is of the highest importance. For new interior woodwork proceed as follows: First rub down the wood with glasspaper, then brush over all knots with a preparation sold as knotting; when this is dry apply a coat of priming to the whole of the woodwork and fill up all cracks with stopping and putty.

To close up the pores of the wood, the whole must be given one coat of a suitable undercoating. This when quite dry and hard should be smoothed with the old fine sandpaper and dusted; it is followed by a second undercoating of a colour similar to that of the enamel which must be allowed to dry thoroughly. It should present a perfectly good surface, but will be matt or semi-glossy in appearance, and it must not be touched with greasy hands. When hard give a flowing coat of the enamel. Interior wall surfaces of plaster or cement must first be primed or filled with a good coat of reliable priming solution; this is needed to stop the suction of the plaster, as otherwise it will affect the colouring.

New exterior woodwork should be treated in the same way as inside work, except that outside quality material should be used for the undercoats. Exterior white enamel work should be finished with two coats, the second applied after the first is thoroughly hard and dry. With woodwork that has already been painted, and when the new colour is the same as the old, it will suffice to rub down and wash the paint with soda-water, stop up holes and give one coat of matt enamel or second undercoating, finishing with the glossy enamel.

Interior wall surfaces, previously painted and in good condition, can be given one coat of undercoating and one of glossy enamel. Walls in bad condition are enamelled as for new work. Distempered walls to be converted to the flat enamel finish can be treated as for new work, but finished with undercoating and a final coat of flat enamel.

Exterior ironwork should be cleaned of rust, coated with anti-rust priming, two coats of glossy enamel, flatting the first coat of enamel by sandpapering and dusting prior to the final coat of glossy enamel.

A useful type of brush is a flat bristle brush ready ground, or worn in by previous use, cleaned and washed. When using proprietary enamels always use undercoatings made by the same manufacturers. Do not add anything to the enamel; simply stir it and apply it in broad, generous strokes of the brush. Do not apply too much enamel, nor must it be brushed out too thin.

Enamel sets very quickly, and in half an hour from application it cannot be touched up without showing. Endeavour to apply the enamel so that the finished work is always behind the brush.

Enamelling a Bath. To cleanse the bath scrub it with hot water and soap extract and scouring powder if necessary. Then two or three good scourings with cold water should follow. The next step is to wipe the bath dry and to smooth the surface with glass paper.

Many good enamels are specially sold for bath work. The one selected should be purchased in two grades; (a) to dry with a matt or dull surface, and (b) to dry glossy. Twice as much of (a) is needed as of (b).

The first and second coats should be made with the dull-drying medium and should be applied sparingly. If a non-glossy enamel be used for the two preliminary coats, each will be dry after the lapse of two days, and then the glossy enamel may be applied; this should be left for a week.

When dry, the bath should be filled with cold water, the plug should then be removed, and the hot tap allowed to run. In this way the cold water should gradually give place to warm and then hot water. The latter should be allowed to remain overnight.

CELLULOSE FINISHES. Cellulose enamels are on an entirely different basis from oil paints, and thus possess different properties. The drying takes place by evaporation of the liquid solvent content, and the action is extremely rapid. Cellulose enamels are generally suitable both for indoor and outdoor work.

When using a cellulose enamel stir the paint well up from the bottom and apply with a clean rubber-set brush having soft bristles. It should be well charged with the paint and handled so as to distribute it evenly over the surface. By finishing the stroke with the tip of the brush lightly in a wet portion, brush marks and "drags" will be avoided. The material should be brushed out only sufficiently to give complete cover over a small area at a time. The first coat should be left a minimum of 2 hours before the second is applied.

Brushing cellulose enamels can be applied over almost all types of surfaces, but these should, of course, always be clean and dry; on bare wood or plaster a specially made undercoat is recommended. The undercoat should be given a drying period of eight hours or more.

Before applying cellulose enamels to finished surfaces all traces of varnish must be removed.

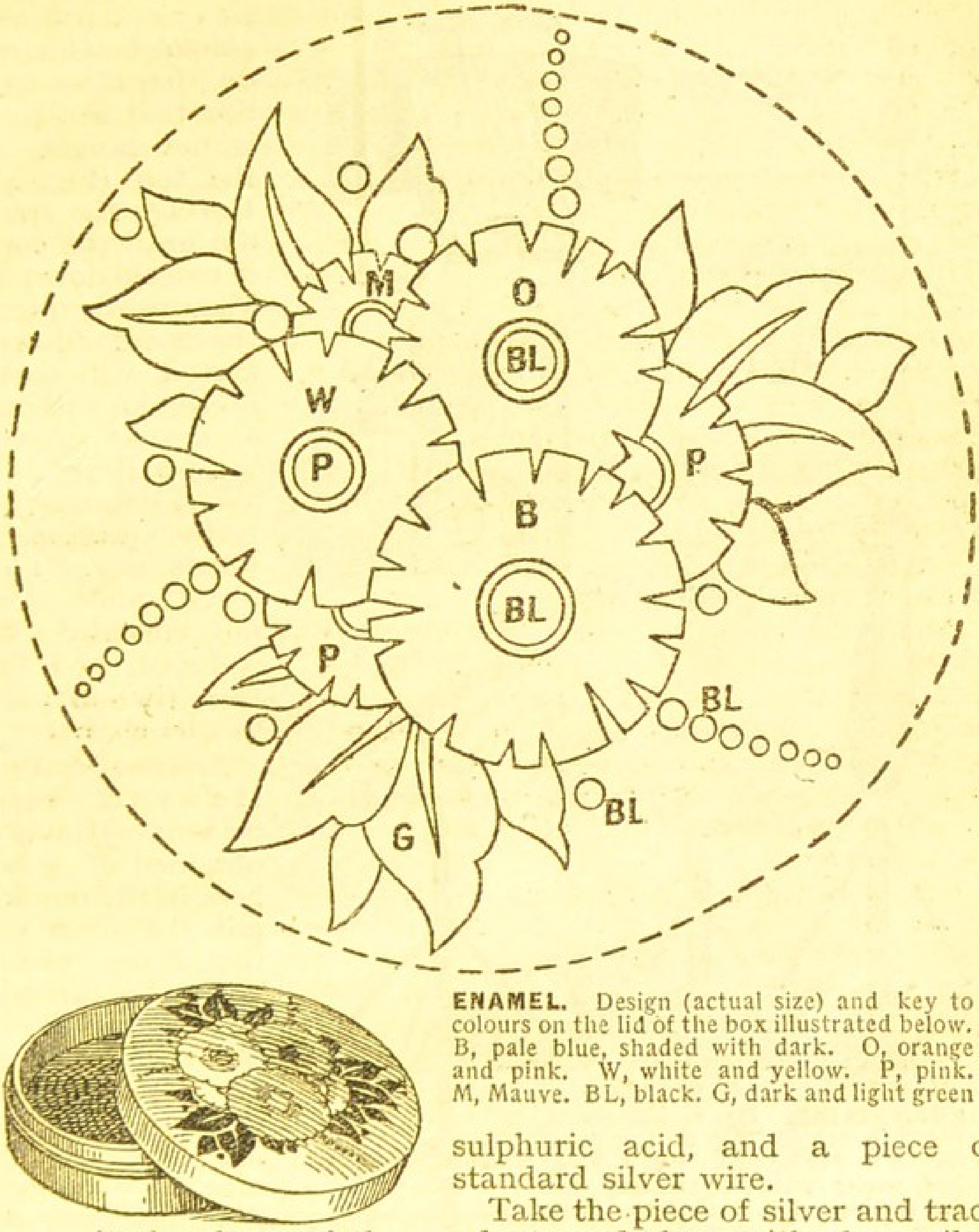
CLEAR CELLULOSE VARNISHES. These are particularly suitable for use by amateurs on stained furniture where french polish would ordinarily be employed. It is necessary to remove every trace of grease or wax polish from the surfaces before the clear cellulose is applied. Clear cellulose varnishes are suitable only for indoor work.

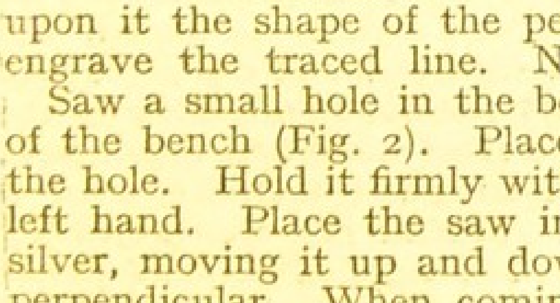
The solvents in cellulose finishes are inflammable, and the material should not be used near a fire or any open flame. When it is used indoors the room should be well ventilated.

ENAMELLING. In most cases enamelling is employed in conjunction with metalwork. In cloisonné enamels, for instance, it is inseparable, fine wires being first soldered to a base. The muffle furnace is of great importance to the enameller. The following tools are needed: a small bench, pair of furnace tongs, porcelain pestle and mortar, pair of small shears, scriber, and set of enameller's saucers.

The other requirements are a palette knife, 6 assorted needle files, 1 half-round file (smooth), 1 flat file, safe-edge, superfine; 2 pairs of small pliers (1 snipe-nosed, 1 flat-nosed), 1 flat steel stake, 1 small planishing hammer and handle, 1 wooden mallet, a small saw frame and saws (No. 0 or 00), an upright drill stock and small drills, a wire brush, acid bowl, and a small vice.

A simple pendant would form an easy job for the beginner. The design having been chosen, the following materials will be needed: A piece of fine silver sheet, gauge 10, size $2\frac{1}{2}$ in. by $2\frac{1}{2}$ in., Fine silver, i.e. unalloyed, should always be used for best colour results, as standard silver, i.e. alloyed, blackens when heated and dulls the enamel. Besides this there are required a sheet of silver foil, gold shell, 1 oz. gum tragacanth, a small bottle of pure





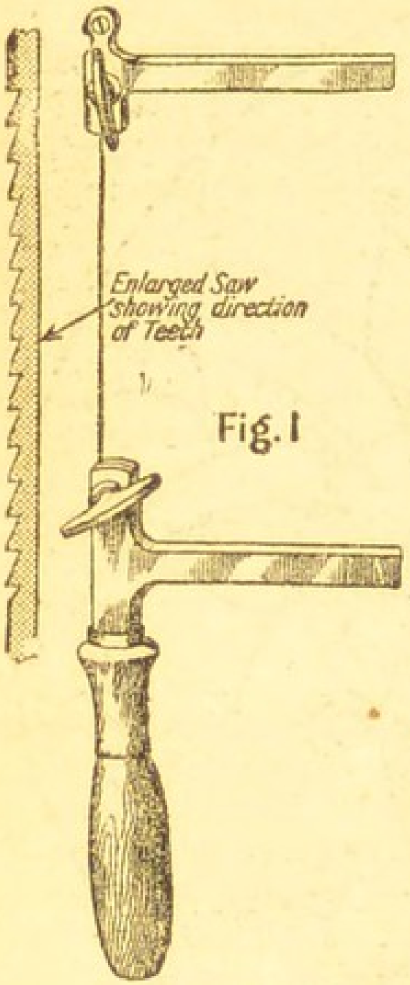
ENAMEL. Design (actual size) and key to colours on the lid of the box illustrated below. B, pale blue, shaded with dark. O, orange and pink. W, white and yellow. P, pink. M, Mauve. BL, black. G, dark and light green

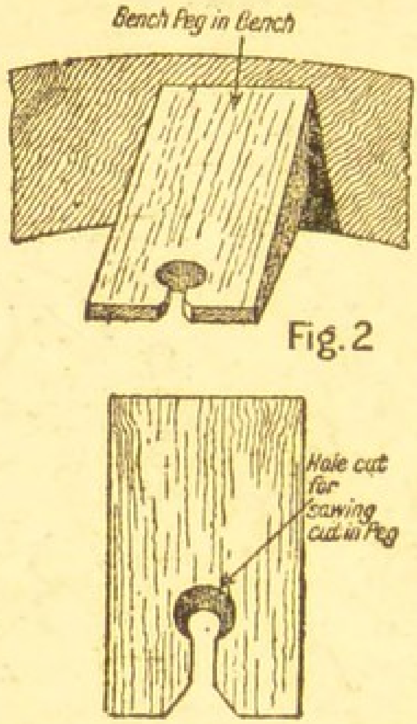
sulphuric acid, and a piece of standard silver wire.

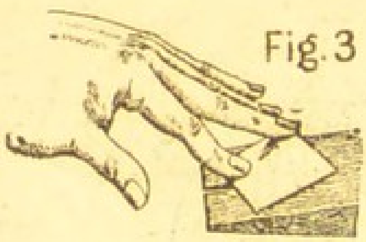
Take the piece of silver and trace upon it the shape of the pendant, and then, with the scriber engrave the traced line. Next saw round the engraved line.

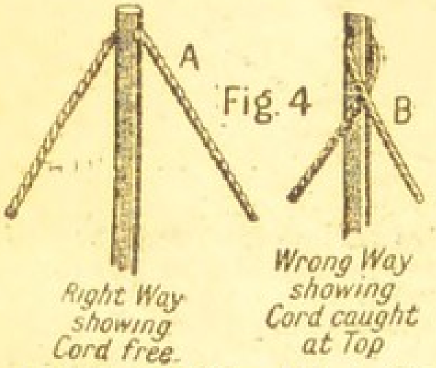
Saw a small hole in the bench peg, the small projecting part of the bench (Fig. 2). Place the silver on the peg, just above the hole. Hold it firmly with the first and second fingers of the left hand. Place the saw in the hole against the edge of the silver, moving it up and down in even strokes. Keep the saw perpendicular. When coming round a curve, move the metal gradually round, not the saw. See that it is kept flat all the time (Fig. 3), lest, by tipping up, it break the saw.

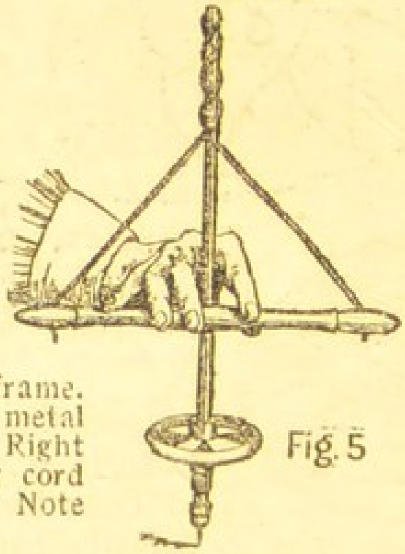
Drilling the hole for the insertion of the ring needs a little practice. Place the drill in the chuck. Keep the drill-stock perpendicular, placing two fingers on the cross-bar. See that the cord is not caught at the top (Fig. 4). Revolve the spindle until the cord is twisted down it. Very gently press the crossbar down, and it will come up again without a second movement (Fig. 5). When spinning, no further pressure is necessary. The metal must now be annealed or softened, and for this the furnace can be used.











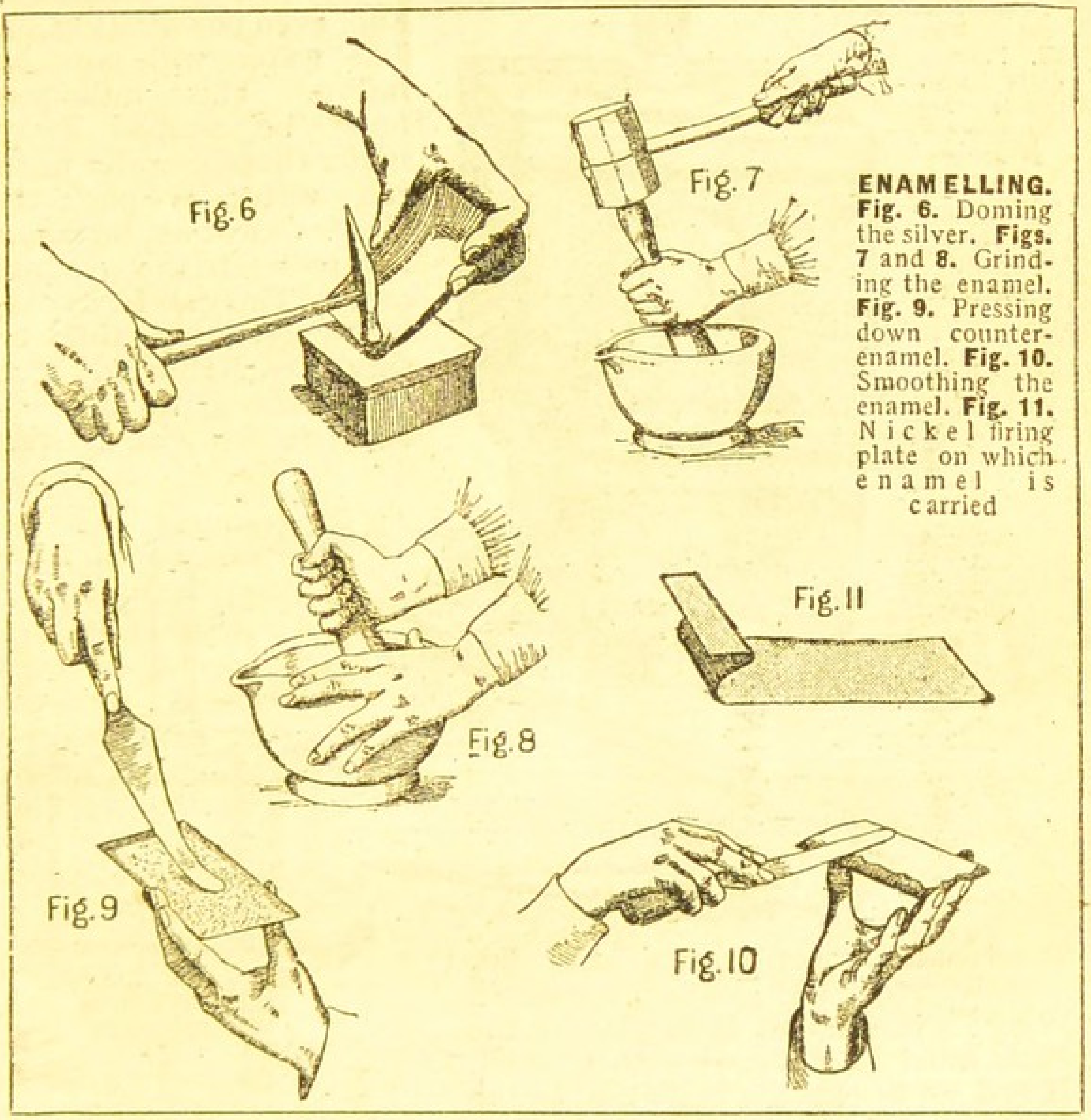
ENAMELLING. Fig. 1. Saw frame. **Fig. 2.** Bench peg. **Fig. 3.** How metal should lie flat on peg. **Fig. 4.** Right and wrong ways of twisting cord for drilling. **Fig. 5** Drilling. Note twist of cord.

ANNEALING AND DOMING THE SILVER. Having obtained a good heat in the muffle, put the silver on the firing plate. With the furnace tongs place it in the muffle for a few seconds until the silver reaches red-heat, taking care to withdraw it immediately as it will melt if left longer. The silver may be plunged into water to cool. It will now be soft and pliable, and is ready for doming. Holding the silver by the edges, place it on the steel stake and tap it with the planishing hammer, making even pits in circles until it becomes the required dome (Fig 6). Should it become stiff the annealing must be repeated. Enamel applied to flat metal draws up, cracks, and flakes off. Hence the reason for doming.

The pendant is now ready for cleaning in a weak solution of acid.

Care must be taken in the mixing of this, or a serious accident may result. The quantities are one part sulphuric acid (vitriol) to 20 parts water (about 10 fluid oz. of water to ½ oz. of acid). Always pour the water into the bowl first; then add the sulphuric acid gently, a few drops at a time, covering the entire surface of the water.

The bowl will be found warm to the touch. Should this process



ENAMELLING. Fig. 6. Doming the silver. **Figs. 7 and 8.** Grinding the enamel. **Fig. 9.** Pressing down counter-enamel. **Fig. 10.** Smoothing the enamel. **Fig. 11.** Nickel firing plate on which enamel is carried

be reversed, or the acid poured in quickly, the sudden mixing of chemicals would create heat enough to cause an explosion.

After leaving it a few seconds it is ready for use. Place the bowl upon a gas ring with a small flame. Put the silver in, and heat until it is just on the boil. Remove the silver from the bowl with a match-end or piece of wood. Never use iron tweezers, as iron in pickle leaves a pink deposit on the silver. Next take the silver and with the wire brush, under running water, brush the surface briskly. When back and front are absolutely bright and free from grease it is ready for the enamel.

The grinding must now be done. Clean the mortar thoroughly. In it place, with a little clean water, a small piece of enamel of the desired colour. Take the pestle, which must also be cleaned, and tap it gently with the wooden mallet, reducing the enamel to small flakes (Fig. 7). Then grind with the pestle until it becomes a fine, even powder (Fig. 8). The water will now be milky. This milkiness must be washed away under running water until the water is perfectly clear. Care must be taken not to wash the enamel away. This can be avoided by giving it time to sink at each rinsing. Put the enamel in one of the saucers with a little water, and cover it with the lid.

ENAMELLING. Fig. 12. Firing plate with enamel placed in front of muffle to allow moisture to evaporate. **Fig. 13.** Placing plate into muffle for the process of firing

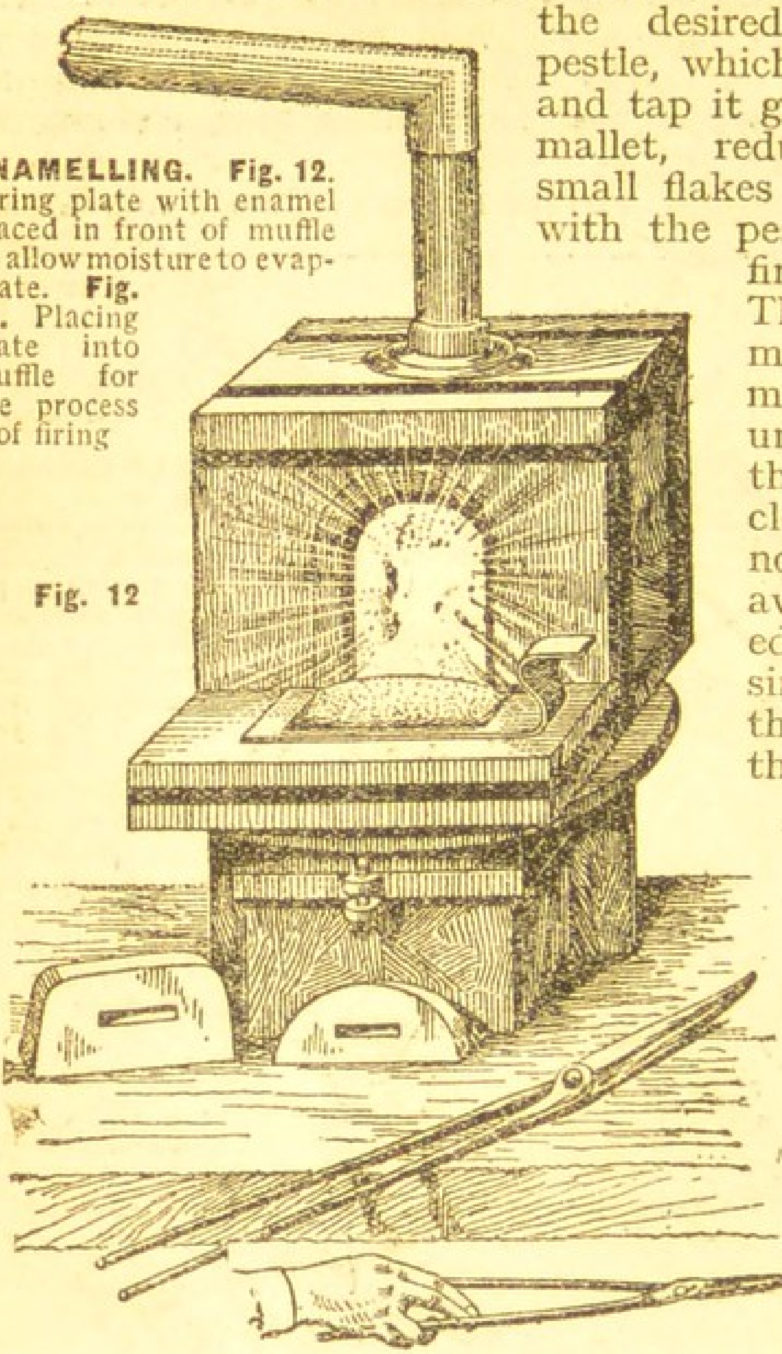


Fig. 12

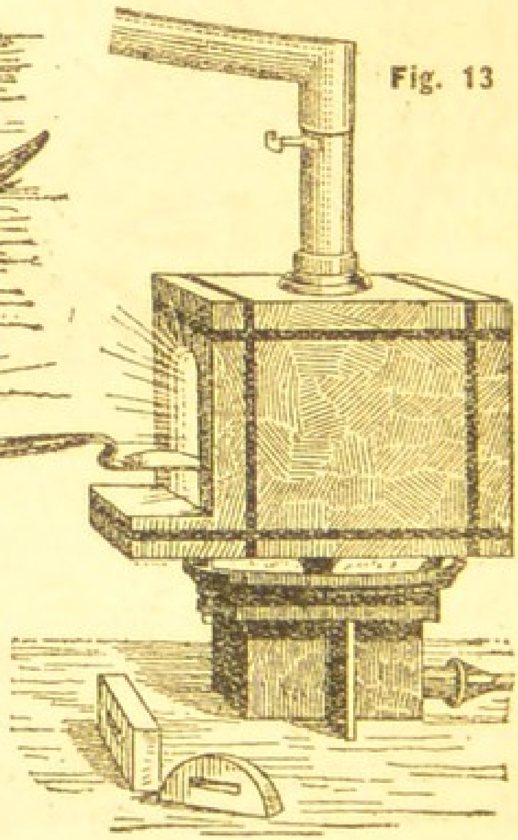
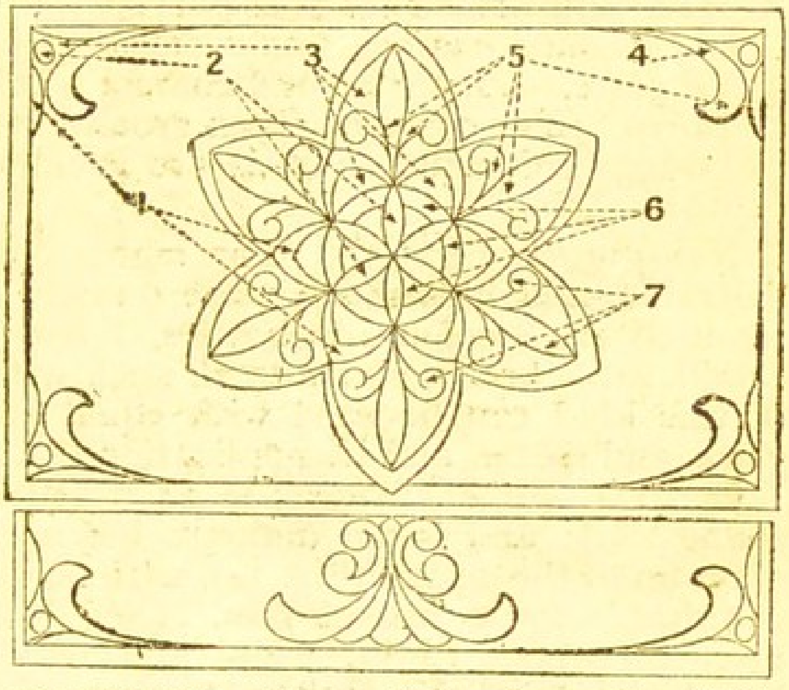


Fig. 13

How to Prevent Cracking. Where a thin metal is employed the back must be covered with enamel. It is done to prevent cracking, as the metal and enamel contract at different rates during cooling. Take two flakes of gum tragacanth and soak in a saucer with water. When the liquid is sticky to the touch, cover the back of the pendant with it, using a clean sable paint brush. The pendant or piece of silver to be dealt with should be held on the tips of the fingers by the edges, back upwards, to avoid marks on the silver.

This having been done, the next step is to take a small spatula, and with it convey the enamel to the back (Fig 9). Tap the edges gently to disperse it over the surface. Then smooth it over, using a slight pressure until the whole surface is evenly and thoroughly covered, but see that the enamel is not too thick. The moisture should be soaked up with clean, white blotting paper or linen rag. To apply the enamel to the front the pendant must be turned, but still held in the same way. The colours must be blended and shaded as required, but no gum tragacanth is necessary on this side of the article. The surface should then be smoothed over with a palette knife (Fig. 10), and the moisture again absorbed.

The firing plate (Fig. 11) is now required. This is made of nickel-sheet, and must be cut to clear the sides of the muffle, and to allow the door to close. Turn the end up, so as to give a grip for the tongs. The muffle should now be an even cherry red, with no dull black spots. This is essential for good results. Place the enamel on the firing plate, lifting it carefully with the palette knife. Remove the door from the muffle and rest the plate in front and leave it there (Fig. 12). When all traces of moisture have evaporated it is ready for firing. The powdered enamel is now dry and easily shaken off, so care must be taken (Fig. 13).



ENAMELLING. Fig. 14. Design for working liquid enamel without fixing on copper, suitable for lid and side of box

The difference in the melting points of various colours make it impossible to say exactly how long an enamel should remain in the muffle. The enameller must watch carefully and see the changing as the enamel melts. It is not good to have the door out all the time, as it chills the muffle. When the enamel is nearing the molten state, hold the tongs over it, and when they are reflected in it, the enamel is fired and must be removed quickly, or it will be spoilt. The pendant or other object should be put near the muffle to cool gradually. The enamel has now had its first firing. It may happen that there are holes in the surface, or that part of the counter-enamel has dropped off. This must be patched when cold, and refired before proceeding.

In a pendant, silver foil might underlie small spots of the design to give a jewelled appearance. Take a sheet of silver foil and, holding it between the packing papers, cut small circles to the number required. These are applied to the surface of the enamel by means of a spot of gum tragacanth solution. Fire again, but only to red heat. When cold, cover the foil with spots of enamel. A small sable brush is best for this purpose.

Spots of white or other light colour are also done in this operation. Again only a slight firing is given, so that these spots are glazed but do not sink to the surface level. There remains the heightening of salient features of the design with gold. For this take the gold shell and a fine sable brush. Using a little water, paint the design with a strong, clean line, and fire again.

The jump-ring for hanging a pendant may be made from a piece of standard silver wire, gauged to slip easily through the hole already drilled for this purpose.

In cloisonné enamel, fine wires or cloisonnés are soldered to a metal plate. Finely ground enamel is filled in between the wires and fired. The surface is then ground evenly to the height of the cloisonnés. Opaque enamels are usually employed in this type of work.

Non-firing Enamel. For many purposes liquid enamel is desirable, and it is much more quickly applied. The materials required are 8 colours in bottles, 1 bottle medium, No. 0, or 00 round sable brush, and 1 small stick with pointed end. Enamel of this kind can be used with equal success on wood, leather, glass, and metal, and its application is a simple matter.

One class of enamelling is an excellent reproduction of cloisonné work, and is not difficult, but accuracy is essential. The diagram of the design (Fig. 14), with lid and side shown in outline, is suitable for a trinket box. (*See* Plates 7 and 8.) Choose a piece of copper 12 in. wide, and measure it on the wooden box to be covered. Make a tracing of the design, and fit it on the box before tracing it on the metal.

To trace on the metal, go over the design with a steel tracer, working from the under side of the metal, and work on a rubber mat. The raised line thus produced retains the enamel in place and separates the colours.

Turn the metal over, place on a piece of hardwood, and punch the background with a round-end punch. Then scrub the metal with special powder, and dry it with a clean rag. Brush on copper patina, using a hard brush. The copper will become almost black. If it does not colour well, or the colour rubs off, it shows that the metal is not clean.

The metal must be washed again, holding it under a tap, then be hung up to dry, allowing the water to drip off in the same direction as the water from the tap ran over it. When dry, first polish it with a rag, then burnish up the high-lights, using special powder; then apply a coat of lacquer evenly all over the surface, and leave it until it is thoroughly hardened.

If the top and sides have been worked in one piece of copper, cut the various pieces out. Leave $\frac{1}{16}$ in. on the bottom of the sides, and at least $\frac{1}{8}$ in. on the end of each side, $\frac{1}{16}$ in. being left all round the top. Fit the two short sides first, turning over the $\frac{1}{16}$ in., and nail along the bottom of the box. Glue the rest of the metal on to the wood, using metal glue. Fit the back, turning the $\frac{1}{16}$ in. over as before, and nailing down, then glue the rest. The front is treated in the same way. The ends of the front and back must be made neat by hammering over the edges of the side pieces.

Round the lid glue slips of copper which have been punched. The top edge can be hammered over the top of the box to about $\frac{3}{16}$ in. Fix the top panel over this, get it into its right place and nail it down, using $\frac{3}{8}$ copper nails. Prick a hole before inserting the nail, using a metal pricker, then insert the nail and hammer in place. When the whole of the box has been covered with copper, give it a hard rub with a leather, and it will be all ready for enamelling. Then consult the key diagram (Fig. 14), for the colours. Work in the enamels with the small stick sold for the purpose. Work all the colours from the centre to the edge, which is raised, and beyond which the enamel should not go. Mauve is obtained by mixing a little lapis blue with red. Do not finger the enamel, as the marks of the skin show.

Key to colouring: 1, green; 2, buff; 3, mauve; 4, lapis; 5, cerulean blue; 6, pale mauve; 7, turquoise.

The enamel spreads, so leave it well inside the design, as it does not look well if the colours join up. In all enamel designs there is a division left betweeen the different parts, so following out the idea of cloisonné, where the outlines are formed by the wire divisions. When the brushes are finished with they can be cleaned with methylated spirit. The bottles should be corked well when they are put away, and the liquid stirred before it is used. If the colours become thick pour a little of the special medium into the bottle and stir it thoroughly.

FACE PLATE. A face plate is a contrivance used on a turning lathe as a means of mounting work to be turned. It comprises a disk, generally of cast iron, with a projecting boss at the back. A hole is drilled through the centre and screwed to correspond with the size of the screw thread on the mandrel. The plate is, as a rule, provided with holes or slots through which bolts are passed, which, in conjunction with clamp plates, bolts, and nuts, are used to fasten the work to the face plate.

FEATHERED JOINT. A feathered joint is one in which the joint between two pieces of wood is secured by means of a narrow strip of relatively thin wood known as a feather. To a large extent it is similar to the groove and tongue joint, except that the latter is formed from the solid.

Featheredge boards, such as weather-boarding, where one edge is thinner than the other, are laid overlapping, and the joint is sometimes known as a feathered joint.

FELT. Felts proper have no thread structure, but are made by matting together fibres which exhibit peculiar powers of cohesion. Goods, however, are sold as felts in which there is an upper and a lower surface of hairy felt and an intermediate woven layer. Felts of this type are practically stretchless and retain their original dimensions, where other kinds may tread out larger, or run up in size.

Roofing felt, which is the coarsest kind, is composed of hair, wool, jute waste, and other rough fibre. Odd lengths make excellent packing material, and strips serve for draught-excluders. Refrigerators can be improvised with felt as a covering. Felt is useful to protect pipes of a house from freezing.

FILE, Using a. In use, the file is grasped by the handle in the right hand, with the length of the file pointing forward across the top of the work to be filed ; the finger tips of the left hand are laid down on the top of the file close to the point end. Vertical downward pressure is applied equally with both hands, and at the same time the file is driven forward. On the recovery stroke the downward pressure is entirely relaxed.

Exert the downward pressure principally with the left hand at the commencement of the stroke, transferring it gradually during the stroke, so that at the finish of the stroke the principal pressure is exerted by the right hand ; properly done, the gradual transferring of the pressing down from the left to the right hand keeps the file level.

The above description applies particularly to the use of a flat file on a flat surface.

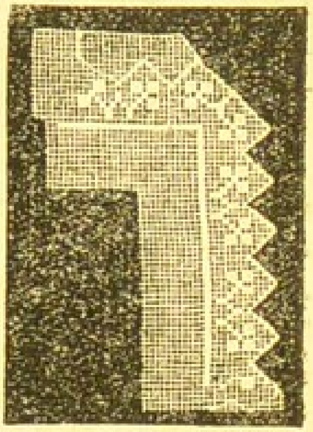
Files are classified according to size, shape, and roughness of surface. The only shapes which are required for daily use are know as hand, half round, square, round, and three square. The grades of roughness are known as rough, middle, bastard, second cut, smooth and dead smooth.

FILET LACE WORK. Real filet lace has a hand-made background made with the ordinary netting stitch used by fishermen, but with a much finer needle and mesh, a round steel knitting needle being used for the latter where a mesh of less than $\frac{1}{8}$ in. is required. Many English filet laces are worked on a machine-made background, the designs being darned on the net by hand.

A square of hand-made net may be lashed firmly to a square filet frame of thick wire, bound with green silk. With a small piece of work, the ground net should be sewn to strong calico, and the latter sewn or lashed to an ordinary frame bound with strong calico. A round embroidery frame could be used for small motifs, by sewing the latter to a piece of material each side so that the net in the middle is quite free.

The stitch employed is the ordinary darning stitch, passing the needle under and over the meshes of the net in an up-and-down direction until the space is filled. The working thread should be of the same thickness as the netted threads, and the number of times the darning must be done in one space depends on the thickness of the thread. Embroidery cotton, flax thread and flourishing thread are suitable for this, as they are only slightly twisted.

The most expensive filet laces are worked in cloth darning. To do this, darn up and down as described, but work only half the number of threads required to fill the space, then darn in the opposite direction, going under and over every thread, including the net background.



FILET LACE. Design suitable for edging tray or tablecloth

MAKING A LACE BORDER. The illustration shows how a lace border can be made and a corner formed in the same design. The darning passes over three threads of the mesh on the leaves, and over two threads for single spaces. For the heading of the lace—the straight edge by which it is sewn to the material to be trimmed—a straight line of three rows of threads is darned right along. To make a firm edge the net should be cut away to its proper depths, allowing for a small hem to be turned, and the border darned through the two thicknesses of net, so that there is not a raw edge. The lower or outside edge of the lace is buttonholed, and this must be worked before the net is cut.

The buttonholing is worked from left to right on two sides of a mesh up to the top or deepest point of a scallop, then on three sides of the mesh at the dip, and down the side of next point, one mesh at a time. To form the corner the direction can be followed from the illustration. In the latter the net is cut away on one side, and the portion after the corner is left ready for cutting.

FINE STUFF. This is a material used in plaster work. It consists of lime-putty and fine, sharp, washed sand. The proportions vary, but a general one is three of sand to one of lime-putty. It can be allowed to stand, after it has been thoroughly mixed, till nearly hard but not dry, and can be made to the required consistency with water or lime water for immediate use. One part of sand may be omitted, and one part of crushed marble, alabaster, or spar substituted in order to give a different type of surface.

FIRECLAY. A variety of clay that will withstand extreme heat is used in making firebricks, for setting parts of a grate or stove. It is obtained in powder form, has to be moistened with water, and applied in a plastic state.

Many excellent compositions are on the market that have fireclay as a base. Fireclay is very useful for making good any place which is subjected to the heat of a fire.

FIREPROOFING. There are various methods of treating an article or piece of material so as to render it partially or wholly non-inflammable. In fabrics the treatment consists in immersing the articles in a liquid, or of spraying them, and is obviously limited to those materials which are not liable to damage by being so treated. The following are applicable to such materials as common muslin, bunting, etc. :

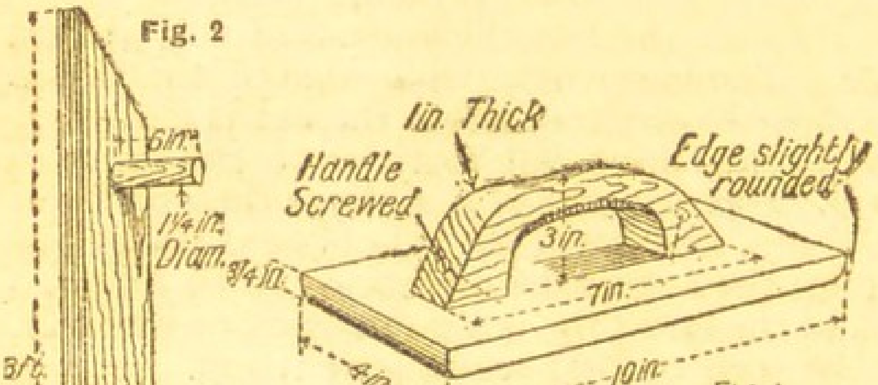
a. A strong solution of tungstate of soda. b. Ammonium borate, 1 part. Potassium carbonate, 3 parts. Water, 33 parts.

Wood is rendered fire-resistant by the use of any of the recognized fireproof paints, such as Metallic Liquid (No. 4). Fireproofing compositions may also be brushed into the wood, or the articles may be entirely immersed ; whitewash is a good protective for woodwork.

For wood fireproofing the following are suggested : a. A strong solution of tungstate of soda. b. Ammonium borate, 2 parts. Potassium carbonate, 6 parts. Water, 60 parts.

FLATTING. A flat or lustreless surface is produced by the use of flatting paints. These dry up with a dead surface like distemper, but with the lasting qualities of good oil paint, and they can be washed with soap and water.

FLOAT, Plastering. This tool is used by plasterers to lay on plaster and to bring it to a smooth or fine surface. It can be made from ordinary deal or other wood, but must be perfectly smooth in the face and very slightly rounded on the edges. The back should have a conveniently shaped handle set lengthways, as Figs. 1 and 3. The angle float, as shown at Fig. 3, is employed for corner work.

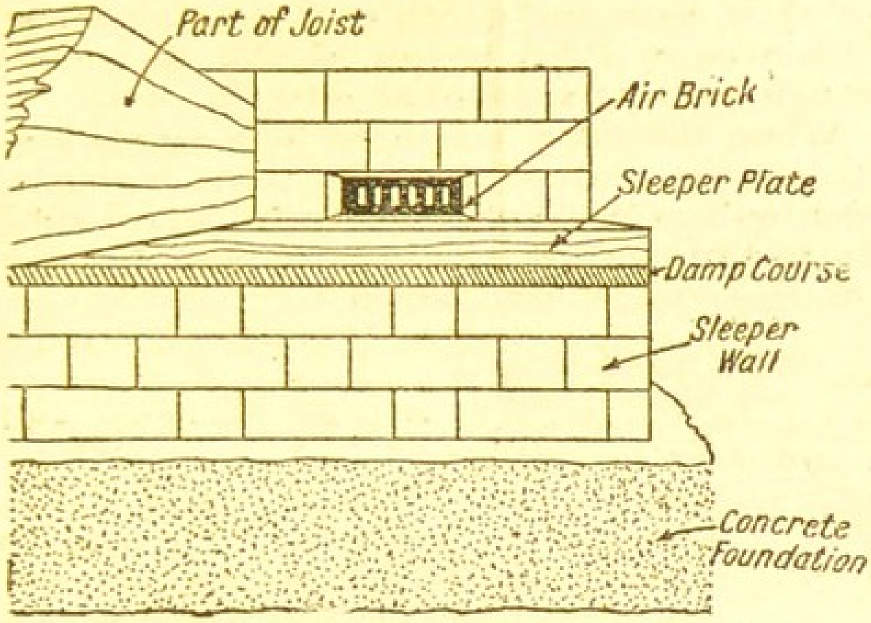


FLOAT. Three types of plasterer's float. **Fig. 1.** Hand float. **Fig. 2.** Derby float. **Fig. 3.** Angle float

FLOCK. Made from the refuse of wool or cotton, flock is used for cheaper upholstery and mattress stuffings. Cotton flock, though not so light or springy as wool flock, is free from the danger of moth, and is extensively used for upholstery.

FLOOR, Making a. Most dwelling-houses are floored with flooring boards averaging 1 in. in thickness and 5 to 6 in. in width. These may have plain edges or be tongued and grooved, the latter being more rigid and draught-proof. Any wooden floor laid near the ground must be insulated from dampness and well ventilated. This is done by first covering the whole site with a bed of concrete at least 4 in. thick.

One way to insulate dampness is by treating the surface of the concrete with a thick coating of tar, and to lay the flooring direct upon it, having previously coated the under side of floor-boards with some wood preservative. There are disadvantages, however, such as the absence of ventilation and this method results in an unyielding surface.

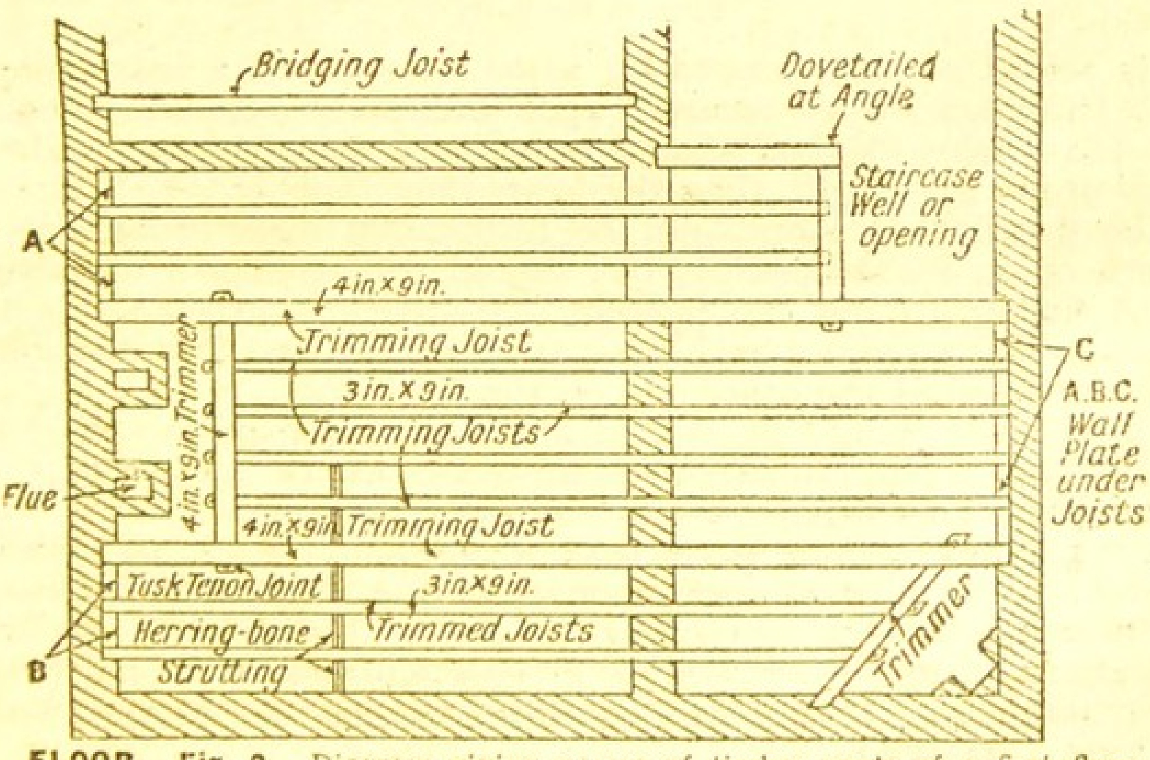


FLOOR. Fig. 1. Principal parts of a ground floor

WOOD FLOORS. A wood floor is best if laid on joists in the usual way. The sleeper walls which support the plates upon which the floor-joists are supported, the presence of air-bricks beneath the floor-boards, and the double course of damp-course slates are points to note.

In floors like Fig. 1, when the joists span the opening between the sleeper walls, they are known as bridging joists and the floor as a single floor ; it is the simplest and the strongest construction.

Upper floors are constructed in a similar manner. A wall plate of timber is set into the brickwork, and upon this are set the flooring joists, which have to be of such strength that they can safely carry the load, and may be supported by light struts.

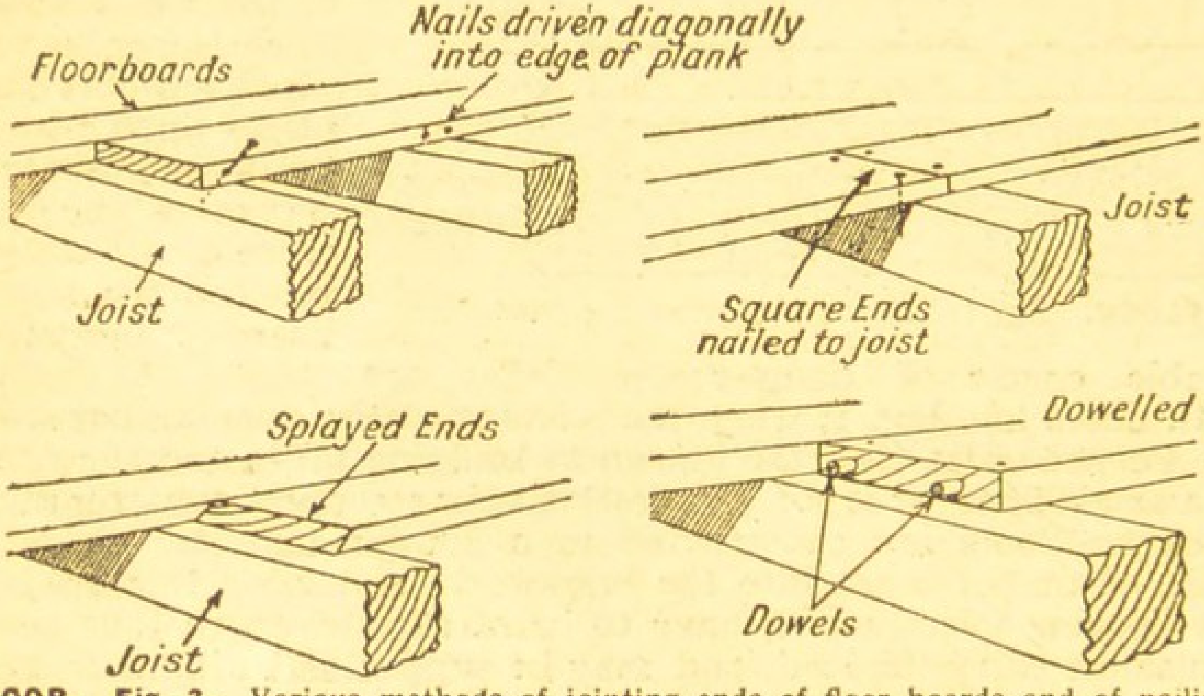


FLOOR. Fig. 2. Diagram giving names of timber parts of a first floor

The upper surface of the joists is floored by laying the first plank against the wall and nailing it to the joists; a second plank is then fitted up to the first and securely cramped with flooring cramps, and nailed to the joists, continuing until the floor is covered.

If the nails are driven through the flooring into the joists, use flooring brads, 2 in. or 2¼ in. long, and punch each one well down below the surface. Plain edge (P.E.) boards, should be nailed through the edge, the nail being at angle of about 45°.

TRIMMER JOISTS. When the floor has to be built around a fireplace a somewhat different treatment of the joists becomes necessary, as the model by-laws prohibit the fixing of any woodwork nearer than 9 in. to any flue. It is necessary, then, to provide a trimmer, or bridging piece, into which the ends of the



FLOOR. Fig. 3. Various methods of jointing ends of floor boards and of nailing them to the joists

joists are fitted and secured by a joint known as a tusk-tenon. Such trimmers are set securely upon wall plates, or firmly built into the brickwork, and should be at least ½ in. thicker, and of equal or greater depth, than the joists they support.

The floorboards should not be terminated directly against a hearth or staircase opening, but should rest against a narrower board fitting around the opening. A diagonal fireplace set in the corner of a room may have a trimmer tenoned into one joist and supported at the other end on the brickwork.

Floorboards should be laid in long lengths, spanning the full width of the room, but whenever a joint has to be made it should come over a joist (Fig. 3).

Wood block floors need a concrete foundation, and there must be some kind of bituminous sheeting interposed between foundation and blocks. Usually the undersides of the blocks are dipped in a bituminous mixture before being placed on the concrete.

For kitchen or bathroom a jointless composition flooring may be used. This is a plastic material which sets in 24 to 48 hours.

Repairing Floors. To repair wood flooring, cut out the bad boards and replace by new, making all joints in the length of the timber over a joist or other firm support. To cut out a tongued and grooved board without damage to the remaining boards, saw through the tongues, using a keyhole or pad saw with as fine a blade as possible. The board can be sawn across by prising it up at one end.

With cement floors, the bad places should be further broken away, and dirt washed away, and the deficiency made good with strong cement mortar. If the whole surface has worn badly it will be better to hack it all over with a chisel and hammer. Then brush the surface clean, wet it thoroughly and recoat to a thickness of at least ½ in. with strong cement mortar. A hard surface, is obtained by using cement and fine washed granite chips, adding some reliable waterproofing composition.

Decorative Floorings. The simplest method of decoration for a wood floor is by staining it. This may be done with one of the branded floor stains or with home-made stain made with vandyke crystals. These are melted in hot water ; the amount of dilution depends on the colour required for the floor. Having thoroughly cleansed this with a strong soda washing and allowed it to dry, the stain is painted on with a good brush. The polish is obtained with a wax polish.

Bright, durable colourings are obtained with floor paints sold by most oil and colour merchants. Decorative flooring is obtained with tile designs in rubber flooring. These are durable, easily laid, comparatively low priced and hygienic.

Linoleum is useful floor covering and surrounds for carpets.

Cleaning Floors. A painted, waxed, or varnished floor should be wiped free of dust and dirt with a soft rag, and then treated to an application of crude oil and benzine, one part of oil being used to three parts of benzine. This should not be allowed to remain on long and should be wiped off with a woollen rag.

Grease on unfinished wood floor is best treated with cold water. The grease may then be scraped off with a knife, and the part scrubbed with warm water and washing soda. If the spot still appears spread over it a paste made from fuller's earth and water, leaving it overnight.

FLUX. Fluxes are used in welding, brazing, and soldering, to prevent oxidation, and to clean the surfaces. A flux in common use is zinc chloride, or killed spirits, and rosin and sal-ammoniac are other useful fluxes.

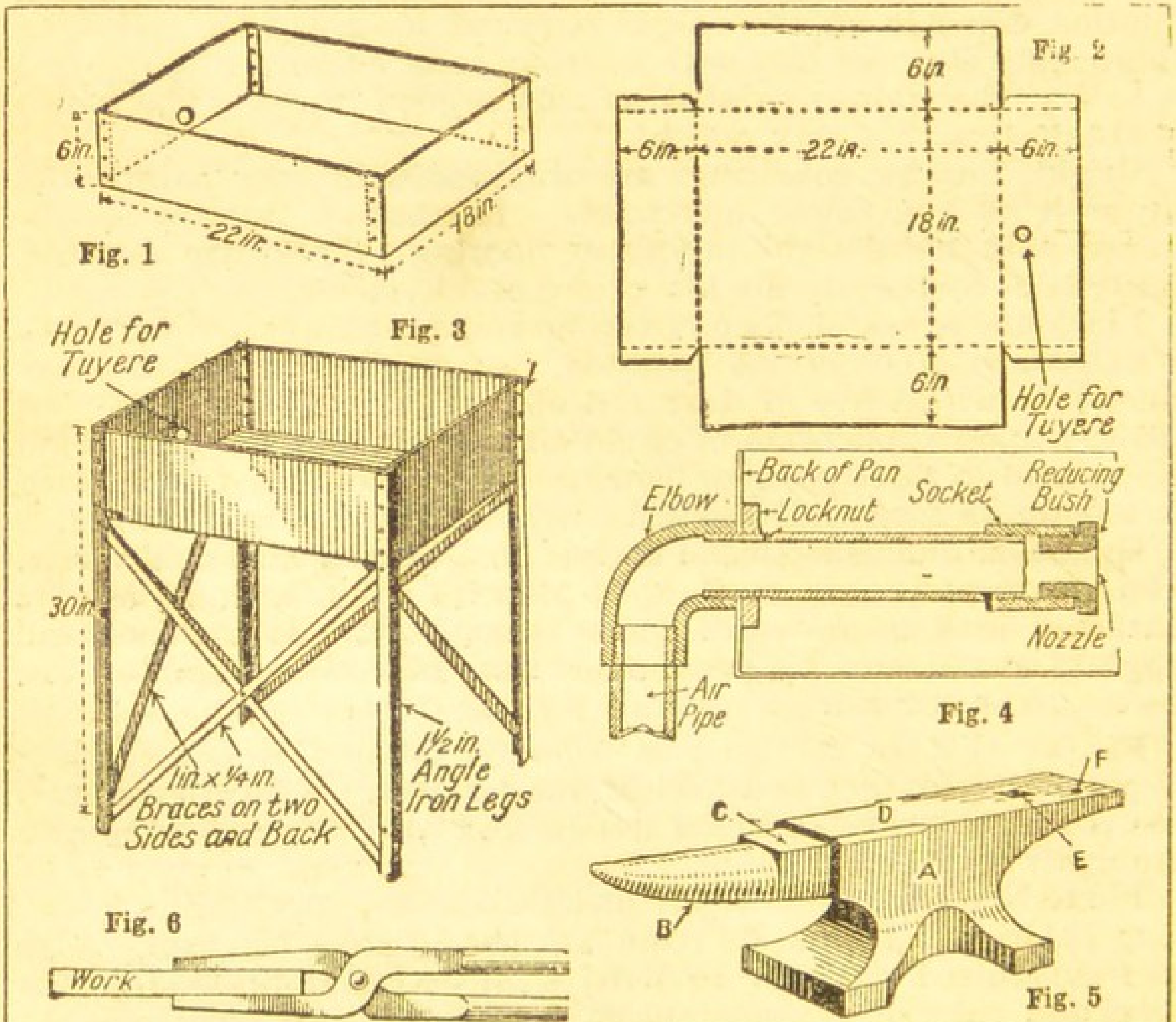
Fluxes for brass and copper include ammonium chloride, rosin, zinc chloride. Tallow or rosin are good fluxes for lead. Zinc and galvanized steel are soldered with hydrochloric acid as the flux, and chloride of ammonia is a good flux for soldering steel and wrought iron.

The flux commonly used for silver soldering is borax, prepared by rubbing a lump on a clean piece of slate, slightly moistened with water ; the creamy paste thus produced is the flux.

FORGE. The forge shown in Fig. 3 can be made as follows. The pan (Fig. 1) is made of a piece of stout sheet iron about No. 18 gauge and cut to the shape shown (Fig. 2) with a cold chisel, the sides bent up at right angles and the corners riveted together. The stand is made from four pieces of angle iron about $1\frac{1}{2}$ in. by $\frac{3}{16}$ in. thick, riveted to the corners of the pan at the top, and braced together at the back and two sides with diagonal struts of flat iron strip about 1 in. wide and $\frac{1}{4}$ in. thick, riveted at the top and bottom to the angle pieces.

The bellows should be of the double action type. The outlet pipe is connected by an iron pipe to the back part of the pan, using iron gas fittings for this purpose. The tuyère can be purchased if desired, but an efficient substitute can be made from a short length of iron pipe screwed to the air pipe in the manner shown in the diagram (Fig. 4), and fitted with a reducing bush.

The fire can be lighted with paper and pieces of wood in the usual way, and the bellows worked gently to draw up the fire as soon as it has taken hold. The fuel should be coke or fine slack



FORGE. Figs. 1 and **2.** Pan for a home-made forge. **Fig. 3.** Pan and framework complete. **Fig. 4.** Section of tuyère and pipe connexions. **Fig. 5.** Parts of anvil : **A**, the body ; **B**, the Horn ; **C**, base of horn ; **D**, the face ; **E**, hardie hole ; **F**, pritchel hole. **Fig. 6.** How the tongs should grip the metal coal. It must fill the pan and be heaped up in the form of a mound, and as the bellows are worked the air will escape through the fire and form a crater of intense heat.

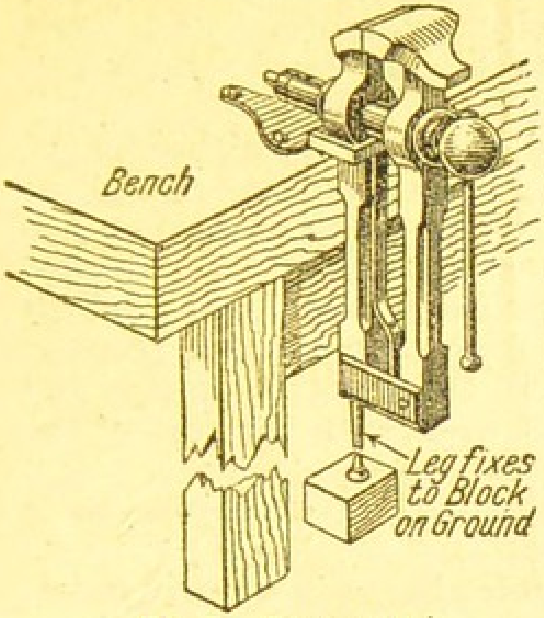


Fig. 7. Blacksmith's type of leg vice

The iron is placed inside and covered with more fuel to exclude the cold air. The metal should always be covered with the fuel, as this saves much waste and ensures a good heat. The metal is withdrawn occasionally to ascertain the progress of the heat, and as soon as the iron is a good bright red heat, generally known as a cherry red, it is in a fit state to work.

FRAME SAW. A frame saw is a large flexible saw blade carried in a wooden frame which has a certain amount of "give," so that the saw blade can be tightened by turning a bottle screw. The teeth of a frame saw are coarse.

FRENCH NAIL. This type of wire nail is in general use for rough work. It is circular in section, with a flat head, and is procurable in a wide range of lengths and in many different thicknesses.

FRENCH POLISHING. The simplest form of french polish consists of a solution of 6 oz. of shellac in a pint of spirit.

The surface to be treated must first be well coated with polish, and time must be allowed between the rubbings for the polish to dry. The first object is to put a shell of polish over the surface, whilst later a glaze is put on the surface thus obtained. It is useless to try to obtain a good polish on a surface insufficiently covered.

Make a pad with a piece of cotton wool, folding it into the shape of an egg, with a point at one end. Cover this with a piece of old linen, folding over the pad and gathering the ends up into the palm of the hand. Pull the point well out. Open the pad and pour in the polish from the back; it should never be used on the front.

See that the surface to be polished is entirely free from dust and cover it with polish by rubbing gently with the pad, in a circular motion. When the surface is covered, leave a little while to harden.

The pad is replenished from time to time, always putting polish in from the back. Wait for a short time after each rubbing.

This process is done three or four times, leaving a day between each coat. As soon as the work is tacky, leave it until dry, and never stop in the middle of the work, as this may pull up the polish. Rub down with pumice between each coat.

In finishing off, rub with fine pumice and a drop of oil, working with grain of wood. Give a final coat of polish, using rather a dry pad, and leave to harden for several hours. Take a new piece of cotton wool, and on this pour a very little crystal glaze. Rub all over the object, using a circular motion, and when the pad is almost dry, rub hard until a very bright surface is obtained.

Repolishing Old Work. An old piece of furniture is repolished on somewhat similar lines. First mix a cupful of vinegar in a quart of boiling water. Dip a piece of flannel into this and quickly wash over the whole surface of the table to remove any grease. Rub dry and polish it well, using a soft cloth; then rub it down with a rag dipped in pumice powder. If there are any holes or deep marks, fill them with stopping and leave it to dry. Rub down to make it even with the rest of the work, and colour with stain to match the wood.

Brown polish known as button polish is the best to use, as it works well and dries quickly and hard.

Work should be done as far as possible always in a warm room. Leave it for 24 hours, and if it has gone dull rub it well again.

FRETWORK: A DECORATIVE HANDICRAFT

Practical Advice on Tools, Materials and Designs

This article also includes instructional notes on Anto-fretwork and Anto-turning

The growing use of the fret in furniture in simple decorative patterns, has revived fretwork as a practical handicraft.

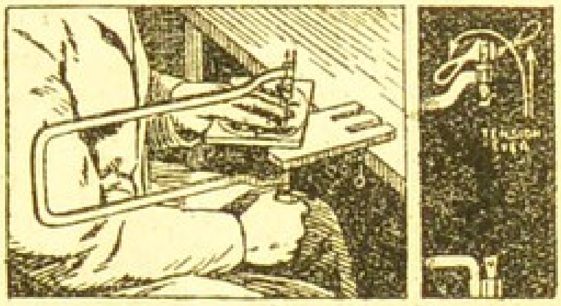
The most important tool is the fretsaw frame (Fig. 1). The 16-in. size is recommended, and some form of tension device is an advantage, such as that shown; the No. 2 saw blade is suitable for general purposes, while thicker saws are used for coarser work.

An Archimedean drill is used to pierce holes through which the saw can be passed to saw internal frets. The actual bit should be a trifle larger than the width of the saw being used. A cutting board will be needed and a wooden one is suggested, 8 in. by 4½ in. being convenient. It is held to the table with thumbscrews. A glasspaper block is used to clean off the design after the cutting has been completed. This is made of steel and has a flat face covered with a piece of flexible material. A set of files is needed to enable the work to be trued up after cutting. These tools are the essential ones.

Materials. The wood used should be obtained ready planed and glass papered. Designs are prepared specially to suit standard thicknesses of wood, so that only standard material should be purchased, for preference. Satin walnut is largely used, and oak and mahogany are also employed for better-class designs. A material which has come to the front in recent years is plywood and for wireless and gramophone frets it is recommended. Decorative frets as applied to furniture can be cut in $\frac{1}{32}$ in. or $\frac{1}{16}$ in. plywood.

For ordinary fretwork models finished designs are obtainable from various suppliers. These are printed full size and are stuck down with paste on to the wood and the outline cut.

Large designs are sometimes a little difficult to handle. In this case the design is rolled round a piece of dowel, and the fretwood pasted. By placing the dowel at the top it can be rolled forward and the design unrolled.

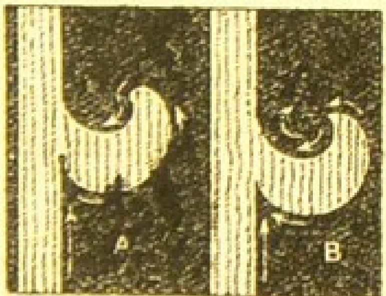


FRETWORK. Fig. 1. How the fretsaw should be held

Drilling and Sawing. When the Archimedean drill is in use see that the wood lies on a flat board ; when so supported the drill is not liable to split out the grain when it emerges at the underside.

It is most important to hold the saw upright, a facility which comes only with practice. The work should be examined after it has been cut and any inaccuracies carefully noted. Never attempt to force the saw into the wood ; it only results in a broken blade. Keep it working steadily up and down by its own weight.

When a corner has to be turned the saw should be moved up and down without the slightest forward movement, and should be turned gradually whilst in this position. It is better, however, to avoid turning in the corner, because it is liable to rob the design of its sharpness (*see* Fig. 2, A). The illustration shows the unsightly gap at the corner made by the turn. In Fig. 2, B, the saw is taken into the corner first along one side and then along the other, so that the two cuts meet and leave a perfectly sharp corner. At the external corner the saw is taken along one side past the corner. It then describes a little loop and comes back along the other side.

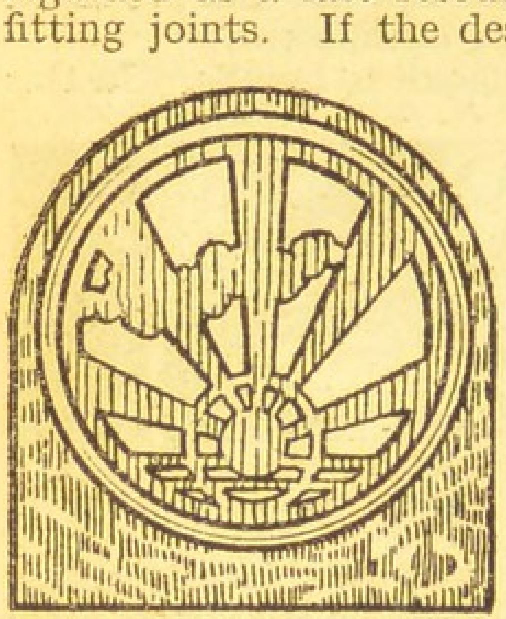


FRETWORK. Fig. 2. **A,** result of turning saw at corners. **B,** better method

Finishing Off. If the paste shows some resistance in peeling off, it can be damped slightly, but do not wet the edges of the work as this is liable to raise the grain. After the paper has been peeled off the surface should be cleaned with the glasspaper block. The work should be held down on a flat board during the process.

No finish such as polish or paint should be applied to ordinary fretwork models. It only chokes up the edges. Certain designs are somewhat different because they have no elaborate internal fret. They are comparatively plain, and are intended to be lacquered or painted. Frets to be applied to furniture are also in a different category. These are polished with the rest of the job after they have been applied to the piece and the glue allowed to harden.

Sometimes a file has to be used for fretwork, but this should be regarded as a last resource. A legitimate use of the file is in fitting joints. If the design stretches slightly when being laid and the joints do not fit well, a few rubs of the file will soon put this right.

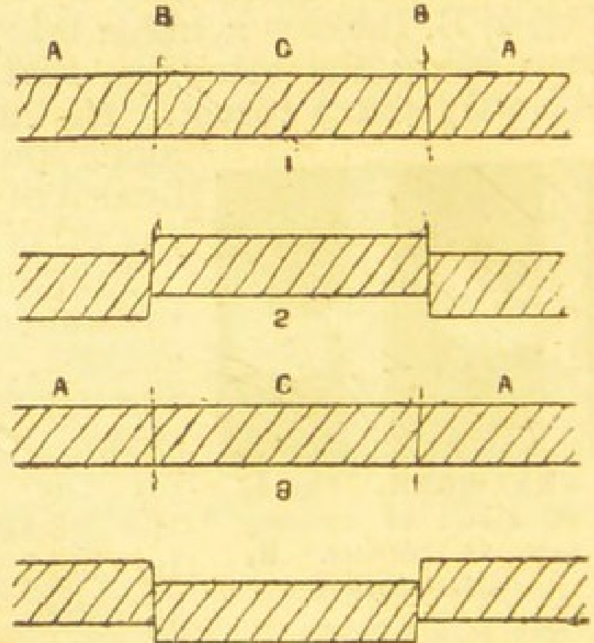


FRETWORK. Fig. 3. Design for a loud-speaker

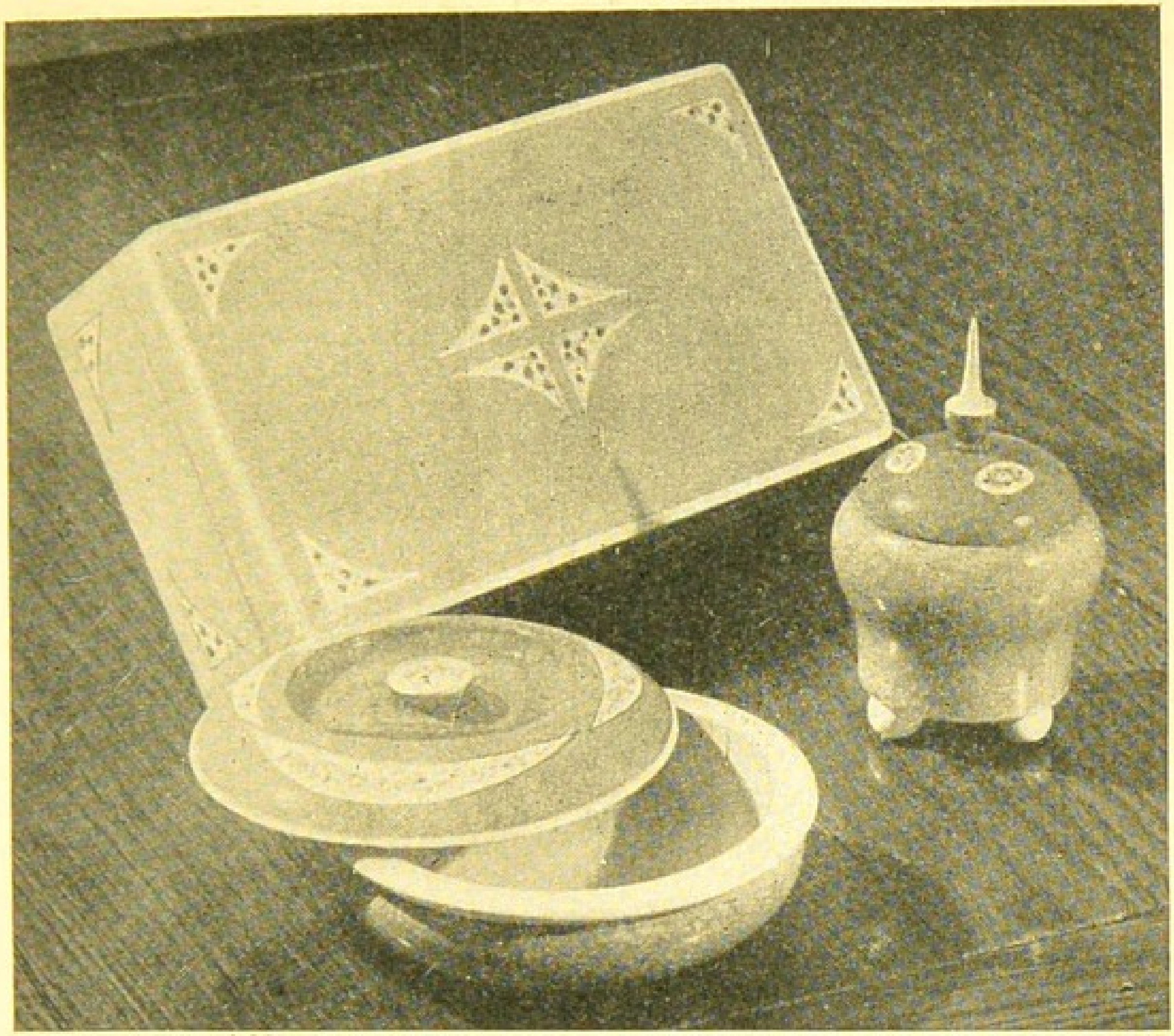
In a large number of cases glue is used in assembling, the most convenient form being the liquid kind in tubes. When the fret is to be applied to furniture care must be taken not to allow the glue to exude at the edges, because it is difficult to remove cleanly and looks unsightly. A good method is to squeeze out the glue on to a flat board, rubbing it with the fingers to spread it evenly. The fret is placed on this and rubbed up and down so that the back is covered with glue. It can then be held in position by a flat, weighted board. When necessary to use nails in fretwork it is advisable to drill holes first, unless the nails are very small.

Types of Designs. The most difficult type of design is that which is built up on a geometrical formation, such as the circle, square, and so on. The eye readily detects any defects in regular shapes, and the smallest inaccuracy is at once apparent in a circle, for example, whereas in floral or leaf work small errors would pass unnoticed. The beginner is advised to choose comparatively simple designs which are not geometrical in form, and which have no very thin members. A design for a loud-speaker or gramophone cabinet is given in Fig. 3. As a rule the simpler these are the better. Yet an elaborate design is not necessarily difficult to cut; in fact, the reverse is often the case, the very intricacy of the pattern hiding mistakes.

Antofret. Antofret is a form of woodwork decoration done with a fretsaw or machine by which it is possible to create raised and sunk panels and other features without employing more than a single thickness of wood for the whole.

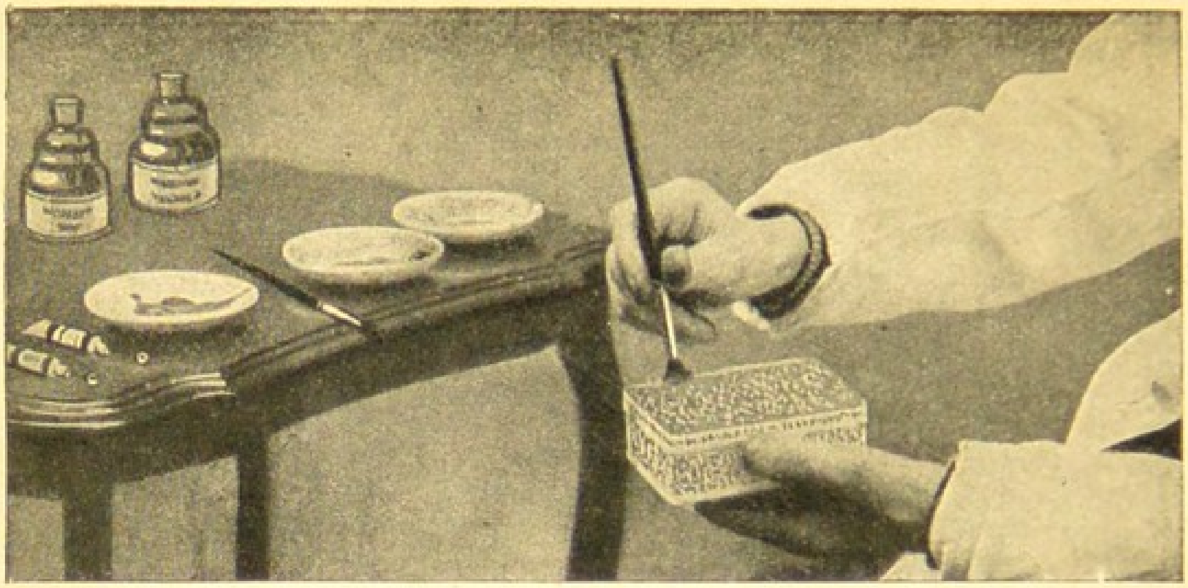


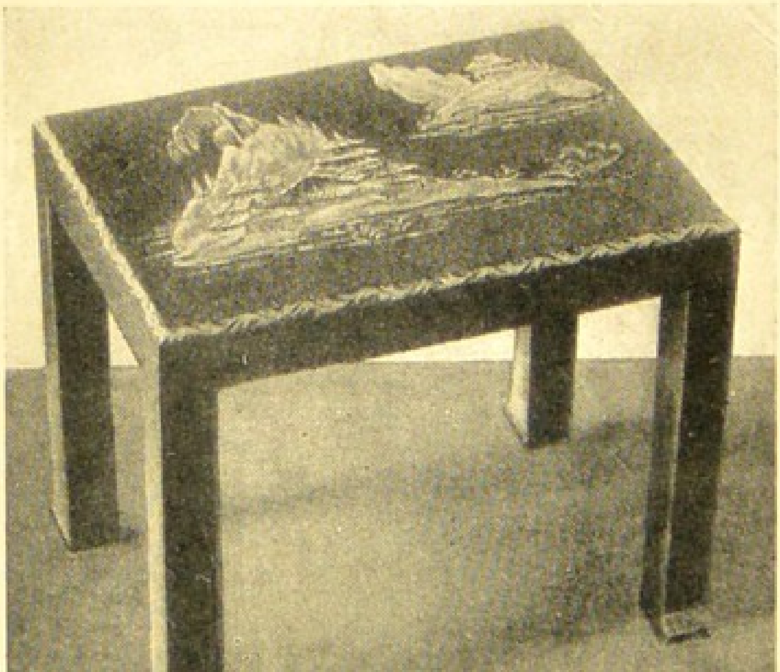
ANTOFRET. Figs. 1-4. Diagrams illustrating the principle on which sunk or relief patterns can be done in fretwork



LACQUER WORK. Top. Cigarette box and powder bowls showing Worcester china effect with stippled coloured background and white lacquer. Left. Finger plates in raised Chinese lacquer. Right. Oval papier mâché tray, a specimen of modern lacquer copied from an old English piece

CHOICE RESULTS OF LACQUER WORK



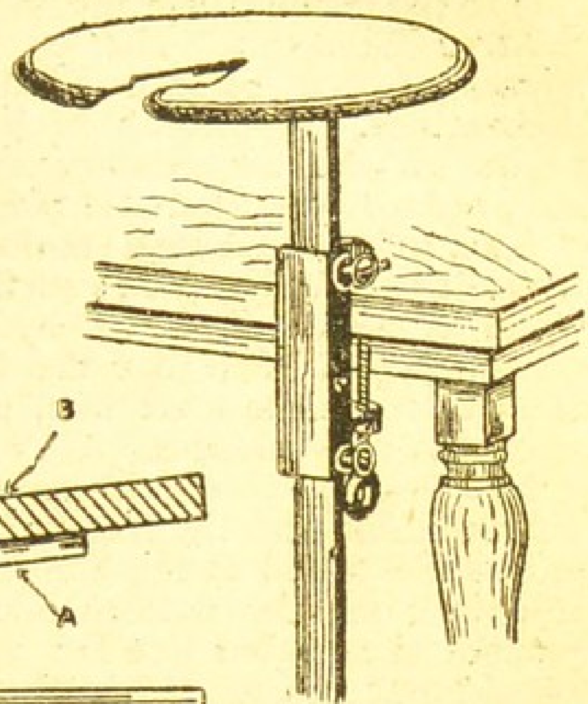


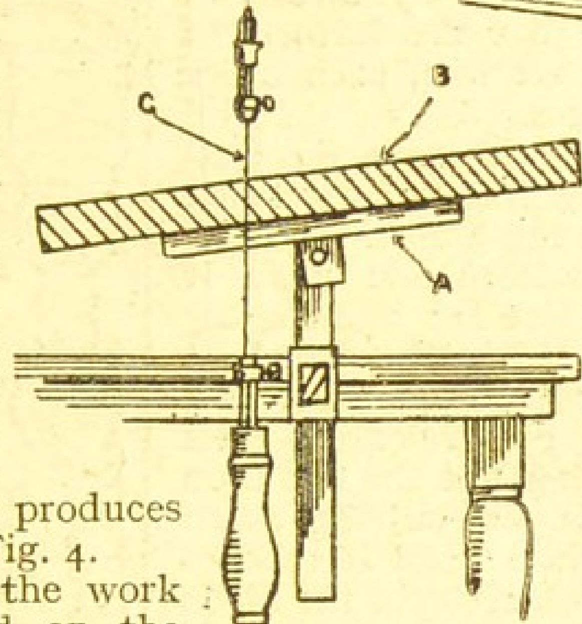
Top. Method of holding dry brush for stippling background. Centre. Use of a template when wiping out the panels. Left. Small lacquered table in Chinese design

PROCESSES IN LACQUERING AND THE FINISHED ARTICLE

The basic principle is that all the pattern lines are cut to a slight bevel. Fig. 1 shows a section of a piece of thin wood; the bevel cut of the fretsaw is indicated by the thin lines at B. The interior panel C is cut out and it will then fit loosely in its surrounding wood by virtue of the loss of the thin line of sawdust which has been cut from the path of the saw; therefore, the section C can be pressed upwards until it tightens on the surrounding wood of A as shown at Fig. 2.

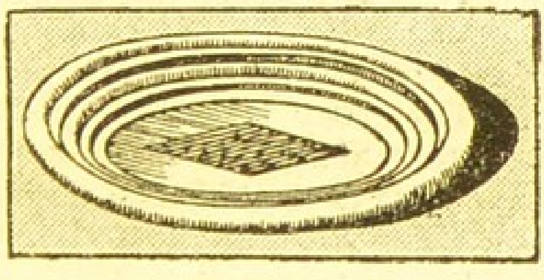
Similarly, if the bevel is in the opposite direction, as at Fig. 3, the central part C is depressed and produces a sunk panel, Fig. 4.

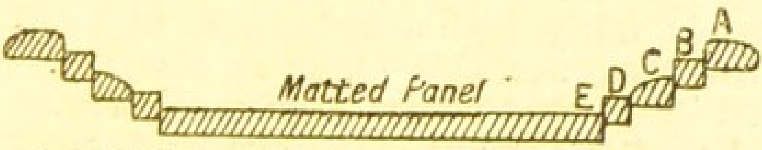




ANTOFRET. Fig. 5. Adjustable table (above) with diagram (left) showing how it tilts the wood, for cutting at an angle

In practice the work itself is placed on the slant and the fretsaw is kept in a vertical position throughout the cutting. For this reason Antofret is best done on a machine with an adjustable cutting-table which can be tilted to any angle as well as used for horizontal work. Fig. 5 shows one of these adjustable tables in use. A is the table, B the wood, and C the saw blade fixed in a hand frame in the position of cutting. The card tray in Fig. 6 gives a good idea of the solid effect which can be obtained from one piece of wood. The rim is made by pressing up the various steps of wood, and the sharp corners shaped down by filing and sandpapering. In the diagram of a section through the tray, the various steps are marked off, A, B, C, etc. After the Antofret panels have all



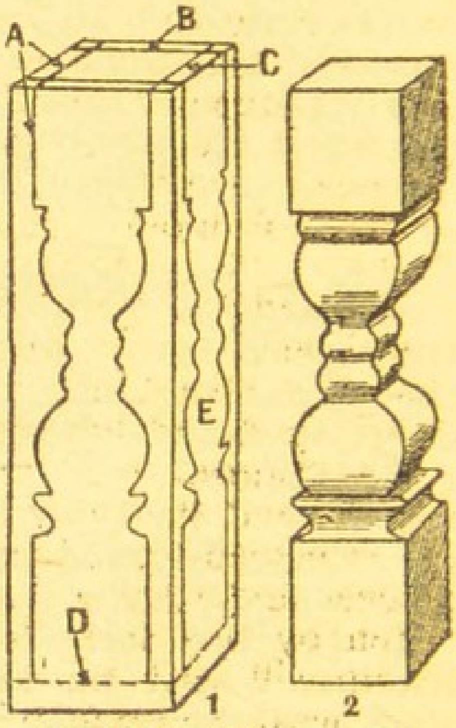


ANTOFRET. Fig. 6. Card tray in antofret. Fig. 7. Sectional view of card tray above, showing series of steps been cut, each must be secured with glue. The parts should be pressed out to their final position and the glue applied on the reverse side to the face in the right angle made by the raised rings, etc.

ANTO-TURNING. This is a simple method of producing square turned columns, finials, or other similar woodwork decorations. A column such as that shown at Fig. 2 can be produced with an ordinary fretsaw, the wood being of suitable size, square in section and planed smooth.

First draw the design carefully upon a piece of paper and then transfer the design to two surfaces of the wood as shown at Fig. 1 by means of carbon paper. See that the features of the pattern come level with each other upon the two surfaces.

The wood is then laid upon the fret-cutting table and the fine fretsaw blade enters the wood at the line A. Thence it cuts along the pattern line until it reaches the dotted line D; the fretsaw should not emerge from the wood at the other end, but should be unthreaded and withdrawn by releasing its clamp. After refixing, cut the line C on the opposite side, again cutting down the entire pattern line until it reaches the dotted line D, when again the blade is released and withdrawn.



ANTO-TURNING. Showing how a square turned column can be cut with a fretsaw

The wood is then turned over to other side and the previous process repeated. When the four cuts have thus been made down to the dotted line D, the surrounding waste wood is severed with a tenon-saw. In the case of terminals, the point or terminal end should come at the commencement of the cut.

FRIEZE, Applying a. For friezes surmounting wood panelling some form of relief is popular. This may be either plaster or imitation. With the first, the original design is modelled by an artist, a mould is taken, and the result is reproduced as often as may be desired. The lengths of frieze are transferred from the place of manufacture to the room, and fixed in position on the wall.

Imitation plaster friezes in fairly high relief, made of wood-pulp, papier mâché, or asbestos, are also made in sections or panels, and can be obtained from paper manufacturers. They are applied like wallpapers. Relief motifs are obtainable separately, which can be placed on a plain surface as desired. In heraldic designs these are particularly suitable for oak panelled rooms.

FUMED OAK. Oak can be darkened by subjecting it to the fumes of ammonia and this gives an appearance of age and enriches the colour. The method is to enclose the work for 12 to 24 hours in a case, cupboard, or small room, with one or more open saucers of liquid ammonia. A quick test of the effect ammonia will have on the wood can be made by placing a piece on the open mouth of the ammonia bottle for a few minutes. Fuming is usually done after the construction of the article, but before the application of varnish or polish.

FURNITURE, Care of. In the cleaning of wooden furniture the kind of polish used is of small importance, for none of them is effectual without regular use and vigorous application. Beeswax and turpentine is a mixture which, though very old-fashioned, is perfectly safe to use on any wood, but on the other hand, preparations under various names are reliable, provided they are not taken as substitutes for regular rubbing with a linen cloth.

One of the worst marks on polished wood is the stain left by glasses in which hot liquid has been served, and in the case of french polish only one method will put the matter right. This is to have the whole of that portion of the table-top glass-papered down and to repolish it afresh. The colour may be restored to varnished or wax-polished surfaces by treating with linseed oil. Ash and deal topped tables can always be well scrubbed with soap, sand and hot water.

BLISTERING OF FURNITURE. Occasionally inlaid furniture will cockle, and the thin veneer will come up in a blister; it cannot be remedied except by a cabinet maker, who may remove the veneer and re-glue it under pressure. This blistering is caused often by furniture standing too near a radiator, or sometimes damp will swell the wood and cause the trouble.

A weak solution of oxalic acid will clean leather coverings, but all preparations should be very sparingly used, and leather should not often have anything applied to it, or it is liable to become sticky.

FUSE, Replacing a. An electric fuse is a short length of thin wire of an easily fusible metal which is inserted in the electric circuit as a protection against fire. If an excessive amount of current flows, the heating may approach the limit when danger from fire will result, and being of an easily fusible metal the fuse reaches melting point earlier than the other parts of the connexion and thus breaks the circuit.

Where the cables enter a house two sealed fuse boxes with glass fronts will be found; these fuses are not to be touched and if they fail the electricity company must replace them. After the main switch comes a pair of consumer's main fuses, through which the whole house supply passes, and there is a batch of fuses carrying the current for sections of the house; finally there may be a number of smaller fuses, which are often away from the other fuse-gear, and control single rooms.

When there is a failure of a group of lights, the first thing to be done is to examine the fuse which has gone. If the fuse shows signs of heating and appears simply to have melted, one may suspect the cause to be gradual deterioration of the wire through long use, and a new piece of fuse may be substituted. Should the wire have disappeared, a definite fault on the affected circuit must be looked for before attempting to insert a new fuse. It may be due to a short in wiring some fitting, or to a wire becoming frayed. The house must be entirely isolated by opening the main double-pole switch, when the melted fuse can be replaced.

Use the same size fuse-wire as before when replacing a fuse, as a larger size may be an infringement of the wiring rules approved by the fire insurance company, and thus may even invalidate the fire policy. The operation consists in cutting off a suitable length of fuse-wire and laying it in place with the ends wrapped round the terminal screws, finally securing the ends by screwing down the terminals, but not hard enough to cut the soft fuse-wire.

GALVANIZING. The object of galvanizing is to preserve from corrosion articles made of iron and steel. It consists in applying a protective coating of zinc to the surface of the metal, and requires the use of special machinery. For hot galvanizing, the article to be treated is immersed in a bath of molten metal at a temperature of about 1,000° F.

Electro-galvanizing is carried on in much the same way as the electro-deposition of copper and other metals. Another method is known as sheradizing. The articles cleaned are then placed in a frame and heated to about 600° F. The barrel contains a quantity of zinc dust, and this is deposited upon them and forms a coating.

GAS PIPE. Gas piping is made almost exclusively in wrought iron and sold in long or short lengths from about 12 in. upwards.

Flexible metallic gas pipe in sizes from $\frac{1}{4}$ in. to $\frac{3}{8}$ in. or more is used for connecting portable gas appliances.

Gas pipe is sold according to the nominal diameter, i.e. the $\frac{1}{2}$ in. gas pipe is nominally of $\frac{1}{2}$ in. diameter in the bore, but actually measures ·825 in. over the top of the threads, or rather more than $\frac{3}{4}$ in. in diameter. The $\frac{1}{8}$ in. pipe, which is the smallest iron pipe that is made, measures ·382 in., or rather more than $\frac{3}{8}$ in. in diameter. It is desirable to specify when purchasing fittings whether they are required to be screwed for iron or brass, remembering that a $\frac{1}{4}$ in. iron pipe is equivalent to $\frac{1}{2}$ in. or $\frac{5}{8}$ in. brass pipe.

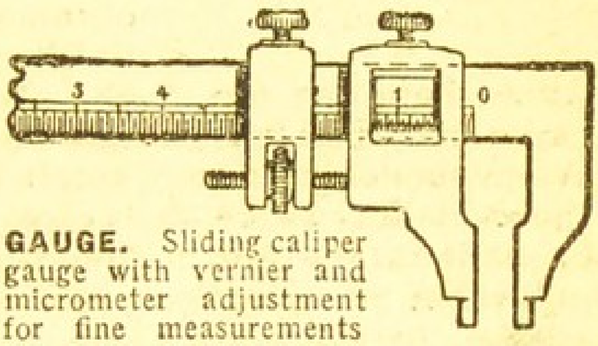
GAUGE. In a wide sense a gauge is a standard of comparison; consequently the word refers both to a gauging instrument, and to the accepted dimensions adopted as a standard.

As an example, take the Birmingham standard wire gauge, generally abbreviated to B.W.G. This is simply a recognized and accepted set of figures defining the diameter of wires, and the thickness of some sheet metals. On the other hand, the Birmingham wire gauge is a measuring instrument in the form of a metal plate with holes drilled in it, corresponding in diameter to the standard dimensions of the B.W.G.

The marking gauge used by carpenters for scribing lines upon a piece of work comprises a wooden bar and a stock made to slide upon the bar, and provided with a screw for fixing it. Near to one end the marking pin is fixed into the bar, and this marks the work. In use the sliding part is fixed to the bar so that the distance from the face to the scribing pin is exactly the desired distance for the required marks from the working face of the wood.

A wire gauge is a metal plate and its edge is pierced with a number of slots which terminate in holes. The gauging part is the space between the jaws, and in gauging a piece of sheet metal or a wire, the correct gauge size of the metal may be taken to be that corresponding with the number stamped against the slot into which the material just fits.

A standard twist drill and steel wire gauge is most useful, either in the plain type or giving the Imperial standard wire gauge sizes. A combination gauge, showing the standard size of drills, the corresponding tapping size, and also the full thread or clearing size, is also used.



GAUGE. Sliding caliper gauge with vernier and micrometer adjustment for fine measurements

The screw thread or screw pitch gauge consists of a number of separate plates secured in a handle, somewhat like a pocket-knife, each separate jaw being fashioned to the correct shape and pitch of the screw thread corresponding with the number and size stamped upon it.

The feeler gauge is used to feel the distance between two objects relatively close together, such as the width of a slot. It has separate blades of hard steel of different thickness, marked with numbers, these being the number of 1,000ths of an inch of thickness.

Another useful gauge is a sliding caliper. This is made of steel, 6 in. to 10 in. long, the stock being graduated usually in both English and metric measures. One jaw slides along the stock and is fixed by a set screw. Readings can be taken down to $\frac{1}{128}$ in. and $\frac{1}{10}$ mm. respectively.

GESSO. Gesso is a form of applied decoration. The material that is employed consists of a pasty substance compounded chiefly of plaster of Paris and glue. It is used for ornament in relief.

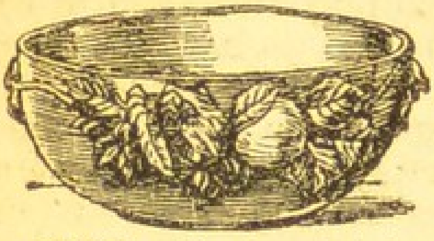
A box (or other article) to be decorated in gesso work is first rubbed down with sandpaper and then painted white before being coloured the desired shade with transparent lacquer.

When dry, make a tracing of the size of the top of the box, and design something suitable. Trace this on to the box.

Mix some gesso powder into a creamy paste with water and apply this to the design with a brush, and avoid going over the edge ; the paste should be modelled a little and applied in the direction it is to lie. In a floral design, each leaf should be modelled separately, and flowers such as roses worked in a circular direction. Several coats of gesso may be used, but not very thickly, as it looks rough when dry. Any unevenness can be rubbed down gently with sandpaper.

When quite hard it can be coloured with barbola colours. Allow these to dry, and then varnish with barbola varnish. Articles can be obtained with the raised work on them, and are then easily finished in colours. The real fascination of the work, however, lies in the modelling.

In modelling use a little gesso powder on the hands, as the paste will work more easily and will not show the marks of the skin. Avoid labouring the work. Take out the amount of paste required and roll it in the hands. Should it be desired to form an apple, or similar fruit, roll it into a ball, and when the correct shape has been obtained put it on a piece of glass and finish off with a barbola modelling tool. Avoid handling too much. To fix the apple on a bowl or mirror, make one side flat, so that there is a good surface for the paste. When modelling a rose, small balls of paste are pressed flat and the modelling tool shapes each petal. The central petals should be made rather thin. Round these place the rest of the petals and pull them into position. (*See* Plate 10.)



GESSO. Bowl painted in coloured lacquers

Mix a little barbola paste with a few drops of water and a little powdered glue for heavy work. Smear this over the portions of the work which it is desired to affix, and press on to the object, using a tool as far as possible. When it is all quite dry colour it, using barbola colours.

As the work dries, touch it up where necessary and when dry, varnish all over with clear varnish. A charming effect is gained by leaving some of the flowers silver or gold.

Coloured Bronze Powders. A modern form of gesso work is executed chiefly in gold and silver and applied on a lacquered background. It is used for ornamenting many kinds of household articles, among them candlesticks, mirrors and powder boxes, and is a form of work that affords many opportunities for the skilful modeller. A liquid medium is sold for use with bronze colours, which are obtainable in glass tubes.

GILDING. The process known as gilding consists in coating the surface of an object with an adhesive and applying to it a very thin film of gold leaf. When dry it appears as a solid gold surface. The usual method is to apply gold leaf or metallic powder, the best results being always obtained with gold leaf.

The tools required are the gilder's knife and cushion. The knife has a thin, narrow blade and the cushion is a board about 6 in. square, the upper surface padded with flannel and covered with wash-leather; three sides are shrouded with thin card to protect the gold leaf from the wind. The underside has a loop so that it can be held with the thumb and supported by the fingers of the left hand. The cushion is used to support the sheet of gold leaf and to facilitate the cutting operations.

The gold leaf is obtained in books containing about 25 leaves approximately 3 in. square, each sheet separated by a piece of thin tissue-paper. The knife is used to cut the gold leaf; it must be kept perfectly clean and the blade must never be touched with the fingers. A long camel-hair brush is employed to transfer the gold leaf from the cushion to the work.

Gilder's gold size can be obtained ready for use, a small bottle covering a considerable amount of work. Suppose that the work is already cleaned and prepared. The gold size is brushed over the part to be gilded, and it is absolutely essential that it should be applied thinly and evenly; if there are little mounds of size on one part of the work, and scarcely covered portions on another, the result will be failure. The next step is to protect the work so that no dust can settle upon it.

The size should be fit to receive the gold after 12 hours. It is best to make some trials on an odd piece of work and to learn by experience. When the size is judged to be in good condition a little of the gold leaf is laid on with the gilder's tip, and pressed down lightly with a pad of cotton wool covered with soft linen. The surface of the gold is then brushed over with a soft hog-hair brush, and it should emerge from this process bright and lustrous.

GIMLET. This is a woodworker's tool used for boring small holes, generally prior to inserting a screw. It comprises a handle, and a steel rod pointed at one end, with a tapering screw thread of variable pitch. It is used by pressing it upon the work and rotating the handle, the rotation causing it to screw its way in.

GLASS AND GLAZING

Choice, Cutting and Uses of Glass

This article deals with glass as used for windows and general constructional work

The cutting of glass is carried out with a diamond pointed tool, or with a hard steel glass cutter. The former is expensive to buy, and requires considerable skill to manipulate in an effective manner. The steel cutters comprise a wooden handle with a steel end-piece or block fitted with a small circular plate carrying two or three small steel wheels, one of which projects beyond the end of the head and does the cutting.

To use either of these cutters they should be held in the right hand with the handle between the first and second fingers and the thumb behind them. The diamond is set at a certain angle in the end of a steel block, pivoted on the handle and free to move through about 45°, this is to facilitate the cutting of intricate shapes. The particular angle at which the diamond must be held varies with each individual stone, the best cutting angle being judged by the sound. When cutting properly the sound should have a ripping quality; when the diamond is wrongly held it is more like a scratch.

CUTTING A NEW WINDOW PANE. For ordinary use in the home the wheel cutter answers all requirements and will stand more rough treatment than a diamond. If a new pane is wanted for a window, and it is to be cut from a piece of odd glass, lay this on a flat table-top on which has been placed a piece of thick cloth, and place a straight-edge on one side of the glass. Bringing sufficient pressure to bear on the cutter, draw it once across the glass, guiding it by the straight-edge. If the glass is thin it will sever easily if turned upside down with the line of the cut resting on the edge of the table, or upon a clean, straight batten, and the surplus glass pressed down. The end can now be cut, guiding the cutter with a set square or tee square the opposite end and remaining side are then cut. When placing the straight-edge as a guide for the cutter, be careful to allow for the thickness of the cutter block. (*See* Plate 12.)

The cutting of glass to fancy shapes, such as those needed in leaded light work, is rather more difficult. A simple method is to cut a set of thin cardboard patterns to the exact shapes of the glass, and to employ them as templates.

Circles are generally cut with a special tool known as a circular glass cutter. It has a central pivot, adjustable arm, and a wheel or diamond.

When cutting curves, the outside curve will come away easily, but a notch, or interior curve, will have to be cut across and across, and the parts removed one by one. To separate the glass when cut to curved forms, tapping is necessary. This consists in striking the back of the plate of glass with the block of the cutter, carefully following the line of the cut. Steady tapping is important, and if the glass has been properly cut the fracture will run along it at each tap. Ragged edges can be trued up by grozing, a process consisting chiefly in biting off the ragged edges of the glass by means of a pair of pliers, using the jaws to squeeze or bite the edge.

GLAZING WINDOWS. In the case of a broken pane in a window first remove the broken glass and the putty.

When this is done, the rebate must be measured and a piece of glass may now be cut, slightly less than these sizes: in most cases about $\frac{1}{8}$ in. less will be correct. The putty must be worked up between the palms of the hands until it is quite plastic.

Place some of the putty into the corners of the rebate, and apply it all the way round the frame. The glass is then placed on to the bottom part of the frame, pressing in closely, and pushed into close contact with the putty. It may be further secured with the aid of a few brads driven into the framework, and a pellet of putty is then pressed into the corners between the glass and the frame, and consolidated by forcing it hard up against the two with the aid of a putty-knife, smoothing the surface.

The remainder of the rebate is then filled, and to get a neat finish the knife is used with long sweeping strokes, if possible from end to end of the window, held at an angle to the glass, and with the blade flat on the edge of the frame, to act as a guide for the knife. This should remove any surplus putty. The inside of the frame should be inspected, and all surplus putty should be removed with the putty-knife.

GLASS, Painting on. Painting on glass is a hobby in which artistic training is not necessary, though where talent is possessed it can be well employed by originating beautiful designs. Vases, flower bowls, dessert services, cocktail sets, and similar articles can be ornamented according to individual taste in designs.

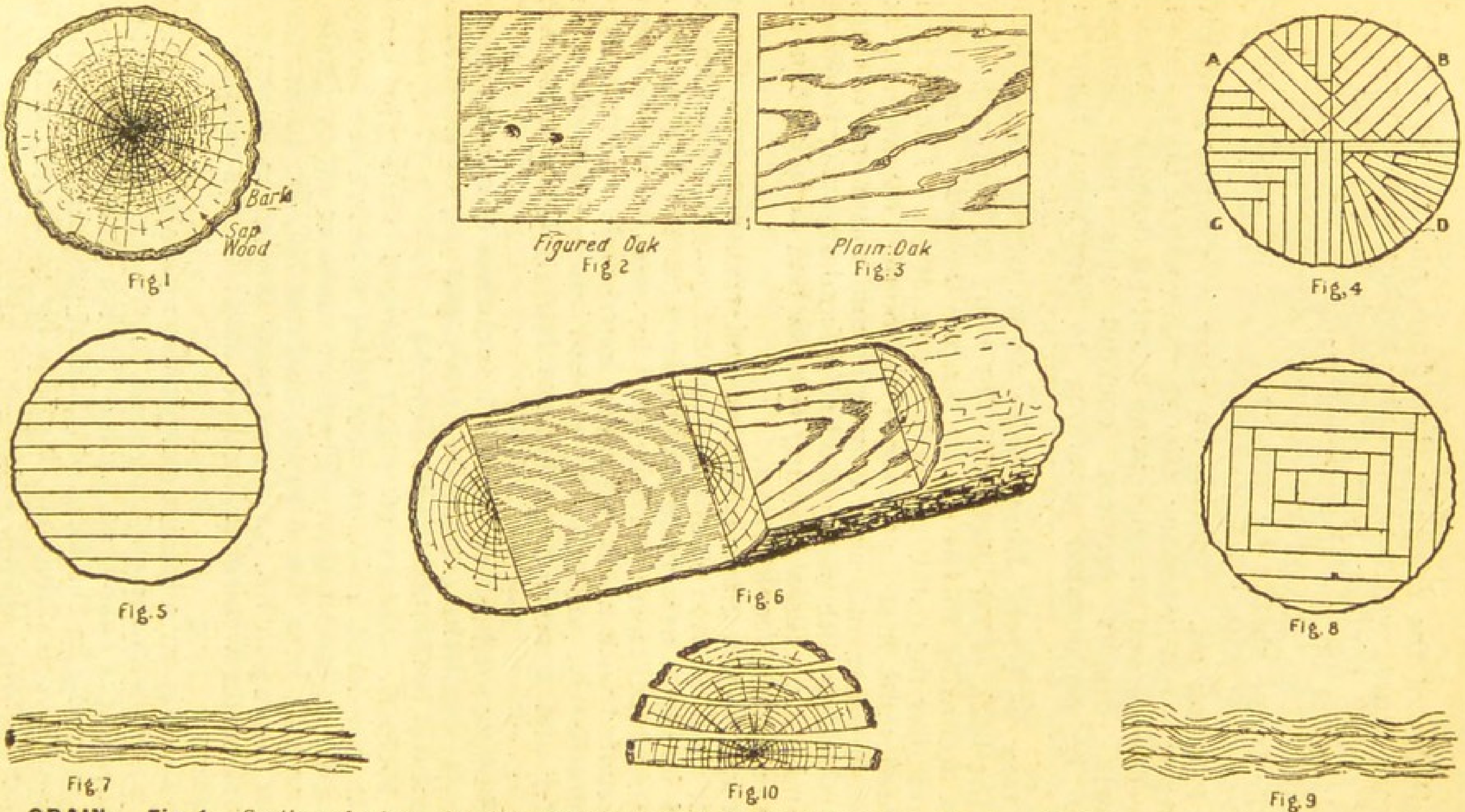
Designs may be traced from copies on to tracing paper and affixed to the back of the glass, and the body of the design can be filled in according to the colour scheme desired. The copy is washed off after the painting has been completed. The surface to be painted must first be cleansed thoroughly by washing it in warm soapy water and, after rinsing in cold water and drying, by lightly sponging with methylated spirit and allowing to stand for a few minutes. Glass painting colours and brushes can be obtained at an artists' colourman.

The colours possess great brilliancy and transparency. Very little colour need be used to obtain the best results. The design is outlined in black first before filling in with the flat colours. A No. 1 sable hair brush should be used for this. The colouring may be executed with a No. 3 squirrel hair brush. Articles dry almost immediately, and can be washed after a few days in warm water and a mild soap without harm. Soda must not be used.

Simple designs are best, as there is less chance of overcrowding the effect. The colours should be lightly put on, or the transparent effect will be marred. (*See* Note 9.)

GLASS PAPER. Sheets of paper covered with glue and coated with powdered glass, sand or other abrasive are known as glass paper, or sand paper. They are made in many grades, the finest ranging from No. 0 to F2, medium No. M2 to S2, and the coarsest No. 2½ to No. 3. Glass paper is used to work up a smooth surface on woodwork, and to assist in the shaping of curved surfaces.

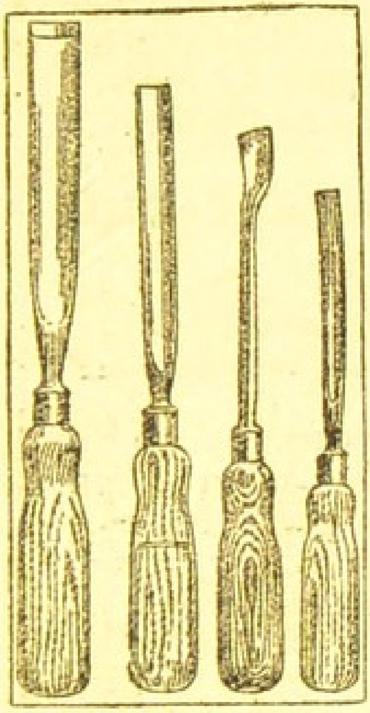
GLUE. Glue is an adhesive preparation obtained by boiling down animal substances such as skin, horns and hoofs. It is mostly either of the cake type, such as Scotch glue, or purchased in a tube, generally in the form of a patent preparation. Casein glue, employed by bookbinders, is made by dissolving casein in a solution of borax. Dutch, Flanders or Cologne glue is a pale, strong adhesive bleached with chloride of lime. Elastic or



GRAIN. **Fig. 1.** Section of a log, showing growth rings and medullary rays. **Fig. 2.** Medullary rays showing as white layers. **Fig. 3.** Grain of plain oak. **Fig. 4.** Method of cutting parallel to rays. **Fig. 5.** Cutting without waste. **Fig. 6.** Difference in grain of two boards from same tree. **Fig. 7.** Undulations in wood from which a straight board is cut. **Fig. 8.** Cutting tangentially to rings. **Fig. 9.** Boards cut through fiddle-back mahogany. **Fig. 10.** Shrinking tendency in a sawn log flexible glue is obtained by combining glue with a preparation of glycerin, glucose, etc.

The preparation of Scotch glue is simple. The glue is purchased in the form of rectangular blocks, and one of these should be broken into small pieces; these are placed in the inner vessel of the glue-pot, covered with cold water, and left to soak for 24 hours at least. The glue-pot is then placed on a slow fire, gently brought to boiling point, and left to simmer until its contents are completely dissolved and ready for use.

GOUGE. A gouge is a curved chisel, the blade being curved transversely so as to be trough-shaped instead of flat. Paring gouges are ground internally, and are intended for hand planing of grooves. Firmer gouges are ground externally and are used for scooping out timber into hollows. Gouges are made in various widths, but a $\frac{5}{8}$ in. firmer gouge is a useful size.



GOUGE. Left to right: paring gouge, firmer gouge, front bent carver's gouge, curved gouge

GRAIN. The term grain refers generally to the character and size of the growth rings of timber. Some woods depend for their figuring upon the annual rings, others upon the medullary rays, others again upon the juncture of branch to trunk.

Fig. 1 represents the section of a log. Every year a growing tree adds a fresh layer to the outside, thus forming a series of concentric rings. The medullary rays radiating from the centre carry nutriment and occur in every wood; in oak or beech they show strongly, when cut, in the form of white layers, which are termed the silver grain, Fig. 2.

The boards should be cut parallel to these rays. Fig. 4 shows a few methods of cutting in this way, D giving the maximum amount of figuring. The latter (Fig. 3) is cut as in Fig. 5, by which method there is no waste; the centre board only will be figured. Fig. 6 shows the difference between two boards cut from the same tree in different places.

A tree never grows perfectly straight, so that when the log is converted into boards the undulations in the direction of the grain occur in the thickness of the wood by reason of the board being cut in a straight line (Fig. 7). Fig. 9 shows a board cut through fiddle-back mahogany in which undulating waves occur in close formation.

Another well-known variety of grain is that known as curl, which is obtained by cutting the tree at the juncture of a branch. The main direction of the curl usually is curved, and when veneers are cut the two adjoining leaves are almost identical, so that the most beautiful effects are obtainable by matching them.

When a pine log is cut as in Fig. 5 the centre plank does not contain the best figuring, as the rings appear at each side in the form of narrow parallel lines of alternate light and dark stripes. In the outer planks the stripes are wider and have a V-shaped formation, the beauty of which is enhanced by the natural irregularity of growth. A method of cutting for work requiring an attractive appearance in the figuring is shown in Fig. 8, in which every plank runs at a tangent to the rings.

The question of cutting is important for other reasons besides that of figuring. Fig. 10 shows the natural shrinking tendency of a sawn log, so that for work requiring an absolutely reliable surface, only those running diametrically should be used. D, in Fig. 4, is the ideal cutting for this purpose, especially for oak.

GRAINING: SIMPLE WOOD ORNAMENTATION AND ITS IMITATION

Suggestions for the Artistic Treatment of Woodwork

This article describes the surface treatment of white woods to simulate oak and other hardwoods

The process of reproducing the colour and appearance of natural wood by a manipulation of paint in superimposed layers is known as graining, the grain being produced on the paint while it is still wet.

The tools required include painters' brushes and combs. The latter are made of steel in various widths, and with varying numbers of teeth; others are made of leather, bone and other flexible materials. Old hairdressers' combs may be pressed into service. Leather combs can be made at home from a piece of stout leather, the teeth being cut to shape with a pocket knife. Several sorts of brushes are needed, including a selection of overgrainers, mottlers, and shaders. A first-class badger hair softener is required and should be about $3\frac{1}{2}$ in. wide. A few camel hair, sable, and fitch brushes are necessary for the veining and similar work, together with a bone thumb-plate.

IMITATING OAK GRAIN. The commonest form of graining is that which represents oak on a door. The ground is first prepared by stopping, priming, and undercoating, as if for ordinary paintwork; then the ground colour is applied. The tint must be the lightest that is to show on the finished work. The grounds will be composed of white lead, stained with yellow ochre, applied as ordinary paint, and finished with a slight gloss. The graining colour may be obtained by a mixture of raw umber or other colour, and should contain plenty of driers. It is brushed thoroughly into the door, after the previous coat is quite hard.

Apply the graining colour to one of the panels only at the start, having previously studied the style of graining to be copied. If it is to be light figured oak, this will require a coarse leather comb to produce the straight part of the grain Then, next to this, the grain is worked in with a medium toothed steel comb; the combing with this tool is carried about half-way across, producing a series of lines wide apart at the outside and closer at the middle of the panel. With a fine steel comb work over the whole of the surface, with a slightly wavy motion, so as to break up the original straight lines; as the untouched side of the panel is reached, the pressure on the comb should decrease, and thus subdue the graining. Combing should start at the top and continue in one unbroken stroke to the bottom, keeping an even pressure on the comb, and using the whole width of it. The figure has now to be worked with the aid of a rag wrapped round the thumb, or by the use of the thumb plate, which is wrapped up and used like the finger tip. Treat all of the panels in a similar manner, but vary the grain. The rails and stiles are then grained, but will not call for much figure work as the wood is generally straighter in grain. The badger is used to soften the edges of the graining, and the mottler to soften the veins and to give a more woody appearance to the work. Fine veining can be worked with the veining fitch.

KNOTS AND SURFACE MARKINGS. The final proceeding is the overgraining and shading; the pigment is ground in water, the colour is spread on a palette and diluted with beer. The overgrainer is dipped in beer and the pigment worked into it. The brush ought to work itself into two or three parts; if it does not, it should be combed or worked with the fingers. The colour is applied with a continuous motion from top to bottom. Before the colour is dry work over it with the badger to break up the hard lines. Knots and other surface markings are worked in with the sable pencils and fitches. When the graining is complete the whole surface of the door is varnished.

Finely-grained woods may be represented without combs, using brushes only. The grounds are prepared, and the graining colours diluted with beer, the graining being accomplished with hog hair mottlers, large sash tools, and the fitches and sable pencils. A piece of wash-leather, a sponge and some rag are of assistance, and two or more colours may have to be worked together. The brushes are worked more or less dry, to remove the unwanted colour, as a comb, but with softer effect.

Bird's eye maple is grained with the mottler. This brush is held so that the bristles separate and break up the straight end; it is held nearly upright, and wiped over the work so that it removes the colour in an undulating manner. Mahogany and walnut require the mottler for the graining colour; the breadth of the veins is varied by altering the pressure of the fingers on the bristles.

GRINDSTONE. A grindstone is an implement used for the sharpening of tools. It comprises a circular stone mounted on a spindle which is supported in a frame; it is adapted for driving by hand or by a treadle. The best type of grindstone is one with a cast-iron frame and fitted with a self-contained treadle and is best fitted with a hood to prevent the water from splashing. Such a stone should be about 2 ft. in diameter and 3 or 4 in. in width. Smaller grindstones can be screwed to the bench.

Knives and other cutting implements are sharpened on a grindstone. In grinding, the stone revolves towards the worker, the tool-rest being adjusted to the proper angle, and set as close to the stone as possible. This prevents the tool from catching and being dragged down. The stone should never be touched with the hands while it is revolving.

The method of grinding a chisel is as follows: Grasp the blade in the left hand, with the fingers uppermost, and grip the handle with the right. Incline the tool so that the angle of the bevel is about 20°. The rest should be set to this angle, and the chisel can then rest flat upon it. The tool is not held in one place, but moved about across the rest to avoid forming a groove in the stone. Grinding continues until the bevel on the tool is flat and true. Ordinary firmer chisels are ground on one side only; turning chisels and cold chisels on both sides.

Gouges are ground on the outside, and are held in a slanting position to the stone. The gouge is twisted or turned so that the bevel is ground to a true curve.

GUN METAL. This is an alloy consisting of about 90 per cent of copper and about 10 per cent of tin, with small quantities of iron, lead, and zinc. It is used for bearings and other mechanical parts. In model construction, gun metal forms the principal metal of which the small castings for the different parts are made. It is also utilized in hydraulic fittings such as pumps. It takes its name from the fact that it was originally used in the manufacture of ordnance.

GUTTA PERCHA. The solidified juice of various trees grown in Asia, this substance has many of the properties of rubber. The two are, however, slightly different in certain ways. For instance, gutta percha is less elastic than rubber, and cannot be vulcanized. It becomes plastic at the temperature of boiling water.

GUTTER, Repairing a. A common cause of trouble is an obstruction in the gutter itself, such as a bird's nest or the accumulation of leaves. The outlet pipe of the rain-water head is choked up, and the remedy is to clear it out, either by means of an iron rod with a hook at the end, or by the removal of the obstruction from the top, and through the gutter itself. In so doing, where the gutter has a separate outlet pipe discharging into an open head, a piece of sack should be placed in the head to prevent dust and dirt falling into the down pipe, as this is very difficult to remove.

When the gutters have been cleared out, a jug of water should be poured on the roof at the highest point of the gutter. If the gutter is in correct line and has a proper and continuous fall, all the water will run away. If it is found that the gutter sags at one of the joints, and a pocket of water remains, this indicates that the fastenings or the brackets are deficient in strength, and must be remedied. This is done preferably by fitting a new bracket, or, if that is not feasible, by inserting a packing piece between the bracket and gutter, thereby restoring the proper level.

In the case of the down pipe, it may be possible to clear it by using a heavy iron weight, sharpened at one end. Attach this to a cord, and pull it up and down in the pipe. If it fails, the pipe will have to be taken down, the choked section removed, and the obstruction got rid of by driving it through with a heavy bar, or by clearing it with a screw at the end of a drain-rod.

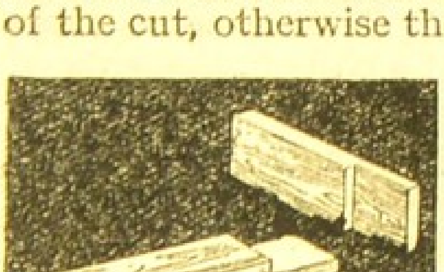
HACKING KNIFE. This tool is used to remove old putty from window frames and plaster from ceilings, for the scraping of paint, and similar work in connexion with the redecoration of the home.

In removing putty, the point of the hacking knife is inserted into it, held in a horizontal position, and forced downward by tapping the back of the blade with a light hammer. When cleaning the plaster round a cornice or in any corners, the knife can be used as a scraper.

HACK SAW. A hack saw is used for cutting metal, and consists of a blade carried in a frame. The blade is made of either dead hard or glass hard steel. The latter is extremely brittle. The frame of a hack saw is provided with pegs to engage the holes in the ends of the blade, and has a wing-nut so arranged that the blade can be strained quite tight by its use.

The blades vary in length, width, thickness, and fineness of teeth.

In use a hack-saw frame is held by its handle in the right hand and by the front bar in the left, and then pushed across the work with a light downward pressure. As the cut deepens, care is needed to ensure that the stroke is made along the direction of the cut, otherwise the saw will snap; the frame should be kept vertical.



HALVED JOINT. Method of joining two pieces of wood

A drop of oil on the teeth is sometimes a help when cutting mild steel, but the majority of mechanics use a saw dry on all materials.

HALVED JOINT, Making a. The general appearance of a lapped halved joint is illustrated. As an example, suppose it is desired to make a joint with material 3 in. wide and 2 in. thick. First plane up the material on all sides, and square off the ends. Then at a distance of 3 in. from the end square a line around three sides of the material, set the marking gauge exactly at half the thickness of the wood, and mark a line on the edges of the pieces of wood, on both sides, and the end where the joint is to be made.

Place the wood horizontally in a vice, or rest it against the bench hook, and saw across the wood exactly on the line marked across it, and to a depth of half the thickness of the material. Put the material in an upright position in the vice, and then saw along the line cut by the marking gauge, sawing to the edge of the line. If both are carefully sawn the result should be an accurate joint when the two pieces are put together.

The joint surfaces should be trued up with a sharp chisel, and the two pieces accurately fitted.

HAMMER. The commonest type for metal-worker's use is that known as the engineer's ball-peine hammer. These are made in all weights, from ¼ lb. to 4 lb. or more, the weight being that of the head, or metal part, of the hammer, which is of cast steel, with an ash or hickory handle. For use in ordinary wood-work, a Warrington hammer or an Exeter pattern hammer is convenient. The former is similar to the engineer's cross peine hammer, but longer in the head. In the Exeter pattern the cross peine is set to the back of the head, and not central as in the former case. The Kent pattern claw hammer is useful in the house, the claw being handy for the withdrawal of nails. Riveting hammers are made with a small cross section and a long head with a cross peine. The upholsterer's hammer is notable for its great length of head, and is made in two forms, one with a claw and the other, known as a cabriole, with a narrow cross peine.

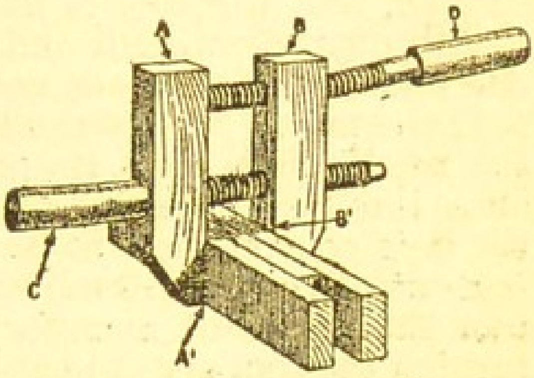
The hide-faced hammers comprise a wood handle, and a cast or wrought iron socket with inserted pieces of raw hide. They are used on parts where hammer marks or bruises would be objectionable. A somewhat similar hammer is made of brass. Jeweller's or watch hammers are small and very light in weight; their use is necessary in this class of work.

The lath hammer has a flat face for driving the nails, and a broad axe-like face for cutting the lath. Chasers or repoussé hammers have a face large in diameter and a ball or other shaped peine.

HAND SAW. There are many types of hand saw, the straight-backed pattern being suitable for most work. These are made in various lengths, from 20 in. to 30 in., with teeth of different shape. Saws with ratchet-shaped teeth are preferable to those of the pyramidal shape, and the 26 in. size is handy for general use.

Hand saws in general are for two classes of work. The cross cut saw is for cutting across the grain; the rip saw is better adapted for cutting or ripping timber in the direction of the grain, the teeth being larger. The handle is held with the first finger of the right hand extended along the right-hand side of the handle and the right thumb along the left-hand side of the handle. For ordinary household work the cross cut saw will answer most requirements.

HAND SCREW. Hand screws are a form of cramp, used by wood and metal workers. They consist essentially of two blocks, which are drawn together by the rotation of two long screws fitted with hand grips. Those favoured by woodworkers are usually made of hardwood throughout. An improved pattern is made in pressed steel, and adapted for grasping work that is tapering or of irregular shape. Hand screws intended to be used for metal work are generally smaller in size. These tools are employed on work such as holding one part to another to act as a drilling jig or guide piece while preparing a duplicate.



HAND SCREW. A, B, jaws; A1, B1, block; C, D, hand screws

The woodworkers' hand screws are invaluable to the home worker. They can be employed to hold together the corners of a light framed building in course of erection, and they serve as a cramp when glueing up joints.

HANDSPIKE. This is a long bar of wood about 3 in. in diameter, tapering at one end, the other shaped in the form of a shoe and clothed with iron. Its general appearance is illustrated, and the implement has many uses in the handling of heavy articles. The shoe should be inserted underneath the object, and it can be raised slightly by depressing the handspike.

A useful implement can be made from ordinary deal about 4 in. wide and 3 in. thick, shaped on the lines illustrated. The shoe can be bent from a piece of wrought iron $1\frac{3}{4}$ in. wide, $\frac{1}{4}$ in. thick, and 18 in. in length.

HANDSPIKE. Long bar of wood, capped with metal at the tip. This implement is used for lifting stones and other heavy articles

HAND VICE. A small vice that can be held in the hand is a very adaptable tool that can be turned to many uses in the home. It is useful for a great many small filing operations, as it can be turned about in any direction. A type with wooden handle and a parallel action to the jaws is useful for fine work, such as model making or clock repairing.

HARDENING AND TEMPERING. The hardening and tempering of tool steel consists in getting the correct hardening temperature for the particular steel, choosing the right liquid for the quenching bath and getting the distribution of tempering temperature in the tool so arranged that the different parts of the finished article are of suitable hardness for their particular work.

Each steel for tools loses its magnetic qualities above a certain temperature, which is identical with the ideal hardening temperature in every case. This fact enables the hardening operation to be carried out with certainty by the use of an ordinary pocket compass.

The procedure for hardening a tool is to hold it by tying copper wire round the middle, then place the compass on the floor a yard from any iron, but within convenient reach of the fire and the quenching bath. Any fire will do for the work if it is hot enough, and the tool is made red hot and tested from time to time by withdrawing it and holding it close to, but at one side of, one end of the compass needle.

If the needle moves the steel is not yet hot enough, but when the needle disregards its presence, the tool must be plunged at once into the quenching bath and moved rapidly about in it till it is cold enough to handle.

EVEN TEMPERATURE AND COOLING. It is essential that the tool should be of a uniform temperature. This is secured by turning the tool about in the fire.

For quenching, cold soft water is satisfactory, unless the tool cracks, when oil will overcome the difficulty.

After it has been hardened the tool is tempered by raising it slowly to a temperature which depends on the use to which the tool is to be put, and then quenching in cold water. Steel, when clean and heated slowly, forms a film of oxide on its surface, and the colour of the film changes as the temperature rises.

After hardening, therefore, the tool is first rubbed bright with emery cloth, taking care not to touch it with the hand, as grease prevents the formation of the temper colours; then, if it is required to be at the same temperature throughout, it is laid on an iron plate, which is placed over a flame. The succession of colours is watched, and the tool is quenched at once when the desired colour is reached. If by accident the colour changes have advanced too far before quenching, the tool must be hardened and correctly tempered all over again; but if the colours have not gone far enough, it may be repolished and retempered without hardening.

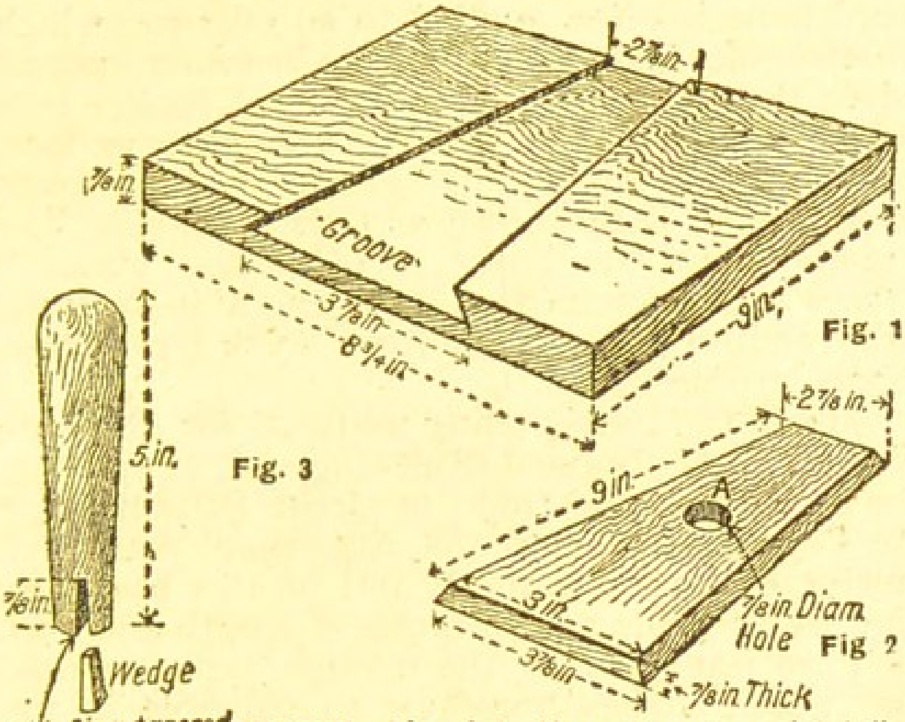
When tempering, a very pale straw colour is used for reamers; light straw for twist drills and tools for turning metals; dark straw for woodworking tools in general and for taps and dies for screwing metal; brown for hatchets and chipping chisels; and dark purple for springs.

HARDWOOD. Chief among the hardwoods are oak, mahogany, walnut, elm, ash, birch, beech, greenheart, teak. They are mostly heavy woods and the grain is often more curly than that of the soft varieties, so the cabinet maker has to finish with a scraper, because a plane tears up the grain in some kinds.

HASP. The hasp is a hinged fitting passed over a staple and secured by means of a padlock or other fastening. The usual pattern comprises a sheet of metal plate, to which is hinged the clasp, made from iron wire.

HASSOCK. From a remnant of carpet or felt a hassock, or round or oblong footstool, can be made at home and stuffed with shavings, the bottom being covered with coarse canvas.

HAWK. The plasterer's hawk is a species of board with a handle projecting vertically downwards from the centre. It is held in the left hand, to support the plaster or mortar when carrying it from the mortar board. The dimensioned drawings (Figs. 1-3) show how a hawk can be made.



HAWK. Figs. 1-3. Measurements and details for making board, wedge piece and handle

HAYBOX. A haybox for cookery can be made from a wood box, which is lined with seven or eight thicknesses of newspaper. A useful size, which will allow of two divisions, is about 22 in. by 15 in., and 15 in. or 16 in. deep. At the bottom of the box there should be an allowance of 6 in. for hay, and a minimum of 3 in. of hay at each side, and tightly packed. Above the pan it is necessary to allow 4 in. for a cushion filled with hay.

HINGES : How to Fit. When fitting hinges the pins must be true and in line. The flap should sit fair and square in the recess cut for it in the framework. This recess must be so shaped as to preserve the alinement of the hinge pin, otherwise the hinges will quickly bind and break away, even if the door can be induced to turn upon them. When hanging a door or a casement window, it should be placed in the frame and wedged up off the ground, the position of the hinges being marked on door and on frame, and from them the outlines of the hinges are marked upon both, squaring them off. A recess has then to be cut in the frame and in the door for the flanges of the hinges, which may be fixed temporarily in place. The door is then tried, and if all is correct the remaining screws are driven home. It is important, when screwing the hinges in their place, that the door be wedged up, otherwise its weight will cause the hinges to sink and the door will jam at the bottom. It is also important to see that the door is plumb and upright, or, in the case of refitting the door, that it fits closely against the door stopping.

To remove old hinges when the screws are rusted in is often troublesome. The difficulty may be met by tapping the hinge itself, especially round the parts where the screw-heads are countersunk. This will often free the head of the screw and allow it to be withdrawn. Paint should be chipped away or burned off with a painter's blow lamp, which will loosen the screws. When all else fails, the pins may be punched out and the flanges of the hinges chipped out with a cold chisel and hammer. Another plan is to drill out the heads of the screws and then cut them away with a countersink.

HONE. The word hone is often applied to an oilstone, which to a large extent it resembles, except that a hone is a finer-grained stone and adapted to the sharpening of the keenest tools. It is made from a block of compact stone having a smooth surface, or very fine grain such as novaculite. Other varieties are made from a soft, smooth, yellow slate known as German hone. The carborundum is made from the finest hand-washed abrasive powders, and produces a very keen edge. For general instrument sharpening the carborundum is good ; for razor work the yellow, or Belgian rock, hones are preferred.

HORSEHAIR. This is the best stuffing material for furniture and mattresses. Very little is obtained from England, the greater proportion used in the upholstery trade in Great Britain being imported from the Continent, China, the Argentine, Australia, etc. It is the shorter hair that is used, and of this there are several qualities, judged according to springiness, length and curl. The curl, or spiral form imparted by the manufacturer, emphasizes the buoyancy which makes horsehair so valuable in upholstery. Adulteration with other hair often takes place.

Besides its resiliency, horsehair is light in weight, and when made up with skill it enables furniture to preserve its shape and comfort for many years. Even after half a century's use, when renovation may be essential, the horsehair stuffing can be reteazed or carded, and replaced almost as a new material. The cost makes it an expensive medium, but the buyer will be repaid by the comfort and durability of the furniture in which it is used, and by a good return of capital so spent in case of re-sale.

HOUSING JOINT. This joint is one in which the breadth and thickness of the one part is recessed into the other part of the two members, which together form the joint. The simplest example is found in the construction of a bookcase, where upright side pieces are grooved across to receive the ends of the board forming the shelf.

To make the plain joint for a bookcase, the end of the board for the shelf is first cut square across, the ends planed up true, and any ragged parts rubbed off with sandpaper, or preferably left clean from the plane. The depth of the groove is marked on each edge of the upright with a marking gauge, and the exact width of the groove scribed across the face of the upright with a sharp cutting point. Two saw cuts are made with a tenon saw, keeping very closely to the lines made with the scriber, and the material between the saw cuts is removed with a chisel, working first from one side and then from the other, and levelling the bottom of the groove with a router. The board should fit tightly into this groove and may be secured with glue, by screws from the outside, or by fine nails driven from the inner angle.

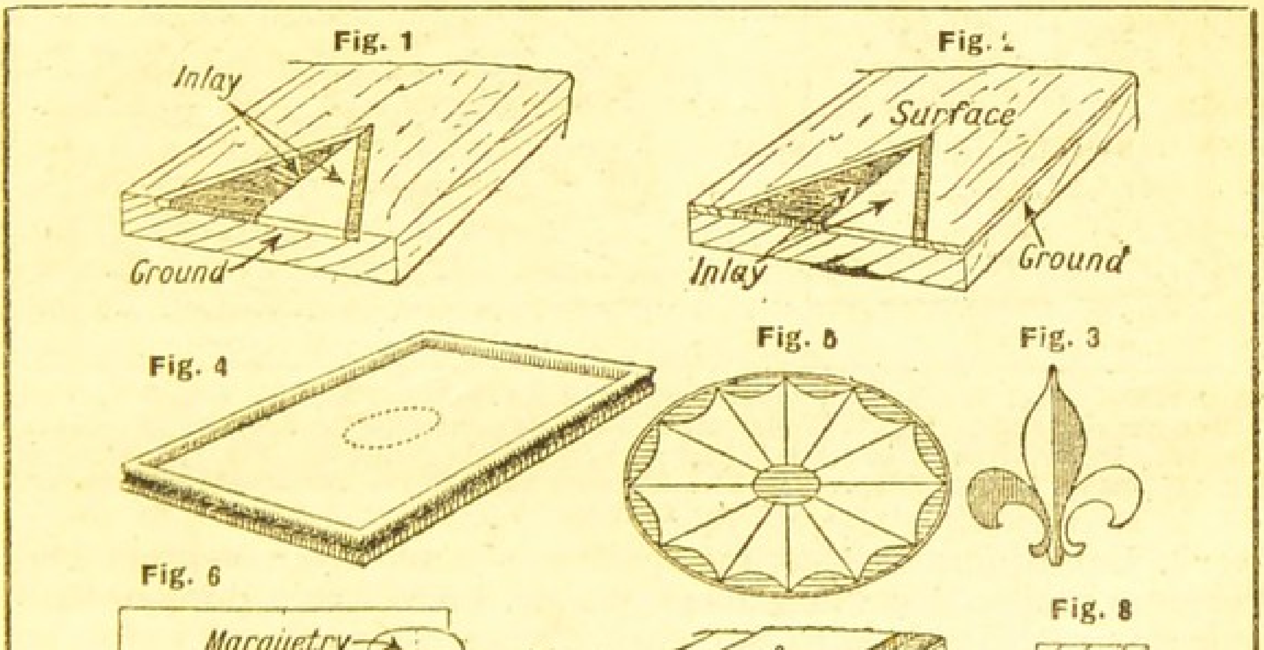
INLAYING: THE ART EXPLAINED

A Pleasing Decoration for Pieces of Furniture

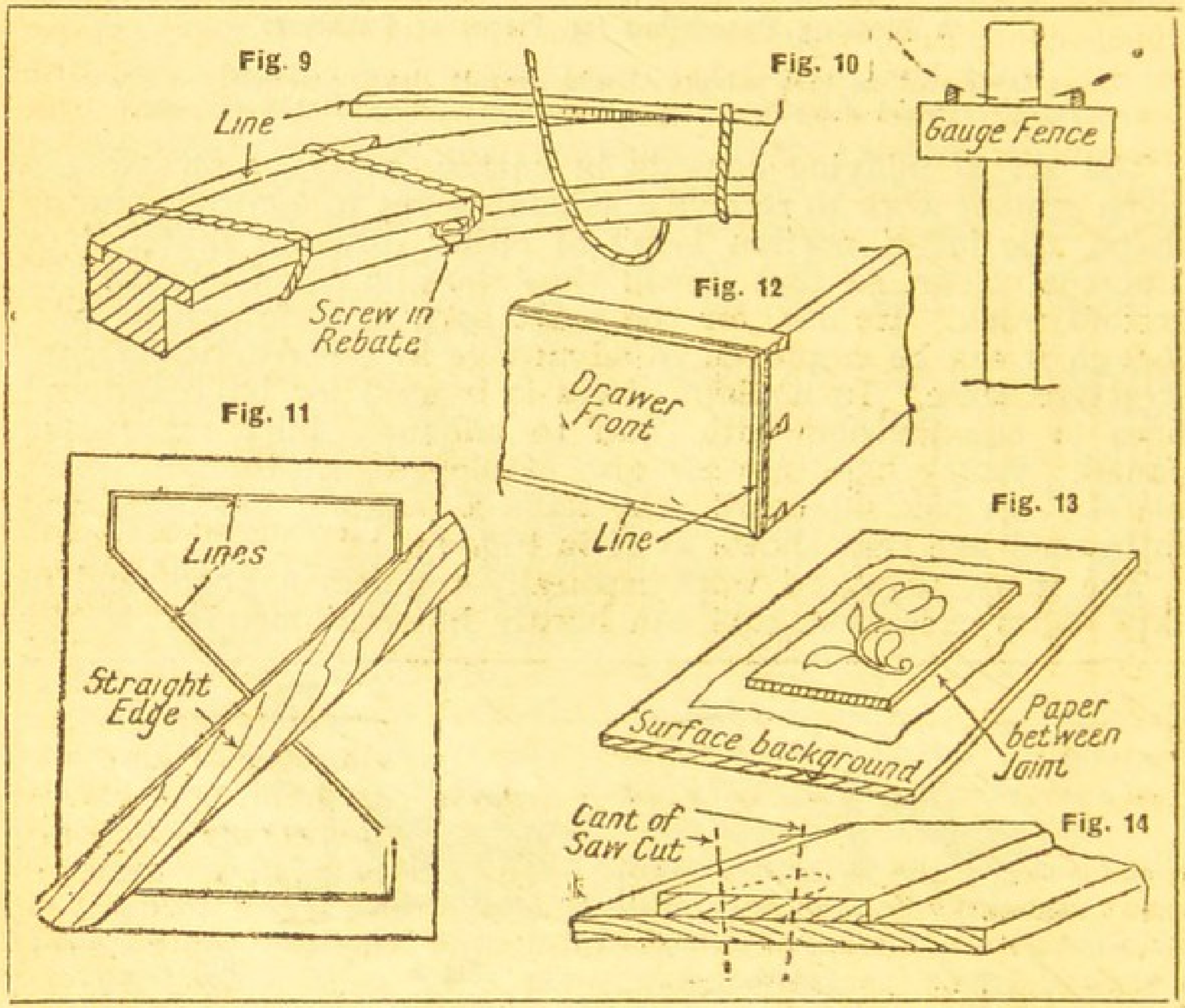
Those interested in this subject should consult also the articles on other forms of wood decoration, e.g. Fretwork, Graining, Marquetry, etc.

The art of inlaying consists in cutting away or recessing a given ground work to receive a substance cut to a corresponding shape, the inlaid portion being of either different material or different colour, so that it will thus show in relief against the ground work. Its use, for the main part, is a decorative one, though it can be employed to advantage in a theoretically constructive sense. In modern pieces it is used for bandings and lines in combination with, and to enhance, inlet marquetry panels. Fancy bandings are also employed on otherwise plain pieces; an oak sideboard may have a banding in ebony and satinwood like that shown at H in Fig. 15.

The more advanced work naturally requires a good deal of skill in its execution, and can hardly be recommended to the



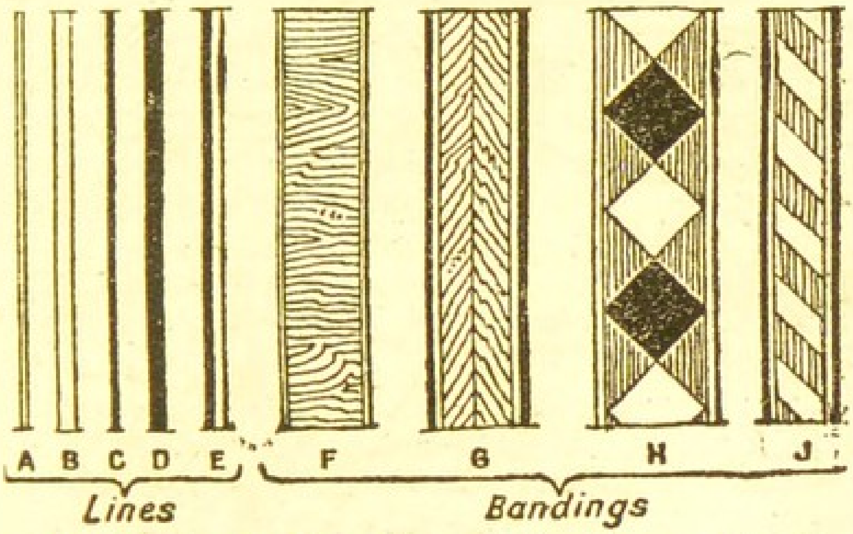
INLAYING. Fig. 1. Direct inlay. **Fig. 2.** Surface inlay. **Fig. 3.** Inlaid pattern in holly and ebony. **Fig. 4.** Mahogany tray ready for central inlay. **Fig. 5.** Sheraton ornament for tray. **Fig. 6.** Method of marking position for inlay. **Fig. 7.** Edge removed for a wide banding. **Fig. 8.** Use of cutting gauge for inlaying lines at edge amateur as a branch of work within his range, but among the more simple types of inlaying there is a great deal of scope, and there is no reason whatever why he should not make his work more interesting by decorating it with a simple form of inlay. The methods employed in inlaying may be roughly divided under two headings, that of inlaying a given ground, and that of applying a surface piece, already inlaid, to a ground work. This latter is in many respects similar to the method employed in marquetry



INLAYING. Fig. 9. Method of binding in glued lines. **Fig. 10.** Gauge for use with a circular edge. **Fig. 11.** Method of using straight edge for diagonal line inlays. **Fig. 12.** Drawer front with inlay to prevent veneer from chipping. **Fig. 13.** Marking out pattern for surface inlay. **Fig. 14.** Showing angle of saw cut in making a surface inlay

work, but differs in that marquetry is made from veneers and requires a special cutting arrangement, known as a donkey, and is cut at a right angle to the work; whereas in the method to be explained here a surface measuring anything from $\frac{1}{16}$ in. to $\frac{1}{4}$ in. thick is required and is cut at a different angle. Figs. 1 and 2 show the two methods employed to give the same effect. Fig. 1 being inlaid directly in the ground, and the other formed on an applied surface. The former is the inlay proper, and is often the only method which can be practicably employed.

SIMPLE INLAYING. Fig. 3 represents an inlaid pattern of holly and ebony for an oak ground. The design should be first carefully drawn full size on a piece of paper and an indication made of which portions are to be in holly and which in ebony. The shape of each inlaid portion is then marked out on the corresponding pieces of wood for inlaying (these being about $\frac{1}{8}$ in. thick) by means of carbon paper, and carefully cut out with a fine fretsaw; all the pieces are assembled on the drawing and fitted together, care being taken to get close joints. Any straight joints may be trued up with a plane, while for the shaped parts a spokeshave or rasp will be useful. They are then all glued to the drawing and together, and another piece of paper glued to the other side, the whole then being laid between two flat boards and cramped and allowed to set. When dry the drawing is stripped off the back and any surplus glue cleaned from off the edges, and the inlay placed in position on the ground work and scribed round the edges with a pointed tool. The ground is now cut away to a depth slightly less than the thickness of the inlay, to allow for cleaning off. This is done with chisels and gouges and must be as clean as possible, the bottom of the recess being perfectly flat and equidistant from the surface all over. In the larger portions this is better accomplished by using a router plane. The inlay should next be made perfectly flat on the underside; the best way to do this is with a toothing plane, which not only levels the work, but makes a series of fine scratches which enable the glue to hold better. It may then be glued in and cramped and left to set for as long as possible, and then cleaned off. If insufficient time is allowed in the setting, it will be found that the inlay will sink.



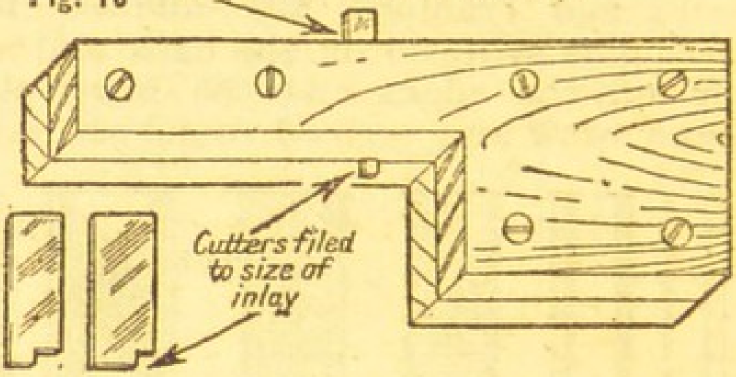
INLAYING. Fig. 15. Lines and bandings employed

The same method is followed when it is desired to inlay a piece of marquetry in a solid ground, such, for example, as Fig. 4, which shows a mahogany tray the centre of which it is desired to inlay with a Sheraton ornament, as Fig. 5. These can be bought cut in the form of marquetry.

To begin, the two axes are marked on the oval, and the corresponding centre lines on the tray. These will give the exact position for the oval (Fig. 6). It is then proceeded with as before. It will be found that the marquetry has a piece of paper glued on one side; this must face upward so that the glue will grip the plain wooden side. Glue the inlay in position and heat a flat block of wood large enough to cover the inlay, and cramp this down on to the inlay with a piece of paper between to prevent the block from sticking to the work. The heat of the block will thus re-liquefy the glue and allow the inlay to be pressed right down.

Bandings and Lines. Bandings may be made by the worker, but they can be bought quite cheaply. They are made in great variety, some being shown in Fig. 15. For the inlaying of these a special tool is required known as a scratch. This is easily made by the worker and is of the form given in Fig. 16. A block of wood is cut in two and then screwed together again, so that the two pieces may be loosened at will. Steel for the cutter is then filed to the width of the inlay (a piece of an old saw blade will do), inserted between the two parts of the scratch at the required distance from the shoulder, and the screws

Fig. 16



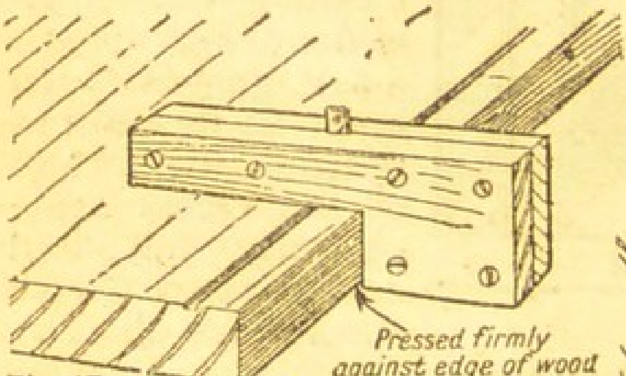


Fig. 17

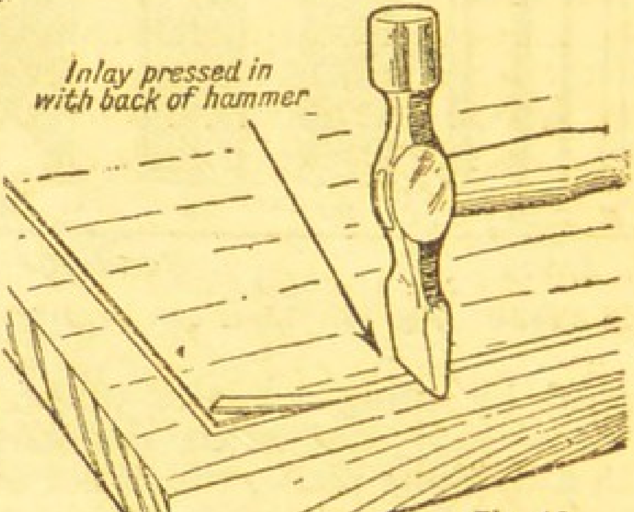


Fig. 18

INLAYING. Fig. 16. Home-made scratch for making groove; the steel cutter is filed to the width of the inlay to be used. **Fig. 17.** Making the groove in which the inlay fits. **Fig. 18.** Fitting in the inlay by pressing with the back of a hammer

tightened. To use it the shoulder is kept tightly up against the edge of the work and worked up and down (Fig. 17). When working across the grain it will be found advisable to cut in the two sides of the groove with a cutting gauge or chisel to prevent the wood splitting up.

For wide bandings to be put round the edge it will be found better to cut round with a cutting gauge and then remove the surplus, as in Fig. 7, with a bull-nose or shoulder plane; while for a line to be put at the edge, a gauge may be used on both edges (Fig. 8). The bandings are glued in and pressed well down with the back of a hammer (Fig. 18). In a rectangular shape the corners are mitred. When two lines cross, put the narrow one in first, and scratch the other across it when dry. To put a line round a circular or oval ground such as a mirror frame, the edge is gauged round to form the rebate for the line, as is shown in Fig. 7.

When glueing, put a screw in the inside of the frame and tie a piece of fine string to it and then put in the line, glueing a little way at a time and binding the string round as you proceed until the starting point is reached, when the line is cut off, as in Fig. 9. The joint in an oval should occur in the flattest part of the shape so that the line will not be so apt to spring out. The string, having been damped, will pull the line in tighter. It is then cleaned off in the usual way.

When inlaying a line a little distance from a circular edge, a good plan is to use a gauge having two projections fastened to the fence, as in Fig. 10, to keep the gauge held rigidly in the correct position.

When a line or banding has to be inlaid in such a position that it is not possible to use a gauge or scratch from a parallel edge, as in Fig. 11, a straight-edge should be held down in a line with the required inlay, and the groove scratched out with a narrow chisel or bradawl the same width as the inlay, while for shaped inlays a template of the shape is cut, and this used as a fence against which the tool may be worked, or in the event of the shape being a circular curve it is sometimes better to file one of the leg points of a pair of dividers for a cutter to the width of the groove and use these, the other leg acting as centre. This is only practicable when the shape is a quick one. It is sometimes necessary when glueing the line to steam it to render it sufficiently pliable to bend round a quick shape. In all cases of lines or bandings use the glue as hot as possible, work in a hot room and proceed with it quickly. (*See* Plate 14.)

An example of inlay not used for a purely decorative purpose is in the case of a veneered surface, when an inlaid line is put across the grain at the end to prevent the veneer from being chipped off, as in Fig. 12; drawer fronts are often treated in this way, being liable to catch.

Applying an Inlaid Surface. The other method of inlaying, i.e. that of applying the inlaid surface, is done as follows: After making the drawing on paper, the ground is prepared, planed perfectly true, and toothed. Now take the surface background and mark roughly the limits of the inlay, i.e. the extent of ground it will cover.

Next prepare the wood for the inlay the same thickness as the background, and with thin glue and with paper in between apply it to the background in a position to cover all the inlay. When dry, mark out the design from the drawing with carbon paper (Fig. 13 shows the two pieces marked out), and with a fine saw cut round the design, holding the saw tilted at a slight angle so as always to undercut the inlay, as in Fig. 14. The tilt of the saw must be always in the direction of the inlay, so that when this is put in position a close joint will show. Having cut the pattern the two thicknesses are separated, the paper removed from the underside of the inlay and the two portions tried together. They are then glued down on to the ground, cramped between two flat boards and allowed to set, and, when dry, cleaned up in the usual way.

Fig. 15 shows some lines and bandings used in inlaying. A and B are lines usually made of either box or satinwood ; C and D, of ebony or of a cheaper wood stained black to represent ebony. E is a combination of the two. F, G, H, and J are bandings made in various fancy woods, such as kingwood, rosewood, tulipwood, etc. The lines at the edges are not only decorative but strengthen the inlay, binding the whole together.

INSERTION, in Needlework. An insertion is a narrow strip of lace with identical edges on both sides, which distinguishes it from a lace border.

The original use for an insertion was to join two pieces of material together, as its French name of entre deux, that is, between the two, implies. It is let in or inserted into a whole piece of material, by hemming on the right side of the ground material, and cutting away the latter and hemming it at the back of the insertion, so that the design of the insertion is transparent. Knitted and crochet insertions are used for trimming teacloths and all kinds of house linen, as they are made to match the border design. Torchon and other hand-made insertions are also used for house linen, while for fine baby linen and children's underwear embroidery insertions are made.

INTARSIA. This is a way of inlaying wood which is now practically identical with marquetry. Originally intarsia was the inlaying of one or more colours upon a lighter or darker ground, while marquetry proper is composed of pieces of thin wood or other material of equal thickness laid down upon a matrix and fastened with glue.

IRON. Iron in its simplest form is known as wrought iron, and is obtainable in large sheets, and round, squared and flat strips, or bars, angle irons, or " L " shaped section bars, and similarly in " T " shaped and other various sections. This strip iron is used for packing-cases, being known as hoop iron, and also used in a similar way for securing the staves of a barrel.

Wrought iron can be welded or brazed without difficulty, and in addition can be drilled or cut with a hack saw. It is inferior to steel, both as regards strength and the ease with which it can be turned in a lathe.

Iron, when melted and poured into a mould, is moulded to most intricate shapes, and is then known as cast iron, being used in this form in the making of innumerable articles ; but, as it necessitates a high temperature to melt it, the process of making iron castings is scarcely practicable to the amateur.

ITALIAN RENAISSANCE WORK

Modern Simplified Form of an Interesting old Artcraft

The articles on Gesso and Lacquer work should be consulted in connexion with this craft, as there are points of resemblance in methods and materials employed

This form of ornament is not practicable on metal or glass, but can be used on wood, papier mâché, and even cardboard. As the paste fills in cracks and dents, it is an excellent method for re-decorating a wooden box or blotter, or for book ends which have become shabby. It is also largely used for decorating white wood articles, which are obtainable in great variety in most good art departments, together with the materials required for this work.

If the article to be decorated is old, it should first be thoroughly cleansed with soap and water and dried. A wooden surface, if smooth, may be sand-papered quickly and just sufficiently to roughen it. A coarse sandpaper should be used, or the surface may be scratched up with a pointed instrument.

ITALIAN RENAISSANCE WORK.
Blotter and box

METHOD AND MATERIALS. A small box is a simple article to begin experiments with in this craft, which is an ideal one for quickly making decorative objects for a bazaar stall at little cost. A special form of paste, called renasco paste, is employed for the raised decoration. It is easier to apply than barbola paste, which requires expert modelling to obtain good results, or than gesso, used for lacquer work, which requires to be exquisitely smooth. Decoration may consist only of the raised paste work done in conventional scrolls all over the article with a spoon-shaped modelling tool supplied with an outfit. Practice is required, but the work in its simple modern form is especially suited to those who cannot draw or paint.

More effective work is done by utilizing a panel as shown in the illustration of finished work. Such panels may be original designs drawn and painted by the worker, in which case the craft may be raised to the standard of an art, or a picture may be cut out and glued to the article and coloured with barbola colours. Photographs and picture postcards can be used, and tinted with transparent oil colours. The panel on the blotter is a photograph of a well-known picture ; those on the tea caddy were cut out from a painting book.

The materials required, besides the paste, are tubes of vandyke brown, emerald green oil colours, yellow, blue, crimson and mauve barbola colours, a special medium and turpentine, gold and silver bronze powders, a sable, a fitch and a hog hair brush, one or two modelling tools, china saucers for mixing colours, and other bronze powders and oil colours which may be needed for a particular piece of work, and are obtainable separately. Metal glue is the best adhesive for sticking on panels and strips of cardboard which may be utilized to form a raised framework round the panel, and should be affixed before the renasco paste is applied. Such a framework has been used to surround the photograph panel on the blotter.

The space which the panel will fill must first be decided on, and then the design must be drawn, traced, or the photograph, card or picture must be glued into place. Where it has been decided to decorate this panel design with barbola colours. portions of the design, trees, birds or figures can be slightly raised with the paste reduced with water to the consistency of a thin cream, and allowing it to dry before applying any colour. The actual painting of the panel is left until the remainder of the decoration is finished. While the panel is drying the rest of the article is covered with the paste, using a hog hair brush. Apply the paste unevenly, covering any strips of cardboard or of wood which may have been glued or nailed into position round the panel. The paste should not be allowed to spread on to the latter.

This first coating of paste is left to set for twelve hours, unless the weather is very damp, when it may take longer. For the second coat the paste is used of a consistency which, when the brush is raised, flows from it in sufficient thickness to make coils. Only the paste is allowed to touch the surface of the first coating, not the brush, which is kept moving in circles, figure eights, or leaf-like formations to form raised decoration. Scroll work design is done with a spoon-shaped modelling tool, instead of the brush.

Gilding and Colouring. When the second coating of the paste is dry, the whole article, except the portion reserved for the panel, is gilded and coloured. A squirrel hair brush is best used for this purpose. Gold bronze mixed with the special medium is painted over the paste ; when this gilding is dry it is, in turn, painted over with vandyke brown oil colour thinned with turpentine. This is allowed to dry for a short time, and then, with a piece of clean rag, the colour is reduced in places to give an antique look. A greenish shade may be obtained by mixing emerald green oil colour with the vandyke brown.

By the time all this has been done, the raised portion of the panel design will be quite dry. Barbola colours look well on this work as they are somewhat suggestive of the old tempera colours used for this form of decoration in the time of the Renaissance. Sable brushes are best for painting and water for thinning. As little shading as possible should be used, the colour being applied, except for details, in flat washes. When raising, the paste should be used more thinly than for the rest of the decoration. The object in the first case is to provide a smooth surface in very slight relief; in the second, a rough surface in bolder relief. For raising the panel design use a sable brush and twist it to avoid brush marks and to make the paste lie correctly. Instead of cardboard strips the framework round the panel can be formed by drawing the paste along and turning the brush while working. It is important to remove or raise the lids of boxes before applying paste. The edges can be trimmed with a sharp penknife when the paste is dry.

Candlesticks and wooden table lamps can be successfully decorated in this method. On the white wood blotter and tea caddy illustrated the panel pictures are merely coloured and no raising paste has been applied to them. After glueing on the panels a rubber roller should be employed in order to remove any bubbles which spoil the appearance of the work.

For the blotter thin strips of cardboard are glued round the panel to form the frame and the back of the blotter is gilded all over. Raised paste is not used for this as the back is required to lie flat on the table. A pretty effect is gained by mixing silver with the gold bronze powder for painting the paste and introducing a little vermilion and vandyke brown oil colours, wiping the latter off so that the metallic lustre is not lost. When the paste work on the front is painted, the photograph is coloured with transparent oil colours, using megilp as the medium for this decoration.

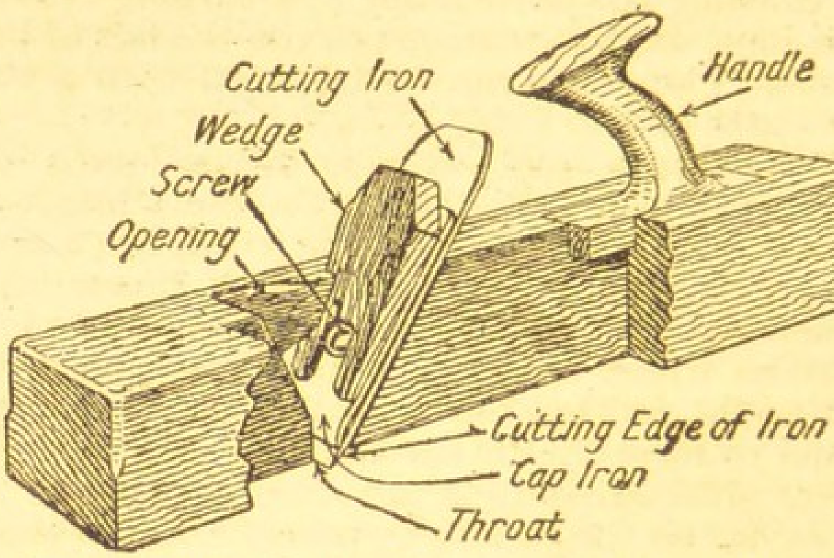
The white wood tea caddy is decorated with five pictures cut to fit sides and top. When these are firmly glued to the wood the box is covered with the paste. Opening the lid, do the sides first and the top last. Bronze powders are used to colour the paste, a good effect being gained with copper instead of gold, the brown oil colour being left only in the unraised portions. If picture postcards are used to decorate the box, they must be tinted with oil colours; if drawings or cut-out line illustrations, these can be worked up with barbola colours.

Many of the materials in the various handicrafts to which the reader is referred can be utilized to make variety of designs and colourings when the worker gains experience, and in this way original pieces are produced. Barbola work, for instance, in a floral design could be used instead of a panel, or for an edging of a box decorated with Renaissance work. Stencils can be employed when painting small panels at the base of candlesticks covered elsewhere with relief work.

JACK PLANE. This name is given to a type of long plane used to prepare the surfaces of timber. It is an indispensable tool for all workers in wood, as by its aid the rough and uneven wood is planed to a true surface.

Jack planes are made in several sizes, varying in width from 2 in. to 2½ in., and from about 14 in. to 15 in. or so in length. Most are made of beech wood. This type of plane is generally sold with an open or single handle, others have a try-plane type of closed handle, another variety has a single handle or horn at the front, but the most usual has the handle at the back, and this type is to be preferred for amateur use. They are to be had with a single or a double iron, the latter being preferable, as it is easier to use.

The iron is secured by a wooden wedge, which has to be removed to withdraw the iron for sharpening purposes. This is accomplished by grasping the plane in the left hand with the fingers on the face, and the thumb in the throat pressing on the iron; a blow is then struck on the top front of the plane; this is repeated if necessary, and releases the iron, which is then withdrawn, the two parts separated by unscrewing them, and the cutting iron sharpened on a grindstone in the usual way. The iron is replaced and secured by driving the wedge back into its place with a hammer.



JACK PLANE. Sectional drawing showing construction

JACQUARD. To produce large figured patterns such as are seen upon brocades, damasks, and tapestries, or to weave monograms and lettering into cloths, a special attachment had to be fitted to the loom. This mechanism bears the name of its inventor, and the goods woven are also described as jacquard.

The process is slower than ordinary weaving, making the goods more costly to produce.

The designs in Brussels and Wilton carpets, damask tablecloths, flowered bath robes and bath mats, are jacquard. In many fabrics jacquard weaving can be detected by the fact that the back and face of the cloth are a perfect replica, but in reversed colourings.

The name has nothing to do with the kind or grade of material, for silk, wool, cotton, and linen may all be woven by this means. Using fine enough thread and a sufficiently elaborate jacquard machine, portraits and coloured pictures can be reproduced quite successfully and faithfully in woven cloth.

JAPAN LACQUER. This is a liquid made of shellac, or some similar resin, metallic oxide, turpentine, and linseed oil. It is used to a considerable extent as a medium when grinding and mixing colours, and as a drier to hasten the setting and hardening qualities. It is reputed to have originated in Japan. Virtually a hard black varnish, it is applied as such, and dries with a glossy and smooth surface.

JOINERY: ITS GENERAL PRINCIPLES

The Choice of Materials and the Tools to Use

A knowledge of joinery is indispensable to those who wish to perform any woodworking operations.

Joinery is that branch of woodwork concerned with the preparation of the more ornamental parts of a building, and particularly the art of joining wood to form a strong structure, durable and pleasing in appearance. Joinery is allied to carpentry; but although many of the tools used are common to both, carpentry is, generally speaking, a rougher class of woodwork.

In addition to a knowledge of the various timbers in common use, it is necessary for the joiner to know the limitations of his material. Joinery becomes ineffective in general for three particular reasons: first, by warping or splitting of the material; secondly, owing to failure of the joint due to the expansion and contraction of the wood; and thirdly, as a result of the natural process of decay.

In good joinery all parts of the wood should be framed together in such a way as to allow for shrinkage or expansion, at the same time proportioning the thickness and breadth to prevent warping. Another point is that the work should be put together so that no end grain, or the minimum of end grain, is exposed to the weather. The end grain is the most liable to attack, because it virtually consists of a series of small pipes conducting moisture to the interior. To reduce shrinkage, all exposed parts should be as narrow as possible, this applying mostly to those members which happen to be framed up.

CHOICE OF MATERIAL. It is a counsel of perfection to specify that all material should be thoroughly seasoned; that the wood should be chosen from the heart of the tree, and that sapwood, the portion of the tree which surrounds the heartwood, should be rejected.

Wood employed in joinery comprises battens or scantlings, measuring from 2 in. to 7 in., boards ranging from 7 in. to 9 in. wide and up to 2 in. thick, and planks, that is, stuff wider than 9 in. Deal is the name given to sawn timber 9 in. wide and from 2½ in. to 4 in. thick. The name does not necessarily apply to yellow deal only, and the term is frequently used to distinguish different kinds of timber, though it properly only means any timber cut to the sizes specified above. Thus the name white deal is commonly used to mean spruce, because this tree is cut into deal for export. Quartering is another name by which certain sizes of sawn timber are known; it is applied to stuff approaching the square in section, as 3 in. by 3 in. or 3 in. by 2 in. All timber should be subjected to a second seasoning after it has been sawn into boards or planks, and from the joiner's point of view this second seasoning is the more important one.

A useful wood is American whitewood, which is obtainable in various widths and thicknesses and is free from knots. It is susceptible of effective treatment with stain and takes a good polish. Mahogany, walnut, and similar ornamental hardwoods are also employed, but for most work ordinary softwoods are used. Of these pine, particularly yellow pine, is the most serviceable for many purposes in the home.

For the provision of panels and all places where large pieces of thin boarding are required, a useful material for the amateur joiner is plywood. Its use saves much trouble in planing, and it has the added advantage of not being liable to warp or shrink when in position.

TOOLS FOR JOINERY. The tools required by the joiner include planes and saws, together with a good selection of firmer, paring, and mortise chisels, and firmer and scribing gouges of different sizes, brace and bits, hammers, pincers, and oilstone. A well-equipped workman will need a quantity of special planes, such as a plough, a fillister, rebate planes and beads, moulding and compass planes, hollows and rounds. Much joinery work is done by machinery. Accurate planing is done by thicknessing machines, moulding and beads are cut by formers, curves are cut by bandsaws, and mortises and tenons and dovetails are cut by special machines. The setting out of intricate pieces of work calls for skill and experience and the accurate use of the rule, square, and bevel, even if the work is partly done by the use of a machine.

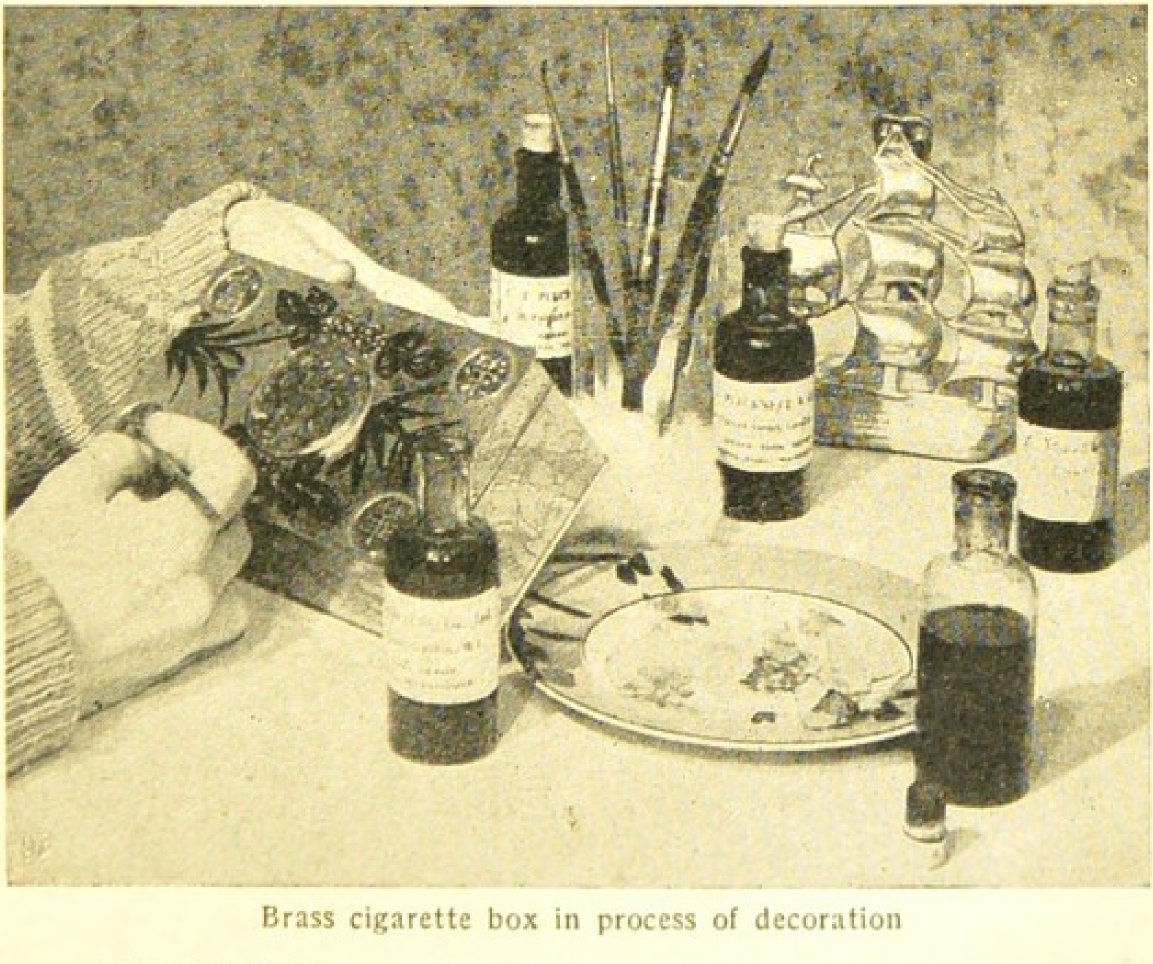
A solid work bench is essential, and should be about 6 ft. in length and 2 ft. in width. A heavy kitchen table provided with a bench top may be used ; but the best work requires a properly constructed bench provided with a strong vice.

The amateur woodworker who takes up joinery should commence by making a careful study of joints and the methods of making the various kinds. Many of these are specifically dealt with under their respective headings, and a general article on the subject follows the present one. Amongst them may be mentioned for special notice the housing joint, the mortise and tenon, the mitre dovetail, and the various classes of halved joints.

It is an excellent plan to begin by practising on a piece of softwood, and in this way to acquire some degree of skill in planing and sawing to a line, for it is little use trying to make even the simplest joint unless the wood is accurately planed, marked out, and sawn. The tools must be kept in the best condition. The plane should be sharpened and set to take a fine shaving. The saw should be sharp, and the thickness of the cut made by it noted ; neglect of this precaution will spoil a joint. Chisels should have keen, sharp edges, obtained by grinding and sharpening on an oilstone.

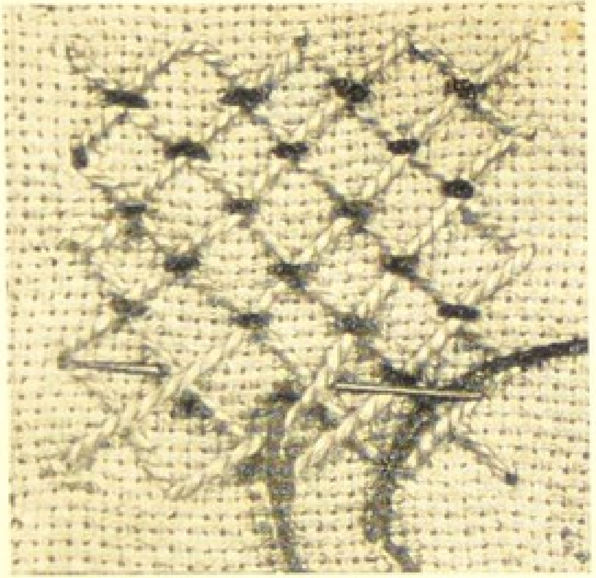
Care must be taken to guard against bruising the wood, for which purpose the use of a mallet is preferable to a hammer.

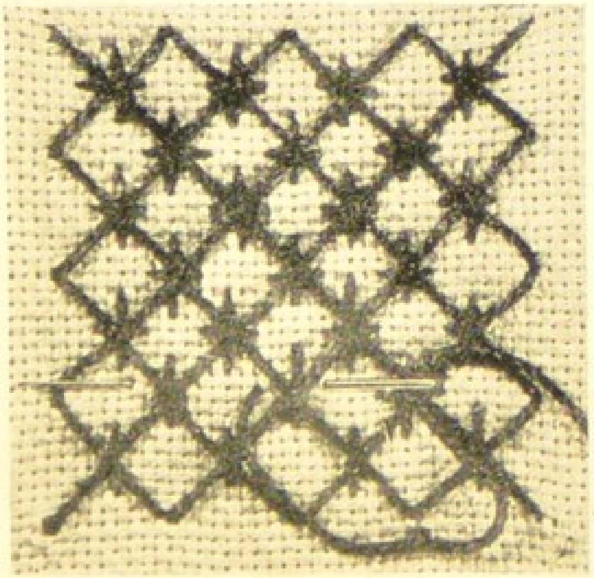
Examples of coloured lacquer work on metal

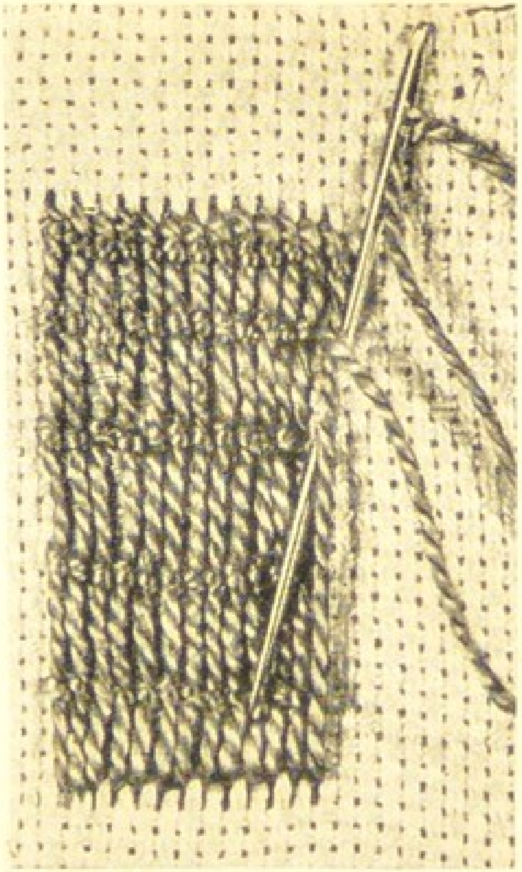


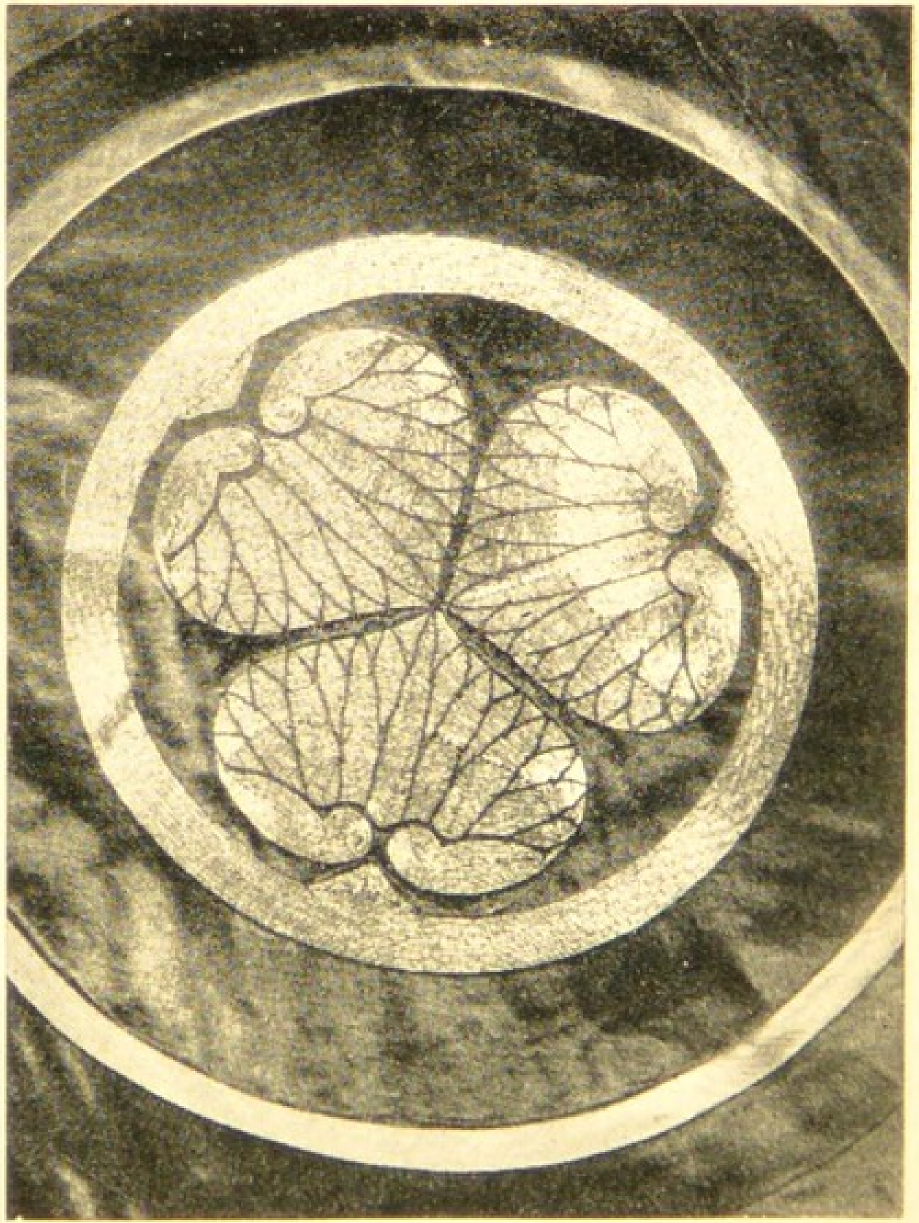
Brass cigarette box in process of decoration

MORE ILLUSTRATIONS OF THE LACQUER WORKERS' ART









LAID WORK. Top left. Showing how the small stitch is made at the crossing of laid threads in diamond stitch. Left. Diaper stitch, showing position of needle at the second half of the stitch. Above. Showing laid threads couched down with Oriental filling. Right. Satin cushion embroidered in gold thread

LAID WORK : SOME STITCHES AND THE FINISHED ARTICLE

When knocking the parts of a joint together, it is helpful to interpose a rough piece of wood between the mallet and the joint. It is also desirable when erecting the work to see that it does not come into contact with the tools, as if the wood is badly bruised it will be difficult or impossible to eliminate any defects that are made.

Generally the operations involved in joinery include sawing, planing, edge and end grain shooting, rebating, grooving, moulding and mitreing, in addition to the construction of joints and frames. The proportioning of panelling is an important part of joiner's work, as are the relation of the panel to the width of stiles, rails, and muntins, and the size and shape of the mouldings and beads, while the effect of light and shade on the surface calls for skill and experience. All joinery requires a good surface finish and neat, accurate joints. The latter are obtained by careful workmanship, and the former by diligent scraping and glasspapering and leaving the work in a suitable state from the plane.

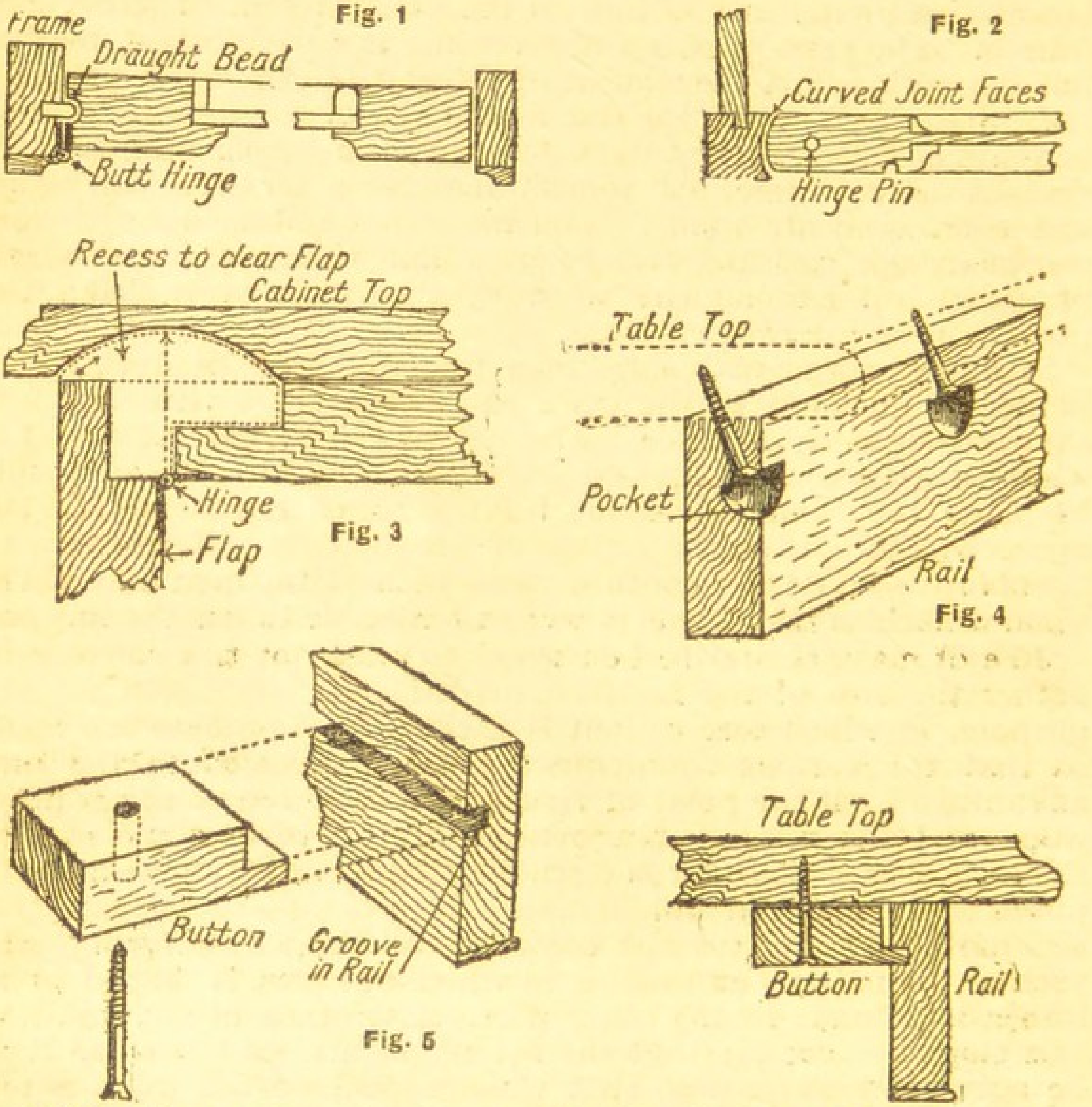
Scraping is done with a specially prepared piece of steel, which is held at an angle to the work and operates by removing fine shavings from the surface. The use of the scraper is essential when dealing with hardwoods, because it is almost impossible to plane the surface without leaving some marks. With the exception of knots on the surface of softwoods, it will generally be possible to obtain a smooth surface with glasspaper, but if the wood contains many knots it will be advisable to use the scraper.

JOINT. Joints are used in woodwork for one of two reasons. Either the size of the material available is insufficient for the purpose, in which case a joint is necessary; or joints are made so that the various components can be arranged to the best advantage from the point of view of the direction of the grain of wood and the relative proportions of the various pieces. In the former case the joint is often effected by simply glueing both pieces of the material and clamping them together while the glue sets hard. The second case comprises all those structural joints, such as the mortise and tenon, in which one part is shaped to fit into a hole made in the other part. Essentials of any joint of this character are (a) that the fitting surfaces of the wood shall be accurately shaped, so that when assembled the joint is virtually solid wood; and (b) that the one part is flat or true with the other, since a very small error in the shaping of the joint faces causes the one part to take a different direction relative to the surface of the other, with the result that the finished job will be distorted or in the state known as winding.

One of the simplest joints in woodwork consists merely of placing one piece of wood upon the other and glueing and screwing them together; or in the case of light work, sticking them together with an adhesive cement or glue. When these joints are effected by nails or screws, they are usually known as butt joints.

In constructional work, or when it is desired to effect a strong joint between two pieces that will be called upon to resist considerable strain, the joints are often effected by shaping the ends of the faces so that to some extent they interlock. They are further secured by means of nuts and bolts.

Still another series of joints is effected by cutting recesses or grooves to receive the other parts, and this series of joints is



JOINT. Figs. 1 and 2. Hinged and shutting joints in plan. **Fig. 3.** Internal hinging joint used in cabinet work. **Fig. 4.** Pocket screwed joint in part section. **Fig. 5.** Buttoning joint; right, sectional end view of assembled joint

generally known as housing joints. Dovetail joints are adapted to resist strain in certain directions, that is to say, the grooves or holes in the one part are so shaped that the leg or end of the other part can be pulled out only in one particular direction. There are many varieties.

A form of joint extensively used is that in which the one part, such as a panel, fits in a recess or groove in a frame. In the former case a portion of the edge of the framework is cut away, either with a cutting gauge or with a rebating plane, the space so cut away being known as a rebate. The joint is in this case effected by placing the panel in position and securing it with a bead or fillet. When the panel fits into a groove, the latter is produced with a plough plane.

Sliding joints are sometimes necessary in woodwork to provide for the shrinkage or expansion of the material according to the humidity of the atmosphere. These are all more or less in the form of a ploughed groove or a long slot of some kind, to hold the material from warping or twisting, but to allow it freedom of expansion and contraction in the direction of its greatest breadth. The jointing surfaces of wood may be secured by an adhesive, by nails, screws, bolts and nuts, pegs, and also by means of a variety of special fasteners, such as corrugated fasteners and drawbolt fasteners. To tighten up the joint surfaces, a commonly used plan is that known as draw-boring, in which a peg is arranged so that it draws the faces of the joint together very tightly.

Another class of joint includes the varieties known as hinged and shutting joints. In good-class work the joint is rebated and provided with a dust or draught bead, Fig. 1, and is then a combination of several joints. When a door is hung on a centre pin, the joint surfaces have to be curved, as in Fig. 2.

Many pieces of furniture are made with internal hinging joints, such as the section shown in Fig. 3, which shows how each piece of material has to be shaped to allow for the rise and fall of a flap, as in a bureau.

Among miscellaneous joints is the device known as pocket screwing, Fig. 4, which consists in boring a hole obliquely through the rail or similar part, and gouging out a recess or pocket in the side of the rail. This allows the screw to be inserted, and provides a flat surface for the head to bear upon. This device is used for fixing table-tops.

Another type of joint is known as cleating or clamping. It is simply a batten screwed to the separate parts to be joined together. Fig. 5 shows a buttoning joint, which comprises a rectangular block of wood rebated to fit into corresponding grooves formed in the rail or fixed part of the construction. The button or wood block is then screwed to the table-top or elsewhere, bringing it firmly into position. It is an excellent joint for fixing a table-top on to the side rails of the table. Slot screwed is another form of joint which is easily carried out and effective in use. It consists of cutting a slot through one of the parts to be jointed and securing it to the other with a screw.

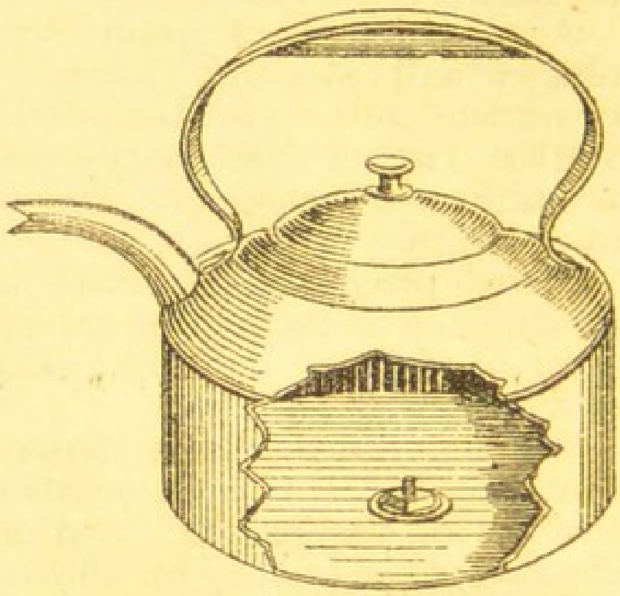
Dowelled joints comprise all those forms where the two jointing faces are flat, and kept in position by one or more pegs fixed firmly into one part, with a portion of the dowel projecting, which fits into the hole formed in the other part of the joint. The dowelled joint may be permanent or detachable, as desired.

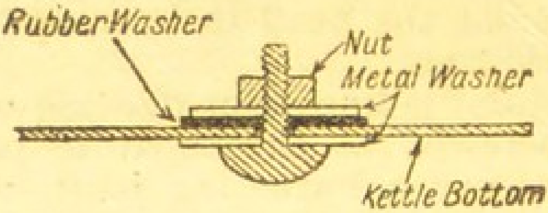
JOINTER. This term is used to describe two entirely different tools. In the one case it refers to a large plane, resembling a jack plane, used when planing the edges of boards preparatory to jointing them together. The bricklayer's jointer is composed of a cast steel blade, tapered at one end and having a handle attached at about an angle of 45° to facilitate its use. It is used to smooth or finish the pointing or joints between brickwork.

JOINTING RULE. This implement, used by plasterers and bricklayers, consists of a batten of wood about 5 ft. long, 3 in. wide and 1 in. thick, bevelled on one edge. It is used for floating or levelling the surface of plaster in the angle of a room, or for working the surface of a screed on a wall, or any other place where a flat surface of plaster is to be built up. It is also used by bricklayers.

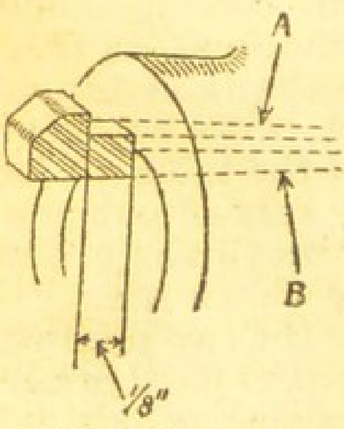
KAPOK. Vegetable down from the thistle and other plants, and used for stuffing cushions, etc., is known as kapok.

KETTLE, Mending a. Repairs to a leaking kettle generally entail the use of solder, but some leaks can be rectified without this by using a bolt, nut, and washers. If the hole is somewhere near the centre of the base of the kettle for instance, a bolt can be inserted with the head outside and a metal washer interposed. A rubber washer is then pushed on to the bolt on the inside, followed by another metal washer. The whole is locked by the nut which is tightened sufficiently to compress the rubber washer to make it leak-proof.





KETTLE. Simple means of mending kettle. Left, details of repair



KEY. Type generally used in general engineering

KEY. In engineering, this is the name given to the specially shaped piece of cast steel that is fitted into keyways cut to receive it on the shaft and the part that is to be mounted on the shaft and secured from turning. The key shown in the diagram is the type commonly used in general engineering. To fit this pattern the outer part is first driven home on the shaft with the keyways dead in line, and the key cut very slightly taper from the head on the faces marked A and B. This taper will be cut to correspond to the amount of taper already given to the keyways. The key when driven home with the hammer should protrude from the shaft, as shown, by not less than $\frac{1}{8}$ in. This point is essential, if trouble is to be avoided when removing the key.

If a key is allowed to become slack, movement will take place between the outer part and the shaft, which, through friction, will very quickly destroy the smooth faces of each, making repair a costly matter. If the keyway has become slightly worn a stepped key can be fitted.

KEYHOLE, Cutting a. This operation can easily and quickly be done with the aid of a small brace and bit and a keyhole saw. The correct position for the keyhole should be found, this being done by placing the lock-case in position against the door, and passing a scriber or other convenient article through the keyhole in the lock-case, and marking its outline on the woodwork of the door.

Having obtained the correct position of the keyhole, the next thing is to bore a hole of a sufficient diameter to admit the keyhole saw. All that is now required is to cut around the marked outline with the saw. Generally the keyhole is covered by an escutcheon, that is, a metal flap, hinged to the wood or metal work, over the head of the keyhole, so arranged that it can either be lifted up or, as is more generally the case, pushed on one side. This should prevent draughts passing through the keyhole.

KNITTING: STITCHES AND PATTERNS

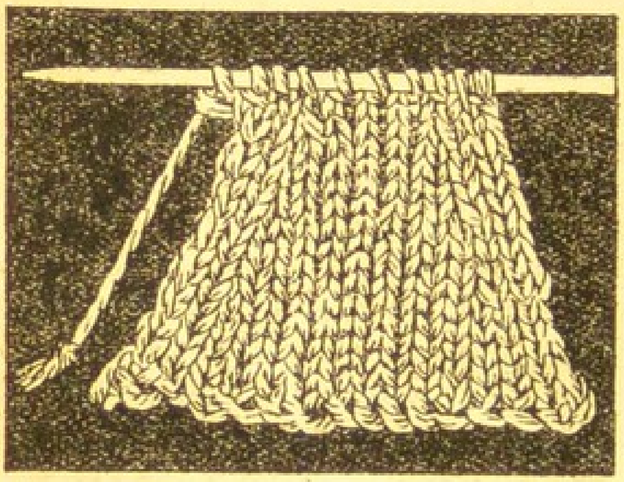
How to Obtain both Simple and Fancy Effects

Here we have a general outline of the principles of Knitting. See also the companion articles, Crochet and Needlework

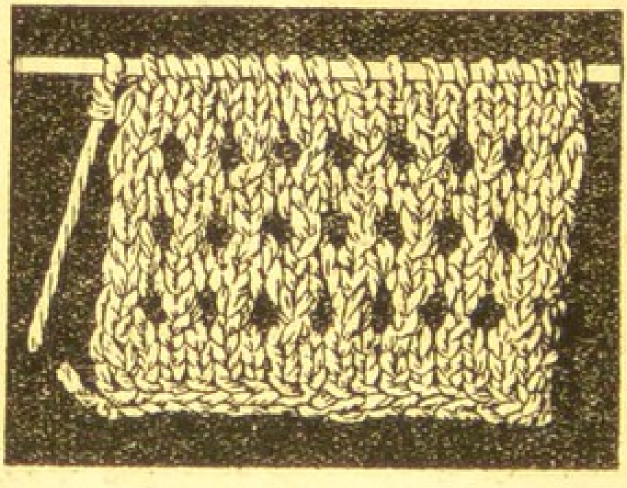
Knitting consists of loops or stitches formed by means of two needles when working a flat piece or four or more needles when working in a round. Through connecting the stitches in one continuous piece an elastic fabric can be produced. In its earliest stage knitting was practically limited to making stockings in a flat piece on two needles, which were afterwards sewn up; from this, knitting stockings in a round was evolved, avoiding the back seam, and fastening off at the toe.

The first process is casting on the stitches. Hold the short end of the wool in the left hand, take the main length in the right hand and pass the latter over the short end, so that it forms a loop. Bend the main length of wool under this loop, keeping the latter in position with the thumb and forefinger of the left hand, and pass it up through the loop so that it forms a complete stitch, as in Fig. 1. Pass this loop on a knitting needle and draw up the wool closely until the loop just fits the needle. Hold this needle in the left hand, and take the working needle in the right hand. Twist the length of wool round the third finger of the right hand, and allow it to pass over the first finger of that hand as the work proceeds. The tightness or looseness of the wool and the manner in which it is held over the third finger determine the tension of the knitting, and it is only by an even tension that good work can be produced. In working, the stitches should be kept near the points of the needles.

One stitch is now on the needle. To make further stitches, put the right-hand needle from left to right through the loop on the left-hand needle, pass the wool round the point of the right needle, bring it through the single loop, Fig. 2, and draw it out until it is long enough to pass it over the point of the left-hand needle, when another stitch will be produced. Continue this operation until enough stitches are on the needle.



PLAIN AND PURL STITCHES. To work the first row, now put the needle in the stitch from left to right, and pass the wool round the right-hand needle as described for casting on. Draw the loop through, and with the right-hand needle pass the first stitch off the left needle, as the new stitch now remains on the right needle. Repeat this action to the end of the row, and if these rows are continued little ridges will be seen on the work two rows making one ridge. Fig. 3 shows this stitch, known as garter-stitch, in progress. To make a neat edge on a piece of knitting, work the first row through the back of the loops.



KNITTING. Fig. 7 (above). Piece of plain knitting decreased at both ends. **Fig. 8.** Pattern resulting from made stitches with plain rows between

The next form of knitting is known as purling. This is used to produce the reverse side of the stitch, so that if stocking web is wanted and the work is being done on two needles, the back row must be purled. Put the right-hand needle through the stitch from right to left (Fig. 4), and keep the working thread to the front of the needle. Pass the thread over and round the right-hand needle and back to the front again ; then let the right-hand needle pass through the loop of the stitch, while the latter slips off the left-hand needle. Fig. 5 shows the second action, with the wool round the needle.

CASTING OFF. The chief method of casting off the stitches is shown in Fig. 6. Knit two stitches as usual, then put the point

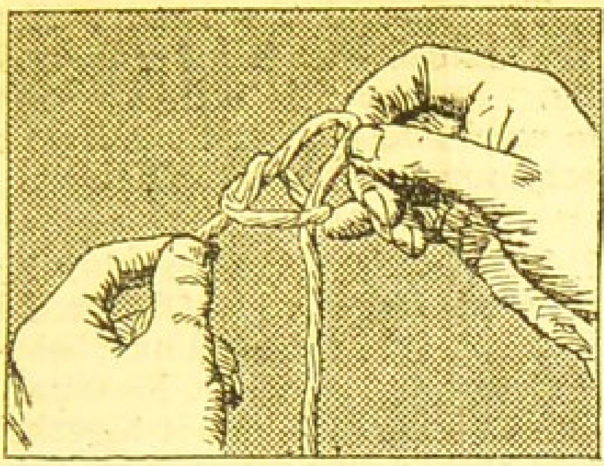


Fig. 1

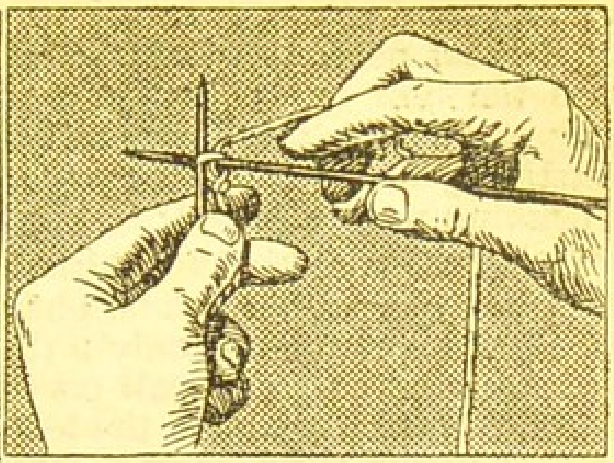


Fig. 2

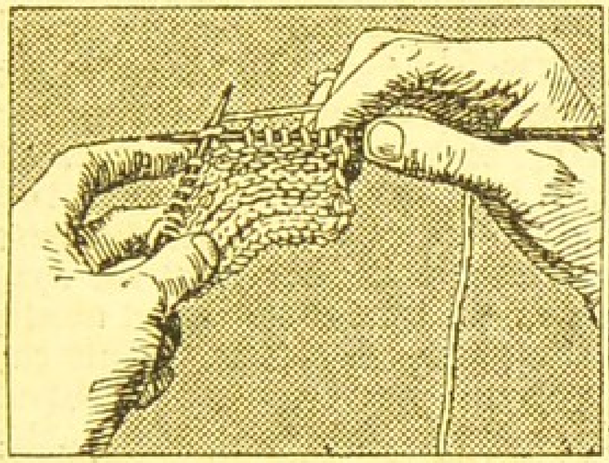


Fig. 3

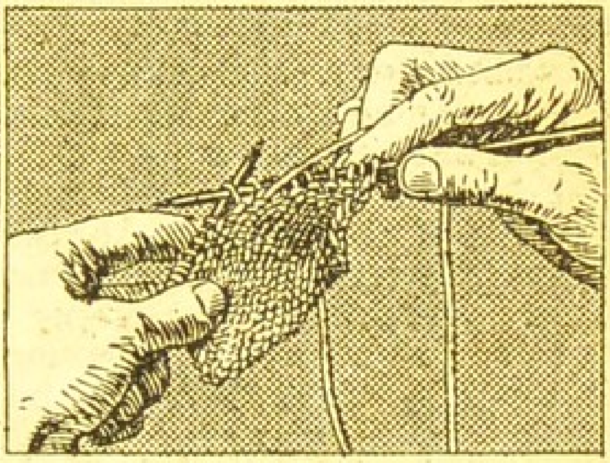


Fig. 4

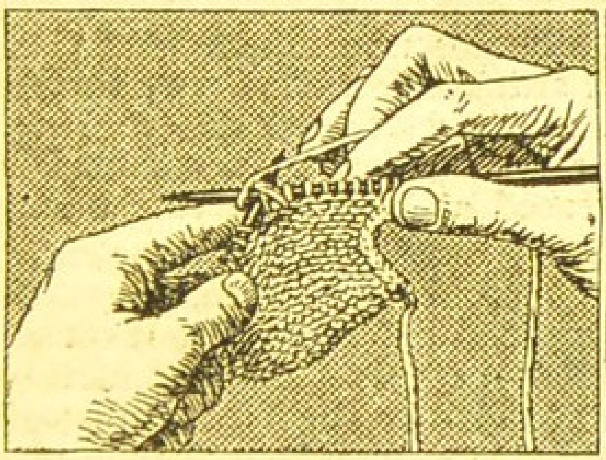


Fig. 5

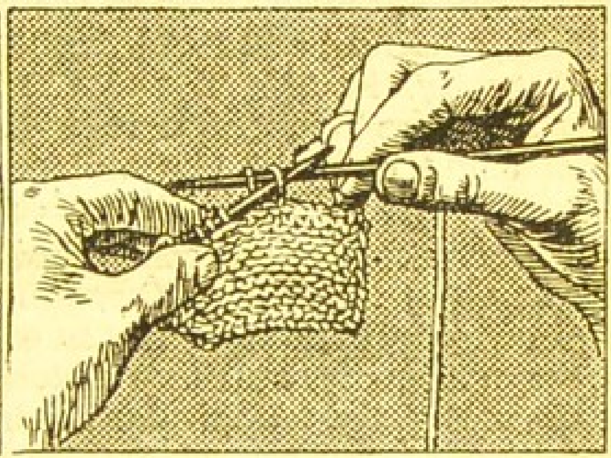


Fig. 6

Fig. 1. How to make the first stitch out of a loop in casting on. **Fig. 2.** Making the second stitch with the needles. The right-hand fingers regulate the tension of the wool. **Fig. 3.** Plain knitting, producing garter stitch, in progress. **Fig. 4.** Purl stitch, first stage, working with thread in front of needle. **Fig. 5.** Purl stitch, second stage, wool round needle. **Fig. 6.** Casting off

DETAILS OF KNITTING TECHNIQUE

of the left-hand needle, from left to right, through the first stitch knitted, and lift it over the second stitch and the point of the right-hand needle. Knit the next stitch on the left needle and pass the first one over the second. Repeat this until there is only one stitch left; then cut the wool and pass it through the remaining stitch, draw it up securely, and fasten in the end with a darning needle.

If a loose casting off is wanted, knit two stitches together by inserting the needle from right to left through the two stitches together instead of one only; then knit them in the ordinary way, when one stitch will result on the right-hand needle. Now pass this stitch back again to the left-hand needle and knit it together with the next stitch, and again pass the resulting stitch back to the left-hand needle, and continue to the end of the row, when a loose edge will be the result. This particular edge bears a resemblance to a cast-on edge as near as possible.

Increasing and Decreasing. The next step to learn is how to increase and decrease stitches for the purpose of forming a piece of knitting into a different shape, such as the leg of a stocking that has to be narrowed towards the ankle. There are two methods of decreasing. At the beginning of a row the decrease is generally formed so that it turns towards the centre of the row, thus: slip one stitch by simply passing it off the left-hand needle on to the right, without passing the thread round it. Knit the next stitch, when there will be two stitches on the right-hand needle, and lift the slipped stitch over the knitted one with the point of the left-hand needle. This is referred to as the slip, knit, and draw-over method.

If a decrease is wanted at the other end of the same needle, two stitches should be knitted together as described above, and these are usually the second and third stitches from the end, so that there will be one stitch to knit at the end after the decrease. Decreasing right at the end of a row makes an uneven edge. Fig. 7 shows plain knitting decreased at both ends of the row.

To increase, a stitch can be knitted into twice to make one extra. Knit in the usual way through the front of a stitch, then knit again through the back of the same loop before passing it off the left-hand needle, and two stitches will result. Another method is to lift up the loop under the first stitch on the left-hand needle and knit it; or knit one and purl one in same stitch.

A made stitch is used in fancy patterns to produce a hole, and usually a stitch is decreased directly after it to restore the balance of the stitches. To work a made stitch before a knitted stitch, simply bring the wool to the front of the needle, so that it passes over the latter when knitting the next stitch, and a straight loop results on the right-hand needle. When working the next row this made loop is knitted like an ordinary stitch, and a complete new stitch results. To make two stitches in this way the thread is passed round the needle twice, then when working the next row a stitch must be knitted and purled in the made loop, otherwise one of the made stitches will be lost. Fig. 8 shows an openwork design that is based on made stitches with plain stocking web rows between.

When knitting in a round for such articles as stockings or children's gaiters without side seams, the stitches must be divided equally on three or more needles, and a fourth one taken for the working needle. At the end of the round the wool must be drawn up very closely so that a gap does not occur between the needles, and when beginning a new needle put the latter in the first stitch of the next needle behind the needle that has just been worked, otherwise a little gap will appear at the beginning of every fresh needle, and this would produce a ladder right down a stocking. A flexible circular wire with points at both ends is often used for knitting jerseys and other tubular garments.

Ribbed knitting is used for the tops of stockings, hems and necks of jerseys, for sleeve edges, and for any position where contraction is required, as the ribs cause the knitting to fit closely. In the case of stockings that are ribbed all the way down, the welt, usually about 3 in. deep, is worked in a different rib from the rest of the stocking, generally a single rib of knit one and purl one alternately. Double rib is two knitted and two purled stitches worked alternately, and a variety of rib designs can be formed, including many broad ribs such as knit 5 and purl 2 alternately.

Joining Wool. In the course of a large piece of work, joining new wool or thread is sure to be done. When the first ball is getting near the end, stop when there is about 8 in. left, take the new ball and lay the two ends together, knit one stitch with the two ends, then knit the following stitches with the new and the old ball alternately. In knitting stockings or any round piece of work this join will be visible only on the inside of the work, so on a flat piece of work on two needles the join should be done on the right side of the work so that the alternate threads are passing on the wrong side.

Another method of joining is by twisting the new thread over the first as each stitch proceeds. Put the needle in the stitch of knitting, then, holding the end of the new ball down with the fingers on the left hand, pass the short end under then over the new wool, so that the latter is encircled with the old end, then use the new wool to knit the stitch. Twist the old wool over the new ball for about 12 stitches and leave the short end of wool to be sewn down afterwards. The only place in which a knot is allowed is at the end of a row when a fancy pattern is being worked, and which would be spoiled with an ordinary joining. If the knot is tied right up to the edge of the knitting it can be hidden when joining up the side seams. A knot is never allowed in stocking knitting.

To make a chain edge on a piece of flat knitting, the first stitch must be slipped purl-wise, and the last stitch should be knitted through the back of a loop instead of through the front in the ordinary way. This edge is used on the flap of a stocking heel, each chain being picked up afterwards when turning the heel to represent one stitch. It is also employed on the armholes of jumpers, and the sleeve stitches are picked up in the same way.

Double knitting is done on two needles, and is worked so that when the flat piece is completed it has two distinct halves that can be pulled apart like a bag, but they are caught all round the edges. It is a useful pattern for scarves where extra warmth is required, as stitches can be cast on for any width and the piece continued for any length. Two stitches are usually knitted single at the beginning and end of each row, so an even number of stitches should be cast on to begin with.

Knit one plain row, then proceed thus: Knit two stitches, bring the wool to the front of the needle, slip a stitch as if for purling, pass the wool back again, and knit the next stitch. Repeat these two stitches alternately to the end of the row, except the last two stitches, which are knitted plain to match the beginning. Continue this row for any length required, and it will be noticed that in the second row the slipped stitch is knitted, and vice versa, which thus causes the two distinct sides of the bag.

FANCY DESIGNS. Brioche knitting is a fancy rib, and for this the number of stitches cast on must be divisible by three. To work it, bring the wool to the front of the needle and slip one stitch purlwise; knit together the next two stitches, and repeat this alternate movement to the end of the row. Every row is worked in the same manner, and in succeeding rows the two stitches that cross each other are always knitted together.

Two-colour knitting is chiefly plain knitting using two colours of thread in the same row to form a design. Sometimes six colours or more are used in one design, but two are usually confined to one row, as the different colours have to be carried along the row during the work. The second wool which is not in use is held over the first finger of the left hand as for crochet, and in the first step it is passed over right-hand needle, before the working wool is passed over that needle to knit the stitch. This catches the spare wool in with the stitch. The second stitch is knitted in the ordinary way, but holding the spare wool on the left finger away from the stitch. The wool not in use passes through every alternate stitch, and is only slightly visible at the back.

When working coloured stripes in ribbing, say, at the hem of a jersey, one plain row should be worked with the new wool on the right side of the work each time the colour of the wool is changed. This plain row will sink in the ribbing and give the work a neater appearance where change of colour is effected.

GRAFTING. Two pieces of knitting can be joined together so that the join is quite invisible and quite flat. It is usually employed for finishing off the toes of socks and stockings.

In the case of a stocking toe the stitches would be equally divided on two needles, one being placed behind the other. The thread should be cut off, leaving about 18 in. hanging for a stocking toe, or longer, according to the number of stitches to be grafted together. Pass the thread into a darning needle and, beginning on the front row—that is, the row nearest to the worker—put the needle in the first stitch as if for knitting, pass the stitch off the needle and draw up the thread, but not too tightly. Put the needle in the second stitch as if about to purl, draw the thread through while this stitch is on the needle, and do not slip it off.

Go to the back needle and reverse the action. Put the needle in the first stitch as if about to purl, draw the thread through and slip this stitch off the needle ; put the needle in the second stitch as if about to knit, and draw the thread through, but do not slip the stitch off the needle. Repeat until all are taken off. The thread must not be drawn tightly.

The method of grafting described above can be memorized thus : knit and slip off, purl and keep on ; purl and slip off, knit and keep on. This includes the two needles.

Knitting Needles. Knitting needles are sometimes referred to as pins or wires. They are divided into two classes, steel needles, which are made in the finer sizes, and bone needles for the coarser sizes. The latter include aluminium, celluloid, ebonite, and amongst patent materials are silver and brass tubing coated with nickel silver.

Needles are numbered 1 to 10 on the bell gauge, which is the standard knitting needle measure.

Steel knitting needles are sold in paper packets in sets of four, and bone in pairs of two and sets of four, some with knobs on for flat pieces of work, and the sets with points at both ends for knitting round or tubular garments. Thicker needles can be bought in a variety of colours, so it is well to use dark needles for light thread and vice versa.

When buying bone needles they should be carefully inspected to see that there are not any flaws, as the tiniest chip will split silk and wool. When a flaw does occur it can be smoothed away with fine glasspaper. This also applies to the point of the needle, which should not be too sharp.

Wooden needles can be treated with glasspaper and given a perfectly smooth finish. Celluloid needles are always smooth, but should not be used for very heavy work as they bend easily. Aluminium needles soil light wool, and should be used only for dark materials ; those made from brass tubing coated with nickel silver are light in use, and do not soil the work.

Knitting shields can be bought cheaply for protecting the points of the needles when not in use. They are made in pairs attached by elastic. In shape the shield resembles a thimble, into which the needles fit.

Knitting Wool. All wools have a certain ply, whether it be 2, 3, or 4 ply, and so on, the word ply meaning the number of threads which compose the thickness of the wool in each case ;

but a 4-ply fingering produces a garment about half the size of a 4-ply thick wool, using exactly the same number of stitches and following also the same directions. There are numerous fancy wools on the market.

Fingering, which is the kind in most general use, is divided into Scotch, super-fingering, and the cheap varieties. All these are employed for stockings, children's dresses and coats, jumpers and underwear. The term Scotch fingering has nothing to do with the place in which it is made. The name should only be used when applied to such wools as are put up in skeins of certain definite yardage, so that the same length of wool is given quite apart from its weight.

Coming under the name of fingering, however, there are many 4-ply threads to which the name of Scotch fingering should not be applied, as they are shorter in the skeins, or contain fewer threads than 60 to 1 oz., the weight in which a skein of 4-ply fingering is made up. Cheap fingerings are harsh and do not give the same warmth or comfort in wear.

Vest wool is about the thickness of Scotch fingering of the same ply, 2, 3, or 4 ply, but it has a softer finish, being specially made for underwear. Unshrinkable vest wool is a common term, but a real unshrinkable wool is not possible to produce without injuring the fabric, as some of the most valuable properties of the wool would be extracted.

Double knitting is a 4-ply wool about twice as thick as 4-ply fingering, and similar in weight and thickness to a good wheeling, although of much better quality and appearance, as well as softer to the touch.

Shetland wool is the name of a very fine 2-ply wool, finer than 2-ply fingering, and receives its name from the Shetland Isles, where very fine shawls, underwear, and jumpers are made. Andalusian is the standard name for a soft 4-ply wool twisted in a similar manner to soft knitting wool, but finer in size owing to the twist. Sold in 1 oz. packets, it is used chiefly for children's garments and for socks.

KNIVES AND FORKS, Repairing. The handle of a carving or table knife may possibly become slack, and when it does it should be immediately seen to. If the blade can be removed from the handle, it will be evidence that the tang is broken, which can be seen by inspection, or that the holding pins have sheared or broken. If the latter is the case, carefully punch out from the handle the remaining portions of the pins, and do likewise from the tang, and test to see that it is straight and true. Next prepare some cement composed of melted resin, pour this into the hole in the handle, and having previously warmed the tang, insert it in place and hold it in position until the resin has set. Then drill out the resin from the pin holes and make them all secure with new pins of brass or German-silver wire. They only need a very slight amount of riveting in order to make them secure.

Xylonite-handled carving knives and forks frequently have serrated tangs, which are difficult, if not impossible, to remove. Other types have through tangs, which are often riveted on to a washer or cap at the end of the handle. This has to be removed before the knife can be repaired. A slight slackness can be taken up by further riveting the end cap. If the knife or fork is of rustless steel it will need especially careful handling, as this material is much harder and more prone to break while being repaired. Drilling is more laborious, and requires plenty of lubricant on the drill to keep it cool and cutting freely.

FORKS. An implement exists for cleaning between the prongs of a fork. It consists of a number of small spiral brushes mounted in a wooden surface, the brushes being so placed that they just fit in between the prongs.

The table fork seldom calls for more in the way of repair than a re-shaping of bent prongs, which are easily straightened out with a small hammer and a hardwood block. At the same time, the points may be re-sharpened, or re-shaped, with the aid of a small file. In both operations care should be exercised to avoid damage to the plate, should the fork be electro-plated, by hammering cautiously and lightly, and by only using the file in order to take off any roughness on the prong.

If the tang has been riveted and the rivet be broken, it merely requires a new rivet, and to load the hole in the handle with liquid cement immediately prior to inserting the tang in its place. If the tang is broken off at the rivet hole, as is often the case, the amateur will do well simply to refix the fork on to the handle by filling the hole in the handle, then pushing the fork into place, allowing it to set hard, and then drilling a small hole through the handle and the tang and securing it with a rivet.

The cement used may be composed of resin and white sand, or 6 parts of resin, $1\frac{1}{2}$ parts of beeswax, and $1\frac{1}{2}$ parts of plaster of Paris, dissolved by first heating the beeswax and resin, and then being stirred in the plaster until a thin, soft paste is formed. The tang should be warmed prior to inserting it into the cement-filled hole in the handle.

BROKEN GUARDS. Carving forks frequently suffer from a broken guard. Their repair depends upon the design. Generally a flat spring sunk into a recess formed in the fork keeps the guard in place. Should this break, punch out the old pin, while holding the fork over a suitable hole in an anvil or on a block of wood or lead. Then clean out the slot and remove the old piece of spring; obtain a new one to pattern, insert it, replace the guard, and grasp it in a vice or strong pair of pliers, using a piece of leather to prevent the fork from being scratched.

Then with the assistance of a piece of steel wire of appropriate thickness, previously prepared and pointed at one end, feel for the holes, drive the pin through, test the guard to see that it works properly, finally cut the wire off close to the fork at each side and slightly rivet up. Do not rivet the guard too tightly.

KNOT. A knot is a hard part of the wood occasioned by the growth of a small branch, which, by growing out at an angle to the normal grain of the tree, causes one set of fibres to cross the other, thus forming a hard spot, very difficult for the amateur to deal with.

When the worker purchases ordinary prepared timber which has already been machine planed, it will be found preferable to use it in that condition if the material is at all knotty, rather than attempt to plane it up. It is not always possible to do this, as the machined surfaces are not all smooth enough for the purpose for which the timber is required. In such a case, one course to adopt is, when planing, to set the plane iron very fine, so that it makes a very fine shaving, and to press it firmly upon the surface of the work, especially when planing over the knots.

By the observation of the run of the grain it may be possible to plane in a circular manner on and around the knot in different directions to that followed for the ordinary run of the grain ; if so this should be done first, so that a slight tendency to hollowness is produced in the region of the knots. The rest of the work should be planed afterwards. The usual trouble is that the knot, being very hard, makes the plane jump, and the knot is passed over with only a partial cut, instead of being brought down the full amount. Much the same procedure must be followed with chisels and gouges.

It may be as well, when a good surface is required, to cut the knot away bodily. In some cases, such as when the wood is thin, it will be found that the knot can be driven down through the wood with the aid of a small punch and hammer. If this is the case, the hole can then be enlarged with a twist drill, and plugged with a circular piece of wood which should be glued and driven in tightly. When the knots are running more or less with the surface of the timber, a recess should be chiselled out with the edges slightly undercut, and a new piece of wood cut and fitted into it with the grain running in the same direction as the rest of the timber. These pieces should be properly glued in and allowed to set hard. The timber can then be easily prepared.

Whenever possible, knots should be avoided by selecting timber that is not prone to this trouble, such as American whitewood, Californian redwood, beech, and similar timber ; these can be obtained in sufficiently large pieces to avoid the presence of a knot altogether.

Knots in Paintwork. In paintwork, the presence of knots is very objectionable, as they contain a kind of resinous material which may ruin the paint if not specially treated. For this purpose various compositions are prepared, known as knotting. This should be brushed over the surfaces of the knots, prior to the application of the paint, and when the knots are very numerous, two coats or more of knotting will be better than one. The surface may then be prepared in the usual way.

LACE MAKING BY HANDWORK

Practical Directions for Producing Exquisite Results

See also the entries on Crochet, Embroidery, Needlework, etc.

Hand-made lace is carried out in two ways, one with a needle and the other with bobbins. French terms are used in this craft. The pattern is known as the toile, the bars are called brides, the meshed groundwork is the réseau; the outlines to the edge of a pattern, made in strong thread or threads, are known as the cordonnet. The small loops are picots, and ornamental fillings are modes. Sometimes the réseau is a fine net to which the pattern is stitched down after being made separately. This lace is known as appliqué.

Fig. 1.
Full bobbin

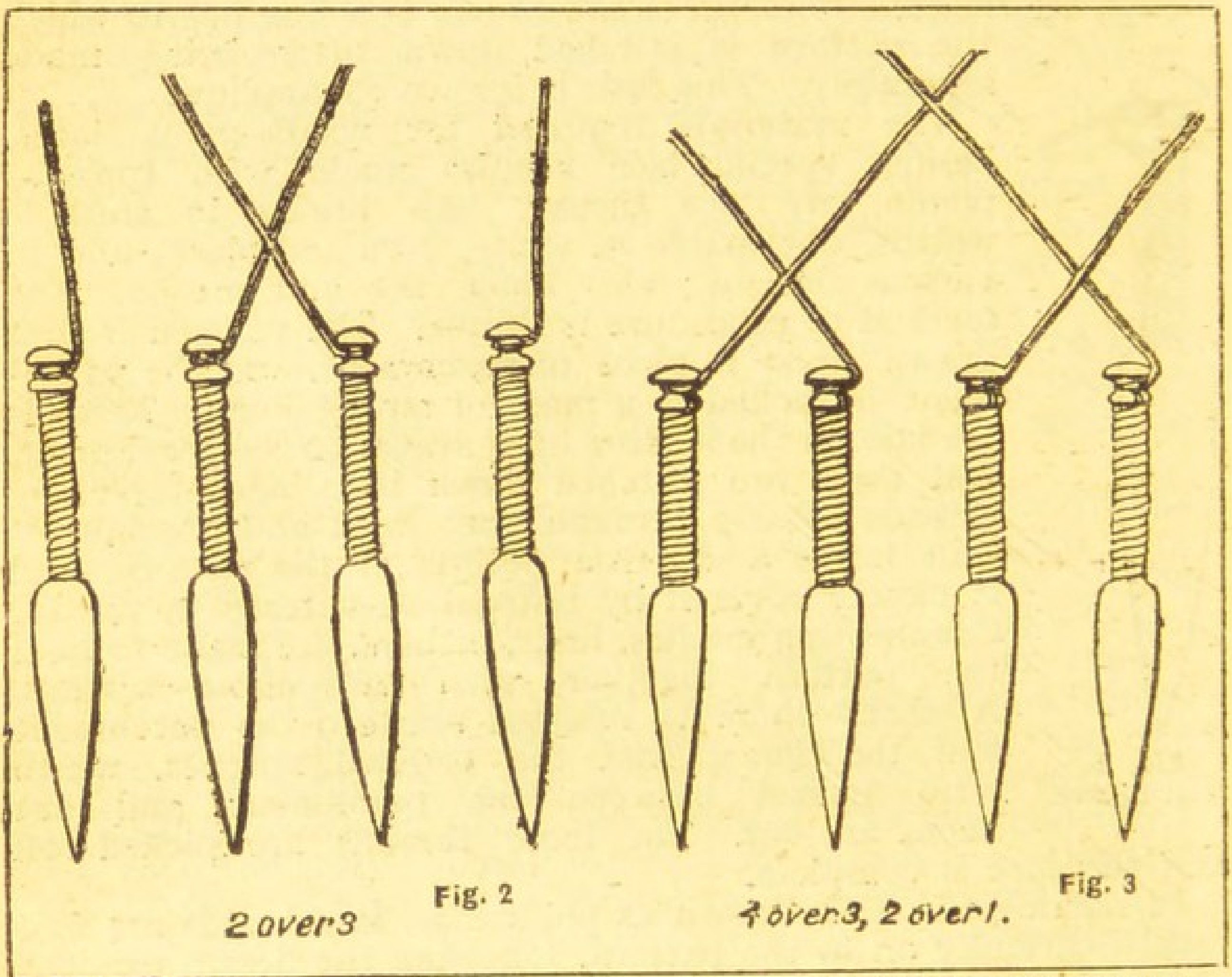
The materials required for needle-point laces, besides special lace needles made with rounded points, are lace thread, lace braids in suitable widths, obtainable in white, écru and black, and in various designs; also linen, net and muslin. The method of procedure is simple. The pattern is first drawn upon a piece of parchment, and the parchment is tacked to a piece of strong linen. Threads are laid on the leading lines drawn on the parchment, and these are stitched down here and there by threads passing through both linen and parchment. This forms a skeleton outline of the pattern, and is closely covered by buttonhole-stitches in thread. Connnecting meshes, links, or bars, are made to hold the pattern together with buttonhole-stitches. A sharp knife is inserted between the parchment and the linen, and the original stitches, which were passed between the parchment and the linen, are cut. The loose threads are picked off and the lace is complete.

In making the laces known as point lace, lace braids are first tacked carefully on to the pattern, following the design exactly. Patterns are obtainable ready drawn upon the linen. These point lace patterns are all drawn with double parallel lines, between which the braid is tacked on with small running-stitches. When the braid turns a curve it must be whipped on both edges and lightly drawn up to follow the form of the pattern exatctly Having tacked down the braid, the connecting bars must be cast. Secure the thread with a small buttonhole-stitch, pass to the opposite braid, and then return with a twisted thread to the place where the original small buttonhole-stich. was placed.

Other spaces formed by the braid may be filled with various needle-point stitches. There are about forty of these, and it is not within the scope of this article to give details of them, or for employing them in the making of modern reticella, Venetian.

and renaissance laces. The simplest braid lace is Bruges. This is made by tacking Bruges lace braids of varying widths into the selected design to form the pattern and whipping them into position. The spaces between the braids are then carefully filled. Sometimes a picot bar braid is used or, if preferred, the connecting bar threads can be plainly buttonholed with equally good effect. Having practised the handling of the braids and making the bars for this lace, it is worth while for the interested worker to purchase a book on needle-made laces.

The pattern in bobbin lace is made by twisting and plaiting the threads of linen, cotton, or silk. The design is selected first,



LACE. Figs. 2 and 3. Showing crossings of the threads to make the half-stitch

and is drawn on paper or parchment to form the patterns. It is then pricked with holes by a pattern pricker. This pricked pattern is fastened to a pillow, and serves as a guide in the disposal of the pins used later to guide the threads.

Some workers use a circular-shaped pad attached to a board, which can be rested on a table and moved about easily. Other lace workers use a well-padded pillow, flattened at both ends so that it can be held between the knees. Whilst the lace is being made it is securely pinned down to the pillow, which is covered with a stout but soft piece of cotton for the lace to rest upon during the process of making. The threads from which the bobbins hang are fastened at the top of the pattern, so that the bobbins themselves hang down over the cushion towards the worker and rest above the lace that is being made. Whatever form of pillow is chosen it must be firmly and evenly stuffed. Ready-made pillows are not expensive.

MARKING THE DESIGN. The design is drawn in ink on some strong, smooth blue paper. If the beginner finds it easier, she can have the design pricked on the paper, and even have a dot for every position where a pin must be placed later in manipulating the threads. The pins used by lace makers are smoother and more slender than ordinary pins; but the beginner can use large ordinary pins at first, and will need 4 or 6 dozen. Lace pins must be kept clean and free from rust, and a plentiful supply facilitates the work. Some workers dip the heads of the pins into melted wax, so that a little globule forms a bead at the head of each pin, and prevents it from slipping through the lace. It is a good plan to have a small pin-cushion with a tab, and to pin it securely to the lace pillow where it can be reached by the right hand when working.

Pricker, bobbins, and bobbin-winder have next to be considered. A pricker can be bought at any art needlework shop. A home-made pricker can be made by taking the wooden portion of an ordinary penholder, melting a drop of sealing-wax, and placing it on the end, and then embedding an ordinary strong but fine sewing needle in the wax while it is still warm and soft. The wax is gently pressed round the eye-end of the needle, and when it cools and sets it holds it firmly in place.

Bobbins of many shapes are available in wood or bone. The number needed depends upon the nature of the design. A beginner would need only about two dozen, but elaborate designs may require well over 1,000 bobbins. Each bobbin is like a little spool with a more or less elaborate handle. If the bobbins have any roughness or unevenness on their surfaces, it is advisable to rub them over gently with fine sandpaper, as the threads used in lace making are so fine and so easily broken. When the bobbins get dirty, they can be washed in a warm, soapy lather, but they must not be used to hold thread again until thoroughly dry.

A bobbin winder is not necessary for a beginner, but it saves time, especially if it has a skein-holder attached. It is very easy to soil the thread, so all handling must be avoided, and it is a good plan to wear white cotton gloves when winding the bobbins. Many workers wear also a white apron and over-sleeves to protect the lace.

MAKING BOBBIN LACE. Amongst the general rules for making bobbin lace is that it is important to work in a good light, preferably with it falling from the left. Directly the eyes feel tired, the work should cease for the time being. It is not necessary to look too closely at the bobbins, but the threads should be watched, as mistakes are then quickly noticed and put right.

The bobbins must be kept closely wound and are picked up lightly by the finger-tips, care being taken not to get them accidentally knocked out of place. Both hands must be used.

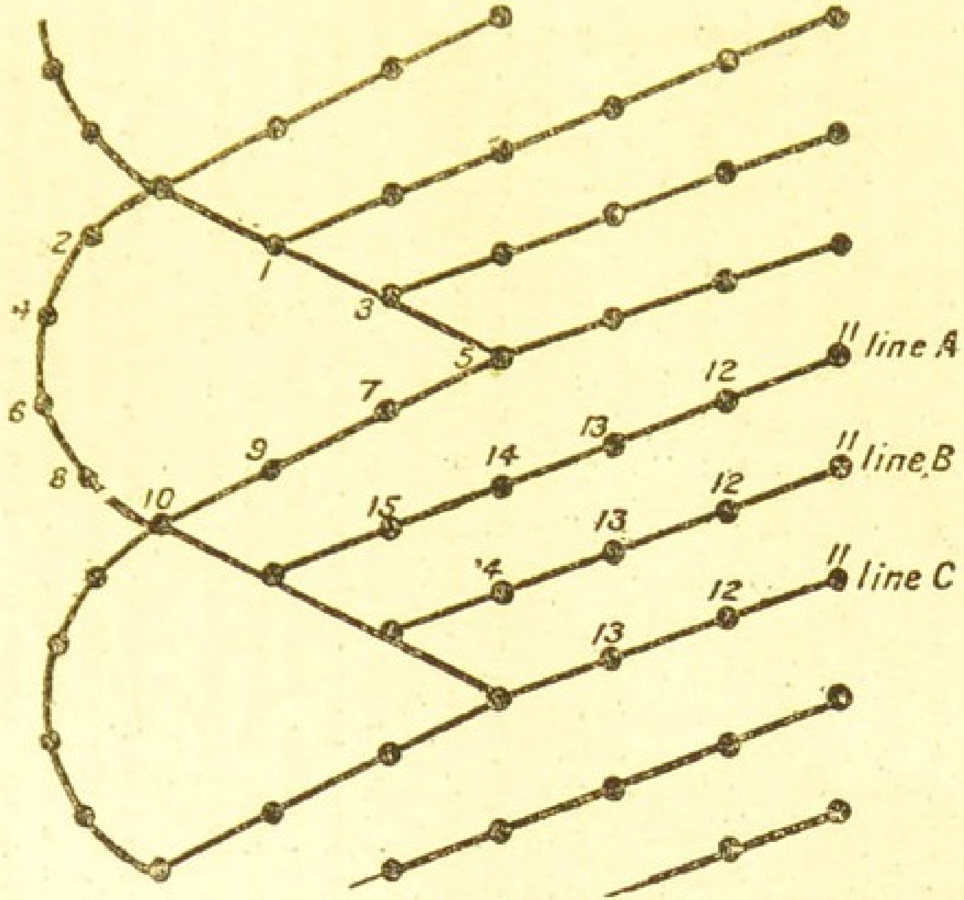
British-made linen thread is the best for lace-making purposes, but mercerized cotton, silk, tinsel, and plain crochet threads are also employed. If the thread becomes entangled, it must not be handled, but the pricker must be used to free the threads. Any thread not in use should be rolled up in blue paper to preserve its colour, and put in an airtight tin until it is wanted. If a thread breaks it must be dealt with carefully, and a knot must never be left visible in the lace itself. If the warp thread breaks some distance from the actual plaiting, it may be possible to knot the broken ends and finish the particular section of the lace before the knot is reached.

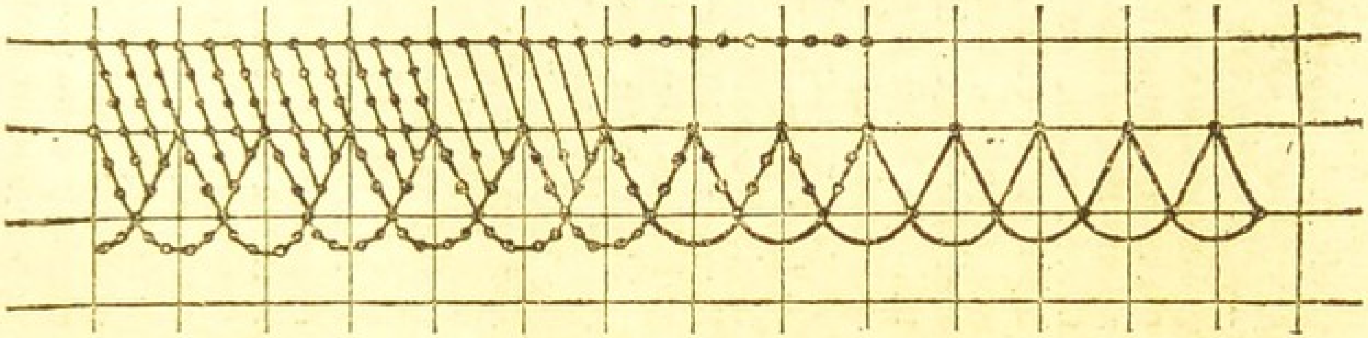
If, however, the break occurs in a traveller thread, it may be brought to the edge and there exchanged by a twist with a stationary bobbin. In this way the knot will not appear in the lace. If the broken end is very short, wind the broken end extending from the bobbin round a pin and tie it. Stick the pin into the pillow near the other broken end of thread. Replace the bobbin and go on weaving. Then cut off the broken end close.

The pattern in bobbin lace is often outlined with stronger thread, or gimp, than that used for the mesh. The variations in the twisting and plaiting of the mesh constitute an essential difference in the kinds of lace.

The bobbins should all be wound the same way, i.e. away from the person winding if she is right-handed. When the body of the bobbin is moderately full, cut the thread, wind it twice round the neck, pull the end under the thread when it runs from body to neck, and pull taut (Fig. 1). When all the bobbins are wound and hung on to pins ready to start the pattern, it is advisable to practise lengthening and shortening the threads. To lengthen, hold the bobbin horizontally and revolve it between finger and thumb until it is the length required. To shorten, hold the bobbin in the left hand, insert the right forefinger under the thread which runs from body to neck, pull upward while the left hand revolves the bobbin until short enough.

If the thread gets loose from the neck and the bobbin begins to unwind after the work is started, it is necessary only to wind the bobbin to the length required and finish by winding the thread twice round the neck of the bobbin and pulling taut. There are three elemental stitches used in all bobbin lace. They are known as half stitch, double stitch, and cloth stitch. To make any stitch 4 bobbins are required, and to learn the stitches it is a good plan to knot the threads of 4 bobbins together, fix the knot to a pin-cushion, and practise the stitches a few times before starting a pattern. Except for outlining with a gimp bobbins are used in pairs.





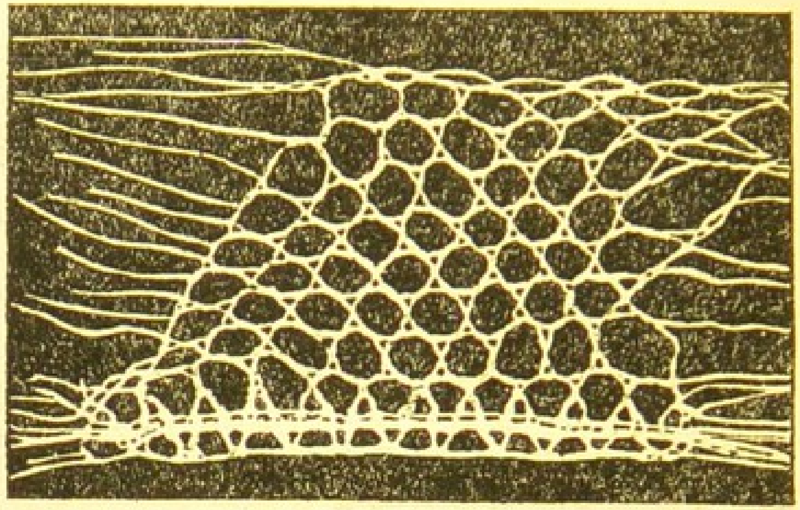


Fig. 4. Mesh of Buckinghamshire lace enlarged to show details

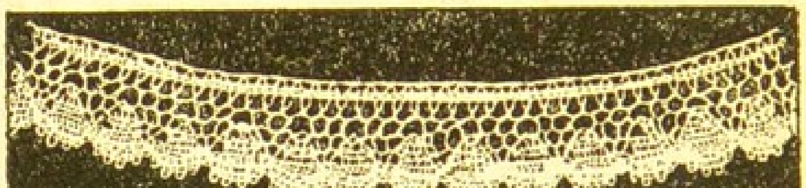


Fig. 5 (left lower). Diagram showing four consecutive stages in the making of Buckinghamshire lace as described in the text on the previous page.
Fig. 6 (left upper). Arrangement of pins for making this lace.
Fig. 7 (above). Strip of narrow Bucks lace with shell edge, made by arrangement of pins shown in Fig. 6

LACE MAKING

Methods of making bobbin lace.

To make a half stitch, place the two pairs of bobbins to be used in the centre of the pillow hanging from a pin and number them from the left. Cross 2 over 3, cross 4 over 3, cross 2 over 1. The first step should be done singly, the second and third steps simultaneously, using the right hand to lift 4 over 3 and the left hand to lift 2 over 1. Figs. 2 and 3 show the working. Double stitch is half stitch done twice without interruption, while cloth stitch consists of crossing 2 over 3, 4 over 3, 2 over 1, and 2 over 3. Whenever a pin is to be inserted it should be placed between bobbins 2 and 3, i.e. between the pairs.

If the directions say close in, it is intended that a similar stitch be made with the same two pairs before proceeding. Twist means cross the right-hand bobbin over the left-hand bobbin of any pair mentioned. It is done once or twice or more times according to the pattern. To fix the two bobbins on the pillow, knot them in groups, say 8 bobbins together or less if preferred, and tie the ends of each group to a pin stuck into the pattern about ½ in. higher up than the work is to be started. The bobbins are counted in pairs, counting from the left.

BUCKINGHAMSHIRE LACE. Instructions are given how to make a simlpe Bucks lace pattern. The two distinctive points about Bucks lace are the mesh or réseau and the gimp, a thicker thread which outlines portions of the pattern. Fig. 4 shows the mesh on an enlarged scale. For the following pattern 26 bobbins are required, two of which should be wound with gimp thread and the remainder with a medium flax lace thread. It is a good plan to have the gimp wound on bobbins which are markedly different from the rest. This pricking can also be worked out on the squared ¼ in. cardboard, and Fig. 5 shows the method in four stages. Tie the bobbins to pins in groups of 6 or 8, and begin the pattern a little further down so as to clear the knotted threads. Before beginning arrange that one gimp bobbin is the 3rd from the left, the other the 11th from the right.

Start with the shell edge, which is worked in cloth stitch. Count the bobbins from the left. Use the diagram in Fig. 6, and see also Fig. 7. Make a stitch (cloth) with the 2nd and 3rd pairs the 3rd and 4th, the 4th and 5th; put a pin in hole 1 and close in. Make a stitch with the 3rd and 4th, 2nd and 3rd, and pass the gimp through the 2nd pair by crossing it over one and under the other bobbin of this pair. Make a stitch with the 1st and 2nd pairs, twist the 1st pair 3 times; put a pin in hole 2 and close in. Pass the gimp back through the 2nd pair. Make a stitch with the 2nd and 3rd pairs, with the 3rd and 4th, the 4th and 5th, the 5th and 6th; put a pin in hole 3 and close in.

Make a stitch with the 4th and 5th pairs, the 3rd and 4th, the 2nd and 3rd. Pass the gimp through the 2nd pair. Make a stitch with the 1st and 2nd pairs, twist the 1st pair 3 times; put a pin in hole 4 and close in. Pass the gimp through the 2nd pair. Make a stitch with the 2nd and 3rd pairs, 3rd and

4tn, 4th and 5th, 5th and 6th, 6th and 7th ; put a pin in hole 5 and close in. Pass the other gimp through the 7th pair and then twist the 7th pair twice. Make a stitch with the 5th and 6th pairs, the 4th and 5th, the 3rd and 4th, the 2nd and 3rd. Pass the gimp through the 2nd pair. Make a stitch with the 1st and 2nd pairs, twist the 1st pair 3 times ; put a pin in hole 6 and close in. Pass the gimp through the 2nd pair. Make a stitch with the 2nd and 3rd pairs, the 3rd and 4th, the 4th and 5th and 5th and 6th ; put a pin in hole 7 and close in. Pass the right-hand gimp through the 6th pair and twist the 6th pair twice.

Make a stitch with the 4th and 5th pairs, the 3rd and 4th pairs, the 2nd and 3rd pairs. Pass the gimp through the 2nd pair. Make a stitch with the 1st and 2nd pairs, twist the 1st pair 3 times ; put a pin in hole 8 and close in. Pass the gimp through the 2nd pair. Make a stitch with the 2nd and 3rd pairs, 3rd and 4th, 4th and 5th ; put a pin in hole 9 and close in. Pass the gimp through the 5th pair and twist the 5th pair twice. Make a stitch with the 3rd and 4th pairs, the 2nd and 3rd. Pass the gimp through the 2nd pair. Make a stitch with the 1st and 2nd pairs, twist the 1st pair 3 times ; put a pin in hole 10 and close in. The two gimps now change places. Pass the left-hand gimp through the 3rd and 4th pairs, cross the right-hand gimp over it and pass it in turn through the 4th, 3rd, and 2nd pairs. This finishes the shell.

The réseau has next to be worked. The four pairs of bobbins and one gimp on the left hand can be pinned quite aside. Proceed with line A, and count the pairs of bobbins from the right. Make a cloth stitch with the 3rd and 4th pairs, with the 2nd and 3rd ; twist the 2nd pair 3 times and put a pin in hole 11. Make a half stitch with the 1st and 2nd pairs and twist them each twice. Make a cloth stitch with the 2nd and 3rd pairs, with the 3rd and 4th pairs ; twist the 4th pair 3 times and put a pin in hole 12 between the 3rd and 4th pairs. The selvedge is always worked in this way.

Now begins the réseau proper. The enlarged detail of this is clearly shown in Fig. 4. This characteristic mesh is used in all Bucks lace for few or many holes, according to the pattern. The following stitch is used for it. Make a half stitch and twist once each of the pairs with which the half stitch has been made. If a pin is put in, it should not be closed in. Make a Bucks stitch with the 4th and 5th pairs, and with the 5th and 6th pairs ; put a pin in hole 13 between the 5th and 6th pairs. Make a Bucks stitch with the 6th and 7th pairs ; put a pin in hole 14. Make a Bucks stitch with the 7th and 8th pairs ; put a pin in hole 15. Pass the gimp through the 8th pair and twist the 8th pair twice. Proceed in the same way with line B as far as putting a pin in hole 14, then pass the gimp through the 7th pair and twist the 7th pair twice. In line C (Fig. 6) proceed as before as far as putting a pin in hole 13, then pass the gimp through the 6th pair and finally twist the 6th pair twice.

LACQUER, Applying. The purpose of lacquering is to protect the surface of the object from the action of the air, and so prevent it from tarnishing. Door knobs, handles, fenders, and other articles can be lacquered, thus obviating the need for constant polishing. They should last for at least six months without requiring any further attention. The materials required for the process include several bottles of lacquer, in colourless crystal and in one or two yellow shades for use on various metals, good quality soft camel-hair brushes, clean glass bottles with cork stoppers for the storage of the brushes, and some clean sawdust, preferably boxwood. The operation must be carried out in a warm room absolutely free from draughts, as these cause the lacquer to bloom, that is, to dry with a milky, bluish appearance.

Suppose, for example, it is intended to lacquer a polished brass or copper object such as a door knocker. The surface may first be polished or finished with a matt effect by dipping in dilute nitric, sulphuric, or hydrochloric acid. The utmost care must be taken when using these chemicals, as both of them are poisonous. Clean tissue paper will be found useful for handling the lacquered article. The next stage is to clean the article thoroughly. This may be done by boiling it in clean water, allowing the water to drain off, and then drying it by burying it in a tin of hot sawdust which has previously been heated by baking it in the oven. After the object has been left in the sawdust for a few minutes it can be removed and brushed over with a clean, dry brush to remove any traces of sawdust. On no account must the article be touched with the bare hands after it has been cleansed; it should always be handled by grasping it with a piece of tissue paper, or some other material free from grease.

LACQUER WORK FOR THE AMATEUR

Modern Form of an Artistic Handicraft

Those interested in similar occupations should turn to Gesso, Leather Work, Papier Mâché, etc. Plates 17, 18 and 19 illustrate Lacquer work and its process.

Much of the old English lacquer was done on papier mâché trays, and a great deal of the modern work seen today has been copied from old designs of English lacquer. The following directions are given for this work. Rub the tray or other surface to be lacquered carefully with fine sandpaper, and coat it over with filling, which is paste made of whitening mixed with water to the consistency of thin cream. Add a little plaster of Paris, and a little glue, powdered, if possible. If ordinary glue is used it must be carefully mixed in when warm and, unless the filling is used at once, the mixture must be kept warm. Avoid using thick filling, as this makes an uneven surface. When dry, rub it down again with sandpaper.

A filling can be purchased together with a set of Chinese lacquer colours and other requisites in an outfit. They are subject to the

Petroleum Act and cannot be sent through the post. Spirit lacquers require careful handling as they are inflammable, and cellulose lacquers, though yielding a fine finish, possess a pungent odour to which the worker requires to accustom himself.

When the work is filled and rubbed down, a design has to be chosen. Designs may be bought from some firm which specializes in this kind of work. Most oriental designs are built up from several motifs, and can be adapted from illustrations or other Chinese pieces. A willow pattern plate or dish makes a good design for adapting to a small piece of work.

The difference between English lacquer and the Chinese is that the design is usually more crowded in the English, and although it is more or less Oriental in character, the western idea seems to creep in.

The next step is to colour the background. For this, dull black lacquer should be employed. Put on one coat with a flat squirrel hair brush and allow it to dry. Then apply a second coat. If it is at all rough, sandpaper it carefully before applying the second coat. Two coats of black are usually sufficient, but should the groundwork look poor, apply a third coat. Draw, or trace from a copy, the main objects of the design on a piece of tracing paper the size of the article, then turn it over and rub the back with whitening. Lay this carefully on the article and go over the design with a pencil, which will apply a clear white tracing to the black surface. The raising paste is next applied. Make all surfaces where it is intended to apply raising paste rough by scratching with a penknife. A paste can be used as directed for the filling, except that it must be much stiffer, or gesso powder may be employed. Choose a hog's hair brush with long hair for this, and apply it by working round the inside of the outline, twisting the brush towards the worker. As it spreads a little, keep inside the outline. Little raising is used in English lacquer. For the tray (*see* Plate 17) only the roof, the rocks at the back, the bridge and the figures were raised. Allow the raising paste to become quite dry, but do not put it near a fire or it will crack. When dry, rub it carefully with sandpaper if at all uneven or rough.

Next gild the raised portions and all main parts of the design, omitting any fine detail. For this gilding first use the special medium obtainable. Paint it over, and when almost dry dust it over with rather heavy bright gold powder, using a chamois leather. Allow it to dry for at least a day. Then wash with soap and water, and dry it carefully, using a soft cloth. If the fine detail cannot be put in freehand, trace, then paint it in with chrome yellow to which a little medium has been added. Dust it over with gold. When it is dry wash it, and put in any foreground, touch it up where necessary and shade it a little with black lining ink and water colour. When dry give it two coats of brown varnish, rubbing down between each coat with poudre de silice. After the second coat of varnish is thoroughly dry, give it a good rub with chamois leather. In English lacquer the floral borders are often painted in colours.

Prepare the wood very carefully when lacquering an old piece of furniture. Wash it well with strong soda water, then rub it down or have it scraped, to remove any roughness. Apply the lacquer very evenly. Quick drying spirit lacquers are not easy to use. A modern outfit sold contains a special solvent for thinning these, as the best results are obtainable by using two or three thin coats rather than one thick one. Amateurs should always try black first, as it is much easier to remedy any mistakes, and usually works more evenly. Pale coloured lacquers are the most difficult for them to use as they need careful handling, and cannot be touched up to any extent.

After the surface is ready, transfer the design as explained, then study it well and decide which portions are to be raised. Unless it is a large piece of work, such as a cabinet, do not raise it too much, as it looks clumsy.

When dry, sandpaper it well and dust it carefully before commencing to work in the foreground. For this the special medium is required. Paint over all the foreground, and when tacky dust it over with coloured bronzes, using gold, red, green, and a little silver. These can be shaded in with the chamois leather. When dry, dust off any superfluous powder, and gild all the main objects in the same way. Use fine dull gold for this.

When dry wash and dry it. When filling in the detail use a very fine sable brush, and make the strokes as fine as possible. Only do a little piece at a time and dust it over with gold. The medium dries quickly and will not hold the powder if allowed to become too dry.

When the detail is finished and dry, wash it well and dry it carefully. The line work must be done next. Mix the special ink with ivory-black water-colour, and put in the fine lines. Should the gold lines be too thick, this can be remedied by painting a black line at the side.

The work may be shaded by using a little burnt sienna and here and there a touch of red. Poster colours may be used. The advantages of using these is that mistakes can be wiped off with a wet rag and the parts in question put in again. Should the work be too bright when finished, dip a damp rag in a little poudre de silice and rub it over the surface, working with the grain of the wood. A final coat of clear varnish may be applied over the whole work where pale ground colours are used.

Modern Forms. There are other kinds of lacquer work of interest to the amateur. Lacquer used in conjunction with raised and modelled gesso and barbola paste has been dealt with in the article on Gesso Work. Modern methods of decorating over lacquer grounds include Worcester painting, so called from the designs chosen, which resemble those on Worcester China, and Marbling. Examples of the first are illustrated. Stencilling is also employed, being carried out in liquid oil colours over the groundwork of lacquer. When it is desired to mix lacquer colours for the groundwork this cannot be done from the bottles, and the mixing is done in a saucer convenient to work from while painting the article.

Worcester painting is particularly suitable for the decoration of dressing-table sets, cigarette-boxes, and for pieces of pottery. Artistic work is achieved with this type of decoration when applied to a pottery vase suitable for a lamp and using the same designs for the vellum shade. On Worcester and Chelsea china tea services, etc., designs are often set in shaped panels, and birds, small flower sprays and Chinese motifs can be copied. Maroon, canary-yellow and apple-green are all correct colours for the finished groundwork, and show up the panels most effectively. The first stage is to coat the article over with the filler, as already described, sandpapered to a smooth surface. Then a coat of white brush-lacquer colour is painted evenly over the surface, using a squirrel hair brush. This must be allowed to dry and a second coat applied. The work must now be left for some hours, preferably overnight, to allow the lacquer to harden before proceeding further. The inside of a box or other article should be lacquered without the coating of filler. The surface must first be sandpapered.

The next stage is to wipe the article over with a damp cloth and then to cover it with the desired shade, yellow for instance, using chrome lemon poster colour, and to stipple this over quite firmly afterwards with a dry squirrel hair brush.

The coat of stippled poster colour must be allowed to dry before the third and most interesting stage of the work is begun, of wiping out the panels for the Worcester designs. It is better to use templates for this rather than trust to the unaided hand.

Templates may be cut out of oiled manilla paper, or purchased in packets of a dozen assorted shapes for a few pence, and their usage will ensure the clean shape of the circle, oval or triangle. Through the template the small panel spaces are wiped out with a slightly wetted rag, removing the yellow poster colour and leaving the originally painted white lacquer groundwork showing. The rim and base of the article should be treated in the same way. This must be done cleanly, and not a trace of the yellow colour should remain.

After the panels have been thus prepared the designs are drawn and painted. More elaborate designs can be traced by means of tracing paper and a carbon. For this work, however, embroidery transfers can be used of small floral patterns. Poster colours are used to tint these, and their simple nature is shown in the three attractive pieces illustrated (Plate 17). The powder bowl on the left has an apple-green stippled ground. The interior, handle and rim are of the white lacquer. Crescent-shaped templates were used through which to wipe out the panels on the lid. The design is painted in pinks and greens and the panels are outlined with gold.

Gold may also be used for the interior of a box or bowl. It must be used over the lacquered groundwork. When completed and quite dry the whole article is varnished with clear white varnish.

Marbling is even a simpler method of decorating a lacquer foundation. This consists in wiping off the poster colour with a damp cloth in a zigzag fashion to imitate graining or the many varied markings of marble. White or cream lacquer lends itself as admirable for foundations for this work, as for Worcester painting, but other lacquer colours can be used ; except black all are suitable for marbling. Blue poster colour cannot be used over red lacquer as it has a tendency to blacken. Designs can be introduced into this marbled work by means of wiping a panel space clean through a template to show the plain lacquer groundwork. Very simple landscape or flower designs of the type used in modern marquetry work look well when introduced into articles with slightly marbled surfaces.

Lacquer Work on Metal. For application on metal surfaces four lacquer colours are prepared, red, blue, green, and yellow, other shades being obtained by mixture of these. In some cases, the colours are used to enhance the pattern already modelled in the metal. In others the design for the most part is traced on to the metal. Having cleaned the box or other article to be decorated with methylated spirit, the selected design is transferred by means of a carbon paper. To prevent the lines being rubbed off they are scratched over with a steel knitting needle. Excellent results can be obtained by the amateur worker skilled in repoussé work, who is able to prepare his own designs in slight relief on pewter, brass or copper, and subsequently to colour them by means of these lacquers.

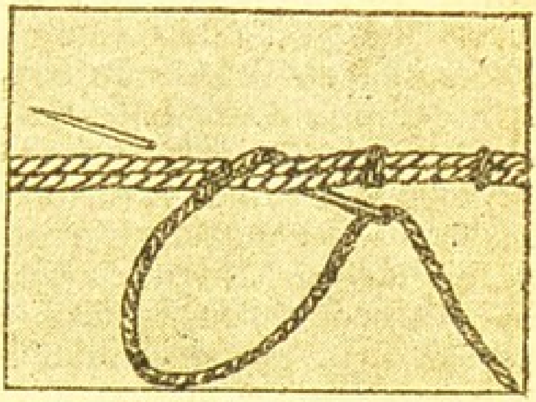
Bronze powders can be utilized in this work and Japan black lacquer. Camel hair brushes are employed for broader effects and fine sable for details. Yellow varnish is used to coat the whole piece when finished and thus render it untarnishable.

In conclusion it may be noted that brushes used for lacquer colours should be washed out in methylated spirit immediately after they are finished with each time. After use with oil colours for stencilling, brushes are cleansed with turpentine.

Bottles must be kept corked when not in use. Best results are obtainable if the work is allowed to dry thoroughly between each process. A coat of varnish should always be given to the finished article. Varnish should be applied evenly with a soft brush and the work set aside to dry where no dust is likely to settle on it. Lacquer colours always require an absolutely smooth surface. Where raising paste is used the opposite rule obtains. The particular portion of surface to be raised has to be roughened to make the paste adhere firmly to the work.

LAID WORK in Embroidery. Laid work is used chiefly in Chinese embroidery, for filling backgrounds and large spaces in designs, or when copying 17th century Italian work in which gold and silver thread are couched down with tiny stitches. A thread is laid, either following the outline of the design or in straight rows across it, or in some filling pattern, when the background is to be decorated with laid work, or following the lines of the ground material.

Laid work is employed for designs when the embroidery is wanted in high relief, and where the working medium cannot be drawn through the ground material in the ordinary way, as in the case of cords, chenille, and heavy silver or gold threads. When embroidering with metal threads this work has the advantage of using less of these expensive materials, as they are not taken through to the wrong side of the fabric, but only caught down on the surface of the material.



LAID WORK. Fig. 1. Simple couching stitch used in this form of laid work

Designs are frequently first padded all over by means of stitchery in coarse, soft crochet cotton. Floral designs may have leaves and flowers stiffened or still further raised by means of cardboard shapes. The latter can be prepared by transferring the required portions of pattern on to a sheet of cardboard and cutting out the shapes with a sharp knife. Sometimes such cardboard shapes are pasted on to the fabric to be embroidered. In other work they are stitched over with the raised padding cotton to give a more raised effect. The metal thread is wound double on to a spindle; this facilitates the even laying of the thread. For raised designs in which the effect of satin-stitch is desired the double metal thread is taken backwards and forwards across the padded leaf, or other figure, and secured on the opposite side with a tiny back-stitch. Laid work is employed for designs embroidered on leather, suède and felt, and also in conjunction with appliqué.

LAID WORK. Black satin cushion embroidered in gold thread couched down with small stitches in gold silk

COUCHING STITCHES. Several forms of laid work are accomplished by means of different ways of placing the laid threads, and variations in the couching stitch used. In its simplest form a couching stitch is shown in Fig. 1, holding down the double thread. To keep metal threads in position a little couching stitch is worked across them at intervals of $\frac{1}{8}$ in.

In Fig. 1 the couching stitch is shown in black, and is left rather loose so that the position of it can be plainly seen; but in the actual work it is drawn down closely, so that it is almost invisible. It is quite permissible to work this stitch obliquely across the laid thread when working an ordinary outline, but when working couched filling, and over very round laid threads, as in the gold embroidery on the cushion illustrated, the stitch should be straight. In couched filling the stitches of the second row come midway between two stitches of the first row.

To work, the laid thread can be caught down at the beginning to keep the end in position, then bring the working thread to the right side of material, after fastening it on the wrong side, just above the laid thread, which is on the outline of the design, draw the thread through, and put the needle back under the laid thread in a perpendicular line. Now bring the point of needle through ground material again about ⅛ in. to the left, just above the laid thread, and draw through, when a perpendicular stitch will be seen across the laid thread. The illustration shows the needle in working position, and it will be seen that it is like a hemming-stitch, but set wide apart.

Scaled couching is formed with loops couched down in the centre, and arranged so that the loops of successive rows begin in the centre of a loop of the previous row and finish in the centre of the next loop of the previous row, so making the formation of scales.

In veined couching, when the first threads are laid in the form of leaf outlines, these are often only caught down with a tiny stitch on either side, but the veins are laid in a reverse direction to the foundation threads, and each vein is couched down as it is laid with the stitch used in oriental filling, and thus holds the first laid threads in place.

Oriental Filling. This filling is an important stitch in laid work. Used for a background, it is shown in Fig. 2 (Plate 20). It is shown, worked in silk, following the lines of the soft canvas groundwork, and it is worked here more open to illustrate the stitch better. The work can be done over the fingers, or in a frame for large pieces. To work, proceed as follows: After joining the silk on the wrong side bring the needle up through the material to the right side at the lower edge of the design and pass it down exactly opposite on the upper edge of the design. Bring the needle up again a little to the left of this laid thread, about ¼ in. down. Insert the needle exactly opposite to the right of this laid thread and bring it out to the left again about ¼ in. down, as shown.

When it is drawn through, a little stitch will be formed across the laid thread. The needle is again inserted to the right of where it last came out, and brought out again on the left about ¼ in. down. Repeat the process to the bottom of the thread, after which another thread is laid close up to the previous one, and so on in succession until the background is covered closely so that no material is visible.

DIAMOND AND DIAPER STITCH. Other fillings are of threads laid with diaper stitch, and also with diamond stitch. They are both used as embroideries for covering backgrounds or large spaces such as bold fruit designs and conventional flowers.

In the form of laid work utilizing diamond stitch the foundation threads are first laid in a sloping direction from left to right, the second lot of threads crossing these in the opposite direction. This is best worked in an embroidery frame to make sure that the threads are taut without being drawn too tightly.

The second process is the making of the little stitch at each crossing of the threads, and this sets the diamond pattern. Fig. 3 shows this stitch in progress. The needle comes through material to the left of the crossing, and is put down again in a straight line to the right of it. With one movement it can be brought up again to the left of the next crossing. When the needle is drawn through, a little stitch is formed which holds down the two threads of the foundation.

In diaper stitch the foundation threads are also laid obliquely, first in one direction, then across the reverse way. The points of the crossings are then couched down with diaper stitch, which resembles cross stitch, but placed differently.

The first half of the stitch is worked across the junction of the two threads, letting it extend at each side of the main threads, so that it is a distinctive stitch in itself and not a little couching stitch only. The first half of the stitch runs parallel with the warp threads of the material, then the work is turned and the second half of the stitch worked in the same way and parallel with the weft threads. Fig. 4 shows the second portion of the stitch in operation.

LAMPSHADES: THEIR MATERIALS AND MAKING

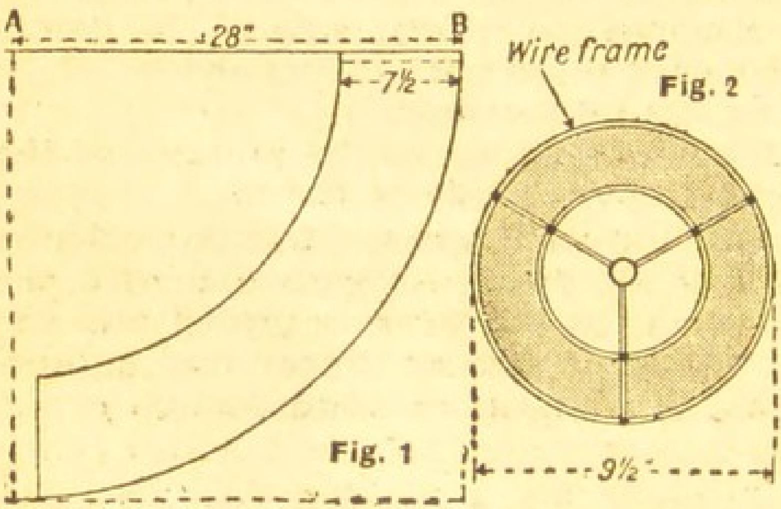
Among the other articles containing helpful ideas in connection with this decorative art are those of Appliqué: Embroidery: Stencilling

The way of the lampshade creator is now eased by the great variety of practical materials available for her assistance. Ready-made imitation vellum or parchment paper shades are very cheap in the smaller sizes and are also obtainable in a variety of larger sizes suitable for floor standards. Packets of cut-out lamp shades in assorted shapes may be bought, or, for those who prefer to cut out their own, sheets of imitation vellum and coloured parchment papers are sold. Special lampshade paper is also made for pleated shades and there are coloured strip borders. Wire frames are obtainable to suit all sizes and shapes in standard, pendant and gimbal fittings.

For making-up purposes, galons by the yard in black and gold, to be sewn or cemented on the edges of shades, and leather thongings or coloured silk braids for lacing them, are provided. Glass ornamental drops for corners of pagoda-shaped shades and brightly coloured tassels of wooden beads in various sizes, silk cords and plain or shaded fringes are all obtainable as decorative furnishing touches.

There are also certain fancy materials cut into shapes and perforated for lacing with thonging. These materials have marbled, mother-of-pearl, or opalescent finishes. A large assortment of lampshades with designs already transferred and only needing to be coloured are obtainable in many sizes. Separate transfers for designs adapted to various styles of decoration, mandarin and other inks, and also lampshade colours, for painting on parchment or, with the correct medium, on silk, brushes for use with these, clear varnish and cement can all be either purchased or ordered in a good art department, or from firms which specialize in materials for this work.

In practice it is often found that better quality China or Jap silks are preferable to those sold for the purpose of lampshade making. The latter are too thin to form a satisfactory basis for painting, or for trimming with rows of fringe. Linen is also used and is particularly suitable for shields to shade electric candle lamps.



LAMPSHADES. Fig. 1. Method of cutting one strip of paper or parchment. **Fig. 2.** Wire frame for pendant lampshade

PLEATED PAPER SHADES. Simple to make and yet most decorative are shades of pleated paper. They are popular for modern table lamps. A charming effect is obtained by employing two colours, one for the lamp, the borders, cord and tassels of the shade, and the other for the pleated paper, which accent colours in the room. The part of the shade through which the light actually shines should be one of the becoming tints ranging from cream to apricot, or from pale pink to deep rose. The exception is green for a reading lamp.

Any good quality of firmly textured and yet finely grained paper will be suitable for pleating. The best kind is of the same description as a cream-laid or bond notepaper. The easiest bordering is one of the specially made strips pasted on, or a passe-partout, but a thin silk ribbon can be sewn on with a fine needle and sewing silk to match.

When cutting the paper for a pleated shade, first measure the frame. Two and a half times the circumference of the base will be the length of paper required for pleating, and two inches extra should be allowed for the depth. To get the required length, several widths of paper may have to be joined. They should be decorated and pleated first.

For this style of lampshade, either a plain border may be used for top and bottom, or a good effect is gained by applying two strip borderings in a broad and narrow width, the lower one about 2 in. from the base of the shade ; or stripes may be painted in mandarin inks either side of a pasted gold border. Cut-out motifs can be applied, but these are not really so successful for this style of shade as the plainer borderings.

To pleat the paper, having allowed any paste used to apply decoration ample time to dry, fold in sections of about $1\frac{1}{2}$ in. wide, pressing each fold down firmly with the thumbnail. The folds must be in concertina fashion and afterwards are folded again backwards and forwards to make them each $\frac{3}{4}$ in. wide. The pleats can, of course, be larger or smaller, according to the size of the shade. Pleating can be practised on a spare piece of paper to be sure that the size of the folds will give the effect desired.

The next process is to punch a row of small holes through which the frame wire, specially provided, a cord or narrow tinsel ribbon is passed, about 2 in. below the top border of the shade. The holes must be cut an equal distance from the edge of each pleat. Before threading them, the lengths of pleated paper must be pasted together and the shade joined.

PARCHMENT AND VELLUM PAPER SHADES. Natural coloured vellum paper is attractive when decorated with a border or a painted design. For those who like to do as much of the work themselves as possible, white parchment paper or imitation vellum shades can be made from sheets of prepared paper.

In order that the shade should set properly it is essential that it should be cut out as shown in Fig. 1, so that the paper used for the shade is a segment of a true circle. Whatever the size required, it should be carefully measured out for depth and cut in this way, with the help of a pair of compasses formed of a pencil, a short piece of string, and a drawing-pin, to which one end of the string is attached, the other being fastened to the pencil.

Pin the paper at its four corners down to a flat-topped table, or a drawing-board, and mark out the segment for the shade with the compasses. If an elaborate design is to be painted, it is easier to decorate before cutting out. Ordinary water colours may be employed, or lampshade colours, or inks. The use of special lampshade colours facilitates putting in a smooth background if it is desired to colour the shade all over. Trace or draw in the chosen design. Work the background to a finish before putting in the colours of the design. A little medium is mixed with the lampshade colour selected, and a flat squirrel hair brush is used to wash in the background. A swab of soft white rag is necessary to smooth the colour over the shade, wiping it off with a light, circular movement.

The use of the medium and rubbing with the rag produces a good surface on which to finish the work. When the background is quite dry the design can be painted in. After this work has been completed the shade can be cut out with sharp scissors and stuck together with strong lampshade cement. Weight the join until quite set, afterwards connecting up the design with additional touches of colour. The latter operation is essential or the join shows.

On a ready coloured paper effective designs can be outlined in black waterproof ink, and metallic bronze powders can be employed with the correct medium. Map varnish can be painted over the shade when dry, leaving a border of dull gold paint half an inch wide top and bottom, which makes a good finish. This method of decoration is especially suitable for a lacquered standard lamp or for small shades in a room with lacquered furniture. Designs for Chinese scenes can be adapted from those employed for lacquer work, or appropriate stencils can be obtained. In the case of an oriental vase lamp the design on the base should be traced or adapted by freehand drawing on to the shade.

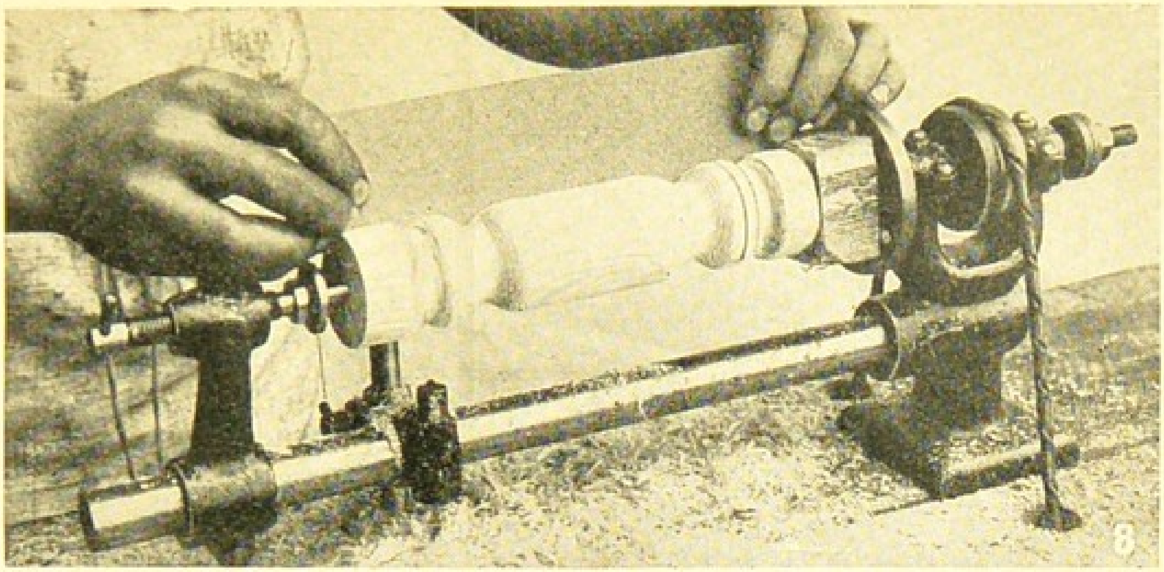
When desiring to copy the same design for a number of shades to be made of natural coloured vellum paper, the original tracing or drawing can be outlined in heavy black waterproof ink, and this pattern can be traced under the vellum paper, which being oiled is semi-transparent and shows the designs clearly through.

Once the shades are coloured, and the edges joined, making up is simple. For a pendant to be used on a bracket the shade is placed over a wire support as shown in Fig. 2. For a table lamp a gimbal fitting is used. Turn the joined shade on its head, paste the wire of the top of the frame, and the lower ring in the same way. Allow time to set, and then lightly stitch the wire rings to the frame. Take a pair of very sharp scissors and cut off any edges of the shade which come beyond the wires, and then bind the wired edges with a narrow fancy galon sewn on with a fine needle and silk by hand.

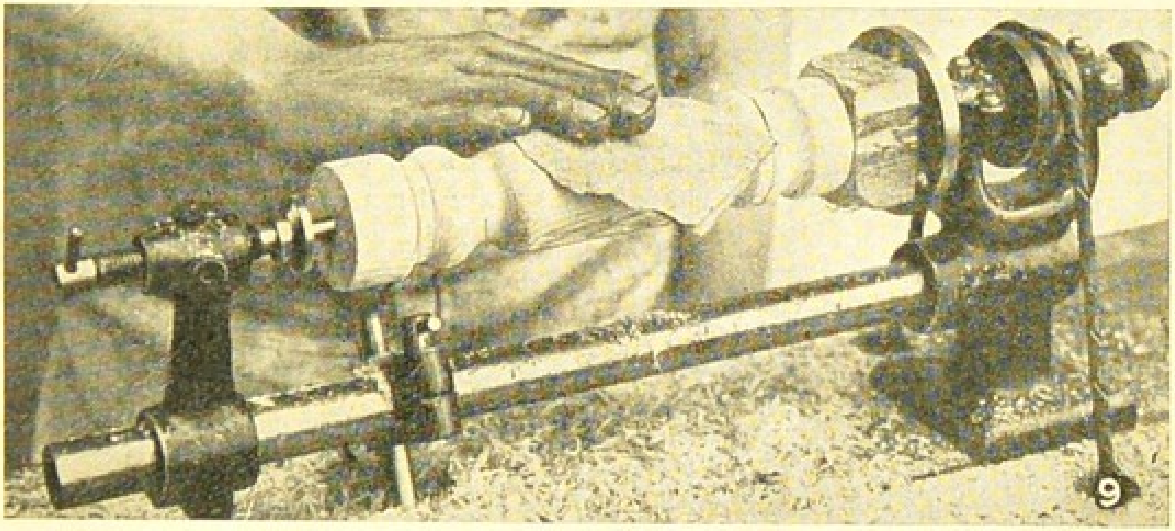
The empire shade for a floor standard lamp, which is illustrated on Plate 23, is bound with black and the geometrical design worked out in wine, yellow, green and black colourings. This interesting design would suit a modern wooden standard. Such all-over designs lend themselves to painting with waterproof inks, as these are transparent, leaving the natural vellum for a few of the lighter portions of the pattern. To dilute these inks distilled water should be used, or rainwater, or water that has been boiled and allowed to cool. Do not use cold water from a tap. Sable or camel hair brushes are best for painting with in this medium, the former for fine work.

Moist tube water colours are best used for a landscape, or less conventional type of design, as they give a softer effect than waterproof inks. These are best where brilliancy of tone is required in a hard, conventional design. Shades last better if finished with clear map varnish.

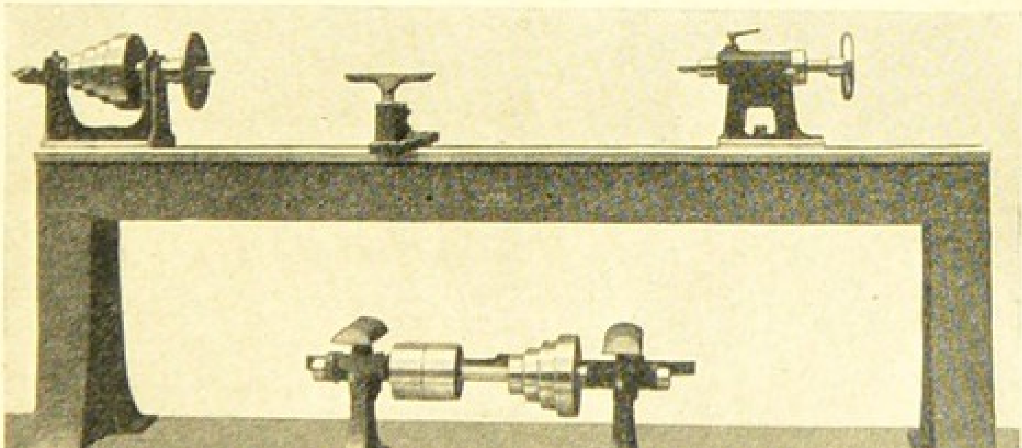
An attractive touch is given to a lampshade with a border design if the vellum is treated with special lampshade colour on



Use of template consisting of a piece of card or zinc cut to the correct profile



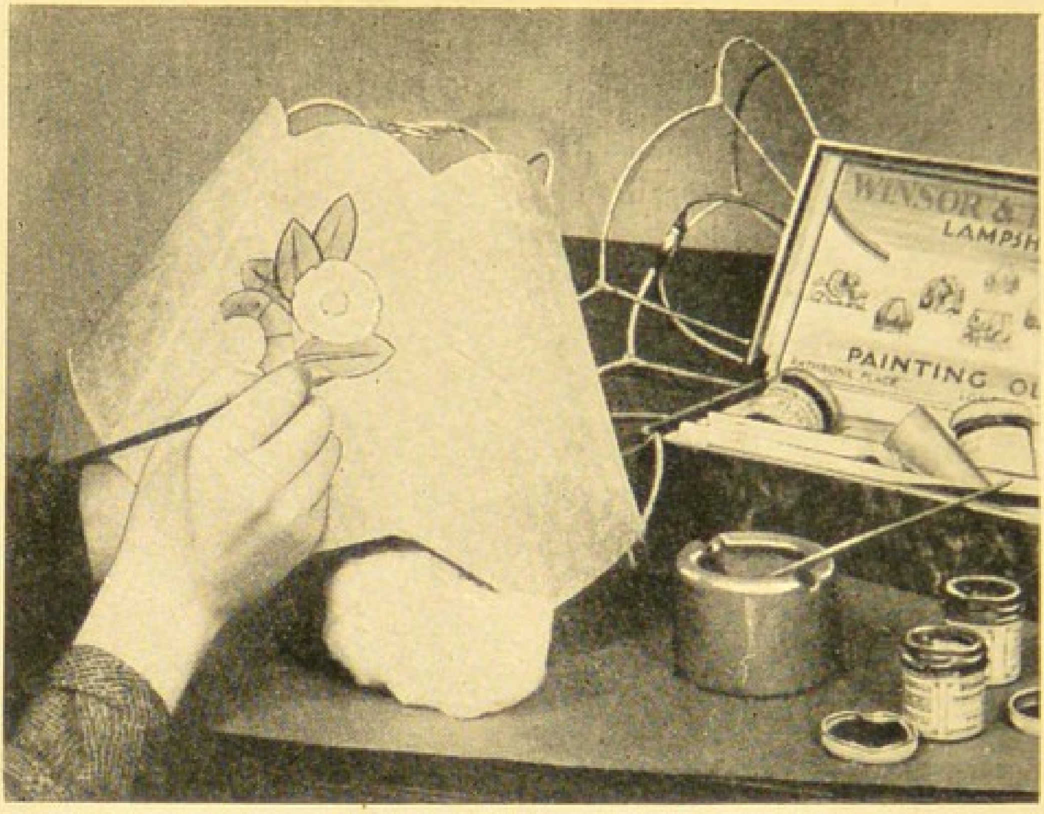
Smoothing the work with glass paper before the final operation of polishing



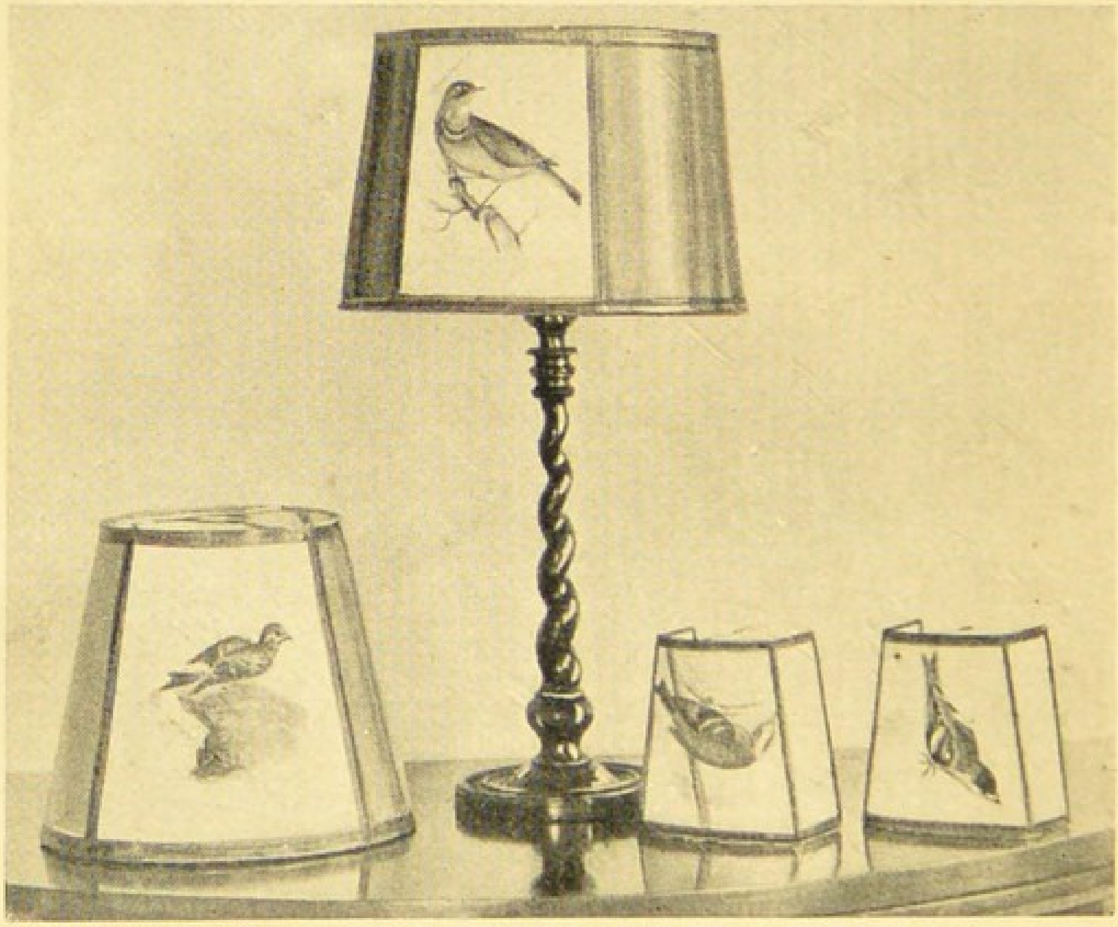
Example of a simple lathe, suitable for the amateur woodworker

THE LATHE AND SOME OF ITS MANY USES

Courtesy of J. Sagar & Co., Ltd.

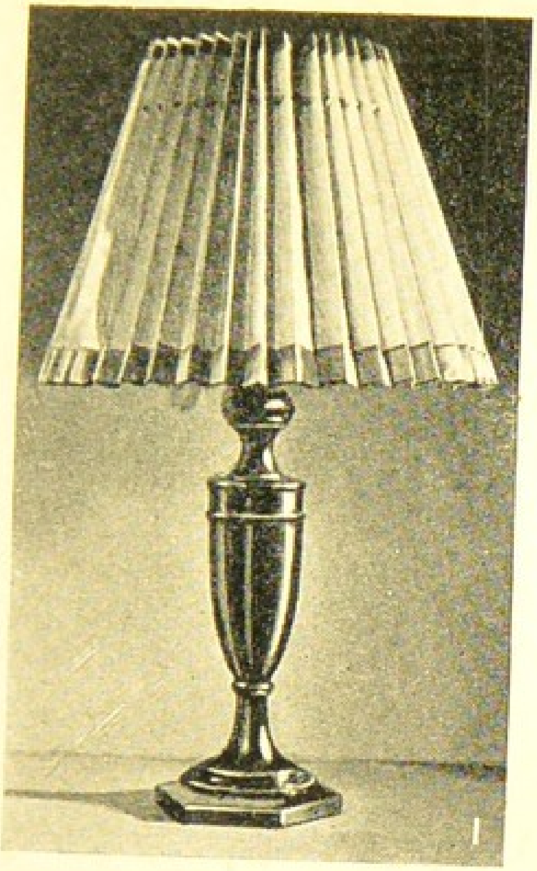


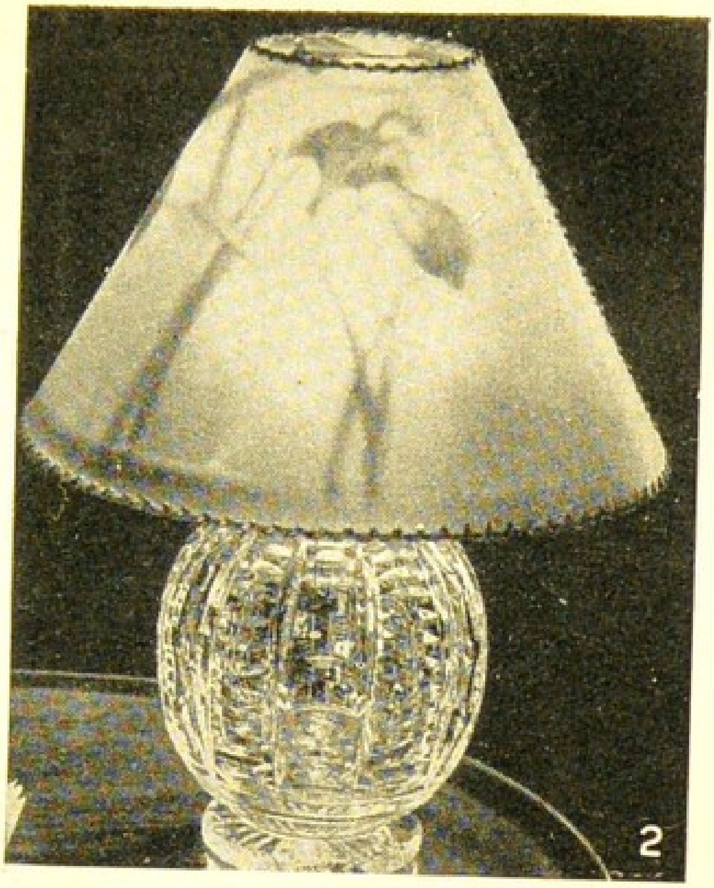
Painting a shade after the sections have been stitched together to fit the cambric-bound frame



Group of shades with colour prints of birds used as decorative panels

LAMPSHADES DECORATED BY HAND PAINTING





LAMPSHADES. Fig. 1. Pleated shade for mahogany table lamp. Fig. 2. Shade in fancy material suitable for cut glass lamp. Fig. 3. Empire shade for floor standard lamp. Fig. 4 Varnished shade with Oriental design in water colours

FOUR LAMPSHADES FOR THE MODERN HOME

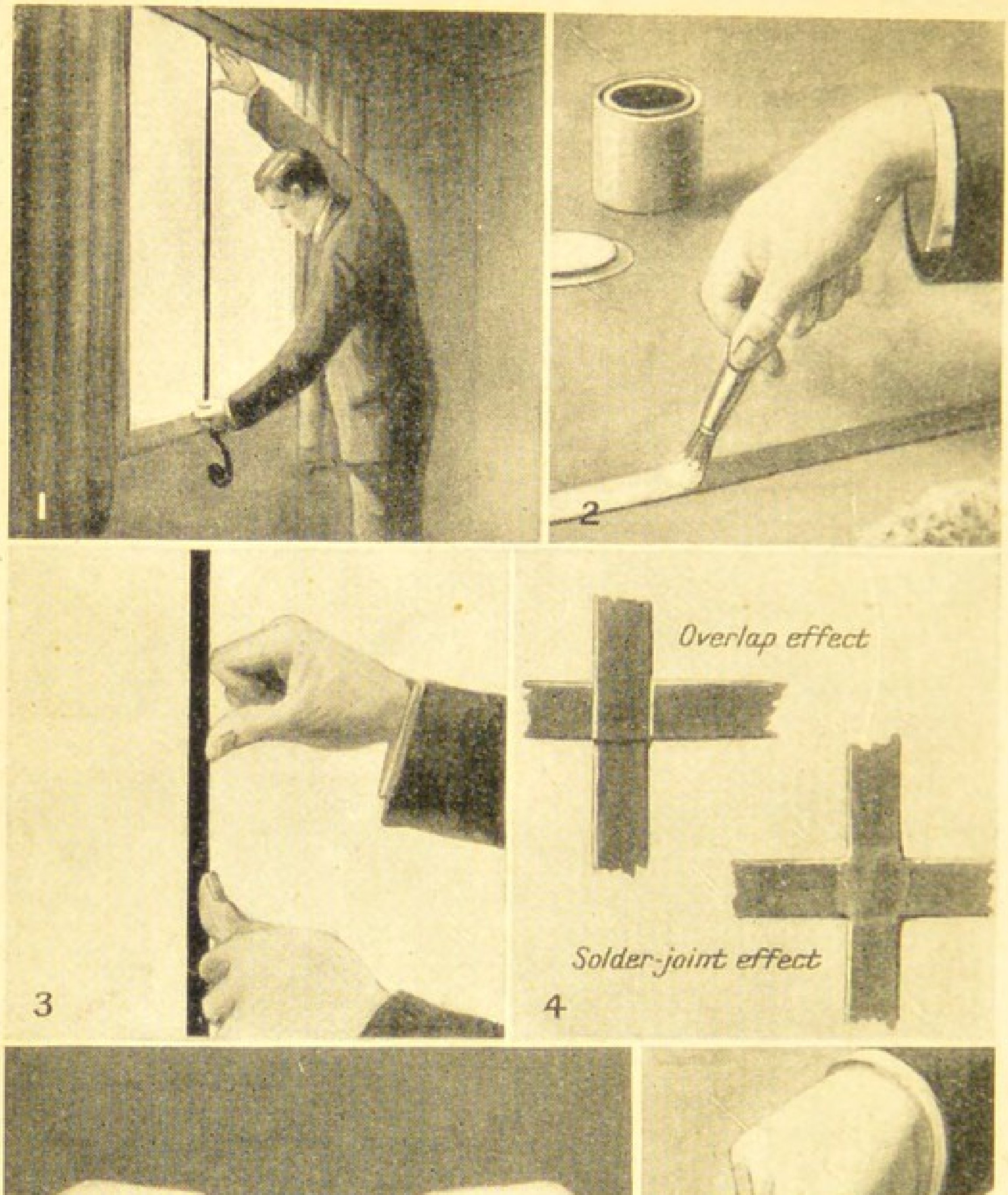


Fig. 1. Measuring length of lead required. Fig. 2. Coating strip with cement. Fig. 3. Applying strip to glass. Fig. 4. Two forms of joint. Fig. 5. How to bend strip lead. Fig. 6. Smoothing inner buckled edge

PROGRESSIVE STAGES IN LEAD ART CRAFT

the inside. The colour should be shaded from deep rose or orange at the top to a pale tint, as this forms a delightful background on which the design at the base of the shade stands out well. Applied designs may be used for these shades. Very simple, but effective, is a border of frieze banding, cut out and applied to a tinted parchment shade, which is afterwards varnished. Chintz or cretonne floral sprays can be cut out and pasted on in the same way, but such decoration is apt to look spotty unless kept to borders leaving the light to shine through the softly-tinted parchment.

Silhouettes are purchasable in black and gold or they can easily be cut out from black, silver or gold paper to make a good decoration. An effective border can be made with raised work, using paste as described in the article on Italian Renaissance work, and afterwards gilding the design. Coloured scraps may be used for nursery shades to form amusing borders. Charming colour effect is obtained by staining the electric bulb amber or orange with transparent glass painting colours.

Many-Sided Shades. Lampshades with many sides are cut to fit special frames. Having selected the frame, pieces of vellum paper are cut exactly to fit the sections, holes are punched about ½ in. from the edge of each separate panel, and the thonging is threaded on to a coarse needle and passed through the shade and round the divisional wires. Such a shade would look well in a study or library and could be decorated with heraldic designs copied from book-plates.

Very quickly made are parchment shades cut out in panels, perforated for thonging, and traced for painting with waterproof inks. With the prepared panels the thonging and frame to fit must be purchased at the same time.

Other materials made up with thonging are obtainable in these shaped panels. The mother-of-pearl and jade imitations are particularly decorative in these fancy materials, and require little or no further ornament than the thonging.

For a cut-glass lamp a beautifully accordant shade in a fancy material is obtainable which resembles ground glass. Many-sided and dome-shaped shades can also be made up by sewing the various panels or sections to the divisional wires of the frame, and covering the joins with a fancy braid or gimp. This method is also used for making up silk or linen shades. The frame must first be covered with nainsook or similar cotton material cut on the cross in strips 1 in. wide. All downward lines of the frame are covered first. On Plate 22 a frame ready prepared is shown, also a shade stitched on to one of the same shape which had been cut to fit the various sections. When the painting has been completed, the stitched joins will be covered with a light gold gimp.

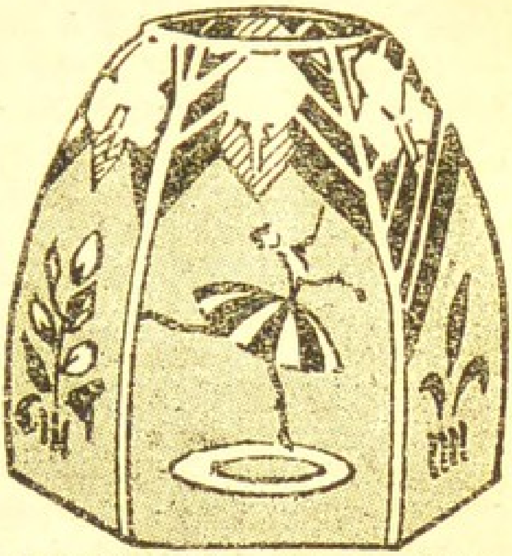
The vellum or silk is first cut out a little larger than the divisional sections of the frame. Taking one piece at a time, cut it neatly to fit the curved top of the frame. Sew this piece on with blanket stitch, holding the thread with the left hand while each stitch is being taken, to prevent any knotting. Having stitched round the top curve, adjust the sections of material neatly against the frame and cut round the base so that it exactly fits, and sew this also to the cotton binding. Make these stitches about ½ in. apart. Having trimmed the sides to the shape of the wire, leave this panel until the next one has been attached top and bottom, and then stitch the two panels together on to the frame. These must not overlay, but just meet on the frame. Continue in this way until all the sections of the frame are covered, and then if a design is to be painted this may be done before stitching the braid or gimp on to hide all joins and to edge the shade. Cover the downward seams first and then the top and back. Panels may have the designs traced on them before stitching to the frame, but in case of tearing a section during the process of sewing together it is better to do the actual painting after stitching has been done.

SILK AND LINEN SHADES. When making a silk shade in the manner just described, the binding on the frame must be very tightly wound round the wire, so that it is impossible for it to turn or slip when the silk is sewn on. The silk should be cut to fit with the lines of the grain going horizontally. The panel section must be pinned to the cambric-bound frame, stretching the silk so that there are no wrinkles. Sew the two sides down with fine tight stitches and keep the material very taut. Then sew top and bottom with rather less tension or the silk will sag in the middle of the panel. Trim closely when the sewing is done and then begin the next panel. When the frame is covered bind it with gimp, taking care to sew this through to the cambric covering the frame. When a coloured material is used for the covering the binding on the frame should match in colour.

Silk lampshades may be trimmed with rows of silk fringe either arranged as a border or almost covering the entire shade. A drawing-room standard lamp may have a shade on which narrow fringes, tinted in gradations from deep rose to pale pink, are sewn in zig-zag lines round the top and likewise again at the base of the shade.

When covered correctly so that there is not a single wrinkle to spoil the surface silk, shades are easily decorated with lampshade colours, using the special medium for painting on silk. Inks can be also used in flat washes and the shading and details of the design finished off with tube water colours. The dome-shaped shade in Fig. 3 has a charming conventionalized design on a mottled background. The panels, top and base are ribbon bound. Such a shade would look well on a table standard in a drawing room.

Shields for electric candle lamps or wall brackets are made on small semicircular wire frames, which are first bound in the manner described, so that no part of the frame is visible, except the wire for fastening it to the electric light socket. Such shields can be of vellum, silk or linen. The last-named is particularly attractive with a bordering design in brightly coloured wools. A medium coarse linen should be used. The stitches must be very neat on the wrong side, or they will not look well when the light shines through the shade. The embroidered linen is well pressed, interlined with thin buckram and lined with pink or orange silk. The edges may be left unfinished and neatened after the work has been stretched and fitted to the frame. The shade must not sag in any way. Having pinned it on to the frame as described in the making of a silk shade, the edges are trimmed and oversewn with ornamental blanket stitch or turned in and sewn down with invisible stitches, Colour beads may be used with good effect to outline these shields.



LAMPSHADE. Fig. 3. Shade made of silk stretched on wire frame and hand painted

LAPPED JOINT. In the simple form of joint known as lapped joints, one part overlaps the other, and the two are glued or nailed together. The lapped joint has been developed in many directions, as, for example, the lapping dovetail, in which the overlapping portion is dovetailed to the other portion. A lapped halving joint is one in which the one piece overlaps the other, and half of the substance of each is cut away so that their surfaces are flush.

Assuming that an ordinary lapped joint is to be made at right angles, the angle may be attained by the use of a square. The upper piece of wood is set in place by the edge of the square, which is applied to it as a guide. The first nail is then driven and the accuracy again tested with the square, and if all is in order jointing is then completed by driving the remaining nails.

Screws are put in on the same system, but in this case the gimlet is used to make the hole for the screw, and the work tested as before. In either case the parts can be adjusted by tapping them with a hammer or mallet to set them square after the first fixing has been made, as the two parts of the joint will then hold together by the friction between their faces.

LATH. The principal use of the building lath, which is a thin, narrow slat of wood or other material, is to construct a lath and plaster partition in a building. Laths are required for the repair of ceilings, and are useful in the home for such purposes as making packing crates and chicken coops, and also for trellis-work. Laths are usually 1 in. wide, and are made in lengths up to 4 ft. 6 in. The sizes are: lath, $\frac{3}{16}$ in. thick, lath and a half, $\frac{1}{4}$ in. thick, and strong or double lath, $\frac{5}{16}$ in. thick.

In making a lath and plaster partition a framework of timber is provided to which the laths are nailed. The frames should be so positioned that there is a support for the laths at a distance of not more than 12 to 14 in. apart, when they are at right angles to the studding or framework. The laths should always break joint; that is, the ends should not all come over each other. This may be done by fixing, say, 8 or 10 laths, with their joints on the middle stud; the next set should come on another stud. If this were not done the vibration would be likely to cause the plaster to crack along the joint, since all the lathing would then bend along the same line. The laths are fixed about ¼ in. to ⅜ in. apart, and the best nails to use are ordinary 1 in. French or lath nails. When it is necessary to fix lathing to a wide piece of wood, as, for example, to a boarded part of the work, the laths must not be nailed directly to it, but to a set of underlying laths or battens at right angles to the face laths. This is done to provide room for the plaster at the back of the laths, as the plaster has to be pressed through the gaps between the lathing to form the key that stops the plaster breaking away.

Metal lathing is used for the same purposes in the form of a sheet of perforated or expanded metal, the interstices providing the key for the plaster. This lathing is fireproof, and valuable for many building purposes.

LATH NAIL. This is a wire nail with a fairly large, round, flat head, used principally for nailing laths to studding, in the early stages of making a lath and plaster partition or other structure. Common sizes are 1 in. and 1¼ in. in length and No. 16 gauge in thickness.

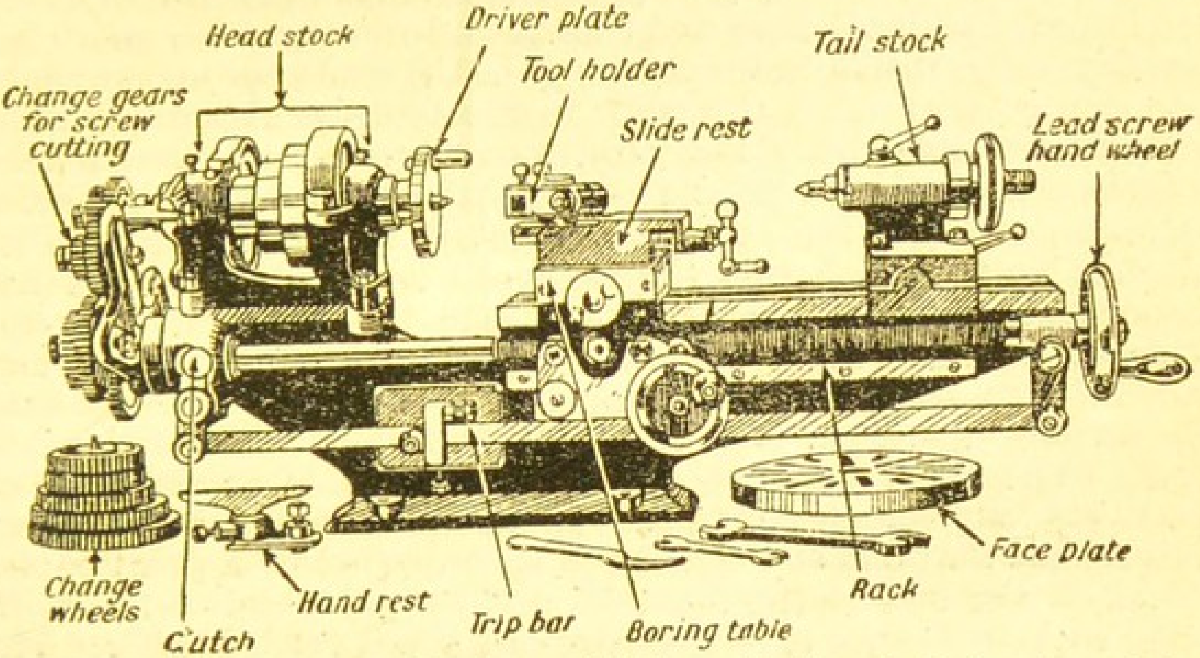
LATHES FOR AMATEUR WORK

Describing the Different Types and their Uses

This article is complementary to those on Metal Turning and Wood Turning.
See also Chuck; Mandrel

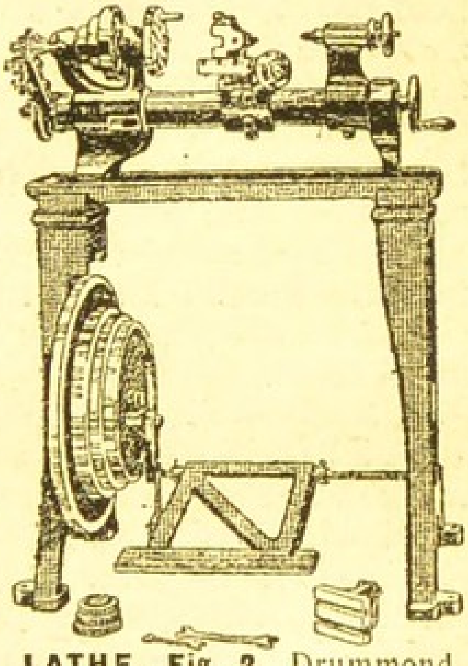
A lathe is an indispensable tool to the amateur craftsman, as by its aid all manner of circular objects can be produced within the capacity of the tool. Essentially, the lathe consists of five parts. The head stock comprises a spindle, called a mandrel, which turns in bearings formed in the body of the head stock. The spindle is provided with a flat or V-shaped pulley, generally with several steps of different diameter. The end of the mandrel is screwed for the attachment of various devices for holding the work.

The head stock is fixed at the left-hand end to a bar known as the bed. A movable part, called the tail stock, is usually provided with a spindle, which can be pushed in and out of the tail stock body by means of a lever or hand wheel and screw. The tool rest is also movably attached to the bed, and is used as a support for hand tools. More advanced types of lathe have a mechanical tool-handling device, known as a slide rest. The next feature is a stand or support of some kind, and may take the form of short feet projecting from the bed and raising it about 6 in. above the surface of the table or bench to which they are screwed; or preferably strong legs well braced together and extending from the floor to the bed itself. Means of driving or rotating the mandrel have to be provided. This usually takes the form of a heavy fly-wheel with steps or grooves turned upon its rim, varying in diameter, and corresponding with the proportions of the steps



LATHE. Fig. 1. Drummond back-geared lathe, with the principal parts explained

on the mandrel pulley. In the case of a bench lathe, that is, one which is screwed to the top of the work bench, the fly-wheel is mounted upon a light stand complete with a treadle, forming a foot motor. On other types the fly-wheel is mounted on a spindle attached to the left-hand standard. A flat or round belt transmits the motion from the fly-wheel to the mandrel. Motion is imparted to the fly-wheel by pressing the treadle with the foot with a steady motion, so that the lathe revolves at a uniform rate.



LATHE. Fig. 2. Drummond 4-inch model-maker's lathe
Courtesy of Drummond Bros., Ltd.

TYPES OF LATHES. These range from simple wood-turning machines to elaborate screw-cutting lathes, which have a set of gear-wheels and a long threaded steel shaft known as a lead screw. This is connected to the side rest, which is free to slide along the bed, and has an independent part known as a top slide, which also has a little lead screw of its own and propels the tool holder. The tool is clamped into the tool post on the top of the tool holder, and it is possible to traverse the tool along the length of the bed, an operation known as sliding. By turning the top slide lead screw, the tool is traversed across the bed. Twisting the top slide at an angle to the bed causes the work to be turned to a taper, and is known as angular turning. Turning at right angles is surfacing.

Screw cutting is effected by connecting the lead screw to the mandrel by a train of spur gears, and arranging their ratio so that the lead screw makes a certain predetermined number of turns per minute, while the mandrel makes another number of turns. Consequently, if the tool is mounted in the tool post and brought into cut, so that when the point of the tool touches the work it will remove shavings, a long, continuous groove or screw thread is formed upon the work held between the centres of the lathe.

Modern amateur lathes include a variety of mechanical devices. In all lathe work, whether turning wood or metal, the work has to be held in one of two ways. It may be bolted or otherwise attached to a disk of metal screwed on to the mandrel nose, and called a face plate, or held in some form of chuck, in which case the turning operation is generally known as chuck or face-plate work. The other method, especially applicable to the case of relatively long spindles or rods, is to mount them between centres. This means that one end of the rod is supported by a point centre placed in the end of the mandrel, the opposite end of the work being supported by a similar centre in the tail stock spindle. The ends of the rod have to be drilled and countersunk to form a bearing for the ends of the point centres. The next step is to fix a clamp called a carrier to one end of the bar, and to screw on to the mandrel nose a small, flat plate with a peg projecting from it and called a driver plate. The peg engages with the back of the carrier, and when the mandrel is rotated the work is thus rotated. The tool is mechanically held in the slide rest.

Amateur wood-turning can usually be carried out with hand-turning tools. Metal turning is mostly effected by the use of the slide rest, although a great deal of work can be done with hand tools.

A simple, efficient and inexpensive lathe is the C.A.V. It is a bench lathe with a slide rest, and is adapted for any small work, whether wood or metal. The lead screw is actuated by a hand wheel at the right hand end of the bed, and traverses the slide rest along a circular bar bed. A cross slide is provided for surfacing and feeding the tool to the work. The mandrel is a hollow one, so that long thin spindles can be passed right through. This results in a very considerable saving of material. A number of accessories are obtainable for this lathe. Another lathe of this class, which has several interesting features, is the Wellington. Like the C.A.V. it is provided with a hollow mandrel and also with a useful device, known as the collet chuck, which is easy to operate and holds the work very firmly.

A tool with a very much wider scope is the Relminor. A regular screw-cutting lathe, it is very good for all classes of small metal turning and is obtainable with or without change gears for screw-cutting. The top slide is detachable so that the large area of the saddle can be employed as a boring table.

A heavier lathe, one of the best that is available for amateur work, is the $3\frac{1}{2}$ in. Drummond gap bed screw-cutting lathe, the leading features of which are indicated in the diagram, Fig. 1, which shows the lathe arranged as a bench machine.

With this machine a very wide variety of work can be carried out, from the making of small delicate parts to quite heavy jobs. In fact it is capable of building up such an intricate piece of work as a scale model steam engine.

Many attachments are obtainable for the screw-cutting type of lathe which materially increase the scope of the worker. Thus, a milling attachment will allow the amateur to carry out such an operation as cutting a keyway or milling a flat or rectangular surface.

A lathe of another type, especially adapted for the model maker, is shown in Fig. 2. This has a bed of hollow, circular form enclosing the lead screw. The height of centres is 4 in.

An inexpensive portable lathe for light wood or metal turning is the Verschoyle mandrel. It clamps on to the edge of a table or bench, occupying little space, and when dismounted can be packed into small compass. It swings 6 in. above the bed and takes 12 in. between centres. By adding an extra length of bed and another bracket the turning length may be increased by 20 in.

Essential Points. Points that should be looked for in any lathe include the following. The mandrel should be made of highest class steel, and rotate easily but without the least trace of shake in adjustable bearings. The moving parts should operate smoothly, easily, and without shake. The centre of the mandrel and the centre of the tail stock should always be in the same line, no matter into what position the tail stock is moved. For wood turning, the fly-wheel should be large in diameter and the mandrel pulley small, as high speed is essential. For metal turning, the fly-wheel should be smaller and the mandrel pulley larger. There should be a difference in the stepping ratios, that is, one large diameter step on the fly-wheel and a smaller diameter on the mandrel pulley for wood turning. The intermediate position should be provided, and in addition a small step on the fly-wheel, in conjunction with as large a diameter on the mandrel pulley as possible, for turning cast iron. Metal-turning lathes, intended for turning cast iron, are preferably fitted with a mechanical speed-reducing arrangement known as a back gear (*see* Fig. 1). The treadle should be so arranged that if the foot is accidentally placed beneath it the connecting rod will automatically be thrown off the crank pin, otherwise the foot may be severely injured.

The lathe as a whole should be stiff, rigid, and strong, so that when in use it does not vibrate or shake about, as this is fatal to good work. Chucks, tools, and accessories can be added to it from time to time as occasion demands. The bearings must be kept free from dirt and frequently oiled.

LATTICE. A lattice is an openwork structure of wood, metal, or other material, formed by crossing or interlacing strips of material. Such a structure is often used to cover a window, to form a screen, or to protect a doorway. In lattice work all that is necessary is to cut strips of material to requisite lengths, and, if working in metal, to drill them at regular intervals for the rivets. When wood is used it will suffice to nail the strips together. To ensure uniformity, the strips may be guided in position by means of a simple space jig, made from a batten having notches cut in its edge at regular distances corresponding to the desired spacing.

In use, one set of strips is laid on the bench or other support, and spaced by placing the notched batten upon them, so that a strip is held in each notch. The first of the next series, which run in the opposite direction, is laid up against the batten, and nailed to the first set of strips. The batten is then removed and turned at right angles, and one of the notches placed over the strip just nailed on. The other strips are put into the notches and similarly nailed and fixed. The batten is then removed towards the end of the strip and the joints nailed together.

LEAD, Uses of. Lead, which is one of the heaviest and softest of metals, has many uses in the home. In the form of pipes it is extensively used in sanitary systems, for waste pipes, and occasionally for hot and cold water services. In sheets, lead is used in the construction of gutters and for covering flat roof surfaces, the lining of sinks, and in numerous other directions. It does not rust or corrode under the action of water. Lead can be soldered, or joints formed by burning, this process consisting in melting the lead at the joints so that it fuses or burns together. In the home lead is used for keeping carpets in place at the edges, or for weighting the bottom of a table-lamp stand or other structure.

LEAD ART CRAFT FOR HOME DECORATION

How to Make Inexpensive Leaded Windows and Mirror Frames

This article deals with the various forms of ornamentation possible by means of prepared lead strips. The entry on Leaded Lights and that on Stained Glass should be consulted. See also Lattice

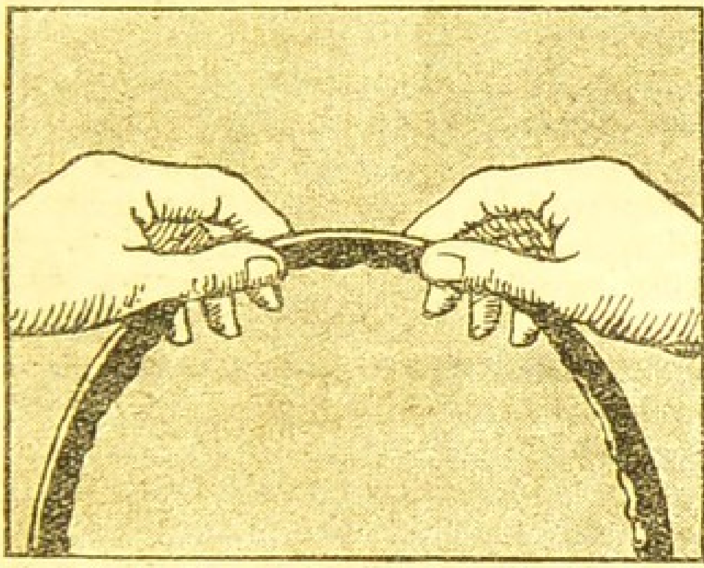
Many people like the appearance of leaded lights for their homes, but are deterred from installing them owing to their cost. By the use of prepared lead, obtainable in coils, a special cement, brush and sponge, the amateur can for a trifling sum convert a plain window into one with leaded panes.

This lead is manufactured in thin strip form and in various widths. It is extremely pliable, easy to use, and is coiled to facilitate handling and for convenient packing. A particular feature of the lead is that it adheres to tiled surfaces, metal, wood, or glass. It can be used for framing pictures or mirrors, and is one of the easiest materials for applying with cement as a moulding. It can be painted with cellulose.

Designs for decorating glass screens, glazed doors for wall cupboards, bookcases or overmantels, can all be carried out by the amateur, while the lead can also be employed for name plates on front doors and gates. The cement to be used with the coils of lead is specially prepared to withstand all weathers. Various outfits are obtainable for this craft, including one which contains glass colour stains for use on windows, etc., in ruby, amber, blue, and green.

Simple Leaded Windows. A small window on the staircase or landing may be selected on which to experiment. It will be found that after applying this form of decoration the window is quite easy to clean. The strips do not work up, however much they are rubbed, if the special cement is used for fixing them on to the single panes of the ordinary window.

The first task will be to measure off the correct length of lead. Hold an end of the lead in one hand at the top of the window and



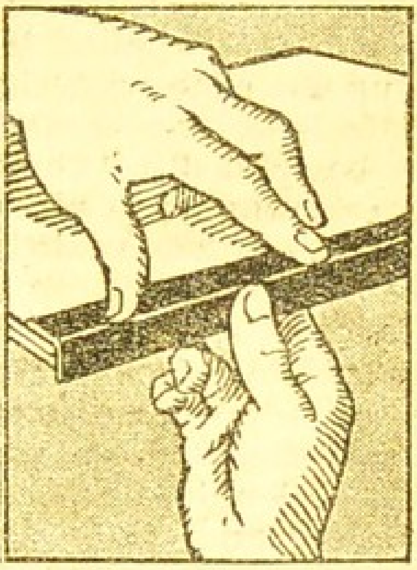
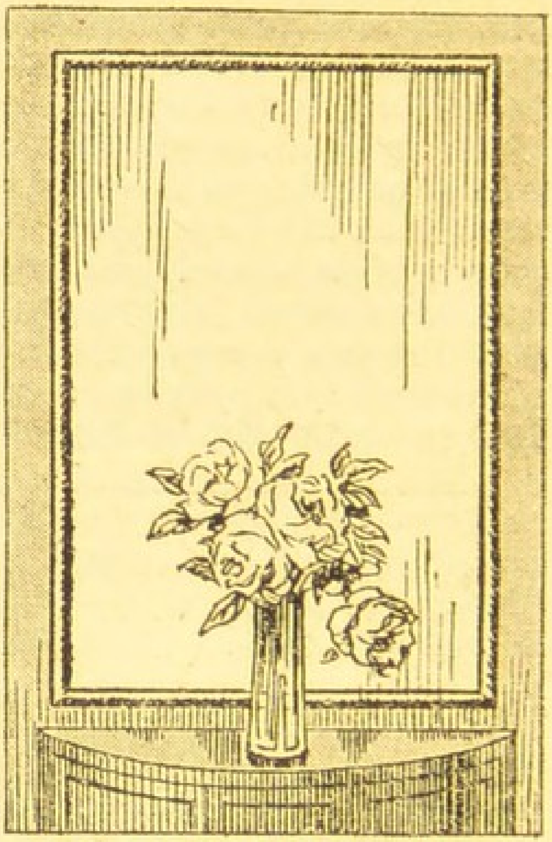


Fig. 1 (left). How to bend strip lead. **Fig. 2.** Grooved lead strip for framing

allow the coil to unwind and fall perpendicularly. Then nick the lead at the desired point with the thumb nail and, taking it from the window, snip it off at that mark. Measure and cut all the lengths for one window before proceeding any farther; then take the brush and the tin of liquid cement and paint each strip of lead on one side only with a thin but even coating of cement. Treat two or three strips of lead in this way before attempting to affix any to the window, as the cement must be on the lead for 15 minutes before applying. This will ensure that the cement has partially dried and is slightly "tacky," and therefore more adhesive. Pencil-mark the window frame to ensure the strips being laid on straight. Now take the strip of lead which was cemented first and lay it on the glass in required position.

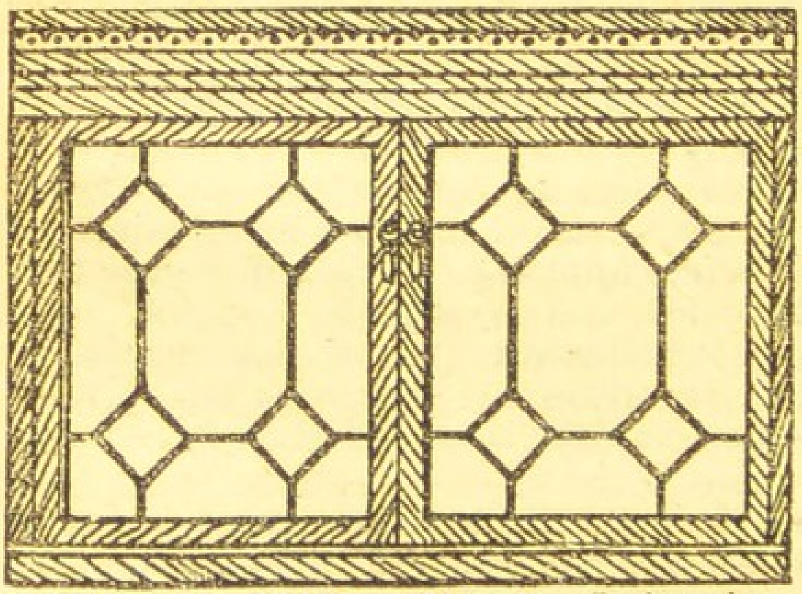
Having made sure that it is exactly straight, press it firmly and evenly with the ball of the thumb, and with a linen rag damped with petrol or turpentine gently sponge away any cement which has been pressed out from under the lead on to the glass. It is more satisfactory to start with the horizontal strips, but leave the top and bottom horizontals until last. They will serve to frame the others and keep them in position. Many people leave the spare cement on the edges of the lead, preferring the appearance of age which the resulting irregularity affords. The strips may be applied to both sides of the window, as the cement stands all weathers.



LEAD ART CRAFT. Fig. 4. Pleasing effect of mirror plainly framed in lead

Opinion is somewhat divided upon the question of overlapping. Some prefer to overlap the strips of lead, for this method is easier and quite attractive. Others prefer to cut each section flush with the next, giving a soldered-joint effect. Mistakes are easily rectified. If a strip of lead is applied incorrectly, turn up the edge with the point of a knife and the whole strip can then be pulled off quite easily. After experimenting with a squared pane effect, a lattice with diamond panes will be found equally easy to simulate.

To imitate the Gothic or Norman arch, as a finishing formation to the top of a window, or to insert panels of heraldic designs, etc., the amateur must learn how to bend the lead. Hold the strip so that the side which is to become the outer edge of the curve is uppermost, and gently pull the lead round to the desired curve, doing a little piece at a time (Fig. 1). The lead is now neatly curved on the outer edge, but the inner edge is buckled. Proceed, therefore, as follows: Lay the curved strip on a flat surface. Hold firmly in position with finger and thumb of one hand and gently press the buckled surface with the ball of the finger. Practically all the buckling will then disappear, and by gentle rubbing with a linen rag, a flat appearance is ensured.



LEAD ART CRAFT. Fig. 3. Design for bookcase or cupboard doors, simulating diamond and other shaped panes

For making a number of curves of the same size it is easier to work with a template. This is a thin piece of cardboard which is cut to the exact curve required. Tack this template on to a smooth piece of wood. Next tack the metal strip to be curved just above the top of the template; then gradually ease the lead round the edge of the template with the fingers by means of a gentle pulling and pressing movement.

Glazed bookcases can be treated in the same way as windows. Recessed cupboards on landings or in halls often look well if the upper portion is glazed and decorated in this way, and the possibilities of lead strips for framing pictures are well worth the notice of amateur craftsmen.

LEADED LIGHTS IN THE HOME

An Old-World Attraction for the House of To-day

Other articles that deal with the decoration of the home are Enamel; Paint; Panelling; Parquet. See also such entries as Casement; Glass; Stained Glass; Window and those on the materials and processes, e.g. Cement

The old form of decoration known as leaded light work consists in the use of pieces of glass to form a pattern, in which they are held together by calms, or strips of lead. These are soldered together at the joints, and the whole fixed in a framework. Leaded lights form a pleasing feature of some styles of decoration, particularly in houses furnished on the Tudor or Jacobean models. In many cases it is possible for the amateur to take out existing casement windows and replace them with leaded light panels, or add lead panels to the framework.

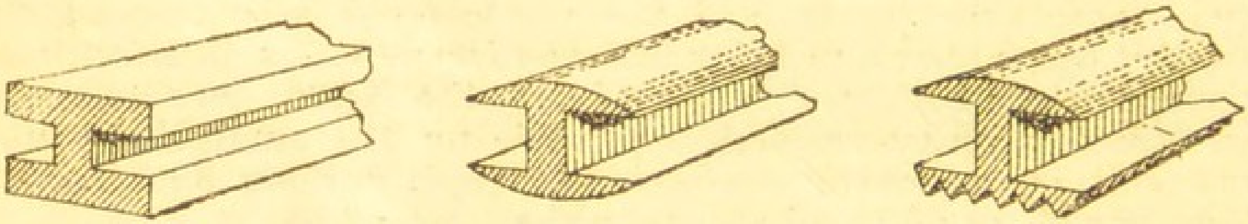
The tools required for making leaded lights are one or two good glass-cutters, either a diamond or one of the newer types of wheel cutter. On a rippled or variegated surface it is probable that a better result will be obtained from the use of the wheel, but in large sheets the diamond is less likely to cause a breakage, as it requires less pressure to effect the cut. A board upon which to cut the glass, a T-square and set-square, and straight-edge are required, as well as one or two knives for cutting the lead, a pair of pliers, and soldering iron.

One or two special implements are needed, including the lathykin, made from a piece of hardwood or bone about 7 in. long. The point of this device is used for opening up the flanges of the lead before inserting the glass, while the prepared flat end is used for pressing them down again when the glass is in position. Machine-drawn lead calms can be obtained ready for use from various firms specializing in this material. The smaller sizes are generally solid lead, while the larger are often reinforced with a steel core.

The types of glass in common use are the ordinary sheet glass, such as is used in windows, and which may be obtained in various colours, and obscured glass, which is made in different grains or surfaces. One of the cheapest kinds that can be used for tints is rolled cathedral glass; it is made in a variety of colours, is non-transparent, and is very useful where some obscurity is required, as for the panels in a screen or a hall lantern.

A number of glasses are graded under the heading antique, and include pot, flashed, streaky, Venetian, and opal. In the pot metal glass the colouring medium is introduced in the process of manufacture, and consequently the glass is coloured right through. Flashed glass is coloured only on the surface. Streaky glass exhibits a variety of streaks of different colour. Venetian has a strongly marked pattern, and is a very brilliant glass; opal glass has an opaque white surface.

PREPARING THE DESIGN. When preparing a design it is necessary to bear in mind the nature of the material and the restrictions it imposes. For example, it is impracticable to introduce very thin lines, except those which are formed by the lead, as obviously there is a limit to the breadth of the glass in the sense that it is extremely difficult to cut a very narrow strip. The desired effect should be obtained therefore from breadth of treatment rather than detail. This only applies to self-colour glass, for when stained glass forms part of the composition the design may be treated in a more decorative and detailed manner.



LEADED LIGHTS. Fig. 1. Diagrams showing three varieties of lead calms employed in this decorative work'

For example, the body of a window made with plain glass of various colours could have a central panel introduced in stained glass which may have some particular feature, such as a heraldic shield or emblem. The best models of such windows should be studied, as it is easy, when dealing with stained glass, to introduce a garish or cheap effect into a window by the use of poor design and colouring.

Taking as an example the light for a window composed of pieces of clear glass, the first procedure is to make full-size drawings showing the exact arrangement of the separate pieces. The lines upon the drawing should represent the heart or centre of the lead. The size to which the glass is cut must then be smaller by the thickness of the heart (i.e. half the thickness for each side). Sometimes the drawing shows also the thickness of the calm itself.

When it is necessary to cut up a number of squares or lozenges of the same size, the glass is first cut into strips of the desired width, and then cut across to form the squares, etc. Test the first strip by placing it between odd pieces of calm and observing that the centre of calm registers with the centre line on the full-size drawing. When the glass has been prepared and the requisite quantity of lead is at hand, the framing is placed flat upon a level table or board, and laths are nailed down on two sides of it in register with the line of the rebate of the window frame. The outside lead is then arranged so that half of it will protrude from the rebate and show inside the sight lines.

Inserting the Glass. Before using the lead it should be slightly stretched to straighten it. The lead is laid upon the bench and the grooves slightly opened with the lathykin on both sides. The requisite number of pieces of lead are cut to the length and breadth of the light and laid on one side ready to hand. Sufficient pieces of glass are then inserted into the lead and built up in the vertical direction of the light. The glass is inserted into the grooves in the lead and tapped tightly in position with the handle of the lead knife. As each piece of glass is inserted, it is temporarily fixed by driving a nail lightly a little way into the bench with the side of the nail against the edge of the glass. Short pieces of lead must be inserted between each piece of glass and cut to such a length that their ends will butt against the vertical strips.

When the first set of glasses has been inserted a long strip of lead of requisite length for the vertical strip is slipped over the edge of the glasses. To do this will necessitate lifting each glass separately from the bench, for which purpose the bent knife is required. This is pushed under the glass and raises it just enough to allow the flange of the vertical lead to be held between the glass and the bench. The temporary nails are removed while the lead is inserted, but fixed behind the lead to prevent it slipping off again. Each nail and separate piece of glass is treated in the same way until the whole length is complete. The light is continued until all the glasses are in position. The remaining two outer leads are placed in position and temporarily secured by nails to the bench. The whole is then pressed tightly against the laths, and afterwards secured by two additional laths.

Before driving the nails into the bench to secure these laths test all the dimensions. Should the panel be oversize this may be corrected by tapping the edge of the lath and driving the pieces of glass more closely together. Corner angles should be tested with a set-square, and when all is in order the second set of laths may be fixed and the joints carefully soldered.

Soldering the Joints. The soldering tool must be tinned before using. The surfaces to be soldered are rubbed over with a composition candle and the solder flowed on to the joint. Neat joints are best obtained when the soldering iron is at the right heat. The face of the iron should be placed only on the joints and held firmly until the solder runs into place.

When all the joints are soldered the panel should be turned over very carefully. Two of the laths can be removed and the panel drawn forward on the surface of the table until it projects sufficiently to allow the hands to be inserted beneath it. It should be grasped between both hands and the projecting portion laid on a strip of wood, while that part of the light resting on the bench is raised with the left hand until the panel is vertical, when it should be turned round and rested against boards which are slanting backwards. The bench is then cleared and the panel lifted by means of boards, laid in a vertical position tilted over and pushed on to the table. The second side is then soldered as before.

For cementing, a small quantity of white lead may be used. Another cement is composed of whiting, plaster of Paris, boiled oil and turpentine, coloured with lamp-black, and with the addition of red lead and patent driers.

The object of cementing is to fill up the grooves and crevices between the glass and the lead so that the panel becomes one solid structure. A good way of doing this is to apply the cement with an ordinary paint brush which has been much worn and has got strong in the bristles, and to brush the cement well in under the flanges of the lead.

The corners should receive extra careful attention; proper cementing is evidenced by the cement working right through from the top to the underside of the work. Lift the light from the bench occasionally and see if the cement has worked through. Surplus cement should be wiped off with cotton waste or clean rag, the light turned over and the cement brushed in on the other side. The whole surface of both sides should then be wiped over to remove surplus cement, and the surfaces dusted with whiting. The panel should be set against a sloping board to harden, and allowed to stand for 12 to 24 hours, when it may be cleaned by dusting it over with clean, dry sawdust and the use of a scrubbing brush. Any cement adhering in the corners should be cleaned out with a pointed piece of hardwood. The panel is then set aside to dry and harden for several days.

Fixing the Panels. Leaded light panels are fitted in different ways, according to the nature of the frame. A simple method is to fix the panel into a rebate in a wooden frame secured with little battens of wood screwed or bradded. In the case of large panels, strengthening bars of iron or copper have to be fitted, soldering a little hook of copper wire to the leads and twisting it round the iron bars. On outside work the rebate should be loaded with putty or cement prior to inserting the panel. If the light is to be fitted into a window with a stone mullion or framework having a rebate, the holes for the supporting bars will have to be chipped out with a mason's chisel and the light bedded in mastic cement, which may be composed of lime, sand, and a little litharge.

Repairing Lights. Repairs to leaded lights are effected by a process known as stopping in, and presuming only one or two small pieces of glass are broken, these are removed by levering up the flange of the lead with the aid of a lead or putty knife, until the pieces can be removed easily. The new piece is cut to shape, inserted in place, and the lead pressed down smooth again. If this necessitates cutting the soldered joints at the corners, they will have to be resoldered. If several pieces of glass are broken the best plan is to cut away the whole of the damaged part and replace it with new lead and new glass, soldering and cementing as if the whole were new work.

LEAK, Stopping a. In the home, a leak is most common when water pipes burst owing to the action of the frost, and, if neglected, may result in the flooding of the premises.

The pipe should be blocked at some point above the fracture, so that the water cannot flow through the pipe and the leak is stopped.. Repairs are effected according to the nature of the material of which the pipe is made. In the case of a lead pipe, this is done by making a plumber's wiped joint, and in the case of an iron pipe, by fixing a new section in place of that which is damaged.

When rain finds its way through a roof or guttering, the leak usually is caused by a broken or misplaced tile or slate, a small hole through the gutter, or through the roof covering if of some material such as bituminous sheeting. The remedies are to replace the damaged tiles or slates with new ones, and close up the fracture in the sheeting. There are several patent compositions which are often effective in curing a leaky roof.

The remedy for a leaking water tap is generally to fit a new washer in place of the old one. *See* Tap.

LEATHER & ORNAMENTAL LEATHER WORK

Necessary Tools and Simple Methods Described

The following article contains many useful hints on materials and accessories required for this decorative craft, together with practical directions for modelling and colouring leather

When choosing leather for an important piece of work such as a fire screen, large bag or blotter, it is advisable to purchase a quarter skin of medium growth. Older skins are coarser and young ones cut to waste. Merchants charge more in proportion for supplying panels of flawless pieces, and if there is a surplus of material after cutting out the required amount for the work, the extra pieces can be made into smaller articles. Skins are usually sold by the square foot.

English calf skin is the best leather for plain or modelling purposes. It can be prepared so that embossed work retains its shape without padding. Kip calf, or East India kip, is a less expensive leather with a coarser grain, but is also good for modelling work. Cowhide is a useful leather for large pieces of work such as a screen or a shopping bag. It models, stains, and wears excellently. As the skins are very large these leathers are obtainable at the lower rate in eighths as well as in quarters and halves. A cheaper underhide is obtainable in narrower widths. Russian leather has a beautiful surface for bookbinding work. Morocco is made from the finest selected and hand-dressed goat skins. Pig-skin is light, but very tough and durable. The reptile skins, crocodile, alligator, lizard, snake, make ornamental but expensive leathers. Persians are hard-wearing and made from foreign sheepskins. They are obtainable in browns and several other colours. Velvet persians are a fancy form of this leather with a suède finish. Persians are used extensively for lining first-class work. Degrained persians are a superior form of suède finished leather used for golf coats and other dress wear. Velvet sheepskin is similar in appearance to velvet persian, but coarser, and is used for making bags and blotters, etc., required with a suède finish. Less expensive for smaller articles is a strong leather made from hide splits and known as velvet splits. Plain skivers are cheap and useful lining leathers. These are the upper grain of split sheepskins. The under or flesh split is called chamois though only an imitation of the skin of that almost extinct animal. Skivers should be strengthened by pasting to leather, linen or board.

Imitation morocco is made from sheepskin with a grained instead of a velvet surface. Polished crocodile, in large or small grainings, and velvet crocodile are copied well in hide. These are strong and effective leathers for shopping bags, pochettes and undecorated blotters. Lizard-grained sheepskin is also an excellent imitation of another reptile skin which can be most successfully made up into handbags.

TOOLS AND ACCESSORIES. Simple outfits are best for the beginner. A useful set of tools comprises: a transparent set-square for correcting angles and cutting the various parts of the work to fit (being marked with inches and quarter inches it takes the place of a rule); sharp knife for cutting leather and turning edges; double-edged ball tool for embossing, i.e. pushing up the design to raise it from the back; combination tracer-modelling tool, used for tracing and modelling the finer parts of a design; pliers punch for punching holes in the leather before thonging; boxwood mallet for flattening out corners and pressing the edges of finished work. A large-eyed blunt needle is required for use with leather thongs. A rug needle will do.

A Dresden tool is often used for backgrounds and completing delicate detail. One end is shaped like an inverted V and the other forms a semi-circle. Both these working ends are thin and smoothly finished. A purse crease is a useful tool for finishing the edges of leather work. It is heated over a gas jet and held vertically. The groove in the creaser fits over the edge of the leather. To round corners it is important to move the article round to meet the creaser. A well finished smoothly indented crease is thus easily made. A brass holing gauge is a detachable device for the punch pliers which enables the worker to punch holes accurately at equal distance both from the edge of the article and from hole to hole.

A brass die outfit for fixing press studs and eyelets to bags and other articles can also be obtained, and press buttons can be bought in various sizes and colours. Each press button consists of four parts: two upper pieces, cap and cap eyelet; and two under pieces, spring and spring eyelet. Directions for the use of these outfits are sold with them, but if the amateur wishes, it is possible to get press studs put in work by a leather merchant or saddler. Matting punches for ornamental work are used for simple forms of decoration instead of modelling the leather and are sold with a number of fittings.

Many other helpful accessories are obtainable. Metal corners can be bought ready for fixing in wallets, also zip fasteners, bag mirrors, frames, locks for bags and metal edges and tabs. Made-up bag linings are also supplied with patterns showing the exact sizes of the outside covers required to fit the inners. Inners for wallets, blotters, pochettes and other articles can be fitted to the panels embossed or decorated by the home worker. Frames are obtainable for fire-screens in oak, mahogany or walnut. Rubber linings are made for leather tobacco pouches. Thongs are prepared for use in various widths and lengths of persian and calf.

Aniline spirit dyes are chiefly used for colouring leather work. A special polish is sold to give a brilliant finish; manilla board is used for stiffening purposes and pattern making, and a cement or flour and water paste for fixing linings, etc. Bronze powders and silver and gold leaf are suitable for decorating leathers, and may be supplemented with transparent lacquer colours. Designs and patterns are obtainable in great variety for decoration and articles in leather.

Modelling or Embossing. Having cut out a piece of leather to the required size, damp it with a clean sponge and water, place it on a drawing board and fix the selected design over it by means of drawing pins, beyond the edges of the leather to obviate marking this. Having traced over the whole design with the tracing tool, remove the paper and trace the design again firmly with the tracing tool on the leather itself.

To raise into relief portions of the work from the back, if the panel is a large one, the leather is held in position by the left arm, the first finger and thumb of the left hand limiting the particular portion of the design being raised, while the right hand underneath the panel pushes up the leather, between the left finger and thumb, with a ball modelling tool, working it to and fro. Care must be taken not to stretch the leather too much. High relief does not look well in leather except in rare instances, when it is usually filled with a padding of cottonwool pasted to the back of the leather and covered over with paper, pasted on before affixing the lining. Medium and low relief should require no filling out if a good quality of calf or hide is used for this work. All the raising work required is begun on the front of the leather.

Having completed the raising, lay the panel flat on a piece of plate glass; or, if a soft surface is required, pin several sheets of blotting paper on to the drawing board. Then, holding the modelling tool at an angle of about 45°, press the whole design down into position along the traced lines. Use the tool in one direction only and with sweeping strokes, to produce a distinct groove, without creasing the background. The heavier the leather the more frequent will be the damping required to keep it soft. Having thus completed the raising and depressing of the principal portions of the relief, work is now done with a Dresden tool on the detail and background. Using the same long, sweeping strokes, the whole design is thrown up by this means into varying shades of relief. In really good leather craft, designs are not overworked, but accomplished with a minimum of strokes and curves. Matting punches are often used for backgrounds to give them variety of texture. The whole of the ground must be covered and the punch is held upright, the same force being given to each blow of the boxwood mallet on to the punch. Where very low relief is required the background is merely pressed down without raising the design from the back.

Staining. In all decorated leather work it is essential that the surface should be absolutely clean before using any stain. When the design is completed the whole piece of leather should be damped over with a clean sponge moistened in water, and then oxalic acid solution is applied with a pad of cotton wool. When this is dry, colouring may be proceeded with. An antique effect is obtained by applying a coat of bichromate of potash to the leather after it has been cleaned. Choose spirit stains of the required colours and mix them with methylated spirit to the tint suitable for the particular work. In some cases the entire surface of the leather is stained one colour, in others several shades are used to bring out the designs. The leather must first be damped before applying stains.

After the article has been coloured (excluding the design if that is to be multi-coloured) and the stain allowed to dry, begin to paint in the design with a camel hair brush, working quickly to avoid hard lines, as these stains dry rapidly. Several coatings of a stain may be required for dark colours. For large surfaces, stains are applied with flat wash brushes or with pads of cotton wool. Shading and tinting require practice. Several colours may be merged into one another by painting them on with small, rather dry brushes. If the effect is crude when finished, a softer one can be produced by a quick wash of very thin background colour over the whole design. Staining may be used to colour designs without embossing, and embossing without staining, as forms of decoration in leather work. The natural colour of calf is beautiful in some modelled work. Small pieces of leather may be utilized to make artificial flowers. Once modelling and colouring have been grasped these can be effectively copied from real or imitation flowers. Skivers and suède are mostly used for this work, and flower centres and other accessories can be bought for it.

Thonging. Lacing leather by means of narrow thongs threaded through a rug needle is a simple method for fastening, and is also used for ornamental edging. If thonging is to present a workmanlike appearance it is essential that the spacing between the holes is accurately gauged. Using a lacing of $\frac{1}{8}$ in. wide, the holes should be $\frac{3}{16}$ in. from each other and from the edge of the article. By means of the holing gauge device, marking and measuring are rendered superfluous.

In use it has been found that shorter lengths of thonging are the most practical. Dragging more than 30 in. of lacing through a large number of holes merely to avoid joining is not only waste of time and energy, but is also apt to spoil the look of the work and to twist the thong. To start, fix the end of the thong between the lining and the leather with paste, and sew as if overstitching. To join thonging, pass the old and new piece through the same hole at the actual join, the old one from the back and the new one from the front, and paste about $\frac{3}{4}$ in. of each under the lining, cutting off the superfluous length of the old piece. Another method is to shave off each end and paste them together, but this is not so durable.

Fire Screen. The panel for the fire screen in Plate 27 relies on colouring and not on modelling for its decoration. A variety of designs are obtainable which would be suitable for such a screen. Having traced the design in the manner already described and gone over it lightly with the modelling tool, the spirit stains are applied, using dark brown for the gull's wings and tail, tipping them with black or with white paint to bring out the feathers. The top of the body and head are also white, the eye is black, and the beak and legs scarlet. The curves of the sea are in white and gradations of blues and greens, while the fish are in browns and white. The sky is left the natural fawn colour of the leather.

The leather panel when painted is covered with a thin layer of paste and affixed to a 3-ply wooden backing. This is allowed to dry thoroughly before framing. It is kept in position by hammering gimp pins through the beading to the sides of the screen. The panel is polished with a special leather polish to give it a glossy surface. Screen panels are also sometimes thonged to frames which are furnished with screw eyes.

LEATHER CLOTH. This cloth, as its name implies, is a substitute for leather, and is used mainly for upholstering. Manufactured by a patent process, it is obtainable in almost every colour with a variety of grains, morocco, antique leather, and pig and buffalo skins being among the leathers simulated. The cloth is damp-proof and fadeless, and requires no special cleaning. Dust or stains may be removed with a damp cloth without destroying its lustre. Leather cloth may also be used for panelling walls.

LECLANCHÉ CELL, Care of. The chemical action in a Leclanché cell results in the zinc rod being consumed, and at the same time the sal-ammoniac is used up. For each oz. of zinc consumed, 2 oz. of sal-ammoniac will be used up, so that whenever the zinc rod has to be replaced the electrolyte should be renewed. After about four zinc rods have been eaten away it will be necessary to replace the porous pot and its contents.

Leclanché cells should be recharged by thoroughly cleaning all the parts, putting in fresh zinc and refilling with fresh sal-ammoniac solution. The solution is made by putting into clean, preferably distilled, water as much sal-ammoniac as can be dissolved, but no more. The proportions are about 3 oz. of sal-ammoniac to 1 pint of water.

Too much of the sal-ammoniac must not be used, or a deposit will form around the bottom of the cell and impede its action. Local chemical action may be set up, resulting in the rapid deterioration of the zinc. Since the deterioration takes place more at the top of the zinc than at the bottom, there is little difficulty in finding out whether the cell is too heavily charged with sal-ammoniac. Leclanché cells are used for batteries, several cells being connected in series to increase their voltage, or in parallel to increase their amperage. In the former case the wire from the zinc rod of one cell is connected with the carbon on the next. In the latter all the zincs are connected together and all the carbons together.

LIME, In Building. Lime is a natural cement, and there are various qualities and grades, of which those used for building are the blue lias and the grey or chalk. Lime requires dry storage. Quick-lime, before it can be used, is slaked with water.

Lime is best slaked by spreading it out upon a board, covering it with a small proportion of sand, and sprinkling the whole with water from time to time, turning the lime over until it is thoroughly slaked. It should be allowed to stand for at least a month before use. For plaster work lime should be slaked by providing a tub, or by digging a hole in the earth and lining it with boards, two-thirds filling it with lump lime, covering it with water, and allowing it to remain for several weeks until it is a thick, creamy mass. It is then known as lime putty, and is used in conjunction with sand or other ingredients.

Lime is purchased from builders' merchants, and when ordering it is well to state the purpose for which it is required. For instance, lime for mortar will be blue lias, and lime for plaster-work pure or fat lime, these expressions referring to the setting properties. Rich limes are those which only contain about 6 per cent of insoluble impurities, and are used for plastering because of their readiness to slack, and their consequent non-liability to blister.

The rapidity of setting of lime depends on the quantity of other substances it contains which render it independent of external agents for its setting properties. The limes containing about 15 per cent of such substances are termed feebly hydraulic. Those containing about 25 per cent are moderately hydraulic, and those containing from 25 to 35 per cent are eminently hydraulic. The last-named grades are most suitable for constructional work.

LIME PUTTY. Also known as plasterer's putty, this is made by slaking chalk lime, allowing it to stand in a tub with water for some weeks. It ultimately becomes of a thick, creamy consistency, and is then used for making plaster.

LIME WASH. Lime washing, or lime whiting, is the process of treating exterior or interior surfaces with a mixture of pure lime and water, which is applied hot with a stiff brush of substantial proportions. In preparing the lime wash a sufficient quantity of quick-lime should be put into a tub or old box that is reasonably water-tight, and the lime covered with boiling water. After it has dissolved, sufficient hot water is added to make an easily workable mixture, a quantity of which may be put into a bucket and stirred as required.

Before applying the lime wash the surface to be coated should be washed down with soda water, and in the case of outbuildings, such as poultry houses and the like, a little soft soap can be added to the washing water. The walls should be sprayed with a strong solution of disinfectant, such as carbolic acid, diluted with water in the proportion of 35 parts of water to 1 part of carbolic acid, and sprayed on by means of a garden syringe.

As soon as the carbolic is dry the whole surface is coated with lime wash, and, to assist it to harden and adhere to the woodwork, a little common salt and sulphate of zinc may be mixed with the slaked lime. The proportions are 2 lb. of salt and about twice the quantity (i.e. 4 lb.) of zinc sulphate to a bushel of lime. The best brush to use is a well-worn whitewash brush, and the wash should be applied vigorously, so that it is driven well into the surface. If necessary, two or more coats may be given, according to the nature of the work to be done.

After walls or ceilings have been repeatedly coated with lime wash, the surface will show a tendency to flake and chip off, and in such cases the old lime wash should be thoroughly well washed and scraped off. Lime wash should not be confused with whiting, which is made up with powdered chalk.

LINOLEUM: Laying. Before floorcloth is laid, loose boards must be fixed, uneven edges planed off, and the floor otherwise prepared. Before cutting the linoleum, careful measurement is essential. Avoid unnecessary joins, and see that there is no join at the doorway. Lay the linoleum so that as little waste as possible is incurred. The edges at the seams should be butted tightly against each other with the pattern carefully matched. Proper tacks, without heads, should be used, and placed about $\frac{1}{8}$ in. from the edge and at a distance of 4 in. apart.

To cut fairly long lengths, rule a pencil-line and place a long ruler on the line to guide the knife ; provided the knife has made an incision, it will readily break when folded back. Special care is needed in fitting lino round pipes, radiators, doorways and wall projections. The fixtures should be disconnected, so that the floorcloth can be laid underneath them.

A certain amount of expansion occurs after linoleum has been laid a short time, and it should be trimmed again where necessary and finally nailed in position.

A treatment which is even more satisfactory, and practically makes a jointless flooring, is to provide a small triangular moulding to match the moulding on the skirting-board. The lino can be cut ¼ in. or ½ in. short of the skirting-board. The moulding is tacked to the latter, and this keeps the lino in position and hides its edges. The moulding should be fixed to the skirting-board only, so that when necessary the lino can be drawn from under it.

The best treatment to get an excellent surface after washing the floor-cloth is to rub wax polish in thoroughly To retain the polish, occasional applications of paste or liquid wax polishes are necessary.

LOCKS: HOW TO FIT AND REPAIR

With Simple Instructions for Cutting Keys

This contribution describes the mechanism of the chief types of lock and gives directions for fitting them to door, lid or drawer

Door locks are made both right and left hand, and many are made reversible to suit any door. The rim lock is a type which is easily fixed on the outside of a door. The first thing to be done is to mark out the door and sink the flange of the lock plate into the edge of the door by chiselling away the surplus wood. Then hold the lock in position and mark the position of the keyhole and the spindle hole with a bradawl on the face of the door. The lock is screwed on with round-headed screws, flat-headed screws being used for the cover plate.

The spindle knobs and escutcheon plate are placed in position, the last-named fixed with escutcheon pins. The box staple may be set in the door frame or on a block. If fitted correctly, the bolt should shoot into the staple with a decided action and a perceptible click. There ought to be just sufficient room for the door to clear the front edge of the staple, and to leave not overmuch space between the lock case and the staple when the door is shut.

The mortise lock is almost invisible when fitted, being mortised in the door, and is widely used. In fitting, the door is first marked out and the centres of the spindle hole and keyhole marked and drilled. The mortise is carefully cut in the ordinary way, the lock flange being recessed into the edge of the door, and the lock secured with countersunk screws. A striking plate takes the place of the staple and is recessed into the edge of the frame. The holes for the lock bolts are drilled out and squared up with a chisel, and must be deep enough to allow the bolt to enter. When the bolts enter the holes properly, the plate is fixed in place with countersunk screws. The joiner uses a special long-shanked chisel with a hooked blade to cut the mortise in door.

Fitting Pin Tumbler Locks. Fitting this type of lock is similar to a rim lock, with the addition of a hole which has to be drilled through the door for the passage of the lock body, which is held in place by two long screws through the door from the back, prior to fixing the lock case. A specially shaped washer plate is supplied to bear against the woodwork, which, by aid of the screws, clamps the lock body to the door.

Iron cupboard locks are used for the doors of meat safes, presses, hot closets, and various other fittings about the house. Smaller locks such as are required for cabinets, wardrobes, chests of drawers, and other articles, are usually of brass. Cabinet locks are made in warded and lever types, the iron being warded, while the brass are lever.

Box locks are fitted in much the same way, but the top plate with the lugs with which the bolts engage has to be fitted to the lid. This is easily done when the link plate has pegs or spikes formed on the upper side as the lock is first fitted, the link plate inserted in the lock, and the lid shut down hard on to the link. The pins hold the link, and when the lock is unbolted the lid is raised with the link in position. The recess is then cut and the link plate secured with screws.

Padlocks are in a class by themselves, as they require no fitting ; they pass through a staple or any place that is to be locked, as, for example, the wheel of a bicycle to the front forks. Varieties are made with lever, tumbler, and pin-tumbler mechanism, as well as simple letter mechanism. Others have a spring-back bolt that is self-locking. Where security is of importance it is a mistake to buy cheap padlocks. Keyhole and spindle hole should be bushed with brass, all parts well made and of appropriate strength, and the case secured with screws so that repairs can be effected readily.

For an outside door a type of padlock with a short stout shackle should be chosen, as this is difficult to force, and the thick shackle would take some time to sever with a saw. It is essential that it should be locked through a stout staple over a hasp.

If a chain has to be used its links should be thick enough to offer at least as much resistance as that offered by the shackle or the staples.

For outside use all fastenings should be as strong as possible.

The fitting of a drawer or till lock is a simple operation, the first thing being to mark the exact centre of the front of the drawer. A recess is cut out at the back to the size of the lock case and flange by means of a fine saw and a chisel. There is a special tool made for the purpose, known as a drawer lock chisel (Fig. 1). The position of the keyhole should be ascertained and cut out with a bit and a keyhole saw, or a fine chisel. The lock is then screwed into place. The bolt hole in the top rail of the drawer is next made and its position is ascertained by placing a little blacklead on the top of the bolt, pushing the drawer into the proper position, and turning the key so as to force the bolt on to the surface. The shape and position for the bolt hole is thus clearly shown. The bolt hole may then be chiselled out to the requisite depth.

In lock repairs the chief items are the replacement of broken springs, renewal of damaged pins, and re-bushing of spindle holes. Most iron-mongers stock a selection of springs, and their replacement only involves slipping into a notch, or refixing with a screw or rivet according to the nature of the construction.

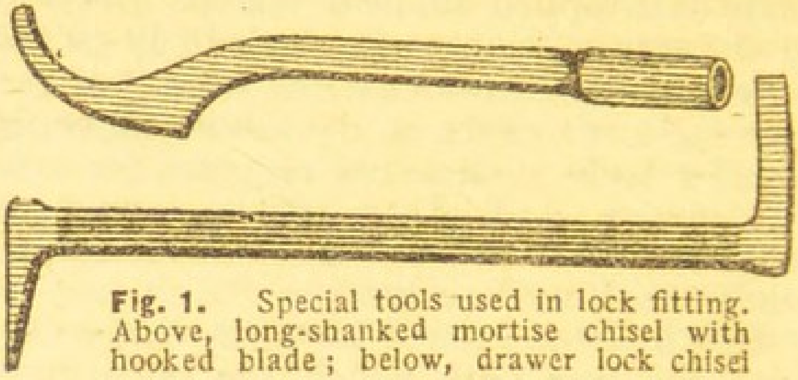


Fig. 1. Special tools used in lock fitting. Above, long-shanked mortise chisel with hooked blade; below, drawer lock chisel

Locks should be oiled occasionally since this assists the smoothness of action and prolongs their life. The old-fashioned method of using a feather dipped in oil is useful for a simple plate or stock lock, but the only way of oiling the modern types of rim and mortise locks is to take them out and unscrew the back plate in order to lubricate the whole of the parts. Locks should always be properly oiled before fitting.

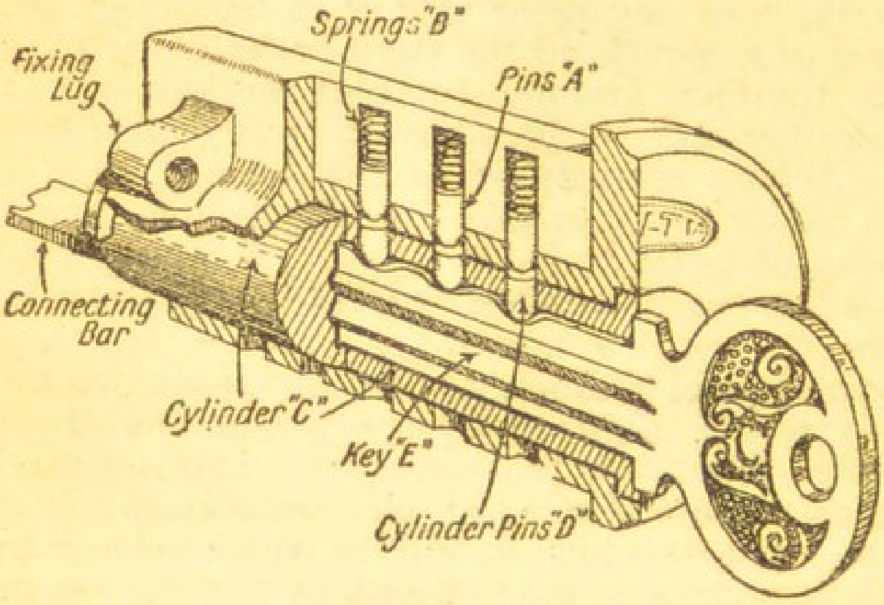


Fig. 2. Pin tumbler system or Yale type of Lock

Key Cutting and Fitting. The following explains how the cutting of a key for a lever type rim lock is done. First procure from an ironmonger a solid uncut key, and get it as nearly the correct size and shape as possible, and with the shank long enough for the door to which it is to be fitted, so that the bow can turn on the outside. In the case of a lever lock the key has first to lift the levers, and then to throw back the follower, which takes back the bolt with it. Next file the blank to such a size that it will enter the keyhole and set against the backplate.

The top of the blank is then filed down, until it will enter the keyhole. See that the pin does not stop the key from entering, and that the blank is not too thick; in either case the blank must be filed to fit; calipers can be used to test the thickness of the blank and the height from the shank to the top of the blank and it will facilitate matters if the lock be removed and be taken to pieces.

The key is first fitted to the follower and then the master lever found by inspection; it can be detected, as it is the one with the slot nearest to the lower edge of the lever. The end of the blank has then to be filed down at the spot exactly opposite this lever until it will raise it the required amount; remove the other levers while doing this.

Each lever is treated in the same way, and the steps thus produced are touched up until the levers lift properly and the follower throws back nicely; the action should be perfect in either direction. The width of the blank may be such that it will have to be made narrower to allow it to turn when the cover-plate is replaced; remove a little metal at a time from the blank, when the result of so doing can be seen and appreciated. The usual files for this work are the thin warding files sold in many sizes, and some thick and some thin ones should be obtained.

A duplicate key can be cut by careful calipering and comparing with the original. When the lock is accessible a film of tallow or beeswax may be applied to the blank, so that when the key is pressed against the wards they will leave a mark on the blank, and thus indicate the parts to be cut away.

LOCK NUT. A lock nut is an ordinary nut used to check, or lock another nut which is screwed on to the same bolt, and prevent its further progress.

LOOMS: FOR HOME WEAVING

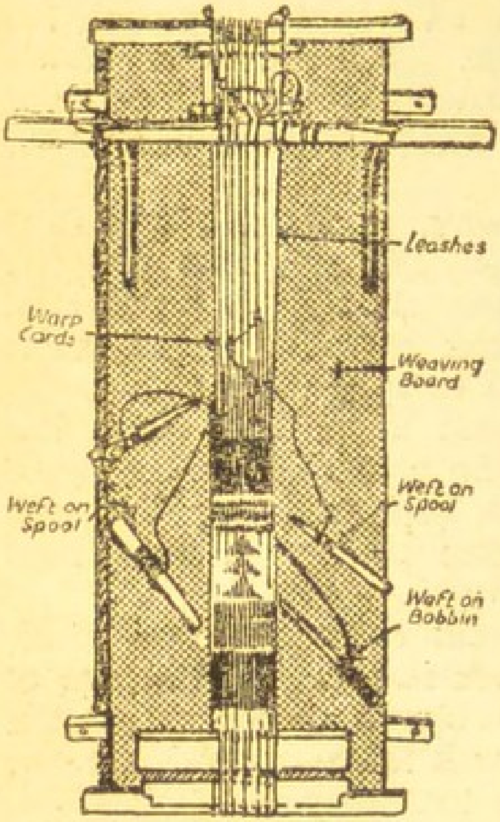
Constructional Details of a Workable Pedal Loom

This contribution describes a handy type of table loom, and tells the woodworker how to make a portable loom of a larger type. See also Rug and Tapestry and other entries of that kind

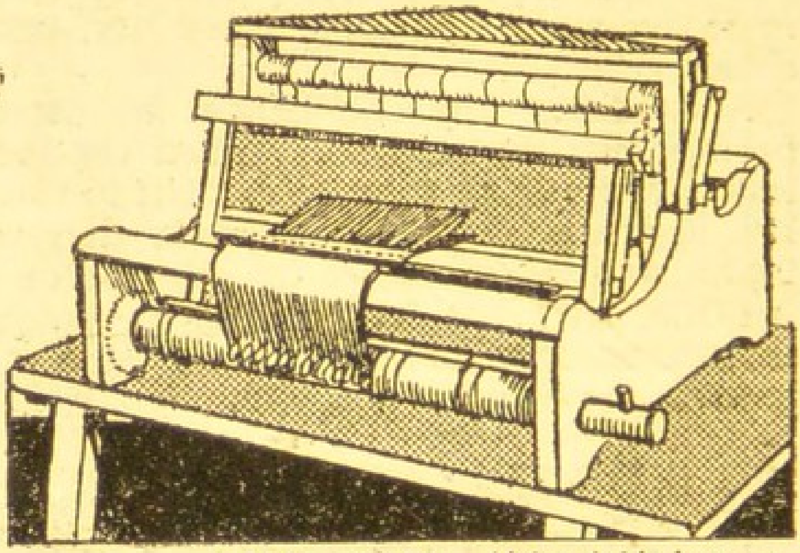
Hand looms range from a board loom such as that shown in Fig. 1, on which narrow tapestry can be woven, to the table loom shown in Fig. 2, which permits of work up to 33 in. wide, and the pedal operated loom (Fig. 3), on which a variety of fabrics up to 42 in. wide can be made. The frames are held together by dowels and pegs, so that the whole structure is readily erected or taken down.

Back, front and side elevations are given in Figs. 4, 5, and 10. In conjunction with Fig. 3 they make the method of construction quite clear. The uprights should be of hardwood, 2¼ in. by 2¼ in. They are connected by rails made of 1 in. beech dowel rod, which run through and are pegged at ends. It will be seen that the side rails go through the intermediate short uprights on which the breast roller rests, and are pegged at the short upright so as to space the latter squarely at the proper distance from the inside of front uprights. The toothed cross bars which support the harness and sleigh are 2 in. by $1\frac{1}{4}$ in. tenoned into posts and pegged.

The side frames are connected together by two rails at each end. These rails must come lower than the tenons of cross bar and dowels of lower rail respectively, so as to leave enough wood between for adequate strength. Two brackets for warp roller are dowelled into back posts at a height of 2 ft. 6 in. from ground, and two for breast roller into the intermediate posts at 2 ft. 2 in., both measurements being to centre of hole where it enters post. The brackets are of dowel rod set in at an angle. The seat board fits on to upper side rails between front and intermediate posts, being cut round front posts.

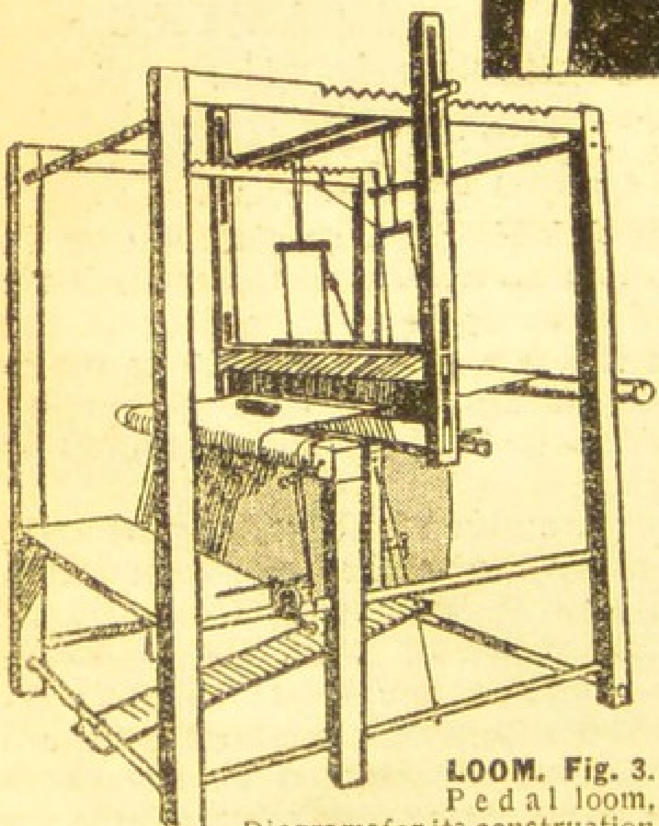


LOOM. Fig. 1. Simple board loom, arranged for weaving narrow tapestry

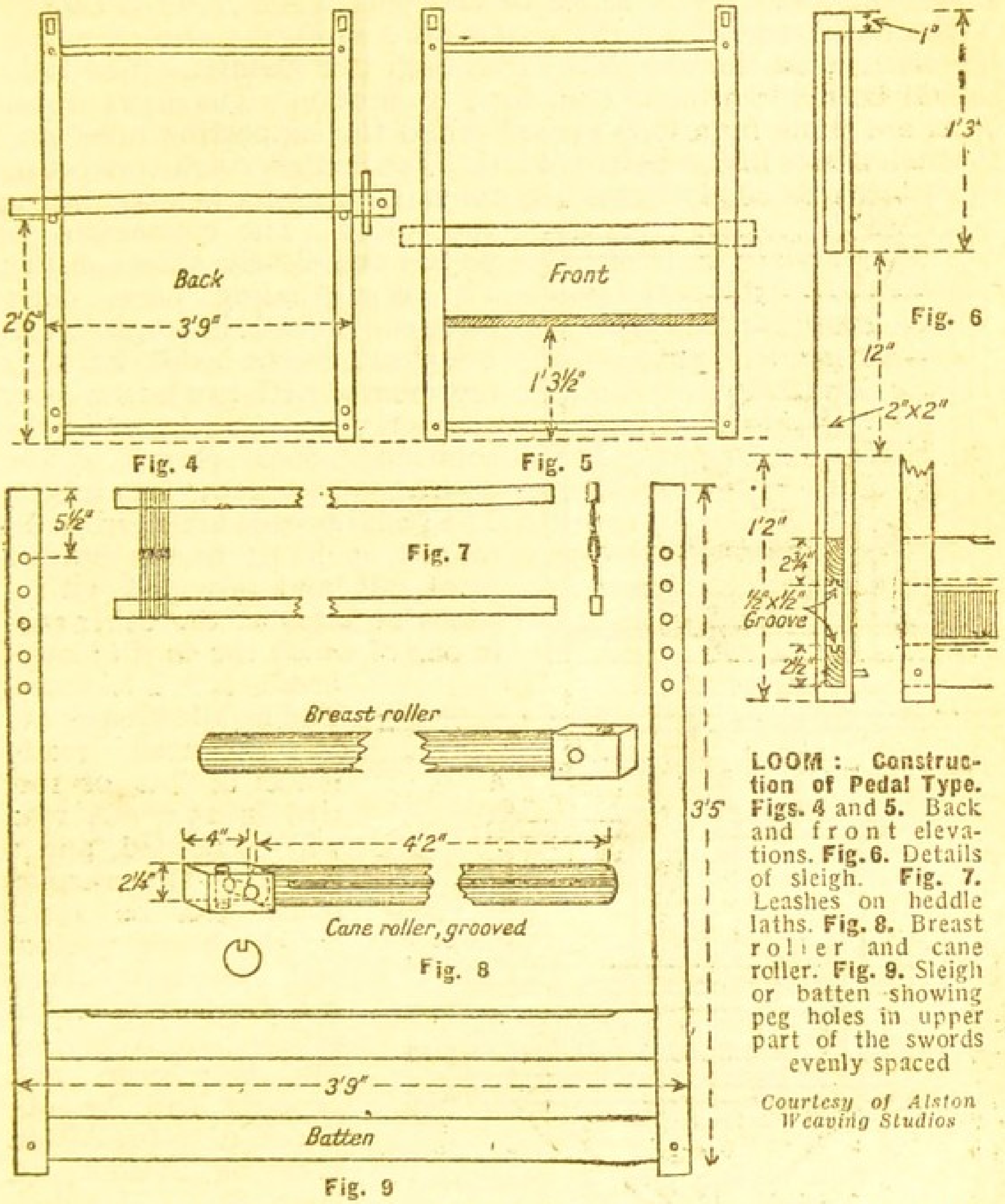


LOOM. Fig. 2. Alston table loom, a compact, portable appliance which takes warps up to 33 in. wide

THE ROLLERS. The breast roller (Fig. 8) is turned from $2\frac{1}{4}$in. stuff, and one end is left square for a distance of 4 in. Two holes for a turning stick are bored through at right angles, and the stick may be a piece of 1 in. dowel. The cane roller is similar, but the squared end is at the opposite side. Both front and back rollers are grooved to take the cane which secures the warp in place. The groove, $\frac{1}{2}$ in. square, is indicated in the diagram of the cane roller. Fig. 3 shows how



LOOM. Fig. 3. Pedal loom. Diagrams for its construction are given in the opposite page and overleaf the rollers are mounted on the brackets, the breast roller with its square to the right and the back roller with its square to the left, both viewed from the front of the loom (seat board).



LOOM : Construction of Pedal Type. Figs. 4 and **5.** Back and front elevations. **Fig. 6.** Details of sleigh. **Fig. 7.** Leashes on heddle laths. **Fig. 8.** Breast roller and cane roller. **Fig. 9.** Sleigh or batten showing peg holes in upper part of the swords evenly spaced

Courtesy of Alston Weaving Studios

Sleigh and Harness. The sleigh or batten (Figs. 6 and 9) consists of four parts, the two sides or swords by which it is hung from a roller supported on the rack, and two grooved rails which hold the reed. The cap, or upper rail, is free to move up in the slot in the swords, so that the reed can be inserted or removed. The lower bar is fixed by pegs to the swords, and the cap also has holes for pegs, so that it can be secured when the reed has been inserted. The reed measures about 5 in. in depth, and is held by the grooves in cap and lower rail. The slots in swords and the tenons on cap and lower rail must be accurately cut, and the peg holes in the upper part of swords should be evenly spaced, so that the batten hangs level from the roller. The rack teeth, too, must be accurately cut and spaced or the sleigh will not hang squarely across the loom. The whole of this part needs especial care.

The harness is shown diagramatically at Figs. 7 and 11, and is represented as the simplest form, with two heddles. The laths should be made of oak, 1 in. by $\frac{5}{8}$ in. section. The short upper laths are slung by a loop passed round the supporting roller and through a hole in the centre of lath. The endless cords connecting short laths to heddle laths are about 40 in. long before making the knots. The connexions to pedals are clearly shown in Fig. 11, corresponding parts being lettered A and B respectively. For clearness, the heddle laths are represented with two leashes only on each pair. Slip knots in the connecting cords permit of any desired adjustment for length. The pedal boards are $4\frac{1}{2}$ in. wide, hinged by loops to the bottom front rail, and provided with a series of holes at the other end, in one of which the cord to lower heddle lath is fastened. The heddle leashes can be procured ready made in lots of 100, tied in 25's. A reed will be needed, and a raddle. The warping board can be made by the home worker, and full instructions will be found in the article on Weaving. The accessories and supplies can be obtained from the Alston Weaving Studios, 15, High Street, London, W.1.

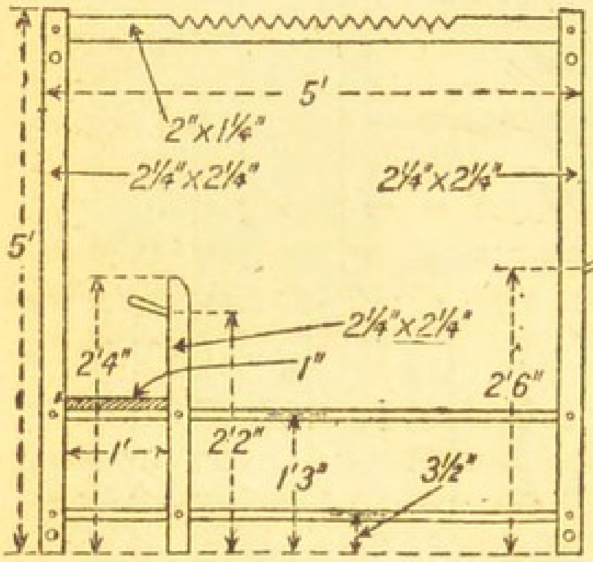


Fig. 10

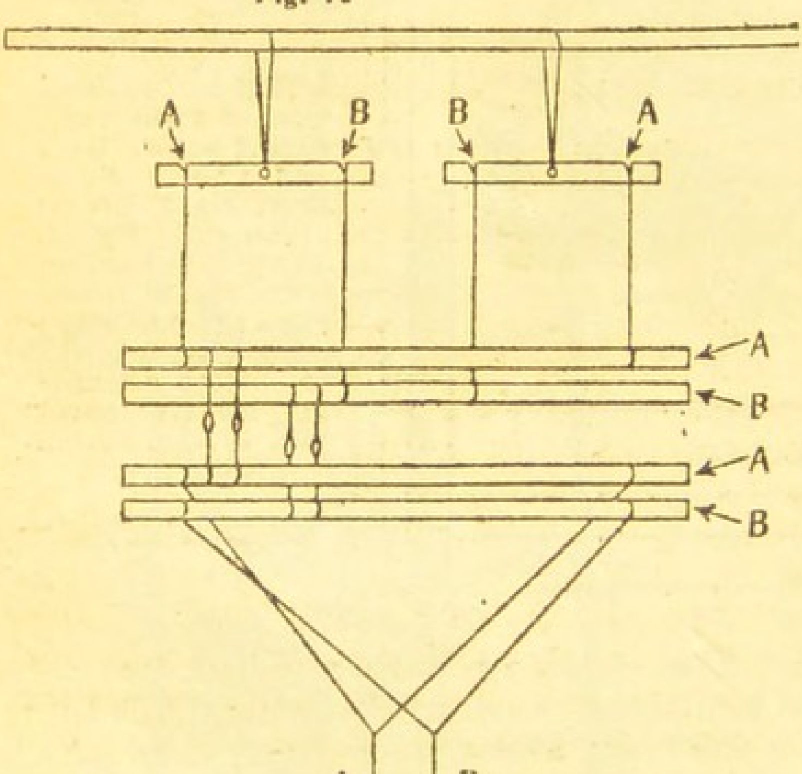


Fig. 11

LOOM. **Figs. 10 and 11.** Showing side elevation and harness arrangement (see text)

MANDREL. The steel spindle in the headstock of a lathe is a mandrel, and the name is also given to a bar of steel provided with conical holes at either end. They enable the bar to be mounted upon centres in the lathe.

The bar is used to support an object to be turned in the lathe, which must have a hole through it of such a size that it will fit tightly on to the mandrel. Work so held can be machined all over.

The Verschoyle patent mandrel is a lathe for light wood and metal turning; it clamps on to the edge of a bench.

MANGLES, Repair of. After being in use for some years a mangle shows signs of wear in the rollers and other parts. Metal parts may be replaced without difficulty if the machine is one of standard make. When the rollers wear hollow they can be trued up, but there is a limit to the amount a roller can be reduced in diameter.

Rollers without ferrules on the ends tend to split, and those that have been kept in a dry place and not used for some time crack. Small cracks may be made good with a waterproof wood-filler, worked in with a fine blade and carefully smoothed on top. When set, the surface should be smoothed with glasspaper.

Cast iron wheels do not cost much, and it is not worth while to have new teeth fitted. If one of the cogs should get broken off, make a rubbing on a piece of paper of the wheel and send to the maker for a new one.

A broken wooden handle may be renewed by filing round the end of the iron rod and removing the washer, and then the new handle should be slipped in place and the end of the iron riveted over with a hammer.

MARQUETRY AND ITS PROCESSES

A Decorative Handicraft Explained and Illustrated

In addition to Inlaying and Veneering, the reader is referred to the entries on the various woods used, e.g. Oak, Satinwood, etc. In this article the whole method of working in this craft is set out in a clear manner so that the amateur will be enabled to embark on the work without undue difficulty. See also Buhl Work

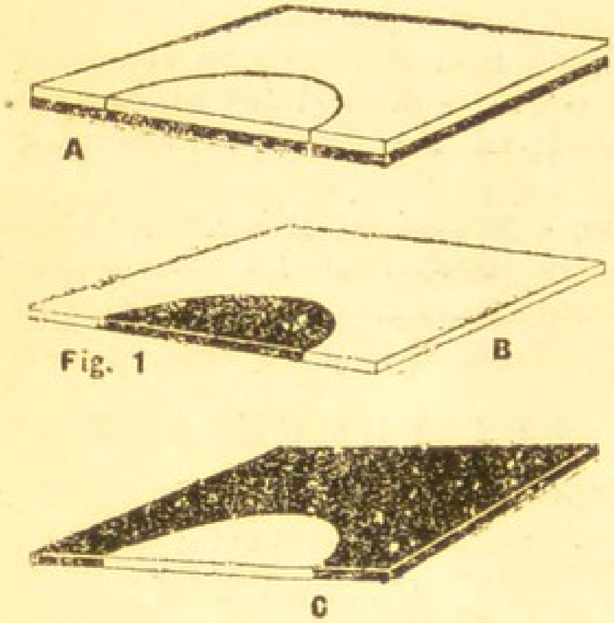
Marquetry is a form of inlaying which differs from inlaying proper in that the effect is obtained by the use of veneers applied to a groundwork. The veneers are cut by a process which affects a saving in time as all the inlays and the background are cut at once. It also offers scope for many elaborate effects.

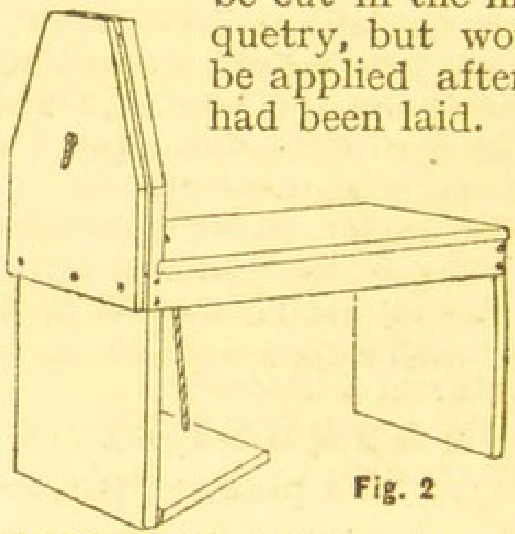
Modern English marquetry work in the form of panels often shows fine design.

Fig. 1 illustrates the principle of marquetry work. Two sheets of veneer of different colour are fastened together and a saw cut made through the two, as in Fig 1 A. They are then separated and the pieces interchanged, as in Fig. 1 B. The remaining parts (Fig. 1 C) would form another inlay. The cutting is done with a fretsaw frame and fine blade.

Fig. 2 shows the type of donkey used in the cutting. The worker sits astride the form and places the work between the two thicknesses of wood at the head. A firm grip is obtained by the treadle, which draws the outer thickness of wood inward toward the other by means of the cord which is attached to the treadle at one end and to the head at the other. A similar type is shown in Fig. 4, and is fixed in an ordinary vice, the two thicknesses being gripped with a thumb-screw.

The range of material for inlaying includes wood, tortoiseshell, ivory, brass, and other metals. The direction of the grain in the inlay plays a great part. Where the inlay occupies a small space in a large panel, it is only necessary to put a small portion of veneer sufficient for the inlay in the required position, but in a panel such as is seen in Fig. 5, where the inlays are distributed fairly evenly, the inlay and background veneers should be of the same size. In this case two different woods are selected for the inlays, so that three thicknesses of veneer will be used. If two panels are required six thicknesses are cut, two of each kind of wood. The cross-banded edge and the inlaid line would not be cut in the marquetry, but would be applied after it had been laid.





MARQUETRY. Fig. 1. Three stages showing principles of the work. **Fig. 2.** Showing simple form of donkey with treadle

Either knife or saw cut veneers may be used. If knife-cut is used, even though only one panel is required, it is generally a better plan to cut an extra panel and so get extra thickness to cut, as the firmer the substance the easier the cutting will be. All the veneers for a single panel must be either knife or saw cut.

A Simple Pattern. Fig. 3 is an example of marquetry using only two woods. Oak and ebony may be selected as forming a good contrast. The right-hand side of Fig. 3 shows the panel with oak background and the left vice versa. The worker should first prepare a drawing of the design on paper, and then make a tracing of it.

Prepare the two sheets of veneer and glue them together with a sheet of paper between, so that they can be separated later. If two panels are to be cut, place the oak and ebony sheets alternately, and when they are cut and separated, interchange the adjacent sheets. It is of vital importance that the thicknesses should be as close together as possible, otherwise they will be apt to split during cutting. When glueing they should be cramped together.

Next, paste the tracing on one side, and, fastening the work in the vice, cut round the design carefully right on the line with a very fine fretsaw. Do not cut away the centre portion first, as this would render the veneer liable to split, especially when afterwards cutting the outer shape across the grain at the top and bottom. When any part is cut out, mark on it the part from which it was cut, to simplify replacement.

Having cut the complete design, next separate the thicknesses by easing the parts away with the thin blade of a knife. The various portions of the adjacent sheets are interchanged and the whole glued on to a sheet of paper, with thin glue. Apply the glue sparingly, or the veneers may buckle. See that the various parts lie together flat ; it may be necessary to put them under a weighted board for this purpose, though glueing down on to the paper is usually sufficient. When dry the veneer may be glued on to the groundwork.

The groundwork must be of a suitable wood to hold the glue well, free from knots, and able to stand well without shrinking or twisting. It must be prepared perfectly true and flat, and must be toothed. Honduras mahogany is the ideal wood to use for a ground, though yellow pine is also good. This latter should be given a coating of size after toothing to fill in the grain, and left to dry, as otherwise when the marquetry is applied the pine would soak up too much glue and leave the marquetry liable to peel off.

Fig. 6 is another example of marquetry, embodying the use of two

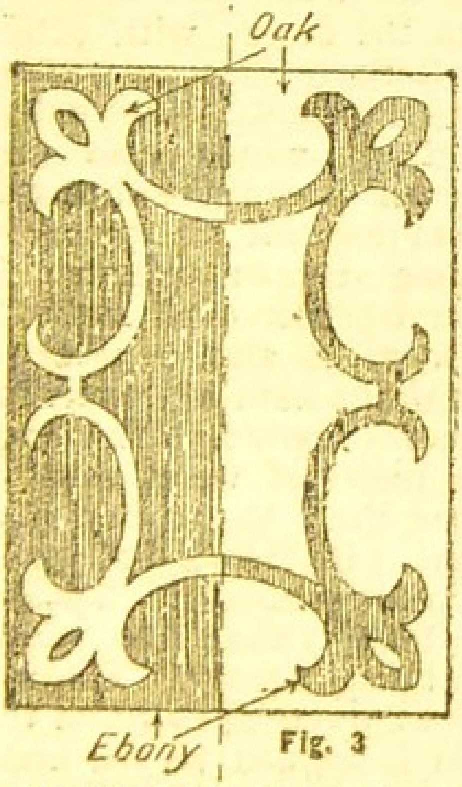


Fig. 3

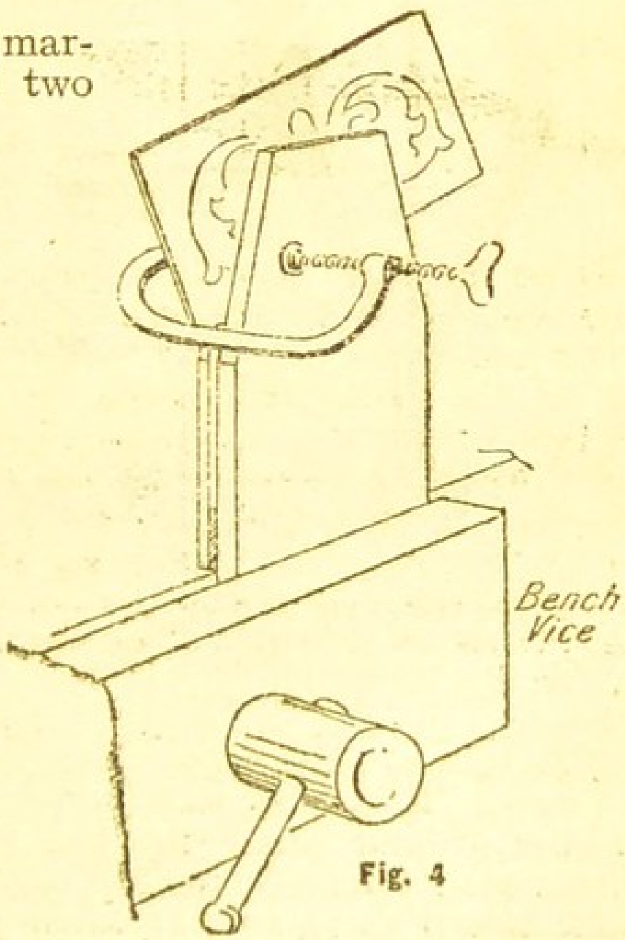


Fig. 4

MARQUETRY. **Fig. 3.** Example showing use of two woods only. The method of working is described in the text. **Fig. 4.** Donkey which can be fixed in an ordinary bench vice inlays, satinwood and a stained green wood, on a mahogany background. In this case the inlays occupy a relatively small space in the panel, the flower and the base only being in satinwood, and the stalk and leaves in green wood, so that it will be necessary only to cut pieces sufficiently large to cover the local inlays. The dotted lines show the position in which these are placed, the green piece being put on to the mahogany background first, and the two pieces of satinwood on the green wood afterwards. The tracing is pasted to the flat mahogany side, care being taken to see that the various parts of the design come opposite to their corresponding veneers. The lines forming the divisions to the petals are formed by saw cuts, and it is advisable not to let them run quite down to the juncture with the stalk, so that the flower will remain in one piece, thus saving the unnecessary labour of putting them together again. They are shown running right through in the sketch, as it might be desirable as an alternative to form the flower with petals of alternate satin and green wood instead of all satinwood, in which case the cuts will run right through.

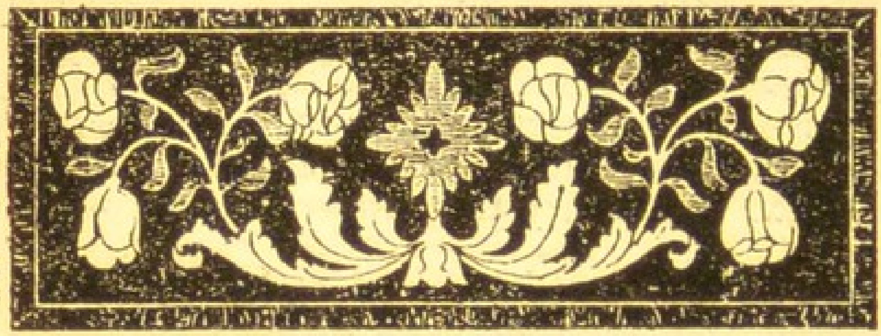


Fig. 5

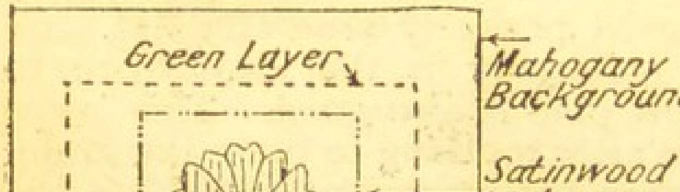
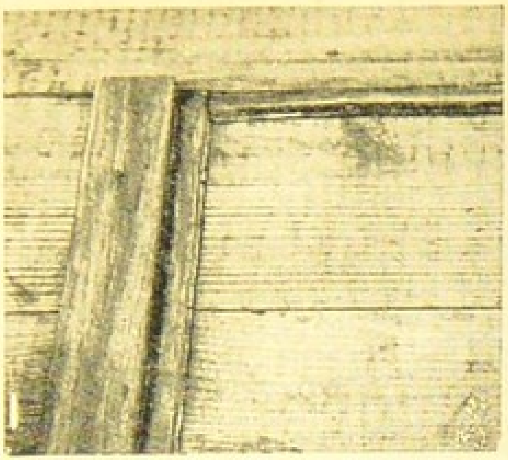
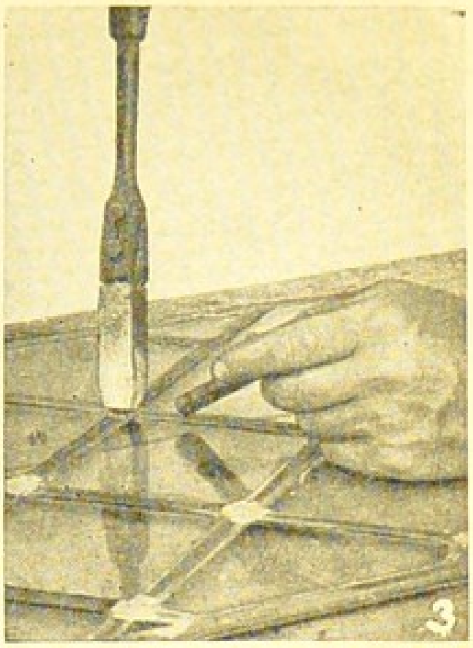


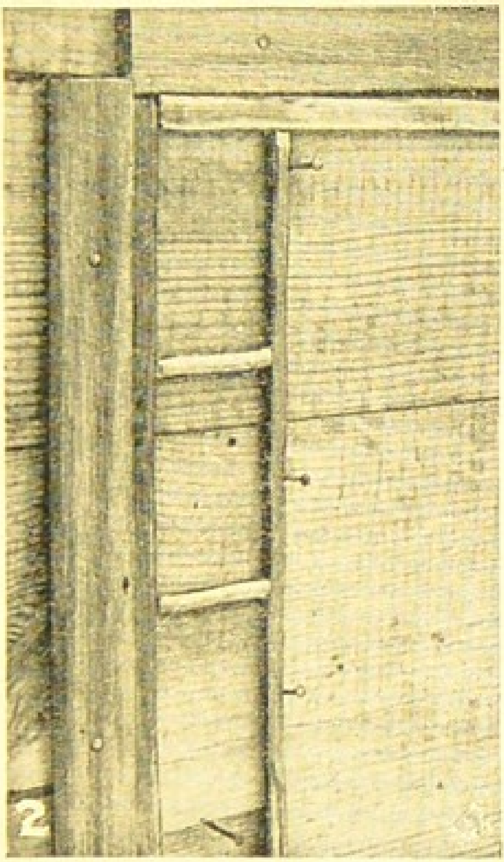
Fig. 6

MARQUETRY. Fig. 5. Panel with evenly distributed inlay. **Fig. 6.** Two inlays, satinwood and green stained wood, in a mahogany background.

LAYING THE MARQUETRY. Laying the marquetry is done by the caul method. Figs. 7, 8, and 9 give an idea of the kind of apparatus that is wanted. The caul is a piece of wood slightly larger than the ground and about 1 in. thick, and quite flat; this is placed on the veneer and presses it equally all over. The crosspieces are slightly longer than the width of the ground, those for the bottom being square. The top pieces are straight on the top edge but are curved slightly on the underside (Fig. 7), so that when pressure is applied to the ends the glue will be forced from the centre outward (Fig. 8) The lower crosspieces must be wider than the top ones, so







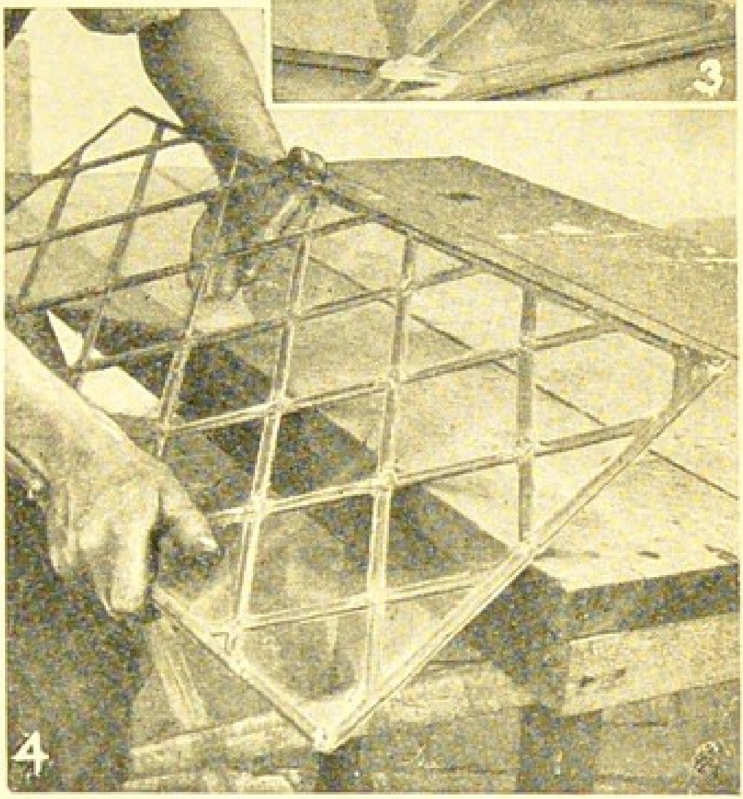
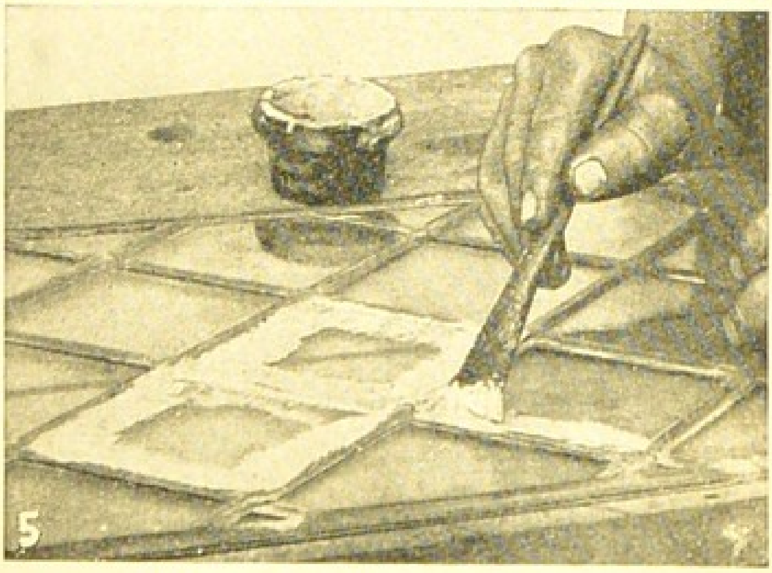
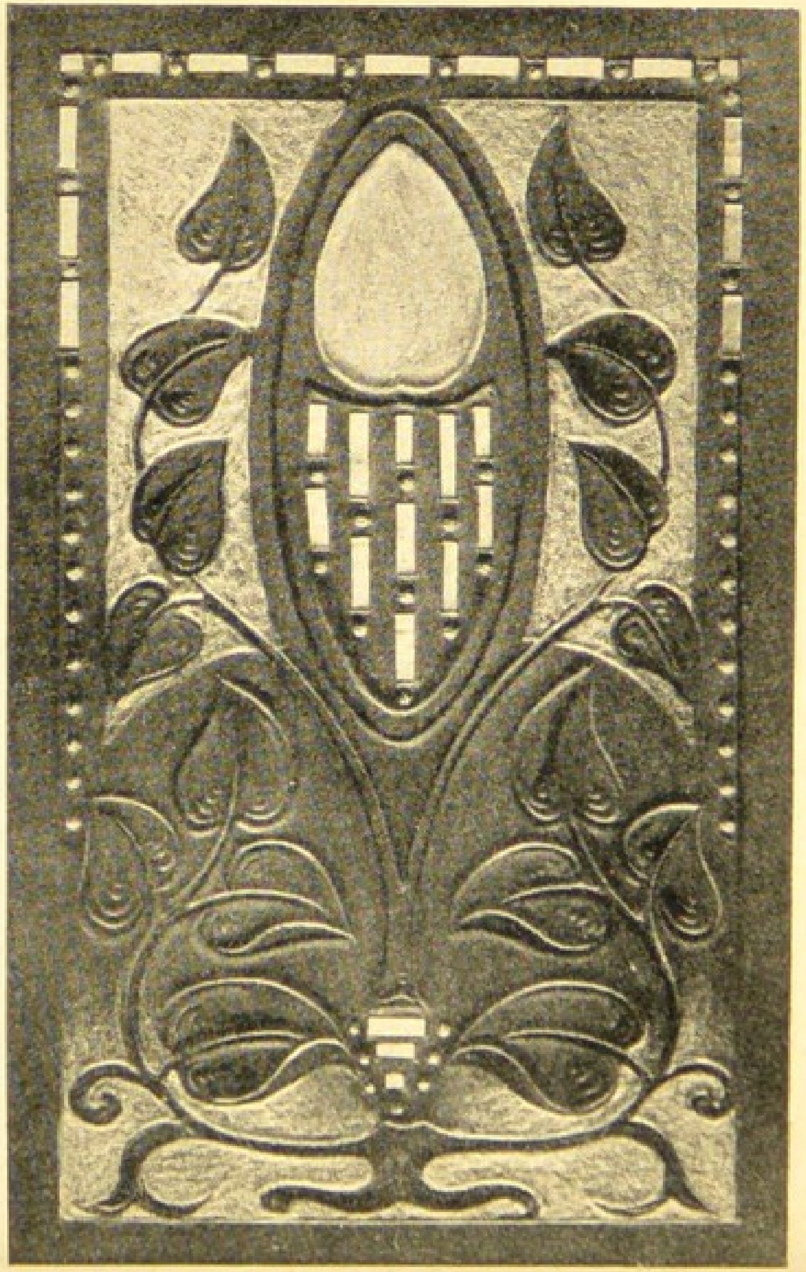
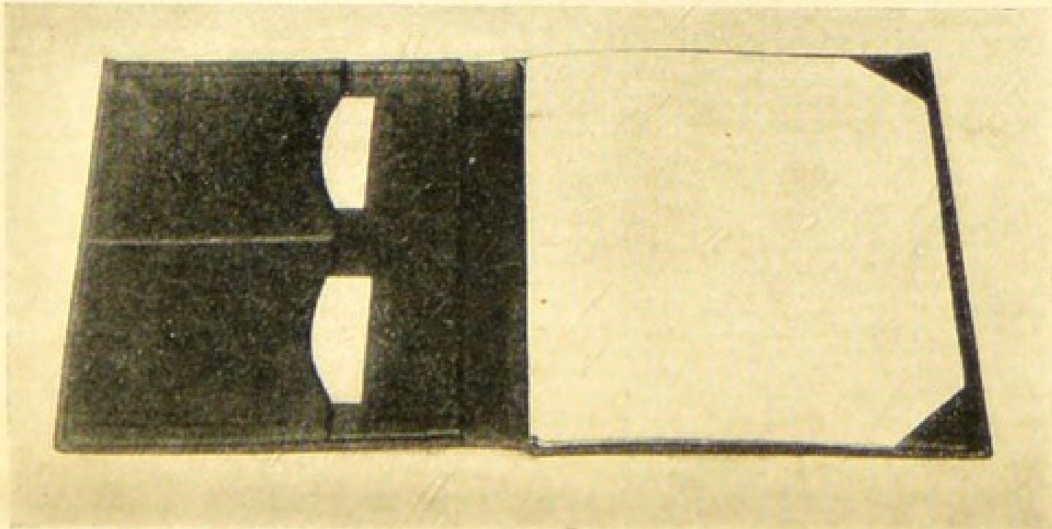


Fig. 1. First steps. Fig. 2. Three pieces of glass in place, the calms held by pins. Fig. 3. Soldering the joints. Fig. 4. Turning panel over to solder other side. Fig 5. Brushing cement into joints



LEADED LIGHTS IN COURSE OF PREPARATION





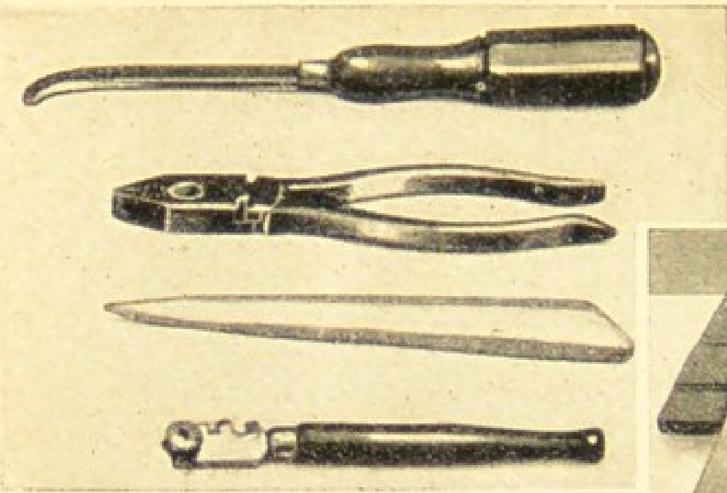
LEATHER WORK.

Left. Diary or address book cover in Venetian lacquer on leather. Right. Design for a telephone or reference book cover in silver thonged or lanette work. Below. Interior of blotter of embossed leather

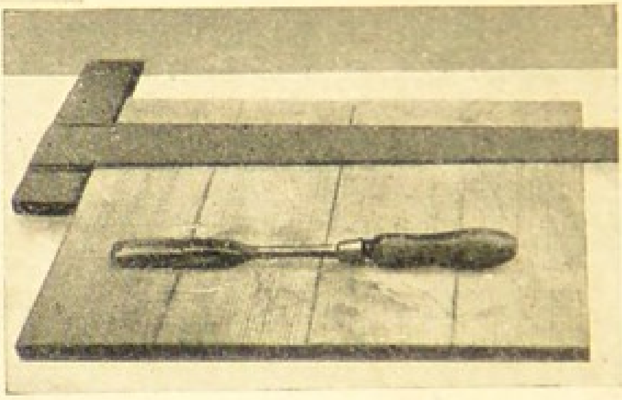
AN ATTRACTIVE METHOD OF DECORATION

Useful book or shopping bag in hide decorated with a modelled conventional design. Right. Firescreen of painted leather mounted on a 3-ply wooden backing and framed in oak

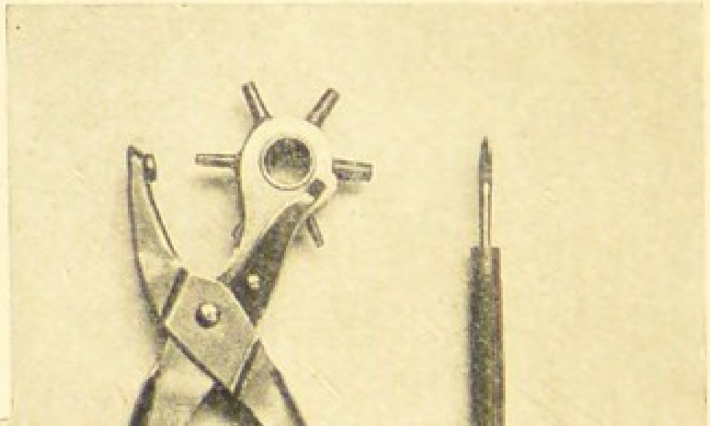
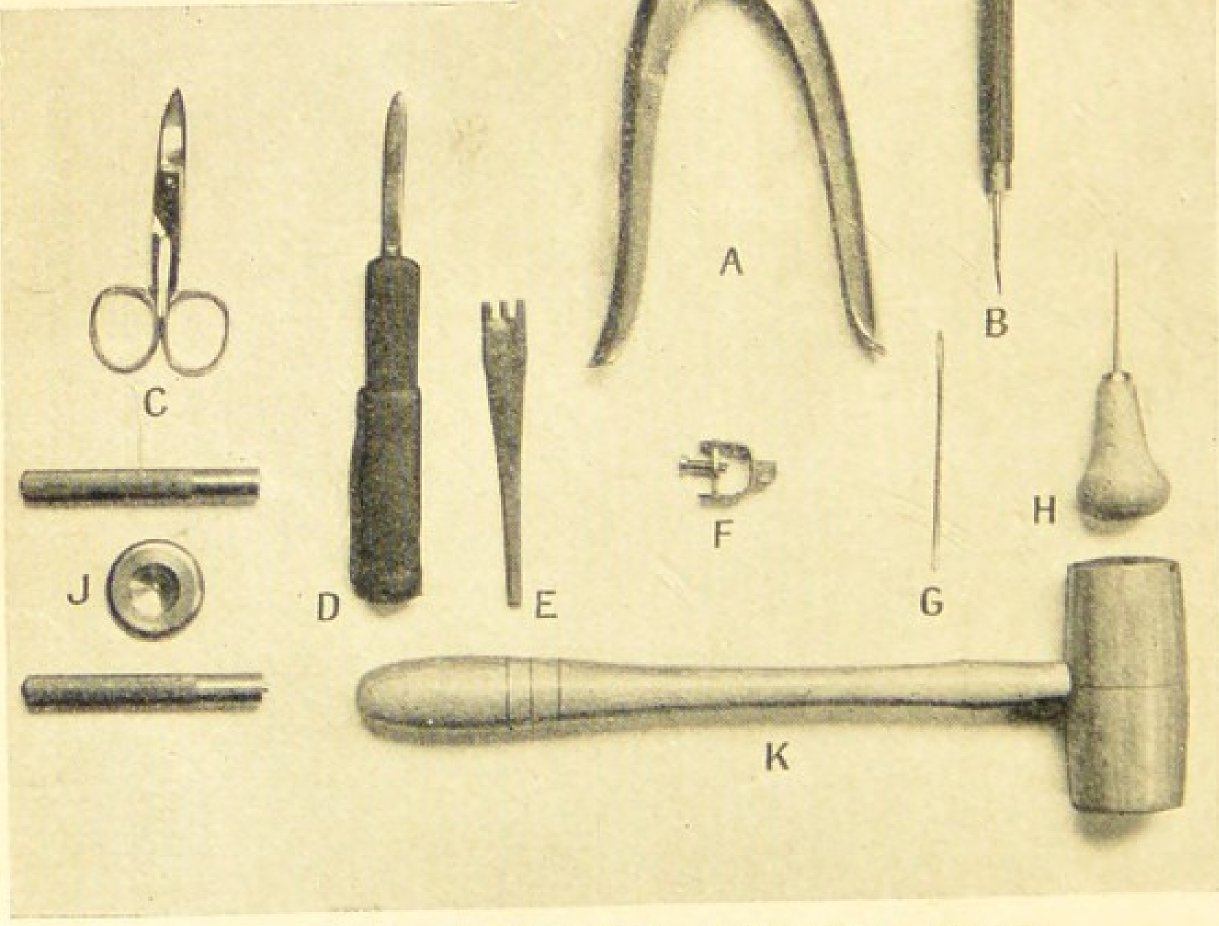
TWO SUGGESTIONS FOR THE LEATHER WORKER



LEADED LIGHTS. Below. Cutting board, T-square and soldering iron. Left. Other special tools required



LEATHERWORK: A SIMPLE OUTFIT. A. Six-hole punch pliers. B. Combined tracing tool. C. Paring scissors. D. Cutting knife. E. Stitch tool F. Gofer pliers. G. Needle for thonging. H. Awl. J. Press button punch and die set. K. Boxwood mallet

TOOLS REQUIRED FOR TWO DECORATIVE CRAFTS

METAL SPINNING. Fig. 1. Tee rest for spinning lathe. **Fig. 2.** Necessary tools for the work. **Fig. 3.** A, disk in position; B, disk being shaped; C, follower in position; D, completed shape in section

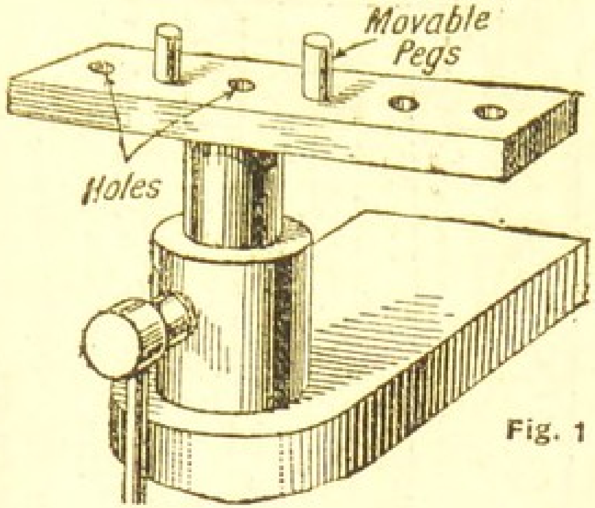


Fig. 1

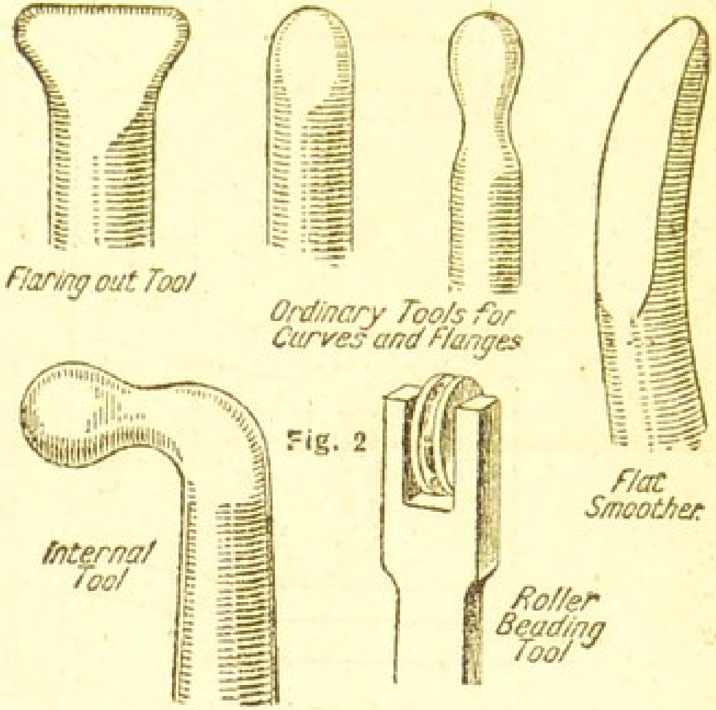


Fig. 2

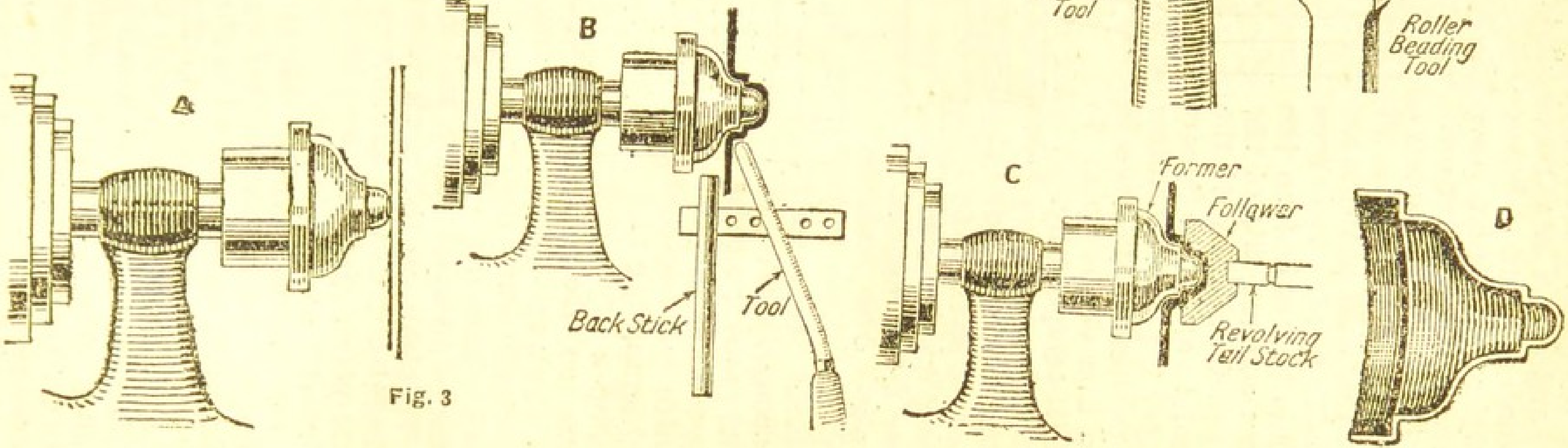
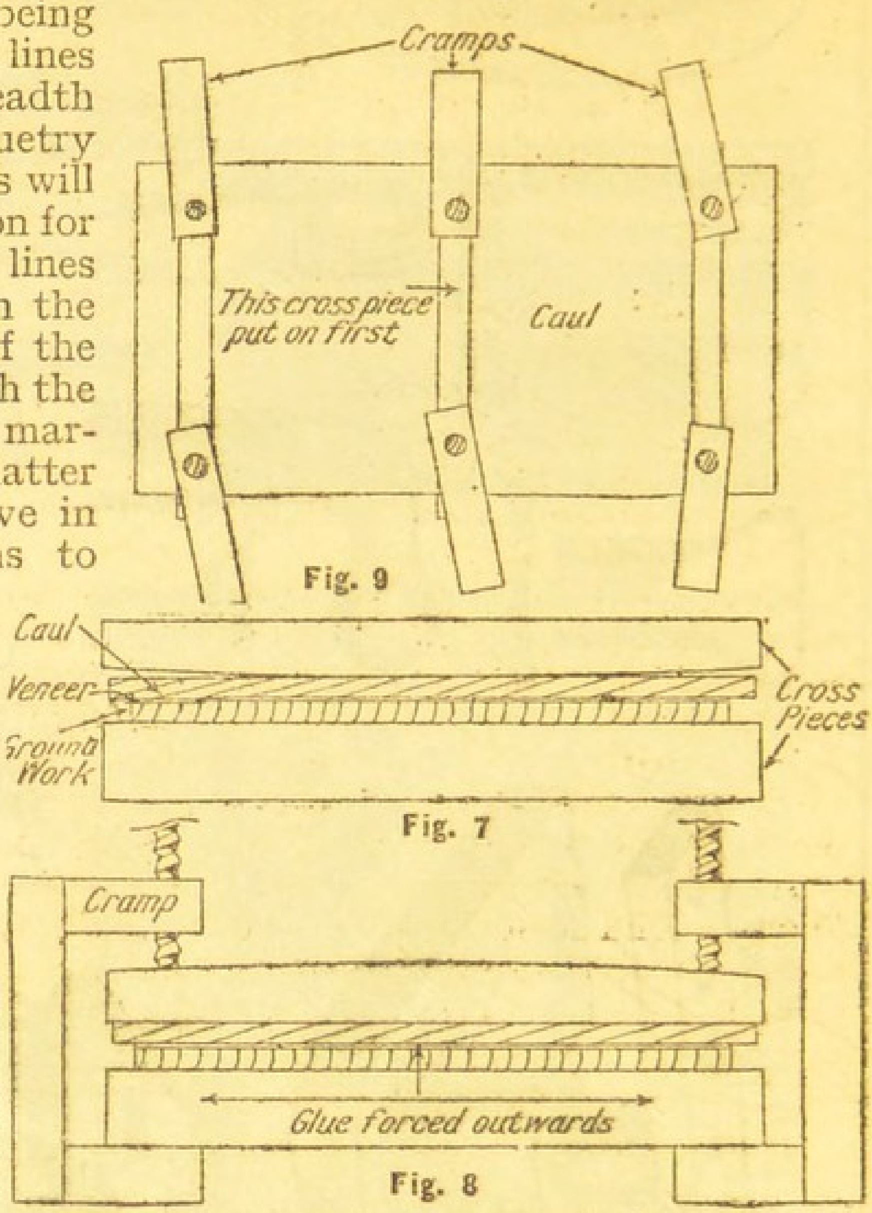


Fig. 3

that the pressure bends the top pieces straight. Two cramps or handscrews are required to each crosspiece.



MARQUETRY. Fig. 7. Laying marquetry by caul method. **Fig. 8.** Pressure applied, forcing glue outward. **Fig. 9.** Plan of apparatus

The ground being ready, mark centre lines in the length and breadth of both the marquetry and the ground ; this will give the exact position for it to be fixed. The lines should be marked on the paper-covered side of the marquetry. Glue both the ground and the marquetry ; place the latter in position and drive in two fine veneer pins to fix it temporarily. The marquetry should be paper side upward, so that the glue grips the wood. Now lay a sheet of paper over the whole.

Heat the caul thoroughly on one side, place it on the paper and apply the centre crosspiece, tightening each cramp a little at a time so that the pressure comes gradually from the centre outward. Fix on the other crosspieces and give all the cramps an extra screw, and leave it to set.

To clean up the work when set, a steel scraper is used ; be careful not to tear the grains up. The job is finished off with fine glasspaper, the two pins used to secure the veneer being first removed.

METAL SPINNING. Metal spinning is employed for making lamp containers and similar vessels, and by using wooden formers the metal can be shaped in almost any profile.

For spinning in its simplest form, a piece of wood is turned up to any desired profile, with curves and corners suitable to the thickness of the metal which is to be spun. This former, as it is called, appears in the illustrations. A special tool rest, Fig. 1, is then rigged up, with a flat-topped tee, having holes in which to place steel pegs. A disk of lead or soft aluminium sheet is screwed by a central screw to the former. By working the shank of the long-handled tool against the steel pegs in the tool rest, using the peg as a fulcrum, and bringing the tool up to the disk with a sweeping action, the revolving metal can be formed into shape. The metal is greased with soft soap or vaseline.

Fig. 3 shows the method of spinning an ornamental base for a vase or other article. As the object is not pierced with a screw in the centre, the sheet metal has to be held up to the former by a revolving centre. When the work has half progressed the back-centre thrust block is replaced by a follower to prevent the work already spun from altering in shape. The job must be annealed between operations if, through tooling, the metal gets too hard to flow properly. The tools used (Fig. 2) are long and stout enough to resist bending. The handles are held firmly under the armpit, the steel end being placed between two pins in the rest. The nose of the tool is held a little below the lathe centre at a point near the centre of the job.

To prevent the disk buckling, a back stick is employed. This accessory is a short piece of hardwood, and is held hard against the rotating metal on the side opposite to that upon which the spinning tool is operating. Rough edges of work are skimmed with a cutting tool, as used in hand metal turning. Internal work needs hook tools. Roller tools are also employed. All tool points must be quite hard and highly polished, and each job requires its own former. When the diameters of the job will not allow a solid former to be used, i.e. in spinning an object like a narrow-necked jar, split formers must be used. Taking a diameter of 4 in. as an average size of work, the speed in revolutions per minute is : soft sheet iron $\frac{1}{32}$ in. thick, 600 ; thicker sheets, 400 ; zinc, 1,200 ; copper, brass and aluminium, 800 to 1,000.

METAL TURNING ON SMALL LATHES

The Tools and Their Use in Various Operations

This contribution deals briefly yet comprehensively with the main processes in metal turning. Lathes suitable for the amateur are described and illustrated in the article Lathe

The process of removing the surface of metal in a lathe is known as metal turning. The object is attached to a rotating spindle, known as a mandrel, and a cutting tool is applied to the revolving work so as to produce the required shape. The tool may be fed up by hand, or in a sliding screw-feed tool fixing.

To obtain the maximum power over the work the heel of the tool should be supported by the rest, the adjustable bar near to the revolving work on which it is held during the operation, well under the cutting edge, as shown in Fig. 1. The tool should be gripped firmly and, especially where iron or steel is being operated upon, the handle of the tool should receive a further support by resting in the hollow of the operator's shoulder. It will tend to lift at the handle, and if this is not resisted it will result in the tool being wrenched from the operator's grasp and getting firmly jammed between the work in the chuck and the tool rest.

When work must be done by hand the cutting must be obtained by rolling the tool on its heel, so that the point enters the metal with the cutting edge at an angle to it.

TYPES OF TOOL. Among the most useful hand tools for a metal-turning lathe is the round nose tool shown in Fig. 2, *a*. This

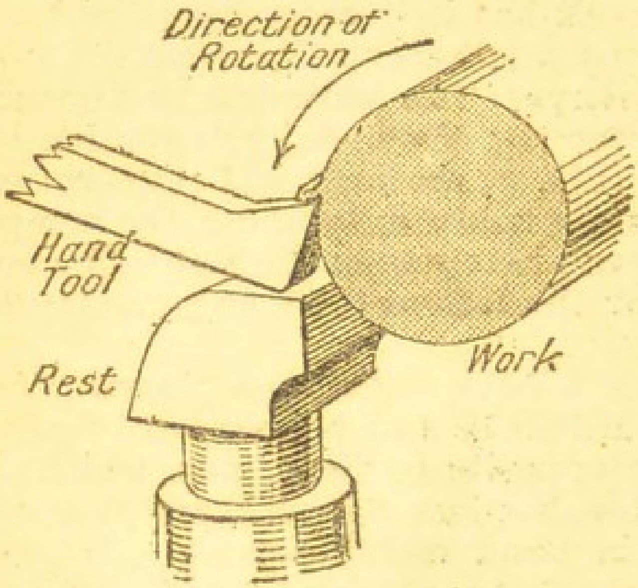


Fig. 1. Showing how a hand tool cuts the metal, the former being held on a rest

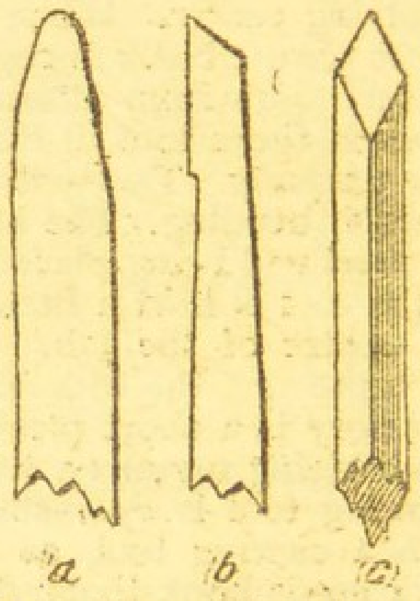
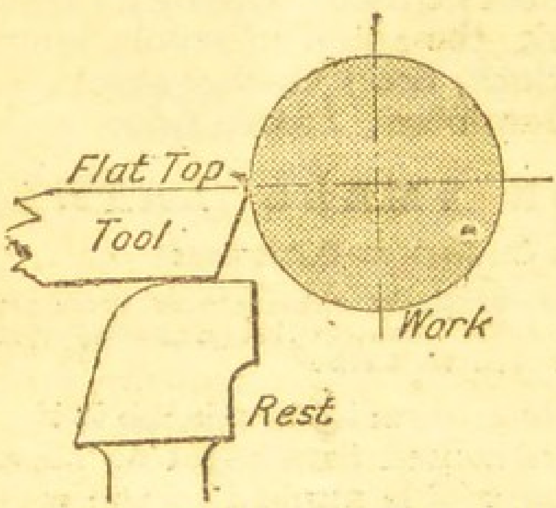
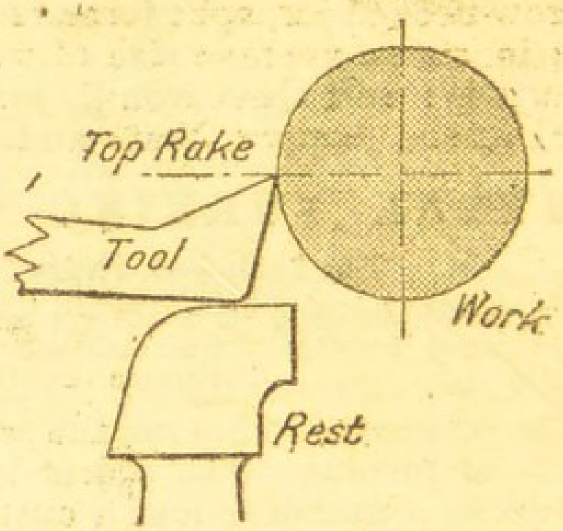


Fig. 2. Types of hand-turning tools: a, round nose; b, side tool; c, graver or diamond point



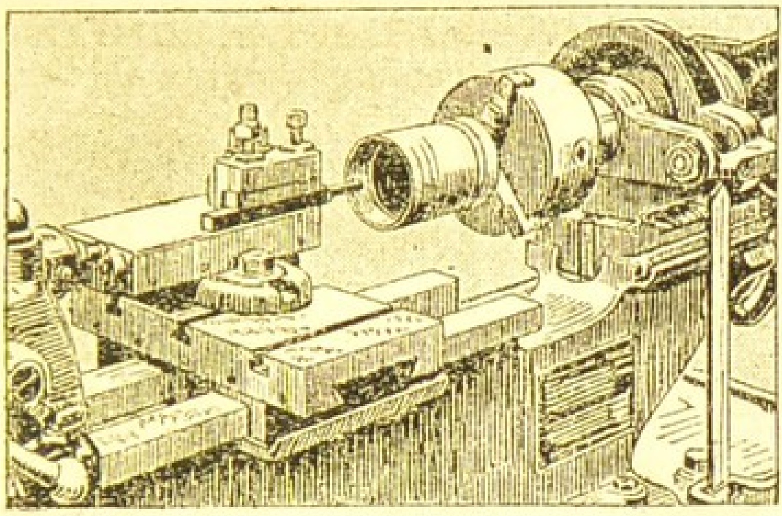


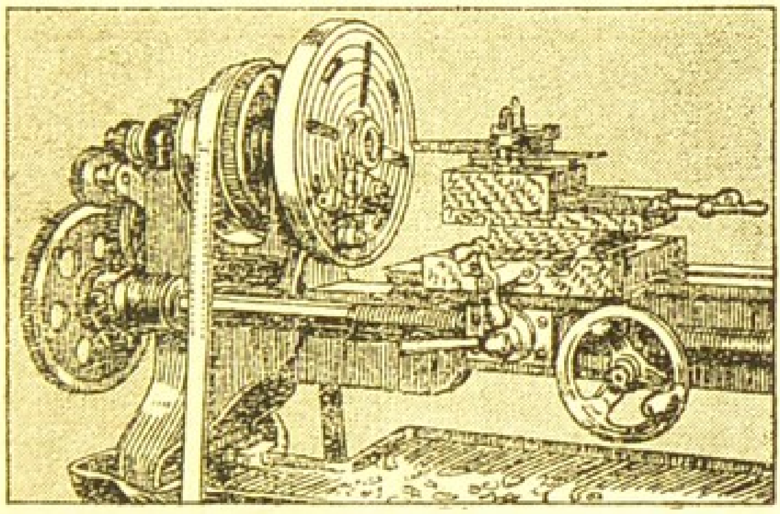
METAL TURNING. Fig. 3 (Left). Diagram showing use of flat-topped tool for brass work. **Fig. 4.** Use of top rake for turning iron

cuts at the side, as well as in the front. The side tool (Fig. 2, *b*), has a cutting edge on its left-hand side; the pointed or graver tool, shown at *c* in Fig. 2, is another useful hand tool.

For brass work, the nose and side tools should have flat tops, as shown in Fig. 3. For turning iron and steel a top rake is used.

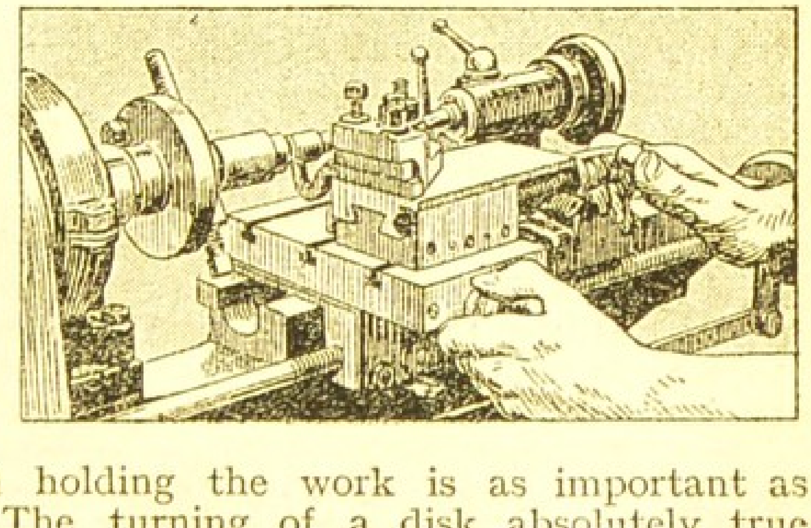
Work to be turned can be held in the chuck. The self-centring chuck is the most commonly used appliance for holding any kind of work which in itself is reasonably round. The three jaws in this type of chuck all move together radially. They are of two patterns, outside and inside. The outside jaws are used to hold rings and disks for facing, boring, as in Fig. 5, or turning portions which are clear of the jaws. With the inside jaws a hollow bush can be held internally while the outside is operated on.





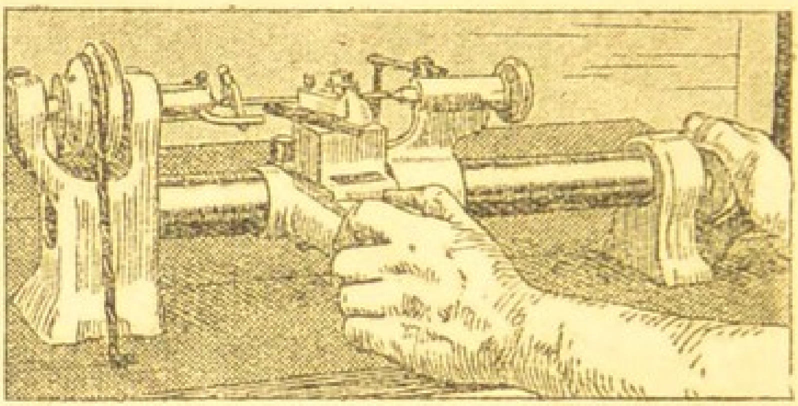
Independent chucks in which the four jaws are separately operated by screw keys are used where great accuracy is required. Work may be bolted to the face plates with the part of the work to be operated upon clear of the holding-on bolts, as in Fig. 6. If not symmetrical the part out of balance must be counter-weighted by bolting a suitable piece of metal on the opposite side. The alternative is to swing the job on centres, which is usually the method adopted for turning pins, bars and shafts.

METAL TURNING. Fig. 5. (Top) Internal boring, showing work held in a three-jaw chuck. **Fig. 6.** Face plate work, showing a small piece of work clamped to plate. **Fig. 7.** (Bottom) Roughing down a mandrel with a swan-necked tool.



THE MANDREL. In employing the slide rest the correct choice of methods in holding the work is as important as the actual turning. The turning of a disk absolutely true with a hole bored in its centre is not usually accomplished in a chuck. The work after boring is mounted on a mandrel, i.e. a bar previously centred and turned true on centres. It follows that, the mandrel being true, greater accuracy can be obtained than by holding it in a chuck and adjusting it. Standard-sized mandrels can be obtained ground truly cylindrical to a high degree of accuracy. To provide for slight variations in the diameters of the holes to be accommodated, expanding mandrels, which are made to grip the work by a screw pressure, are provided. Mandrels should not be used for heavy jobs unless they are sufficiently robust to allow of the operations being carried out without springing when the cutting tools are applied.

Roughing down a mandrel is illustrated in Fig. 7. The rough bar is held between centres, driven by a carrier and cut with a swan-necked tool fixed in the slide-rest tool holder.



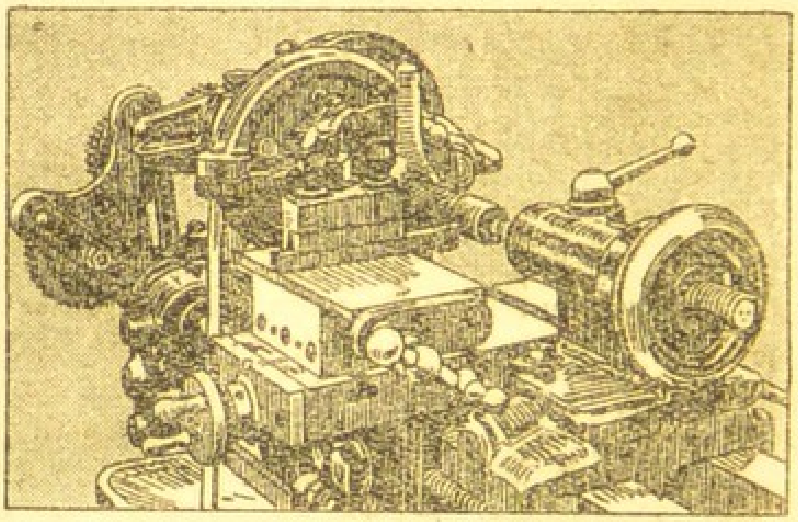


Fig. 8. (top) Piece of work mounted and driven between centres. **Fig. 9.** Screw cutting in a lathe

INTERNAL WORK. Internal turning, or boring, is accomplished by placing a hook tool in the holder longitudinally, as in Fig. 5. The feed-in, which increases the internal diameter of the work being operated on, involves a reversed movement of the slide-rest handle. Where it is essential that the bore of an object shall be quite true with its external diameter, it is necessary to perform both the internal and external turning operations while the work is fixed in the chuck. This has been done in the case of the piston illustrated in Fig. 5. The casting is held by a spigot on its head, which is afterwards sawn off. Where such an operation is impossible, it is usual to bore the job out accurately, and then to remove it from the lathe. A mandrel is made to fit the bore tightly, and the outside operations are accomplished with the work on this mandrel.

In feeding the tool, regularity of rotation of the hand wheel on the end of the screw should be observed; it should be kept moving slowly but evenly.

All screw-cutting lathes can be arranged to obtain a self-acting traverse, so that fine finishes can be obtained without effort.

SCREW CUTTING. In screw cutting the saddle of the lathe is traversed along the bed with a rate of feed which bears a predetermined proportion to the revolutions of the mandrel. The lead screw which guides the saddle tool holder is coupled by a train of gear wheels. These gear wheels may be altered in ratio as desired.

Change wheels for all the usual threads are supplied with screw-cutting lathes.

Fig. 9 shows a screw thread that is being cut on the end of a pin supported between the lathe centres.

CUTTING SPEEDS. The cutting speeds for various metals differ. Wrought iron and steel should be turned at from 200 to 300 in. per minute, tool steels at 200, cast iron at 190 to 200, soft gunmetal at 500 to 600, and brass at 800 in. The speed is found by multiplying the revolutions of the lathe mandrel by the circumference of the work. A piece of work in cast iron, 1 in. in diameter and approximately $3\frac{1}{8}$ in. in circumference, should therefore run at from 60 to 65 revolutions per minute.

Cast iron, brass and gunmetal are not lubricated in turning operations, but to obtain a good finish on wrought iron and steel requires the use of oil, or any saponaceous solution.

MICROMETER. As a precision measuring instrument the micrometer is generally used in metal work. Its principle of working is based on a screw calibrated so that readings of 1,000th of an inch, or finer, can be taken directly.

The ordinary type of micrometer comprises a U-shaped body. At one end is a circular projecting portion called a sleeve, which has a screw thread cut in a portion of its length. In the type of instrument to which the following description applies the pitch of the threads is 40 to the inch. Into the sleeve is screwed a spindle rotated by an outer portion called the thimble. In some patterns this and the thimble are rigid; others have a ratchet device in the form of a subsidiary and smaller handle which is situated at the end of the thimble.

Its function is to rotate the thimble to open the jaws of the micrometer, but to close them with a pressure determined only by the amount of friction on the spring pawl of the ratchet. When the determined pressure between the measuring faces has been reached the ratchet will slip, and the screw cannot be turned any more. Thus, it is impossible to strain it. A locking device is provided, so that if the instrument is required to measure several pieces of material of the same size, it can be used as a limit gauge.

The anvil is movable, and by means of the milled nut at the end of the frame opposite to the sleeve it can be drawn back to increase the measuring range of the instrument. To set the instrument the spindle is set at zero, the anvil drawn back, and a limit gauge in the form of a circular disk inserted between the end of the spindle and the anvil. The latter is pressed into contact with the disk and locked in position.

MEASURING METHODS. In use the instrument is simply applied to the object to be gauged, the thimble rotated until it is almost in adjustment, and the final turn completed with the aid of the ratchet handle. This drives the spindle into contact with the object to be measured.

Supposing it to be a bar of metal $1\frac{1}{8}$ in. in diameter, this reading would be taken as thousandths of an inch, as, practically speaking, all micrometers are calibrated in the same way, or else have metric readings.

On the bevel edge of the thimble is a series of lines and marks, beginning at 0, the next marked division being 5, and so on by regular steps of 5 up to 20. The zero mark will also be read as 25. There are thus 25 separate divisions around the edge of the thimble. On the sleeve is a series of numbers and division marks, commencing at 0 and numbered consecutively to 9 and 0. There are thus 10 spaces, each sub-divided into 4 spaces.

As the spindle is screwed the thimble when rotated travels up and down along the sleeve, and, as it works outward, the marks on the sleeve appear, 1, 2, 3, etc. The distance which is traversed by one revolution of the thimble is determined by the pitch, or number of threads per inch cut on the spindle, and as this is 40, it follows that one revolution of the thimble draws back the spindle $\frac{1}{40}$ in. The calibrations on the sleeve are spaced $\frac{1}{10}$ in. apart, and, being further divided into 4, one complete revolution of the thimble will draw it back exactly this amount; that is, $\frac{1}{40}$ in. But as the rim of the thimble is divided into 25, if the thimble is only rotated to move through, say, one space on the thimble scale, the exact amount which the spindle has been drawn back will be $\frac{1}{1000}$ in., because the spindle has made $\frac{1}{25}$ of a revolution; that is, $\frac{1}{25}$ of $\frac{1}{40}$ in.; that is to say, $\frac{1}{1000}$ in.

All the readings are taken from the horizontal line marked on the sleeve, and from the zero mark on the thimble. When using a micrometer it is better to think in thousandths than in any other figures. For example, $\frac{1}{4}$ in. is more quickly remembered as $\frac{250}{1000}$ and similarly with other fractions.

MICROSCOPE, Constructing a. The construction of a simple microscope is not a difficult task for the amateur to carry out. Virtually, all that is necessary is the attachment of a lens, or group of lenses acting as a single lens, to a tubular body which is provided with a sliding adjustment. The whole is then screwed to a stand or support. The stand may take the form of a brass tube of suitable diameter, bushed at one end to accommodate a smaller, movable tube; into this the eyepiece is fitted. At the base of the lower tube an aperture must be made in order that objects for examination can be inserted for the purposes of scrutiny.

Supposing the lens to be about $1\frac{1}{2}$ in. in diameter and of the type commonly used as a magnifying glass, it can be mounted in a cardboard tube and held in position by a ring made of cardboard, glued to the inside of the tube about $\frac{1}{2}$ in. from the outer end. The lens is laid upon this ring and located by a second ring glued close to its other face.

The body can be made of a longer diameter cardboard tube and bushed at its upper end with a wooden or stout cardboard ring This ring should be glued and pinned into position. The base can be made from a piece of wood about 3 to 4 in. square.

A Compound Microscope. The construction of a compound instrument calls for very considerable technical skill, but the amateur who is in possession of a set of mounted lenses can make the body and general framework.

The first process is to make up the body tube, which should be from 1 to $1\frac{1}{2}$ in. in diameter and about 10 in. long. The brass tube used is a light-weight, brazed or treblit type. It has to be cut to lengths and the ends turned up true in the lathe. A shorter tube must be obtained which will just fit inside the larger tube.

To the outer end of the draw tube fix the eyepiece, by screwing the bore of the draw tube to suit that on the eyepiece. The inside of the tubes should be painted with a dull black paint. To the lower end of the body tube fix in a similar manner the objective, which will have a brass mount with a screw thread so that it can be screwed into the end of the body tube. It may be adjustable, and mounted in a short length of tube, in which case it should be made a close fit.

A fine adjustment must be provided by either a rack and pinion or a long screwed rod. The former can be purchased from photographic dealers, the rack being about $\frac{1}{4}$ in. wide and the pinion about $\frac{3}{8}$ in. in diameter. These parts are mounted by soldering the rack on the outside of the body tube and absolutely in line with it. A slot has then to be cut through the tube at the top of the extension arm, so that the rack can pass through it when the body tube is moved up and down in the extension arm tube. The pinion is mounted by means of two small brass plates, bent to shape and silver soldered to the sides of the slot through the extension tube. A hole is drilled through them to accommodate the pinion spindle.

The pinion mav be attached to the spindle and provided on the outside with a brass knurled nut.

The completed instrument is finally mounted on a tripod stand suitably fitted with a stage for holding the slides containing the objects to be inspected. The tripod can be made up from solid brass, the three legs being united by a brass block. The latter must be drilled to take the retaining screw of the extension arm, which holds the body tube, to which it is silver soldered. To complete the instrument, a reflector should be fitted on to the adjustable mounting attached to the stage.

MILLING. This is a process of removing metal by a rotating cutter from a piece of work which is bolted down to a table capable of sliding sideways and endways and vertically. The tool used in a lathe is held in slides against the rotating work.

Small lathes are often fitted with attachments which, in effect, convert the tool into a species of milling machine. The work can be bolted to a vertical slide and brought up to a milling cutter fixed in a chuck on the lathe mandrel. Slotting and grooving can be accomplished in this way within the limits of the stroke of the vertical slide. In some cases the vertical slide is arranged to hold a spindle running in plain or ball bearings, with a pulley at one end and a chuck for holding the cutters at the other. The body of the appliance is bolted to the vertical slide of the milling attachment, and the spindle is driven by an overhead gear.

MITRE JOINTS IN WOODWORK

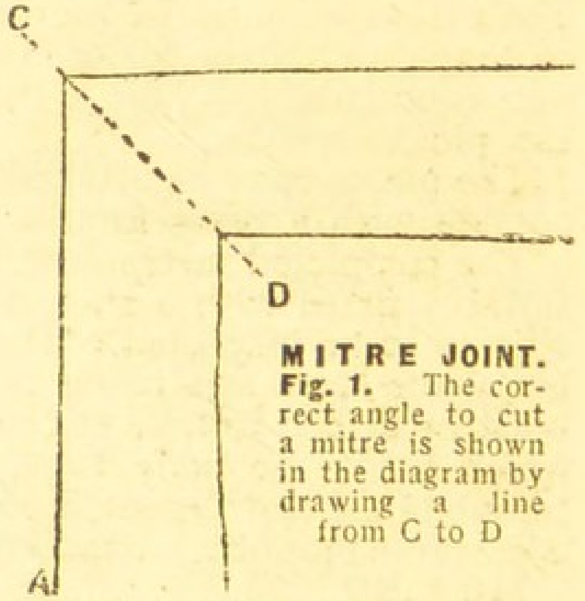
How to Make and Use a Mitre Box and a Shooting Board

This contribution supplements those on Moulding and Picture Framing. The principal woodwork joints are dealt with under specific headings, and other valuable hints are given in the article on Joint. See also Cabinet Making; Door; Drawer, etc.

The term mitre is applied to various kinds of joints formed between two pieces of material, as, for example, in picture frames and mouldings. The ends are butted together in such a way that the joint between them bisects the angle between the external edges of the material. A right-angle mitre is one in which the mouldings are at right angles, the angle of the joint being therefore 45°. The particular object of using the mitre is two-fold; the contours of the moulding should exactly meet and flow into each other at the joints, and the inner and outer faces of the moulding should not expose any end grain.

Mitred joints are often keyed at the corners with a plain or dovetailed key, examples of which are illustrated. The simple key in Fig. 2 is fitted by making a saw-cut in the ends of the mitred parts of the frame. In stronger work the key is sawn from hardwood, say, about $\frac{1}{4}$ in. thick, and is fitted into slots made in the ends of the mitred joints by sawing and chiselling. The grain of the key is set to run parallel with one of its edges, to give strength.

The keyed dovetailed mitre joint in Fig. 3 is an ordinary mitred joint with a double dovetail formed across it. Into the dovetail a piece of X-shaped hardwood is fitted.



MITRE JOINT. Fig. 1. The correct angle to cut a mitre is shown in the diagram by drawing a line from C to D

Normally, the surface of the mitred joint will be upright, or at right angles to the flat surface, but it will be inclined to some angle across the length of the moulding. This angle can be ascertained by calculation, but the simplest method is to make a full or scale size drawing of the parts to be mitred. An example is given in Fig. 1, and from this it will be seen that the parallel lines representing the mitreing intersect at the corner, or angles, as at A, B, and C. The correct angle to cut the mitre is determined by joining the intersections of the two inner lines to that of the two outer lines, as at D, C. Having ascertained this angle, the bevel square is set to it, and the angle marked upon the moulding which is then sawn off, and the ends planed or shot true.

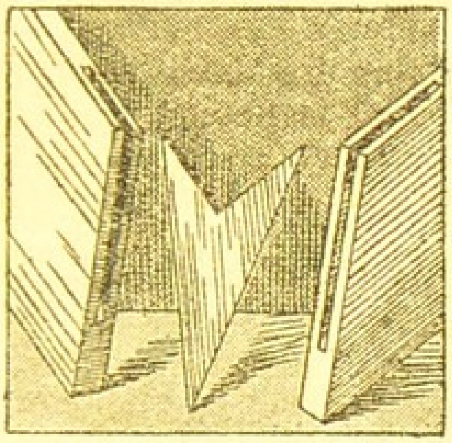
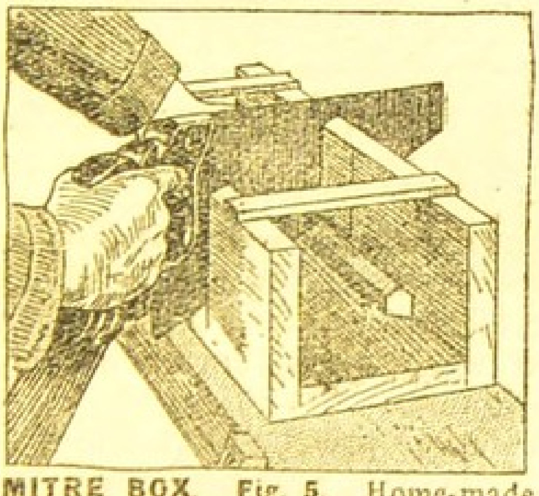


Fig. 2. Keyed mitre joint, as used in very small work, shown separated

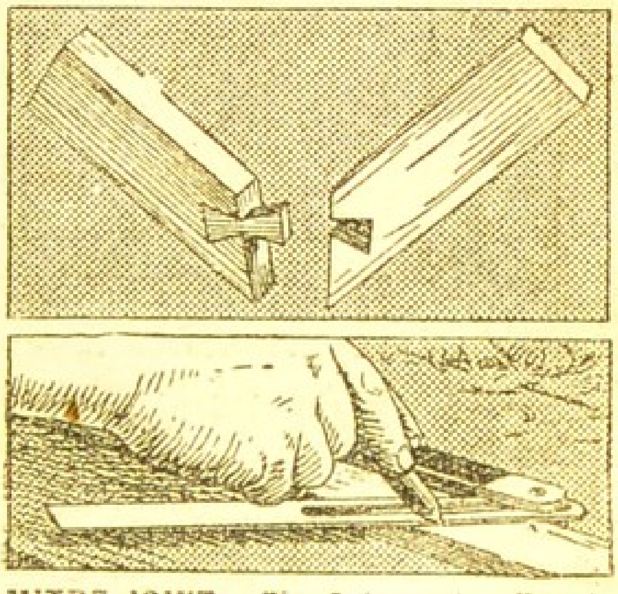
Fig. 4 shows how mitre is marked with the bevel square. To facilitate marking, a standard mitre template can be used.

Mitre Box. A box for the cutting of material up to 5 in. square can be made from 3 pieces of deal, planed up true on the faces and edges and measuring 6 in. wide and 1 in. thick (Fig. 5). The length of the three pieces should be about 2 ft. (Fig. 6 gives the dimensions). The pieces are nailed together to form a box, and two battens, 2 in. wide and about ½ in. thick, are nailed across the tops of the side pieces to keep them from spreading. The angle between these and the baseboard must be exactly 90°.

The cuts which guide the saw while cutting the moulding must then be done. Mark off in the centre of the block a line at right angles to the length of the box; project this line to the face of each of the side pieces, and saw through to this line. Then set a bevel square exactly at 45°, mark this angle on the upper edges of the side pieces, square off on each of the outer sides of the side pieces, and again saw through. Repeat this operation on the opposite hand, and the mitre box is complete and ready for use. Fig. 6 shows the correct angles marked out.



MITRE BOX. Fig. 5. Home-made mitre box in use. Material up to 5 in. square can be cut



MITRE JOINT. Fig. 3 (upper). Key in place in one half of a dovetail mitre joint. This joint is used in stronger work. Fig. 4. Mitre angle being marked on the moulding with a bevel square

The moulding to be cut is pressed into the lower corner of the box and held with the left hand, while the saw is manipulated with the right.

A mitre block, useful for cutting small mouldings, is illustrated in Figs. 7 and 8. It may be composed of a board, 18 in. long, 6 in. wide, and 1 in. thick, and another of the same length, about 3 in, wide and about $1\frac{1}{2}$ in. thick, which is glued and dowelled to the first board. It is marked off with angles and sawn through as before.

Mitre Shooting Board. After moulding has been sawn to the requisite angle, the end of the material is planed up true with a mitre shooting board. This appliance may be made from a piece of deal about 9 in. wide and 1 in. thick, to one side

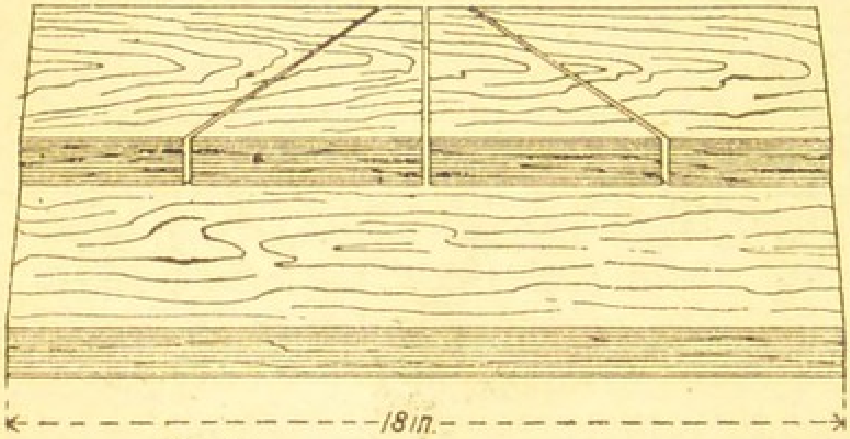


Fig. 6. Plan of mitre box, showing correct angles. Fig. 7. Solid mitre block. Fig. 8. Section of block, showing necessary measurement

Fig. 8

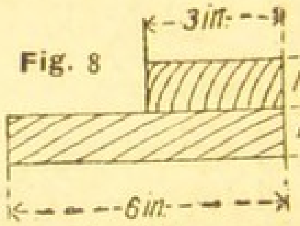


Fig. 7

End View

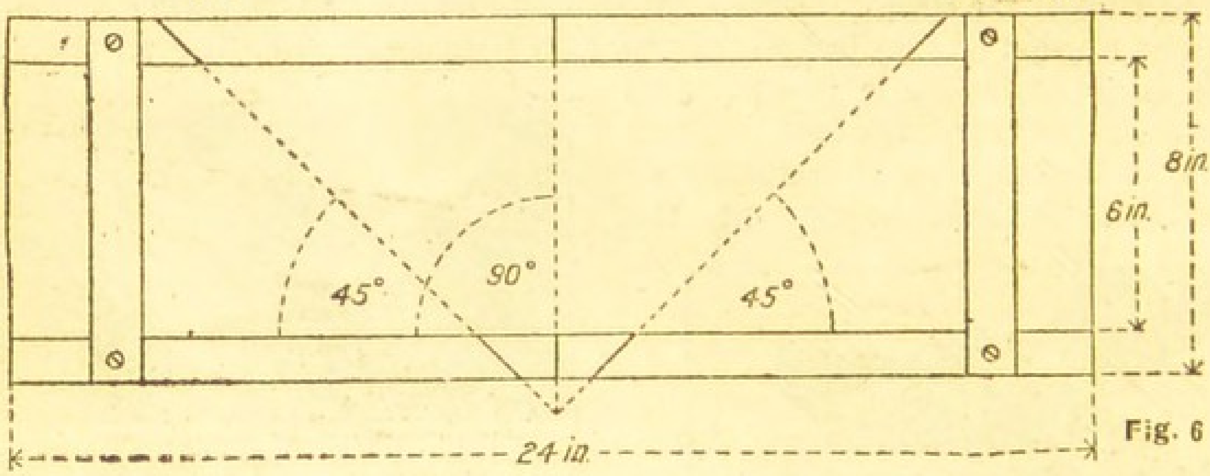


Fig. 6

of which is glued and dowelled a narrower board about 3 in. wide and $\frac{3}{4}$ in. thick. At the extreme left-hand end a third block is screwed with its edge exactly at right-angles to that of the "fence" or guide batten. This third block is used for accurately shooting the end grain of the wood at 90°.

Another piece of batten is glued and dowelled to the top of the fence at about the middle of its length, and this piece has its edges cut and planed to the desired angles, forming a mitre template. The work to be planed is held against this angle block with the left hand, and a jack plane is laid on its side, with the sole of the plane against the edge of the fence. The moulding is fed towards it, thereby cutting the end the same angle as that of the guide piece.

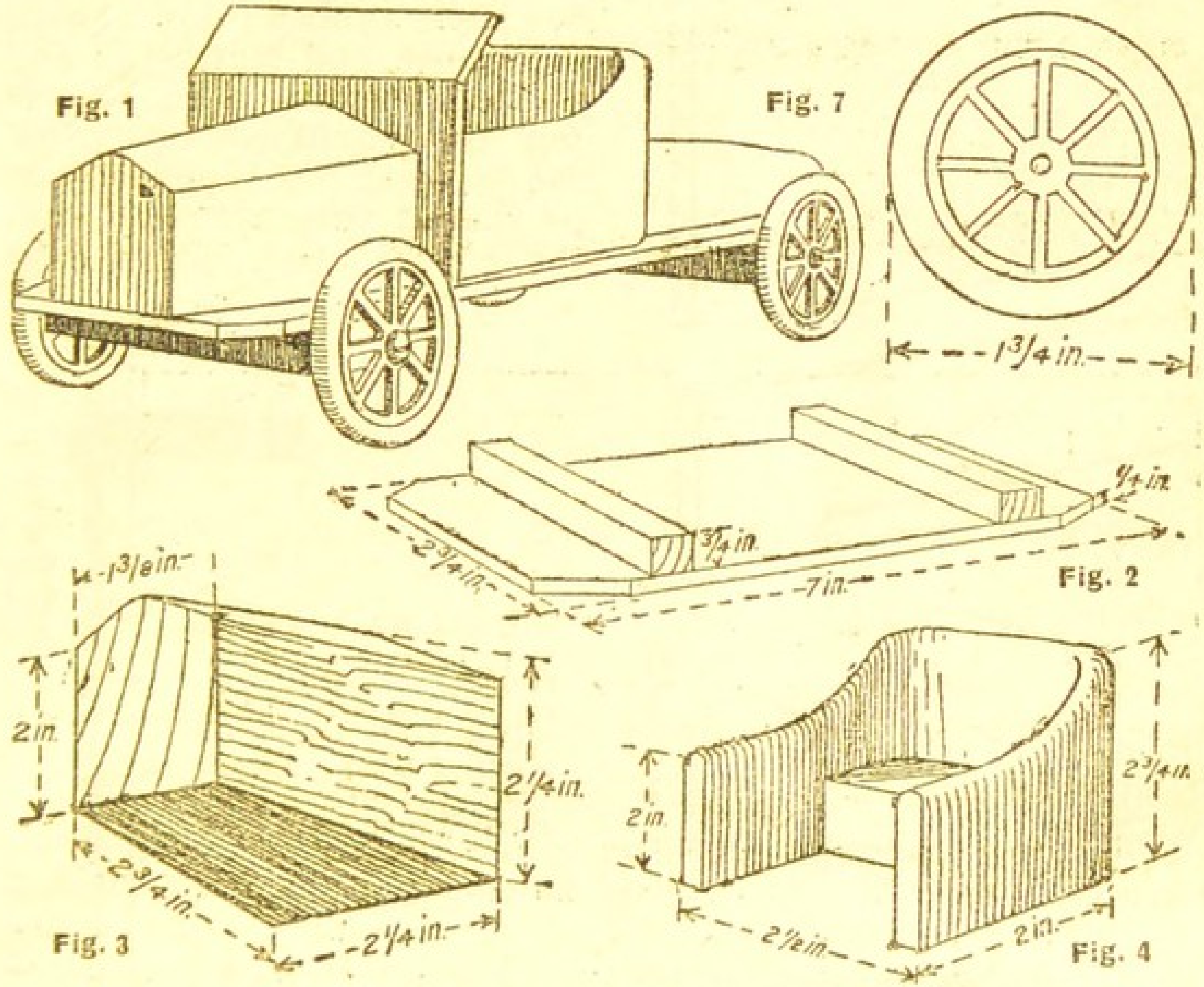
MODELLING

Details About a Pleasing and Profitable Pursuit

Our readers are here told how certain interesting models can be made. See also the entries Boat; Engine; Locomotive and others, for making which a knowledge of modelling is useful

Under the head of modelling are grouped a number of hobbies for the amateur. A number of these do not call for any particular degree of skill, and are generally a matter of ingenuity in utilizing odds and ends of otherwise waste material; while all the tools required are a good pocket-knife, a small file, and a pair of pliers. Excellent results can be obtained by the use of these tools, while the addition of a few others makes more advanced models possible.

For example, a model of a motor-car may be a very elaborate job with every tiny fitting reproduced on the model. Another



MODELLING. Fig. 1. Finished motor car made from softwood. **Fig. 2.** Framework. **Fig. 3.** Bonnet as seen from below. **Fig. 4.** Body and seat made in one piece. **Fig. 7.** Wheel

one, for the amusement of young children, can be made up, as in Figs. 1 to 7, from solid blocks of softwood, shaped with a pocket-knife, chisel, and saw, and assembled in the form of a motor car. This may then be mounted upon 4 wheels (Fig. 7), fixed by screws to the frame (Fig. 2) and the body work (Figs. 3 to 6), so that they can revolve freely. The frame (Fig. 2) is cut to the shape shown from wood $\frac{1}{4}$ in. thick, and to the dimensions given; two axle pieces of $\frac{3}{4}$ in. square stuff are cut and glued across the frame.

The bonnet (Fig. 3) can be cut from a solid piece of softwood to the shape shown and glued and screwed to the front of the frame. The body and seat are sawn from one piece, and shaped as shown in Fig. 4. The seat can be cut out with a sharp chisel and covered with cloth or other material to represent the upholstery. It is attached with screws and glue to the frame, and the dashboard and screen fixed across it between the body and the bonnet. The dickey seat is a wedge-shaped block, as in Fig. 6 and attached to the back of the seat and to the frame.

When all the parts have been assembled they should be well rubbed down with sandpaper, and painted in any desired colours. The wheels can be purchased ready for use at most toy shops, or can be shaped with a fretsaw and the edge shaped with a rasp

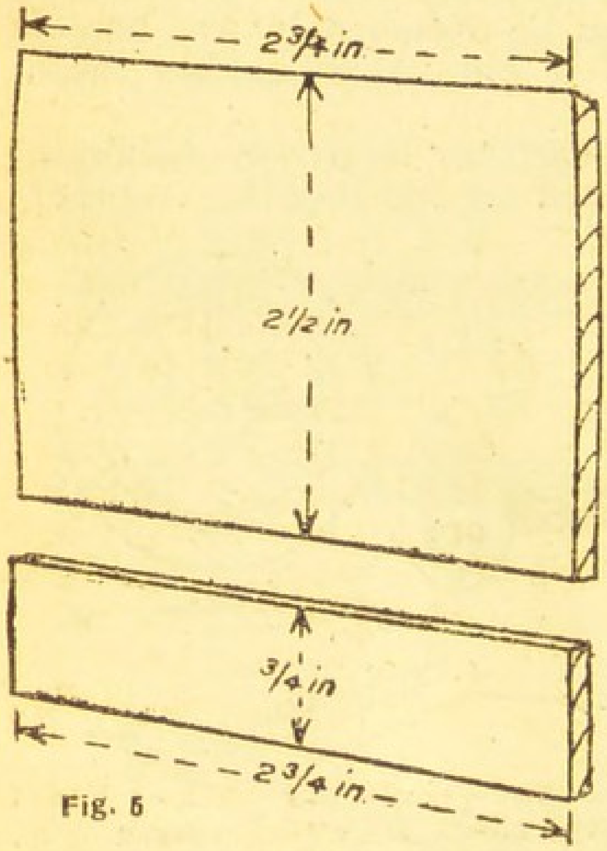


Fig. 5

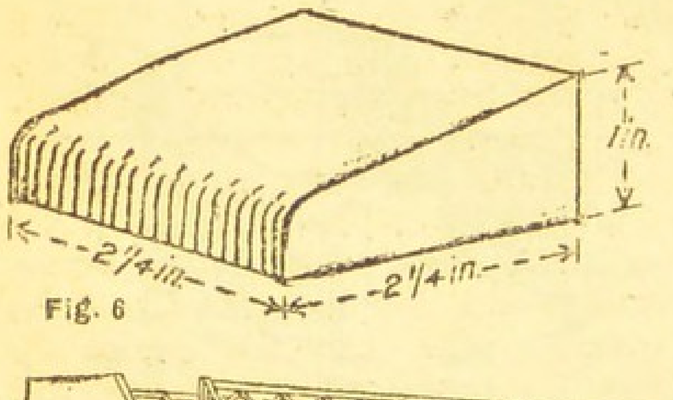


Fig. 6

MODELLING. **Fig. 5.** Dashboard and screen. **Fig. 6.** Dickey seat. **Fig. 8.** Model railway bridge made from thin pieces of wood. **Fig. 9.** Signal, the upright being of wood and the arm of tinplate

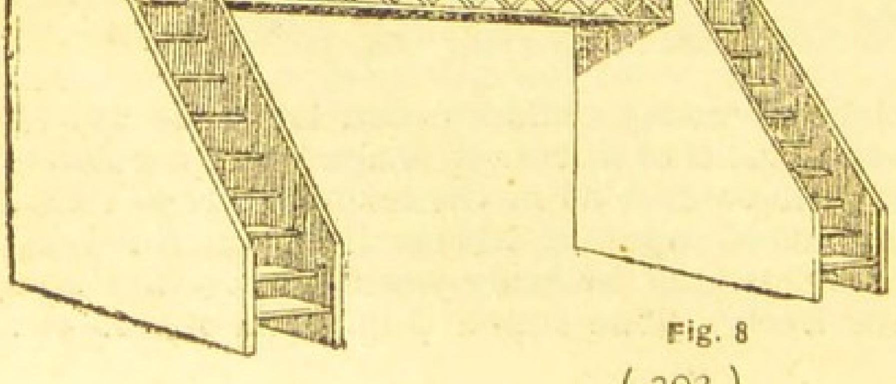


Fig. 8

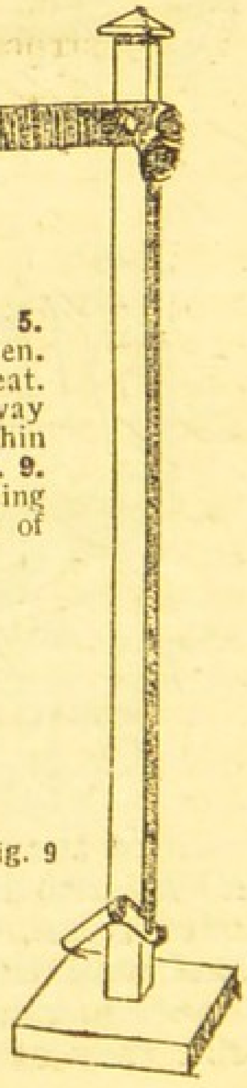


Fig. 9

and sandpapered. The spokes ought to be painted to match the body, and the rim a dark grey colour to represent the rubber tyres.

A complete model railway system is practical when a large room can be set aside for it. Even a loft or attic can be used in this way, and a wide shelf of rough boards built around a framing about 3 ft. from the floor. On this the railway track is laid, with points, signals, or any other features which appeal to the modeller. This is followed by the making of tunnels and bridges, station buildings, and other features of the railway, all of which can be carried out with cardboard, brown paper, and other homely materials.

A model railway station can be made in cardboard on the lines described for cardboard modelling, or it may be fashioned from wood as in the article on dolls' house. A little bridge could be made up from thin pieces of wood, as in Fig. 8, which makes the chief points of construction clear. Two pairs of uprights should be provided on each side of the track with cross-pieces at the top connecting them together. Stairs can be made up on the two side pieces with the requisite number of treads, which may be pieces of strip wood cut to a length equal to the distance between the side pieces. A floor is placed upon the cross-pieces, and the top of this can be cut from a piece of cigar-box wood. The hand rails and the simple lattice work to represent the construction of the bridge can be built up from thin strips of wood glued and pinned together. When it is finished, the whole may be painted in grey, brown, or other colours, using a flat oil paint.

The modelling of the signals is comparatively simple, and details are given in Fig. 9. A square piece of wood about 9 in. long and ⅜ in. square will be suitable for a No. 0 gauge railway system. The piece should be planed to taper on all 4 sides, the signal arm or semaphore being cut from a piece of tinplate. This is attached to the top by means of a small screw, so that it is free to move. A thin wire connects the back of the signal and the spectacle plate to the lever or bell crank cut from tin plate and fixed at the bottom of the post. Another wire can be taken through screw eyes, or similar fittings sold for the purpose, to a signal cabin complete with levers. This can be made up at home, or purchased ready for use, and if the wires are connected up properly, the result will be that when the lever is pulled in the cabin the signal will fall, indicating that the line is clear.

An effective tunnel can be modelled by cutting two tunnel mouths from pieces of wood and fastening thin strips of wood on to them to represent brickwork. Triangular pieces are cut, glued, and bradded in place to represent the rim, or retaining walls. The whole may be painted in a dull brown colour and lines to represent the brickwork. These should be fixed in position on the baseboard, one at either end of the proposed tunnel. Some light laths are nailed between them and others in a sloping direction to the baseboard and through it towards the back of the wall. Quantities of thick brown paper are then obtained, crumpled up, and glued to the laths. Other sheets of brown paper, thoroughly moistened until they are quite limp and coated with glue on the underside, are worked over the top of the crumpled pieces to represent the hillside. Two or three layers may be needed to make the structure strong and firm.

REALISTIC TOUCHES. When it is dry, the exterior should be washed over with a solution of hot water and glue and a little sand sprinkled on in places. Small pieces of broken brick and similar material can be glued on in addition to the sand, to represent pieces of rock. The parts that are to be represented as grass are washed over with the solution of glue and some flock sprinkled over it. As soon as the glue has set hard, it will be found that the flock adheres to it and any surplus can be dusted off with a painter's dusting brush.

The outside of the tunnel may be improved by modelling trees from pieces of sponge with twigs set in them, to represent the trunks and boughs of trees, and dipped into green dye. The sponge should be teased with tweezers, and pulled out so that it bears some resemblance to the branches and foliage.

A road bridge over the railway can be made up along the same lines as the tunnel mouths with bearing pieces of the wood to represent the roadway. For pavement, strips of wood are screwed to the sides of the roadway, coating it with glue and covering it with fine coal-dust to represent a tar macadam road. A lake or a river may be represented by making a depression on the baseboard, or by building up the banks, making it up out of brown paper as previously described. The hollow should be worked with the paper, covered with glued solution, and sprinkled with coloured sand. Pieces of slightly wavy but transparent glass are placed over the depression, and blue and white lines are painted on the underside of the glass. The model can be improved with reeds or rushes by the side of the water, and some bushes and a tree or two.

A fogman's hut or other small building can be modelled by the side of the lake, and a river or stream may be represented running away into the distance, and, painted on the back screen, showing it as a tributary of a large river ; a further addition is made by making the river run under the railway, which crosses a ravine by a bridge. This bridge can have as its principal members two posts, $\frac{3}{4}$ in. in depth and $\frac{1}{4}$ in. in thickness, set slantwise to the sides of the gap of the ravine. Upon these will be mounted a thin board of $\frac{3}{16}$ in. thick and slightly overlapping the side pieces. Upon these other small strips are set upward and side by side, with a gap between them equal to the thickness of the strips. The top girder is T-shaped, and made by glueing and pinning two strips together ; the end uprights are made from the same material. The framework thus formed is filled in with lattice work, of strip wood, about $\frac{3}{16}$ in. wide and $\frac{1}{16}$ in. thick, glueing the strips in a slantwise direction on one side of the T, and the opposite direction on the other side, thus forming a criss-cross or lattice. This bridge will look best if painted in dull colours, preferably grey to resemble stone.

A ravine may be modelled in the same manner as a tunnel, by making up the sides with brown paper and covering it with flock, pieces of miniature rock and modelling little paths. If there still remains sufficient space, a turntable can be incorporated; this consists of a disc of wood mounted on a central pivot. It can be set in a siding or off-shoot, but it should not be put in the main line. Goods sidings or small platforms can be added to the general lay-out.

To make a lighthouse a sheet of brown paper coated with glue is rolled up so that it forms a circular tapering tube, about 15 in. long, 5 in. in diameter at the base and about 2 in. in diameter at the top. When it has set hard, the outside should be covered with a piece of good quality white paper, affixed with paste. This, when dry, should be lined up to represent the masonry, and a few small windows indicated near the top, as well as a doorway at the bottom. The tube is mounted on a disc of wood by glueing it to the edge of the wood and securing it with a few pins.

A rectangular baseboard is prepared from a rough block of wood, 3 or 4 in. thick, fixed to the corner of it, and the base of the lighthouse mounted thereon. Crumpled brown paper represents the rocks, which can be finished as before, and the whole completed by painting it dull grey, or green. The surface of the sea can be suggested by using white paper, moistened to render it more pliable and then crumpled up to represent the waves. The breakers around the rocks are produced with the aid of fine cottonwool glued to the top of the waves, and when dry teased, or pulled up with tweezers to imitate the foam. The surface of the sea is more difficult to paint and may be commenced by coating all of it with a fairly light shade of bluey-green and then purples, browns, and greens, to represent the varying colours of the water.

The top of the lighthouse is finished by cutting a disc about $3\frac{1}{2}$ in. in diameter for the platform. The lights, or windows, for the lantern can be made from an unspillable ink-well set upside down and fixed to the platform with seccotine. A thin ring of cardboard is cut and worked round the bottom of the ink-well and glued securely to the platform to strengthen the fixing. The conical cap with the weather vane is made from cardboard and stuck to the top of the lantern; for the rails round the platform pieces of tinplate $\frac{1}{2}$ in. broad are bent to shape. It should be pierced by punching a series of slits through it, with a piece of cast steel, such as the end of a small file slightly grooved on the end to form a punch. Alternatively, cardboard can be used, and the railings cut out with the point of a sharp knife.

When finished in natural colours, the lighthouse is quite attractive, and the effect is improved if a small boat is set on the sea in the foreground. A pocket flash-lamp battery can be introduced through the opening or door cut through the walls of the tube at the back part of the lighthouse. A switch wired to the battery is attached to the base, and the wires are taken to a miniature lamp-holder attached to the tube on the platform. A flash-lamp bulb is screwed into the holder and should just fit into the ink-well. To complete the effect some small model ships can be made from thin slips of wood cut to the shape of the hull, deck-houses and other features being shaped from card and the masts made with pins and rigged with fine cotton or silk. These, when suitably painted, can be made to look most realistic.

MODELLING OF ANIMALS. The modelling of animals is an attractive pastime. Bears, lions, and many other animals can be sawn to shape from thin pieces of wood, provided with separate legs obtained from similar pieces, and assembled together. They should be very strongly made, and all the joints well glued and pinned together. Bright colours and simple outlines should be the guiding features.

Plasticine, plaster, and similar materials also lend themselves to the construction of toys. Modelling in cork may also be included and may comprise nothing more elaborate than a few quaint figures oil painted, or may take the form of a model of a house, bridge, or any other building made up from small pieces of cork fixed together with seccotine and pins.

The use of large pieces of cork, together with other materials, such as cardboard, stiff paper, brown paper, green baize, and linen, enables more ambitious work to be carried out. Particularly interesting is the modelling to scale of an old village. Paper pulp, made by soaking old newspapers and then thoroughly straining out the water, provides a material, when mixed with gum, that can be modelled into shapes that are difficult to obtain in any other way.

An interesting occupation is to reproduce to a small scale either a favourite seaside resort or some notable or historic scene. In carrying out this work, cork should be the main material used, as it is easily shaped with a sharp knife. Large pieces of work may be modelled in sections and glued together, and if the surface of the material is coated with size, oil paints can be employed with considerable effect.

Another excellent material for modelling is chalk, which is obtainable quite easily in many parts of the country. It can be cut to all sorts of shapes with no other tool than a penknife, and it forms an ideal material for relief carving. Scale models of stone buildings may be made by using sawn blocks of chalk ; a fine tenon saw will serve, and the surfaces can be joined by first coating them with size and applying seccotine when dry.

The chalk can be stained and coloured with water colour. Various stages in the development of architecture may be shown by utilizing cork and chalk, and the materials may be combined in making scale models of famous buildings and old ruins. If chalk in blocks is not readily obtainable, a good substitute, easily worked, can be made from plaster of Paris mixed with water and poured into rough moulds. Gesso and barbola paste can also be used for this purpose.

Modelling Wax. For modelling flowers and fruits pure beeswax is used with a small proportion of lard or olive oil. The wax employed for kindergarten purposes contains beeswax, paraffin wax, sesame oil, and sulphur.

MOELLON. A mixture used in mason's work, and composed of rubble, stone, and mortar, is known as moellon. It is employed as a filling to fill up the cavities between two wall faces built with blocks of stone.

MOHAIR. Properly used, the term mohair signifies yarn or fabric made from the hair of the Angora goat. The fabric resembles alpaca, though somewhat coarser. Mohair mats and door slips are much used, and most astrakhan, Persian lamb, Teddy bear fabrics, and imitation tiger skin rugs are mohair.

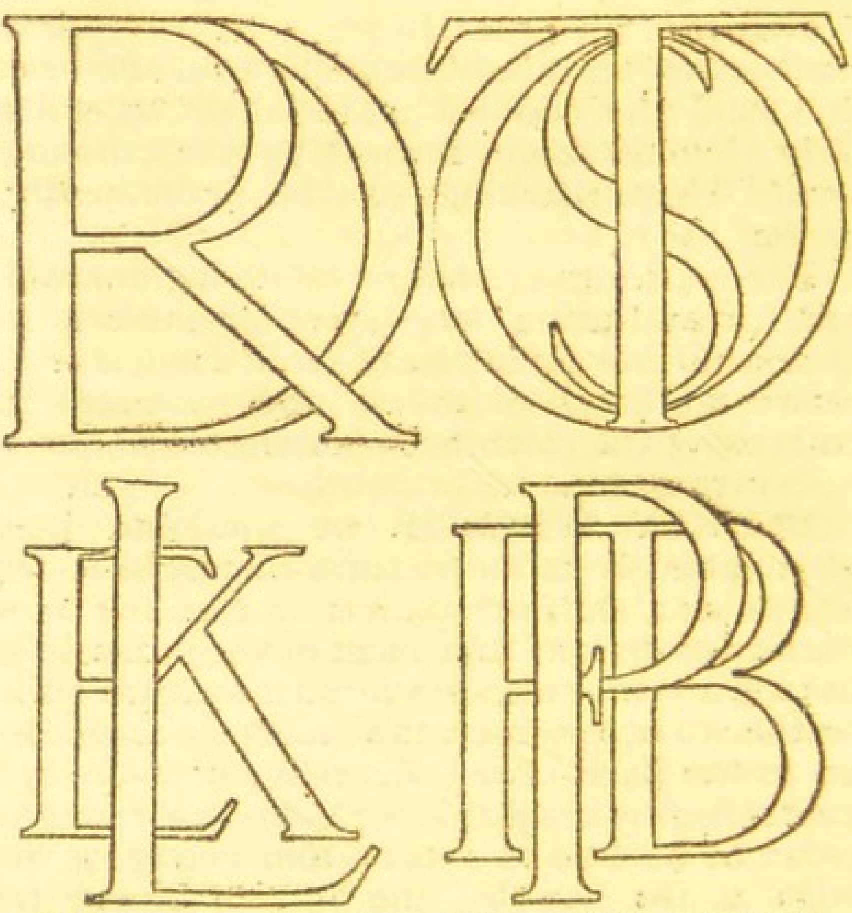
MOIRE. In order to see a moiré appearance take any light, plain, open-textured fabric like thin silk or cambric, fold it lightly and hold the doubled material up to a good light. An irregularly clouded figure formed by the crossing of the lines will be seen. These markings can be permanently fixed upon suitable cloths.

The markings are made by laying one wet surface of cloth over another and using very heavy pressure to impress the ribbedness of one surface upon the other. That is not the only method, for moiré markings of a less uneven character are obtainable by embossing the cloth between engraved, countersunk rollers under heavy pressure.

MONKEY WRENCH. A nut and bolt spanner, which is adjustable so as to fit nuts of any size within a wide range is known as a shifting spanner or monkey wrench. It is made in a variety of designs, but most of them consist essentially of a handle having a jaw at one end formed integral with it and at right angles to the shaft, a second jaw being arranged to slide along the shaft up to the fixed jaw. The movement of the loose jaw is generally controlled by a short length of screw mounted in the jaw carriage, so as to be free to rotate, and engaging in a rack cut along the edge of the handle; the outside of the thread of the screw is milled to provide an easy grip for the fingers when turning the screw to adjust the gap between the jaws to fit the nut.

In choosing a wrench the type described above is preferable in large sizes, as it is very robust, but for a small size many prefer the pattern in which the jaw nearer the handle end is formed integral with the handle; the outer jaw has a screw threaded stem entering the handle and controlled by a knurled nut located in a window opening. This latter shape is handy to use, but it does not stand up to heavy work on large nuts so well. As for size, one about 6 in. long is very useful, either for the house or car; but there are large nuts connected with plumbing which require a jaw gap of 2 in., and a 3 in. opening is not too large for some jobs about a car; it is therefore desirable to have both a large and a small shifting spanner in the tool box. For car work a full set of fixed spanners is necessary, since the monkey wrench cannot be used so quickly as the special spanner that fits the nut, but for the house a couple of sizes of adjustable spanners will meet all requirements. The practice of finishing the tightening of a nut by hammering on the end of the spanner handle is specially undesirable in the case of a monkey wrench. No tool of this class will withstand such treatment for long without the jaws being so strained that they are no longer parallel, and that means that the tool is useless and will have to be replaced.

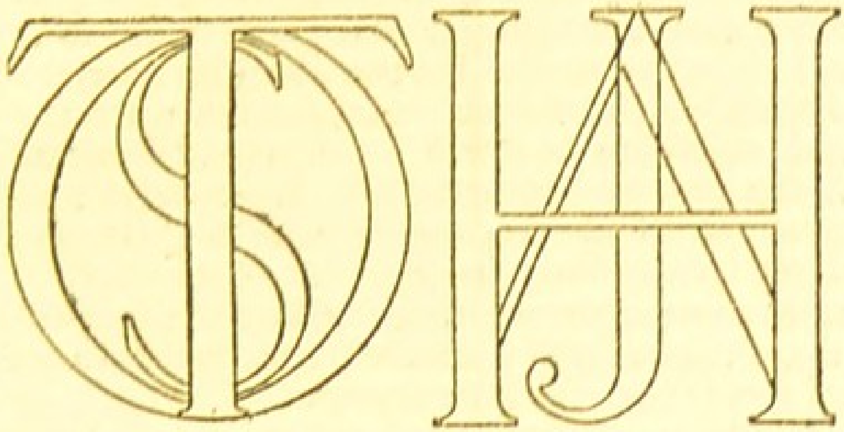
MONOGRAM. Two or more capital letters combined in one form what is termed a monogram. A good example of this is seen in the dipthong Æ. Initials formed into a monogram and cut out in thin tin or zinc, can be used for marking linen, books, etc. Another method is to engrave or etch the monogram on silver.



MONOGRAM. Examples of monograms, composed of two or more letters, suitable for stencil cutting

In designing a monogram, legibility must be considered, and in arranging initials, it is often advisable to give prominence to the initial letter of the surname; this may be effected by enlarging the letter or by utilizing colour. Roman lettering lends itself to artistic arrangements, the best method being to commence with the principal letter, work out as many combinations as possible, and then decide on the best. A symmetrical letter is the easiest to commence with, and where other letters can be arranged in an O or C, the work will be comparatively simple. Some combinations of letters are very awkward to arrange but it is generally only a matter of practice.

Examples of two and three letter symmetrical as well as non-symmetrical arrangements are illustrated. All the examples are suitable for stencil cutting, but care must be taken to arrange properties between the letters. Monograms are quite as effective in embroidery as initial letters, the method employed in stitching being the same. Interlaced letters as the O entwined, or the C placed back to back, are often mistaken for monograms, but they are ciphers.



MONOGRAM. Two further examples suitable for stencil cutting

MORTAR. Mortar is a mixture of lime and sand, or similar materials used for making the joints between brickwork and in numerous other building operations. Its purpose is threefold: to distribute the pressure or weight through the brickwork, to cause the bricks to adhere, or bind together, and as a non-conductor, preventing the transmission of heat and sound, and rendering the wall impervious to water. These functions are governed largely by the proportions of the mortar and the method by which it is applied.

The strength and impermeability of the wall depend very largely upon the mortar. Bad mortar allows wet and rain to find a way through the wall; it rapidly crumbles away, and is invariably the chief cause of the rapid deterioration of the building. On the other hand, a good mortar makes a wall drier, stronger, and more durable.

In many districts of England and Wales the by-laws provide for the quality of the mortar which shall be used, and generally these require that all brick and stone work shall be put together with good mortar, or good cement, and that the mortar must be composed of lime and clean, sharp sand, without earthy matter, in the proportion of 1 part of lime to 3 parts of sand. Portland cement mortar may be made with good quality Portland cement, in the proportion of 4 parts of sand to 1 part of cement.

In the preparation of ordinary mortar, the first consideration is the quality of the lime. Excellent mortar can be made with lime, such as lias limes, mixed with sand in the proportion of 1 to 2. The Portland cement should conform to the standard specification of the British Portland cement manufacturers. It is best to purchase the lime from a reliable builder's merchant, and to specify a hydraulic lime, such as, blue lias. The lime must next be slaked which is done by adding water to quick-lime. The usual method is to make a hole in the ground, line it with rough boards and put in the lime; then cover the lime with water, and leave it for about a month.

If the lime (q.v.) is not properly slaked, it will continue to work and expand, with the result that the mortar joints will be cracked, or, in bad cases, the brickwork itself may be displaced.

Another method sometimes used, for small, quick jobs, is to mix the lime and sand together in the proportion of 2 parts of sand to 1 of lime, and sprinkle them with water from a watering-can, having a rose head, applying as much water as the material can absorb repeating the process from time to time during the day, continuing until the lime is thoroughly slaked. In any case, the lime should be left as long as possible to temper.

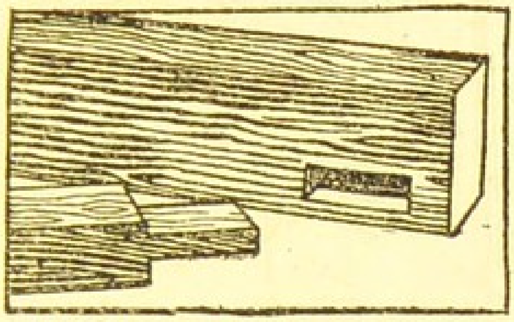
When Portland cement is used for making mortar, the mixture should be knocked up, or prepared, immediately prior to its application, as cement mortar sets hard very quickly, and must be used immediately it has been prepared; otherwise it will become set. After that stage has been reached, if it is again knocked up, and more water is added to make the mixture workable, it will seriously diminish its strength. Lime hardens by exposure to the air, whereas Portland cement hardens by the presence of water. For this reason, lime mortar should only be used in dry situations, and cement always where dampness has to be resisted.

When applying the mortar, the bricks should be dipped in water or otherwise wetted, as if they are used dry, they will absorb moisture too quickly for the mortar, with the result that it will crack or may possibly crumble.

Lime mortar works with a fat or greasy feeling, whereas cement mortar is very harsh, and far more difficult to use, for which reason a common practice is to make up a mortar composed of 1 part cement, ½ part of lime, and 2 or 3 parts sand. This mixture works much better, and for many purposes is quite satisfactory. Mortar is applied with a trowel or float, according to the nature of the work. In bricklaying, it is most important that the vertical joints between the various brick courses be thoroughly filled up, or flushed up, as it is termed, with mortar. Walls are covered with mortar, the process being known as rendering. Various modifications of the constituents of mortar are used for such specific purposes as plastering the interior of a room, or plastering on lathing.

MORTAR BOARD. Boards that are fastened together with battens to make a table or platform about 3 ft. square are used to support a quantity of mortar, and should be placed adjacent to the spot where the work is being done. Almost any strong, fairly smooth boards will do, the only requirement being a level and solid surface. The boards should not be badly split, nor should they have holes through them; otherwise a large quantity of mortar will find its way through and be wasted. *See* Brick; Cement; Lime; Plaster; Putty; Rendering.

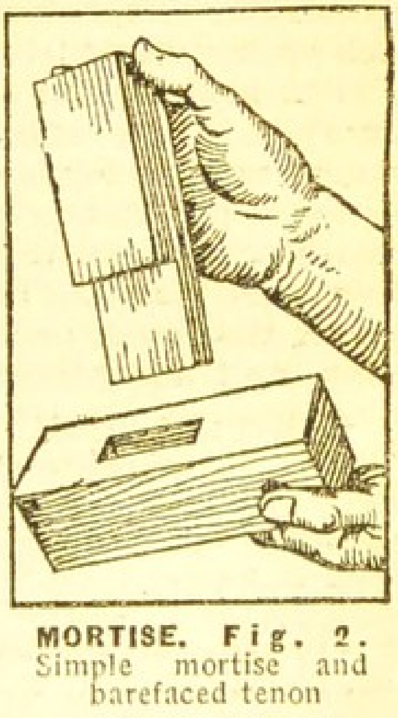
MORTISE JOINT. A mortise is a rectangular hole formed to receive a peg, or tenon, shaped on the part to be jointed. The simplest consists of a slot, cut in the centre of a beam, to receive the tenon on the end of an upright, as shown in Fig. 1. The bare-faced tenon in Fig. 2 has only one shoulder. In the closed mortise the tenon is surrounded by wood on all four sides and the end, and the mortise does not pass right through the wood, but terminates at a distance from the face. When the work is completely finished, the joint between the rail and post is not visible except as a line between the two parts.



MORTISE. Fig. 1. Plain type of slot or mortise to receive tenon on end of upright

The joint shown in Fig. 3 is a haunched mortise; the tenon is cut back for the bulk of its length, but a small projecting portion is left at the side to provide a maximum grip on the post. The slot mortise is merely a slot cut in the end of one part to receive the tenon formed on the other part. The adjustable slot mortise and tenon are only used where it is desired to exert pressure upon some projecting part of the framework, as, for example, the canvas of an oil painting. The wedges are driven in, and the parts of the framework separated, thus tightening up the canvas.

When the tenon does not pass right through the mortise it is known as a stub tenon. The oblique mortise and tenon is used for joints on the ends of braces and struts, and has to be cut at an angle instead of square.

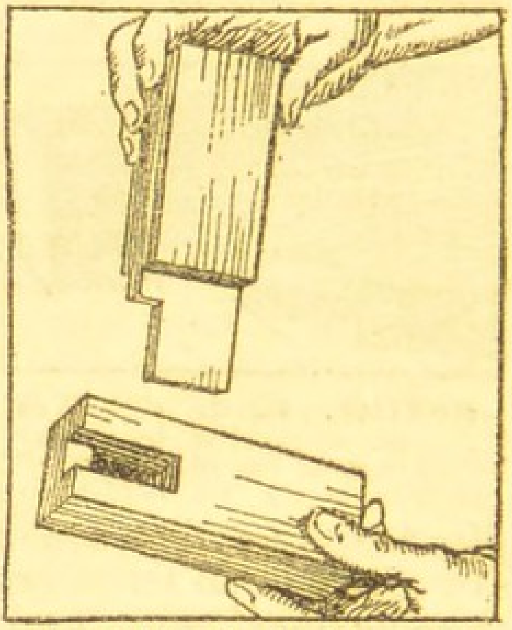


MORTISE. Fig. 2. Simple mortise and barefaced tenon

In a fox wedge tenon, the mortise does not go right through the wood, but terminates at a distance from the face, and the walls of the mortise are cut to an angle, so that the bottom of the mortise in the wood is wider than the mouth, or entrance. The tenon is cut to a width that will just enter the mortise. Two or more wedges are then made of hardwood and inserted in saw cuts made in the end of the tenon. When finally assembled, the parts are glued, the wedges just inserted into the slots, and the joint driven home with a mallet, or cramped up tightly. A similar system of wedging is often adopted where the tenon passes right through the mortise. Here the wedges are driven in from the outside, and serve to make a perfectly rigid joint.

GENERAL PRINCIPLES. Usually, mortise and tenon joints are secured by glueing and wedging, by pins or by draw boring. The proportion of the mortise and tenon in the case of a stub and through mortise should be about one-third the thickness of the material. It is imperative that the walls of the mortise be square to each other and to the joint faces.

The general procedure in the making of any mortised joint consists firstly in marking accurately on the wood . this should be done with a scriber and set-square. The width is set out with the aid of a mortise gauge, which is used to scribe lines on both sides of the part to be mortised. There is thus a rectangular space marked out on opposite sides of the wood, indicating the material to be removed. The tenon should similarly be marked out, with the same setting of the mortise gauge.



MORTISE. Fig. 3. Haunched single mortise and tenon

The mortise is then cut by drilling holes with a centre-bit, just within the lines to remove the bulk of the timber, and the remainder is cut out with a chisel ; further chiselling continues until the bulk of the hole has been cut half-way through. The timber is then turned over and cut from the opposite side.

The final fitting may be completed with an ordinary firmer chisel by careful paring. As a guide to the eye, an ordinary set-square should be set by the side of the work, this being an aid to keeping the chisel correctly upright while cutting out the mortise. The tenon may be cut out almost entirely with the tenon saw, and cuts should be outside of the lines, so that a small amount has to be chiselled away to make a perfect fit. The two parts should be tried together and fitted by cutting away all the high places. The tenon should be tested with a square to see if the tenon or the mortise is at fault, and any irregularities corrected accordingly.

MORTISE LOCK. A special type of lock, known as a mortise lock, is so made and fitted into its case that it can be mortised into the edge of a door, leaving only the bolt and catch protruding, with the turning knobs on either side of the door. *See* Lock.

MOTIF, In Needlework. A motif is a piece of lace or embroidery set into a background of ordinary material to form a trimming. There are crochet and knitted lace motifs in ovals, oblongs, circles and squares, embroidery motifs of all shapes and sizes, and real lace motifs such as those made with Honiton braid and pillow laces, which take the shapes of flowers, butterflies, etc.

There are several methods of mounting motifs to the material. The first is to tack the motif on the right side of the material, then sew down with a small hemming stitch, in the case of knitting or crochet, taking one hemming stitch through each stitch of knitting or crochet. The material is then cut away at the back of the motif, leaving about $\frac{1}{4}$ in. to turn back a little hem, or only leaving about $\frac{1}{8}$ in. and buttonholing the raw edge. A second method is to buttonhole the motif to the material on the right side, and cut away the material at the back of it just below the wrong side of the buttonhole stitches.

Another method which gives a strong edge and a neat finish is carried out thus : Lay the motif on the right side of the material and pin it down so that the edges are quite taut and in the correct position. Now draw a pencil line on the material right round the motif, then remove the latter from the material. With embroidery cotton and a fine crewel needle, buttonhole all round the pencilled outline so that the pearl edge of the buttonhole stitch comes right on the pencil line. When the buttonholing is completed, take the motif and sew it, stitch by stitch, to the buttonholing. If the pencilling and sewing are on the correct line, the motif should be an exact fit, and the material at the back can be cut away. *See* Appliqué Needlework; Embroidery; Lace Making, etc.

MOULDING. A moulding is a strip of wood or other material worked to an ornamental pattern on one or more of its faces. In architecture, mouldings may be worked in stone or brickwork, or other material of which the building is made, to relieve the surface and act as an adornment. They are generally found in the form of curved section strings at the bases and jambs, and are used round openings for doors and windows. The householder is mostly concerned with mouldings for the embellishment of the interior of the house. Patterns are obtainable from timber merchants. Cabinet mouldings are made in a variety of patterns and in many different sizes for the decoration of furniture. Picture mouldings are in a class by themselves.

MOUNTING, of Pictures. Photographs and pictures are usually improved by careful mounting, the mount consisting of a sheet or frame of paper or cardboard, of white or that colour which most heightens the effect of the picture. It may vary in size from one little larger than the picture to one several times its size. At times, when used simply for stiffening, it is of the same size.

Photographs, prints, etchings, pencil and black-and-white drawings, etc., and also small lightly-tinted water-colours look well when fixed before a solid mount. Mounts of larger and heavier pictures should be in the form of cardboard with bevelled edges. Such mounts are not infrequently a part of the frame, in which case they may slope slightly back from frame to picture. By means of a mount an oval, round, or oblong picture can be inserted in a square frame. Oil pictures rarely require mounts.

The size, shape, and colour of the mount depend entirely upon the picture, and can only be decided by individual judgement. The picture need not necessarily be placed in the centre of the mount; it may be nearer the top than the bottom, though not vice versa. It is well to note, also, that a bold or darkly-coloured picture will be enhanced by a dark or dull-coloured mount, while a picture in pencil or delicately tinted will be killed by a dark one. The mount should never be bright in colour.

CUTTING THE MOUNTS. Mount-cutting is simple work, and requires but a few tools. Although a penknife may be used, the best results are obtained with a mount-cutter's knife (Fig. 1). In addition a steel straight edge with one edge bevelled, a 2 ft. rule, a pair of compasses with a pencil point, and a tee square are necessary. First cut the mount to fit the frame, and then mark the space of opening required. There are two methods of doing this; either rule the lines very faintly on the mount or place the picture in position on top of the mount, and then prick the corners carefully with a pin.

Fig. 1

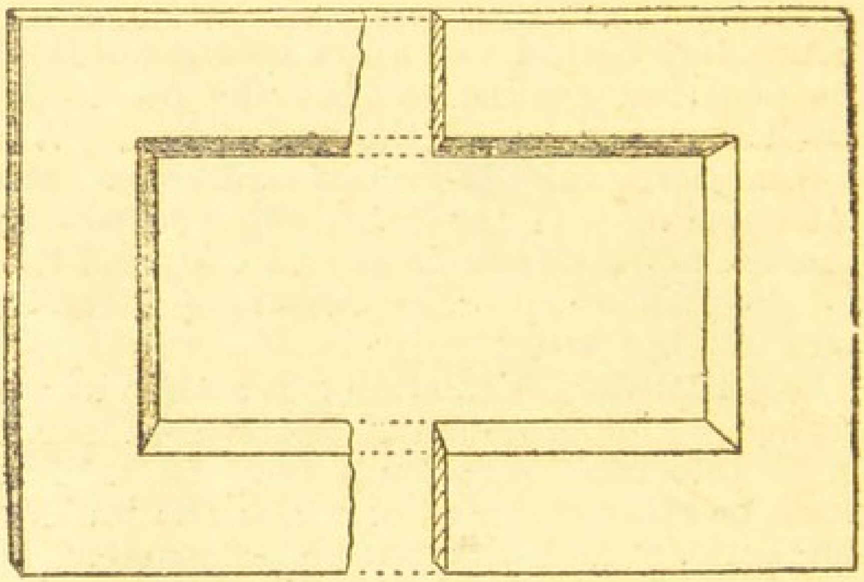


Fig. 2

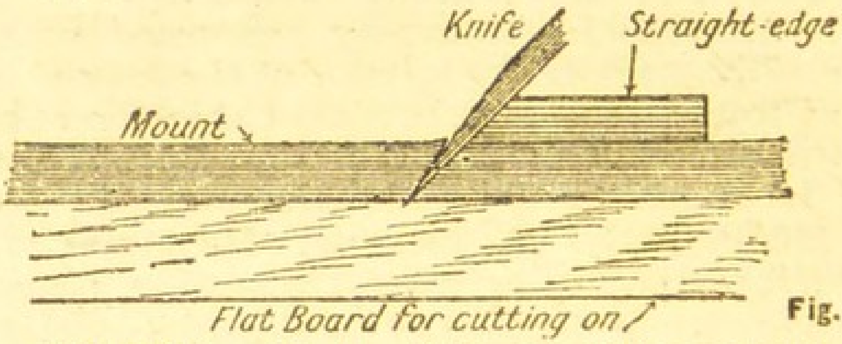


Fig. 3

MOUNTING. **Fig. 1.** Knife for cutting a mount. **Fig. 2.** Mount cut, showing bevelled edge of opening. **Fig. 3.** Diagram showing angle at which knife is held

To cut out a square or rectangular mount, as shown somewhat exaggerated in Fig. 2, place the straight edge a little way from the line or points, grasp the handle of the knife firmly in the right hand, and with the left pressing on the straight edge, make a complete slanting cut along the line, as in Fig. 3. Repeat this on the three sides, and if necessary ease the corners so that they come away clean. The picture is fastened to the back with a little fish glue smeared on the extreme edge, or it may be secured by pasting narrow strips on the back of the picture and mount.

It is essential to the appearance of a cut-out mount that the mitre cut at the corners should be clean. The long cuts should be made in one stroke, and this is not difficult with thin mounts, but in cutting thick cardboard the knife must be very sharp, and it must go through the materials, as two attempts will spoil the effect. The cutting of round and elliptical openings must be done freehand. It is not possible to have a stock of shapes to suit all openings, but with practice in straight cutting without a straight edge it will not be found difficult to round corners and follow curves. Mounting boards, which are obtained from dealers in artist's materials, are supplied in thicknesses known as 4, 6, 8, 10, and 12 sheet, and in sizes from quarter royal, $11\frac{1}{2}$ in. by $9\frac{1}{4}$ in., to antiquarian, 53 in. by 35 in.

Gilt mounts are often used for water colours, and although the cut edges will be white, they can be gilded by using gold leaf. Brush the back of the leaf with gold size, both being obtainable from an artist's colourman, and when dry cut into strips a little wider than the bevelled cut. Moisten the size with a camel hair brush dipped in water, and place the strips on the bevel with the top edge true with the surface. Press gently with a soft rag, and when all the edges are covered turn the mount over and press the projecting edges of the leaf on the back and give a final rub with the rag. *See* Passe-Partout ; Picture Framing.

MOUNTING OF PHOTOGRAPHS. When an adhesive is to be applied to the whole of the back of a print, for mounting it on a card or heavy paper, it should contain a minimum of moisture, and be used very sparingly to avoid cockling of print or mount, The best adhesive for this purpose is that sold as photo mountant. of which dextrine is usually the principal component.

A similar paste mountant can quite easily be made at home as follows : Mix $\frac{1}{2}$ lb. of the best white dextrine (the best quality only should be used) with cold water to make a smooth, creamy paste, taking small quantities of dextrine with a very little water and adding further dextrine and water as required. When the paste is thoroughly mixed, stir in 20 or 30 drops of oil of cloves or cinnamon and 5 oz. of water.

Boil in a clean saucepan until clear. Set it aside in a straight-mouthed jar, such as the white jars used for holding marmalade, to cool, and keep it covered. These mountants are very economical in use, and a small quantity on the tip of the finger or brush need only be used, rubbing it well in to the back of the print. Other mountants are made of paste and arrowroot.

To mount a photograph or print it should first be made properly flat and be trimmed square. Non-photographic prints are sometimes best flattened by damping slightly on the back ; but care should be taken to see that the print is not damaged, and in the case of old and valuable prints it is better to avoid damping.

If photographs or prints are not to be mounted close up, i.e. the mount is to show, the print should be arranged so that it is exactly central on the mount but with more margin below it than above. If the margin is equal top and bottom as well as both sides, it will give the appearance of being mounted too low. The best rule is to have the margins at top and sides equal, and the bottom margin half as deep again. The place to be occupied by the print on the mount should be measured out and marked at each corner with pencil dots. A little mounting paste is then rubbed into the surface of the mount and the whole of the back of the print is treated with mountant.

The print is placed immediately in position on the mount, and pressure applied by rubbing all over with a clean rag or handkerchief. A roller squeegee may be used instead if clean paper is interposed between the photograph and the roller. As soon as it is seen that the print adheres all over, it is put away under pressure.

For photographs or prints that are to be mounted in portfolios or albums, or framed up by passe-partout method, it is sufficient to mount them by the corners or edges with gum or seccotine.

MUFFLED GLASS. This term is used for a particular type of glass, the characteristics of which are similar to sheet glass. It is blown into cylinders in a similar fashion, but is distinguished by a surface ripple, which is more marked on one side of the sheet than on the other, and varies considerably. It possesses considerable brilliance, and is sometimes used for leaded light work. Muffled glass takes its name from the fact that the cylinders in which it is made are generally known as muffs.

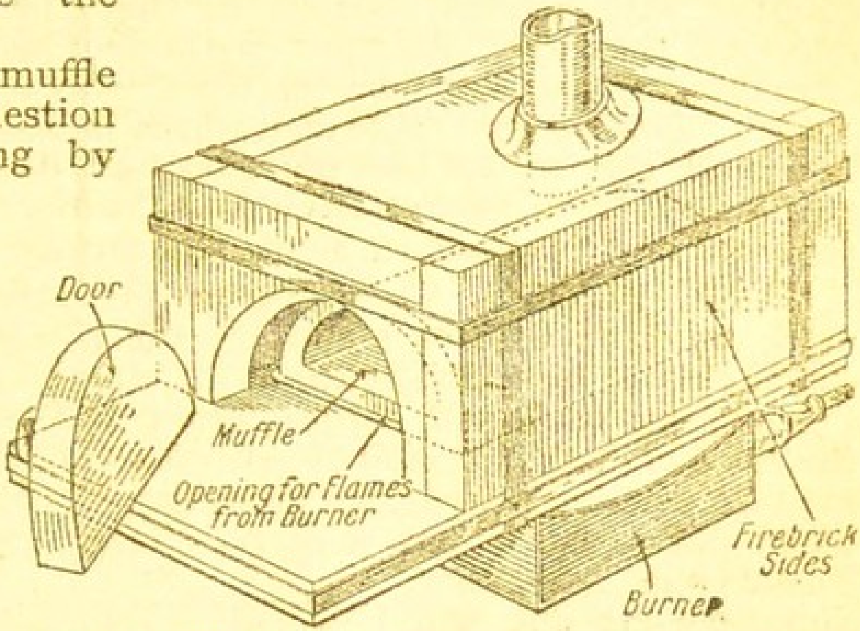
MUFFLE FURNACE. In a particular type of furnace the heat from the fire is made to pass around an inner or oven-like member. This is termed a muffle furnace, and a small one may be used by the home worker. The muffle furnace is employed in the enamelling of jewelry, for firing pottery, and also in the heating of tools for hardening.

A muffle furnace for the enameller is readily made from fireclay bricks, built up as shown in the diagram. The furnace body is strengthened with iron bands, and a long chimney is provided to dispose of the fumes, and to create sufficient draught to cause the fire to burn well and fiercely. All joints must be luted with fireclay, and the whole well baked with the gas burner.

In this style of furnace the door is usually at the end and the flue pipe at the top. The burner is located beneath the furnace, the latter standing on short legs resting on a substantial base of some fireproof material, such as a firebrick or a sheet of asbestos on an iron plate. A hole is cut in the bottom of the furnace to admit the flames of the burner, and a simple damper regulates the amount of air admitted.

Fireclay bricks can be obtained from the ironmonger, who will also be able to procure the clay muffle to go inside furnace, the appropriate type of gas burner with gas and air regulators, and if desired a chimney with cast iron foot. The gas supply tap and pipe must be large enough to allow full pressure at the nozzle, and for the size indicated a half-inch supply is required. It should be added that it is advisable to procure the clay muffle first and to make the furnace to suit it.

Dimensions inside muffle for the furnace in question might be 4 in. long by 2 in. high by 2 in. wide. For a larger size a $\frac{5}{8}$ in. supply pipe would be needed, when muffle might be, say, 9 in. by $4\frac{1}{2}$ in. by $5\frac{3}{8}$ in.



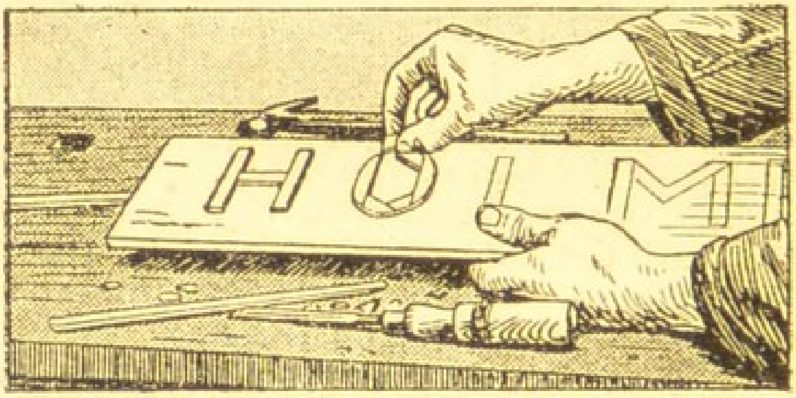
MUFFLE FURNACE Diagram showing construction of gas-heated muffle furnace for the amateur enameller

NAILING. The whole secret, it may be said, of driving a nail lies in the use of the hammer. It should be held rather loosely and near the end of the shaft. The nail must be struck fair and square on the head, and the hammer should fall in a straight line with the path of the nail, otherwise the nail will not be driven in straight. There are other methods, however, beside the ordinary one of driving the nail straight in. For example, if a nail be driven at an angle through a piece of wood it will drive the wood in the direction in which the nail is pointing. Consequently, if two boards are to be nailed on to joists or battens, the joint between the boards can be brought close up by first nailing one of the boards and then nailing the second with the nails inclining toward the board already fixed. Another way of driving nails is known as dovetailing, in which each nail is driven at an angle into the wood so that it can be drawn out readily. A common method of driving a nail to prevent its being withdrawn is known as clenching. The nail is driven right through the material so that about $\frac{1}{2}$ in. projects on the opposite side. This portion is then struck with the hammer so that the pointed end is bent over and down into the work.

It is always advisable to make small holes with a bradawl through wood that is liable to split, and then drive the nails through the holes. The hole should be somewhat less than the diameter of the nail, and another point is to avoid having two nails in the same grain of wood ; the nails should be zigzagged, or staggered, so that each nail is separated by as much untouched wood as possible.

SECRET NAILING. When several boards are to be nailed so that the joints do not show a great deal, diagonal nailing may be used. The nails can then be driven diagonally into the edge of one plank so that when the next plank is placed against it and driven home the nail will be invisible. Generally this method is adopted with rebated boards so that the second plank may interlock the first. Another method of secret nailing consists of making an incision into the wood with a tool like a very fine gouge. This raises a shaving, which is bent back and the nail driven in the cavity and punched well down. The shaving is glued and then pressed back into position. In good work the nails are always punched below the surface of the wood.

NAME PLATE. Name plates for private houses can be made up from various materials, the choice being governed to some extent by considerations of durability and appearance. For exterior work oak, copper, brass, and lead are good both on the score of durability and of general suitability. Ornamentation may be effected by various processes. In the case of a wooden name plate, the letters may be incised, or may be raised by carving. Another method is to cut the letters to shape from comparatively thin material, and apply them to the plate. The wooden letters may be painted, or left in the natural colour and glued and tacked to a dark stained base, or the letters might be dark and the base light. Poker work and chip carving are applicable to wooden plates; stencilling and painting in colours are also employed.



NAME PLATE. Showing the worker building up wooden letters on a base

A name plate may be made in wrought iron. Pierced metal and applied metal letters are other processes. For brass and copper, engraving is generally adopted. Leaded letters applied on glass is another very satisfactory method of making a name plate.

Wooden and lead letters can be obtained in various sizes. All that has to be done with these is to get a baseboard, say a piece of oak, and clean it up smooth in the vice, and mould or otherwise decorate the edges. The lettering should be set up by temporarily fixing a batten towards the lower part of the plate and placing the separate letters upon it, arranging them until the space between them is accurate and pleasing to the eye, noting each of the characters, marking their position on the baseboard, glueing and pinning if necessary. When dry, the edges of the letters can be modelled or left plain, and the background coloured, oiled or polished.

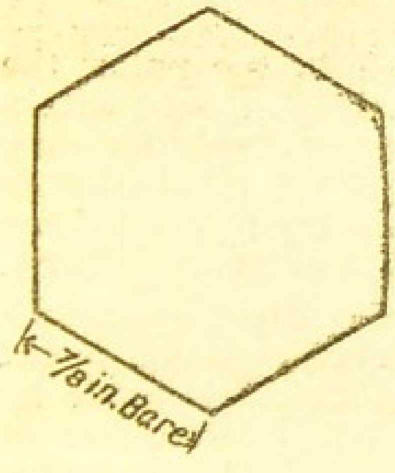
In making a repoussé name plate the design should be drawn and a tracing made. The latter is transferred in reverse to the back of the metal plate, which is then mounted on to a cement block and the work of embossing proceeded with.

A simple way to make a name plate for a protected doorway is to build the letters up from thin strips of wood, such as can be obtained for strip work. The lettering is marked out on the baseboard, and pieces of the wood strip cut off to the right length. These have then to be glued and pinned to the baseboard. Curved or rounded letters are represented by short straight pieces; but if these are carefully cut they have a certain quaint charm for many people.

NAP CLOTH. Woollen nap cloth is warm without being unduly heavy. The nap is produced by a process of rubbing, and the motions of the rubbing surfaces control the pattern. Besides the pimples, large or small, of Petersham nap there are also wavy naps, referred to sometimes as Elysians or Witney naps.

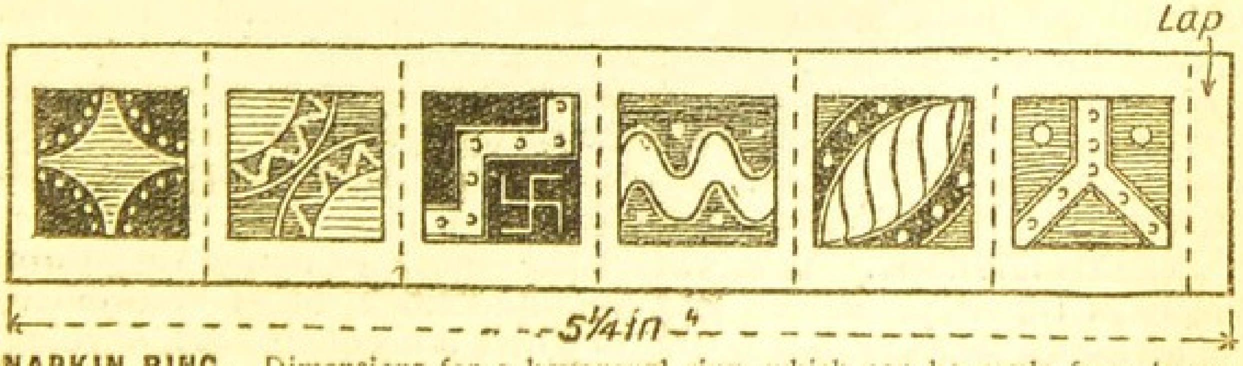
The weakness of nap cloth is that the surface rubs smooth at the points of most friction, and in the cheapest qualities this defect soon appears. Nap cloths are made at widely differing prices, and the best qualities are much the most satisfactory in the end.

NAPKIN RING, Making a. A pleasing type of ring takes the form of a hexagon and can be made from brass, pewter, copper or silver. A set of such rings could be worked out, using a different predominant colour for the background in each case.



Suitable proportions are given in the diagram, and it will be seen that in the first stages the metal is simply a strip. It should be perfectly flat and accurately marked out where the bends are to be made.

The next stage is the bending of the strip to the correct angle. This must be bent very carefully, otherwise the ring will be unequal. A large size hexagon nut such as is used by engineers for large-size bolts is useful as a guide in bending to the proper



NAPKIN RING. Dimensions for a hexagonal ring, which can be made from brass, pewter, copper or silver, and ornamented with enamel work. The flat strip of metal is shown marked out with the design. Above, left, plan of ring angle. The two ends of the ring may either be butted and silver soldered, or made slightly to overlap, and then soft soldered. Allowance for the jointing must be made when fixing the proportions of the strip.

Having soldered the joint, all six faces should be cleaned up with fine emery paper and neatly grained. Then the finest grain emery paper should be struck across the surface in one direction only until the whole exhibits a uniform surface. The next step is to decide upon a suitable design, such as that shown, and carry it out with some of the specially prepared enamel as described in lacquer work on metal (*see* Lacquer Work), or with the regulation stove enamel. When this part of the work has been finished, the ring must be dipped in lacquer varnish in order to preserve it from the atmosphere.

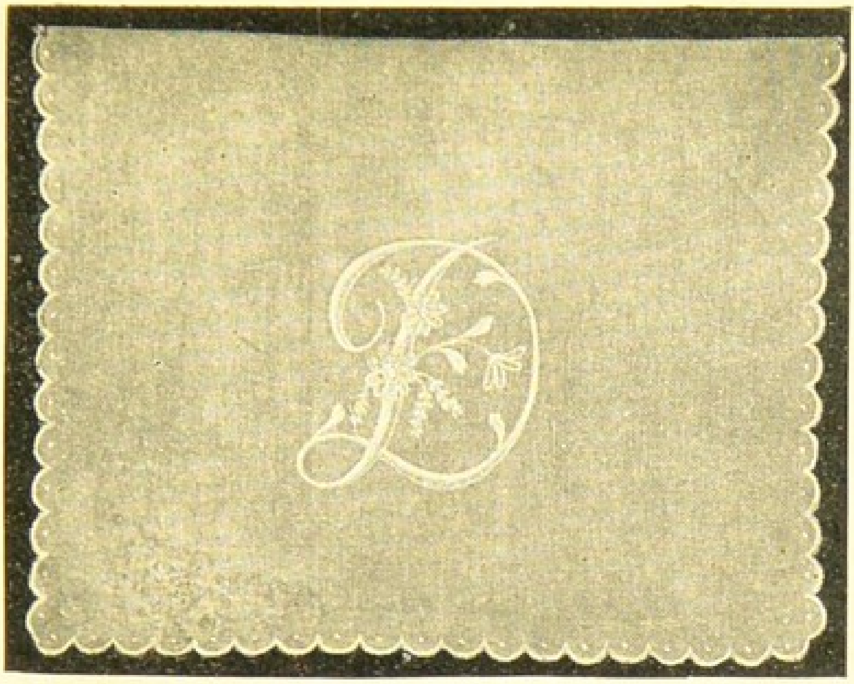
NEEDLE. Needles for sewing purposes are sold cheaply in small packets, and can be bought either in one particular size or in varying sizes. Needles used on damp materials should be wiped thoroughly before being put away, or they will rust and become unfit for further use. A little asbestos powder in needle packets will prevent rust. Rusty needles should be passed backwards and forwards through an emery cushion. In warm weather this makes them easier to use if it is done occasionally while working. The threading of a needle is facilitated by holding the eye before a sheet of paper or any white object. Other kinds of needles used in the home include knitting needles, varieties of which are described in the article on Knitting, special packing needles, larding needles, and gramophone needles.

When a splinter of a needle is broken off in the palm, the finger, or elsewhere, a doctor should be consulted at once with a view to its removal. If there is any delay the splinter may move away from its point of entry. X-rays are invaluable in localizing such fragments. It is usually necessary to open down on the needle, but this is often possible under a local anaesthetic.

NEEDLE CASE. Various kinds of needle cases are easily made, and provide a good means of saving needles which might otherwise be lost or allowed to rust. The simplest is made by sewing together in the form of a book a few small pieces of flannel cut to a uniform size. Flannel is preferable to other cloths for this purpose because, being composed of wool, it is a better preventive of rust. A small leather case to which the leaflets can be stitched, or some stiff cardboard covered with satin, makes the whole stronger and more compact. *See* Knitting; Needlework; Woolwork.

NEEDLEWORK. This wide term embraces many variations, such as tapestry, crewel, and appliqué work, other embroidery of all kinds, lace and beadwork, in which a needle is used, darning, and plain sewing, as well as knitting and crochet.

Plain needlework is the first essential to learn. Besides its

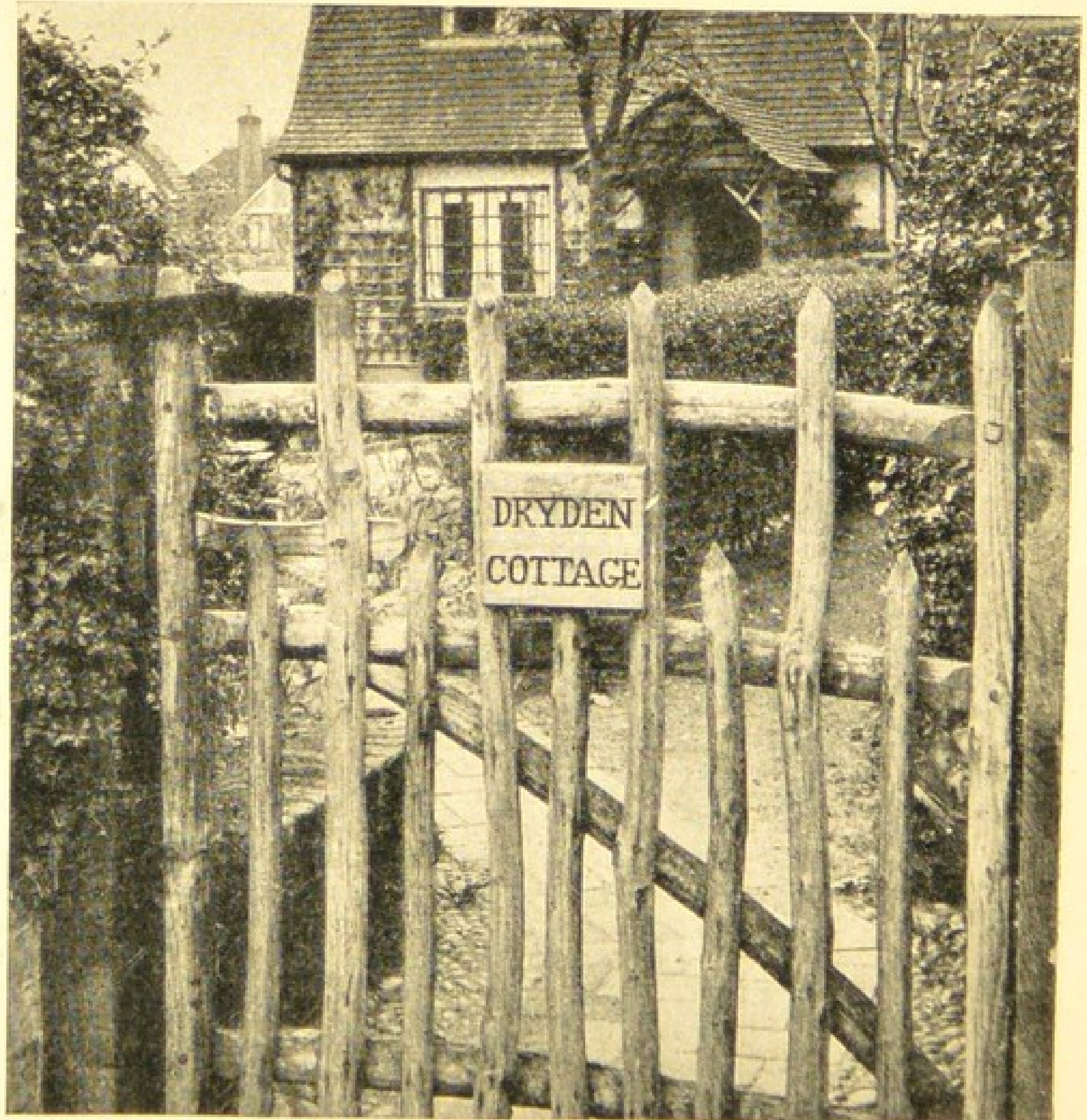


NIGHTDRESS CASE, made from linen, with scalloped edges and initial embroidered on flap

CIRCULAR NIGHTDRESS CASE in gathered taffeta with shaded silk rose spray in centre

ATTRACTIVE SACHETS FOR HOLDING NIGHT WEAR

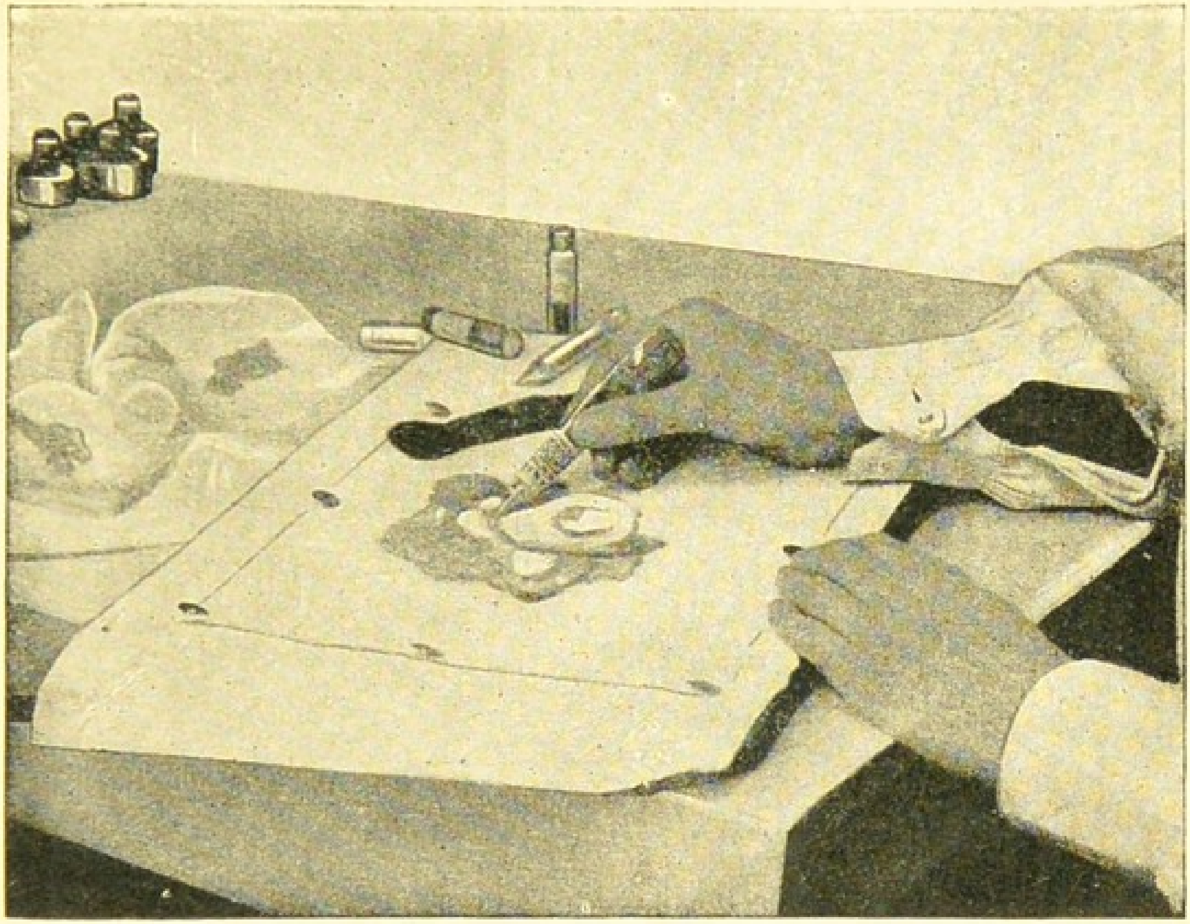
Courtesy of "Good Needlework" Magazine



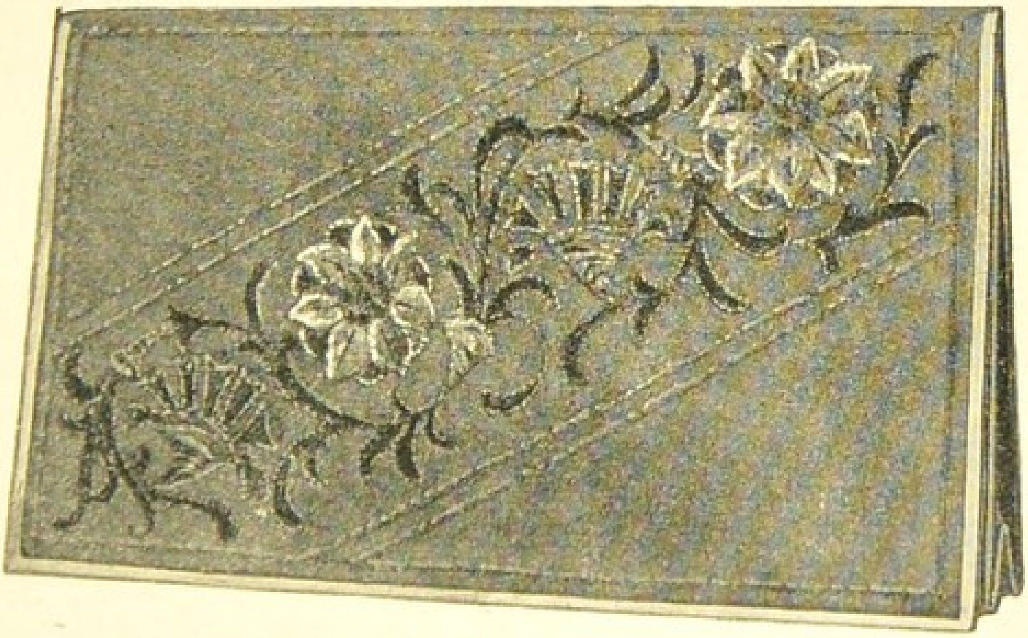
Left. Name plate suitable for a small house standing back from the street, the colour contrast of the unobtrusive name plate catches the eye. Right. Incised lettering on a wooden base forms a simple but effective name plate for the chestnut pale gateway of the cottage type of residence

NAME PLATES DESIGNED TO CATCH THE EYE

Humphrey & Vera Joel



Making the raised outline on a gauze desert dolly. The tin nozzle is screwed on to the tube of special enamel



Suede cloth pochette decorated with a conventional design in special colours for painting on fabrics

TEXTILE FABRICS DECORATED IN SPECIAL COLOURS

The paper is torn into irregular pieces, soaked in water, then covered evenly with paste and spread, each piece overlapping the other, on the surface

Antique Persian box in papier mâché with inscription " The work of Mirza Ali Muhammad, Irani "

PAPIER MACHE : THE FIRST OPERATION AND THE FINISHED ARTICLE

practical value, it teaches neatness, cleanliness in handling delicate materials, and accuracy, and gives scope for artistic expression. Those who have all their needlework done for them need a knowledge of it in order to be able to distinguish good work from bad, and those who must do their own will find a good groundwork of plain needlework helpful for everyday use, and with such a knowledge, proficiency in fancy work is more easily achieved.

Objections are raised against handwork on the ground that it is not worth while, as machines can copy most of the stitches, and that it is unhealthy work. Machine work may be an excellent substitute, but for fine materials it can never equal handwork, and in any case, a certain amount of the latter is always necessary.

Conditions of Work. For the sake of one's health it is important never to sit in a stooping position; see that the chair and table suit each other in height, and hold the work so that it is only necessary to bend the head a little. When doing a piece of work that requires pinning down, such as the stroking of gathers on a large piece of work, never pin to the knee, but use a weighted cushion placed on the table, so that when pinned the work is at a convenient height for manipulation. Always sit so that the light comes over the shoulder; never work in a dim light, and avoid using black, or very dark materials when working in an artificial light. Choose a steel thimble rather than a silver or bone one. The latter soon splits and silver ones are very apt to wear thin.

Needles, Scissors and Thread. Use rather short needles for ordinary plain sewing and longer ones for dressmaking, while darning needles should be longer still, with a long eye. The needle should be a little thicker than the working thread, so as to make a smooth passage for the latter through the material. Bent needles should not be used.

Two kinds of scissors are indispensable, a large pair with a blunt and sharp end (the latter always being kept down) for cutting out large pieces of material, and a small pair with two very sharp points for cutting fine materials and embroidery. See that the handles are large and smoothly rounded, as if too tight they hurt the thumb.

When using tacking threads keep a reel of tacking cotton, which is much cheaper than sewing cotton, and answers the purpose just as well. The most efficient work is done through the work being tacked into the correct position first; sticking pins in is the lazy method, except in very few instances. Do not put a long thread in the needle for ordinary sewing; about 18 in. is quite enough. For tacking, a very long thread can be used, as several stitches can be put in at once before drawing up the whole length of thread. In the case of cotton from the reel, thread the needle with the end just cut off the reel, as the opposite end is likely to be more trouble to thread through splitting. *See* Crochet Work; Embroidery; Seam; Tapestry Needlework.

NET. Nets for needlework are made chiefly in two materials, cotton and silk, cotton being most employed. They are made with both coarser and finer threads, and in meshes of different shapes and sizes. Hexagonal mesh is the most common. Mechlin is hexagonal. Lille is diamond-shaped, and some are square or filet, much used in dyed shades for curtains. Network forms an integral part of the design of hand-made laces.

NETTING : How to Make. Netting for lawn tennis, fishing, garden purposes and hammocks is usually bought, but it can be made at home. The necessary implements consist of a piece of bone, steel, or wood, made with notched ends, called the needle, and a smooth flat or round rod called the mesh or gauge.

The circumference of the mesh used controls the size of the loops, and meshes can be bought in numbered sizes. A lead-weighted heavy cushion is required, or in the case of coarse twine netting, a stirrup to slip over the left foot and provide a fixed point to pull upon may be used. To this cushion or stirrup a cord is attached to form the foundation loop; the first loop or loops of the net are cast upon this foundation. Netting consists of loops of thread called stitches, secured by knots.

The thread may be fine silk for netted purses, knitting cotton, crochet cotton, cabled twines, or tarred string. Knots of different kinds are made for different purposes; loops of different shapes and sizes can be worked into a pattern, and different colours of thread can be introduced. The work is done a row at a time, and sufficient thread for one row should be wound upon the needle at the start.

Netting stitches are oblong or square and the patterns are produced in plain netting by the different ways of passing the thread over the mesh and the manner of connecting the loops, as well as by the various sized meshes. Plain netting is given the simplest form of pattern by the last method. Two or three rows are worked over a narrow mesh and then the same number over a coarser one, continuing the use of first one mesh, and then the other at regular intervals.

Plain netting is the one to learn first. The mesh is taken in the left hand, thumb on top and fingers beneath. The mesh is held close to the foundation loop and the thread is passed over the mesh and two forefingers. The thread is brought under the mesh and placed under the thumb; then it is put round the hand and held by the little finger. The needle thus brought in front of the mesh is passed under the first loop between mesh and finger and into the foundation loop, and the thread is drawn tight close to the mesh.

The fisherman's knot is made by holding mesh and needle in the manner described, and passing the thread round the mesh but not over the fingers, then passing the needle upwards through the loop that is to be made, drawing the loop up to the mesh and holding the thread tight under the thumb. The thread is allowed to fall to the left, and the needle is put upward behind the loop and the thread is drawn tight.

The work may be begun with only a single loop directly attached to the foundation ; or as many as 100 loops of fine silk may be cast on the foundation, as in making long netted silk purses. Steel or ivory netting needles are used for finer work of this kind.

NICKEL. Nickel is a white metal which takes a brilliant polish and resists atmospheric corrosion very well. Numerous household articles made of iron or steel are often nickel plated, for instance, scissors, thimbles, pins, pliers, and other small tools, small keys, etc. The process is used also for handle bars and other parts of bicycles, and similar metal fittings. Nickel-plated articles that get rubbed in use keep themselves bright, but such as are not exposed to occasional friction get dull in time, though slowly ; they may then, however, be polished in a few seconds by merely wiping or washing off dirt and rubbing with a cloth or leather.

The nickel coating generally adheres firmly enough to stand service conditions, but it may sometimes get chipped or worn off in places, exposing an ugly black patch due to the corrosion of the underlying steel. Nothing but replating will then restore the appearance of the article.

NIELLO. This Italian word is used for a process of decorating metal with incised designs filled with black alloy. To some extent it resembles both inlaying and enamelling. The alloy is one of sulphur with silver, copper, or lead. Niello is also used for the piece of work decorated in this fashion, and for an impression on paper taken from the engraved and incised surface before the niello alloy has been laid therein.

NIGHT-WEAR CASE. Cases to hold night-dresses and pyjamas can be made of a variety of materials, such as linen, silk or suède. The term sachet is usually employed for such cases when made without a flap and when padded with a layer of wadding, which may or may not be perfumed with lavender or a sachet powder. Satin and silk taffeta, trimmed with tinsel lace, or frilled or gauged georgette, are often selected to make up into sachets : if padded these cannot be laundered, but have to be dry cleaned, so that such unwashable materials are liked when it is wished to make this bedroom accessory a particularly decorative one.

Whether the case or sachet is simple or elaborate, it should always be chosen with due consideration for the colours already in the room, and in particular to accord with the bedspread. For instance, on a lace and linen spread a black satin night-wear sachet would look out of place, whereas one in pale blue taffeta, broderie Anglaise, or frilled pink organdie would be charming ; on an art silk bedspread a simple linen case would be unsuitable, but a satin one, such as that illustrated on Plate 29, would add a decorative finishing touch to the whole bedroom.

Simple Cases. The simplest type of night-wear case can be made from a piece of linen measuring 36 in. long and 15 in. wide. Cut this out and then fold it lengthways, letting the bottom folded portion reach about two-thirds of the way up the total length of material. Turn the top part down to form the flap, seam up the sides, and hem down the raw edges on the outside. Then turn the whole inside out and the plain case is complete. The flap can then be edged with lace, galon or fringe, and trimmed with an appliqué motif, or motifs neatly stitched on to the centre or corners, or by a panel of contrasting linen on which a transfer design has been embroidered. For this panel cut a square of linen measuring about 8 in. and, after embroidering it, faggot it to, or use ornamental blanket stitch to attach it to, the centre of the flap.

A case cut to the measurements given could be made of a deep shade of lavender linen and embroidered and scalloped in a pale shade of green. Delicate pink and blue could be used for floral embroidery at the corners of the flap. Before being made up, the edges of the third of the length which forms the flap are traced and scalloped, and the embroidery designs are also transferred. The superfluous raw edge is then cut away from the scalloping. Press the embroidery on the wrong side and fold the linen into three. Tack the sides of the plain two-thirds to form the pocket together and seam neatly so that they do not show beyond the scalloped edges of the flap.

Edges may be hemstitched instead of scalloped; the flaps of such cases may be embroidered in Renaissance or Richelieu work, in broderie Anglaise or in cross stitch. If the last is employed the edges should have a fancy cross stitch border. Crash may be used to make the case and woolwork for decoration in bright colours, the edges being finished with ornamental blanket stitch.

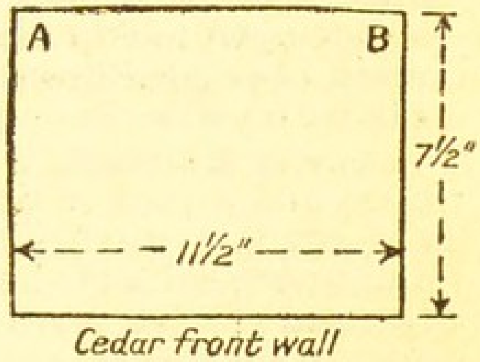
Flaps may be rounded at the corners or made envelope shape if liked and bound with a contrasting colour. Stranded cotton is best used for embroidery on linen cases. The simplest stitches are employed for floral designs, such as satin and stem stitch, buttonhole, rose and lazy-daisy stitches for stalks, leaves and flowers and French knots for the centres of the latter. These stitches are illustrated in the article on Embroidery. Plain blanket stitch is the same as buttonhole stitch, with a coarser thread and larger stitches and spacing.

Velvet sheep skin or suède finished splits for pyjama cases can be cut out to the same measurements, the edges thonged, and a design or monogram stencilled on the flap, which is usually fastened down by means of one or two press studs (*see* Leather Work.)

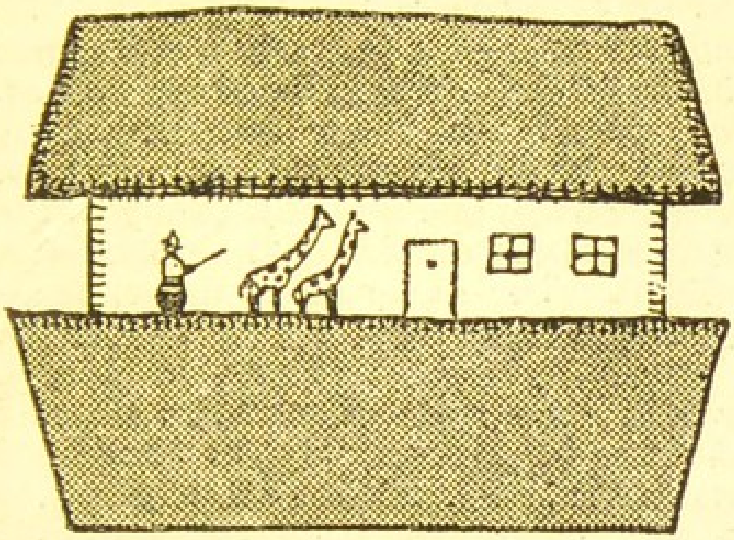
Noah's Ark Case. A delightful case for the pyjamas of nursery folk is illustrated. It is made of linen, red for the roof, fawn or cedar brown for the walls, and bright blue for the hull.

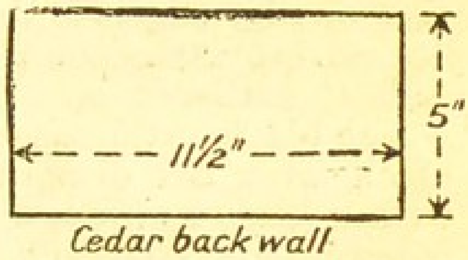
The embroidery, which is of the simplest description, is done with one skein each of red, blue, cedar, darker brown and black stranded cotton. The preliminary stitching of the edges of the various pieces must be done firmly and neatly or the case will not wash and wear well.

First cut out the linen according to the diagrams. Turnings are allowed for. Tack down a neat hem all round the red roof piece, sloping sides first and then the two straight edges. Hem the tops and bottoms of the two cedar pieces, using one thread of matching stranded cotton and tack down a single ¼ in. turning along the sides. Along the bottom of the front wall, having first drawn or traced the design, embroider the figures,

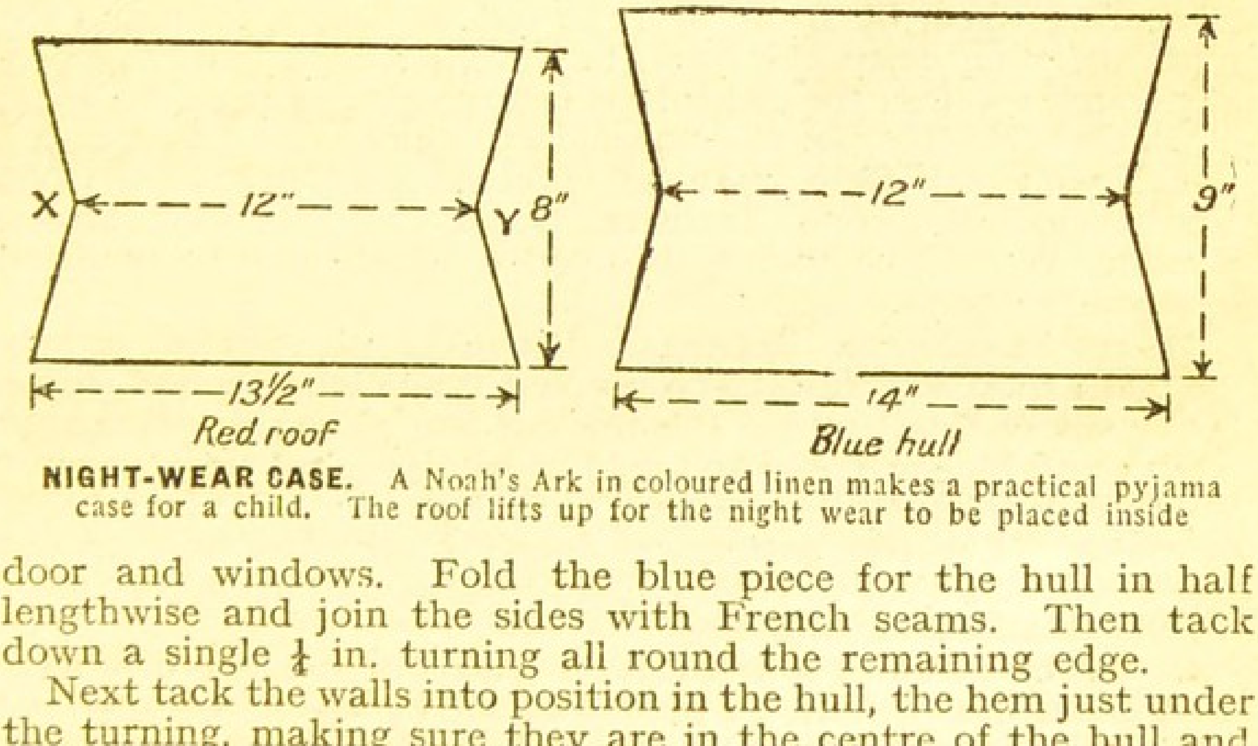


Cedar front wall





Cedar back wall



Red roof

Blue hull

NIGHT-WEAR CASE. A Noah's Ark in coloured linen makes a practical pyjama case for a child. The roof lifts up for the night wear to be placed inside

door and windows. Fold the blue piece for the hull in half lengthwise and join the sides with French seams. Then tack down a single ¼ in. turning all round the remaining edge.

Next tack the walls into position in the hull, the hem just under the turning, making sure they are in the centre of the hull and using three blue threads and ¼ in. long blanket stitches with ¼ in. spaces between. Blanket stitch all round the top of the boat, thus attaching the front walls to the front of the boat and the back wall to the back of the boat. Tack the walls together at each side and blanket stitch them together with matching cotton, using a smaller stitch and spacing.

Fold the roof in half and stitch the top edges (X and Y) firmly to the top of the front wall (points A and B). Tack the lower back edge of the roof to the back wall. Now blanket stitch wool half an inch smaller than the taffeta all round. Lay one piece of taffeta for lining on a top piece and seam all round the edges, leaving about 6 in. open. Tack a wadding shape on the lining at the extreme edge and turn them all inside out. Finish off the last 6 in. invisibly and prepare the second padded half of the sachet in the same way. Stitch the two pads together and leave one side open to slip the night-dress in. Trim with the cord and a motif of padded flowers or gold or silver embroidery. Gold for a silk with yellow in it, silver for blue or mauve.

A pretty trimming is made by using a 2-in. wide tinsel gauze ribbon and a gold or silver lace to finish the front of the sachet. Take running stitches along the edge of the ribbon and draw up to fit the sides of the sachet. Tack it into position round the edges and stitch a narrow tinsel lace on one side of it facing to the centre of the sachet, and another on the outside of the ribbon and also on the edge of the sachet. The inner lace trimming is flat on the edge of the gauze, and the outer lace should be slightly gathered.

The black satin case shown in Plate 29 consists of two ovals of black satin, two of pink taffeta and two of wadding and trimmed with a basket of silk flowers in vivid colourings and with a gold insertion and lace each ¾ in. wide. First cut a pattern of an oval measuring 16 in. by 19 in. deep. in red, as before, all round the roof, fastening down the back, but leaving front loose to open. Slip-stitch together the ends of the boat projecting from the walls. A transfer (No. 166) for the embroidery, which is used to decorate this Noah's Ark Case, may be obtained post free from Good Needlework Magazine Transfer Dept., 291, Oxford Street, London, W.1. The cost is threepence, which may be remitted in postage stamps.

More Elaborate Sachets. Beautiful night-dress sachets are made from shot silk. The simplest is an oblong bound with a heavy silk or tinsel cord. For this cut four pieces of taffeta shot mauve and blue or flame and gold or whatever colouring is most suitable for the room—measuring 17 in. by 13 in. Cut two shapes of cotton. Lay this pattern on double black satin and cut out two ovals ; then cut two more from rose pink taffeta and two more a trifle smaller from wadding.

On one of the black satin ovals the basket of flowers is arranged. A suitable design may be accomplished by means of appliqué work (q.v.) by painting on the satin, by embroidering the flowers or by making them in ribbon work (q.v.). The basket is made from five rows of the gold insertion sewn over a piece of gold coloured satin shaped like a basket. Stitch it down on the sachet and arrange the flowers over it.

Lay a taffeta and a satin oval face to face and seam them together three-quarters of the way round. Lay a wadding oval on the taffeta one and catch it down with slip-stitches all round the edge. Turn the seamed ovals right side out, and the wadding will be in its correct position between them. Finish off the last part of the seam invisibly. Seam the remaining three ovals in the same way. Slip-stitch the two padded halves together, leaving them open for about eight inches at the left-hand side.

All round the edge of the top oval, stitch a strip of gold insertion ¾ in. wide, gathering it on the inner edge to fit the curve of the oval. Then, round the extreme edge of the sachet stitch a strip of gold lace about ¾ in. wide, gathered slightly along the straight edge. These laces must, of course, be stitched only to the top oval where the sachet is left open at the side.

NITRIC ACID. The use of nitric acid in the home is restricted chiefly to such operations as the etching of metals, although in the form of a salt, such as nitrate of silver, there are important applications in photography. Barium nitrate and strontium nitrate are used for the manufacture of many kinds of fireworks. When used as a very weak solution in water nitric acid forms a useful cleansing agent for badly discoloured brass, copper, and similar alloys; but the metal must be thoroughly scoured in boiling soda water immediately afterwards, as the action, unless stopped, will corrode the metal.

NITRO-CELLULOSE FINISHES. These are enamels and lacquers prepared by dissolving nitro-cellulose in special solvents and incorporating pigments to give the desired colour or tint. The drying, which is rapid, takes place by evaporation of the solvent. Cellulose finishes, as these products are usually described, are prepared specifically for spraying or for brush application. The former class is extensively used for industrial work (e.g. in enamelling coachwork, furniture, etc.). The home worker can obtain a portable spraying outfit with "pistol," foot pump, and air reservoir, for about 50s.

Brushing finishes are obtainable in a wide range of attractive colours, and, though slower than the spray class, are comparatively rapid in drying. The technique of their application presents no difficulty.

The solvents employed are inflammable, and the material should not be used near a fire or any open flame. When the work is done indoors the room should be well ventilated.

The brushes used should be rubber set ones having soft bristles, and care should be taken not to mix together the products of different makers, since the base or solvent used might be different in nature and composition. For a like reason both undercoating and finishing coat should be those supplied by the same maker.

NOSE BIT. This is a brace bit in the form of a semicircular sectioned tool with a lip at the cutting end. It is used for boring holes in wood, particularly when the hole is to be bored in the same direction as the grain of the wood, as the lip at the end of the bit enables the core of the hole to be drawn out.

NOSINGS. In working nosings the rough and ready way, which often gives quite excellent results, is to plane over the two corner edges at an angle of 45° and then plane off the 4 corner edges which will result from the first planing. This produces 9 flat surfaces on the edge, and it only remains to plane off these edges one into the other. Another plan is to use a hollow plane, or spokeshave, and produce the required shape by virtue of that of the cutter. Generally, however, both of these implements are used after the edge has been roughly rounded. The finish should be effected with fine sandpapering.

NUT, In Engineering. A nut is a fastening device, generally with a hole in it, the sides of which are screw threaded. It is employed in conjunction with a screwed bolt or stud, or fixed on to a cylindrical piece having screw threads corresponding to those in the nut.

OAK. There is no other wood equal to English oak in durability, hardness, toughness, weight and flexibility. It has great strength in proportion to its weight and is subject to very little warping and shrinking.

A good proportion of oak is cleft instead of sawn, that is, it must be sawn across the grain but is split lengthwise. The cleavage follows the grain, and for many purposes the wood is stronger than it would be if sawn. The cleft pieces are not so straight as sawn ones, but they may be planed or turned and retain the advantages of cleft wood. Wheel spokes and ladder rounds are made in this way. Pales for fences and hurdles are used roughly cleft, and rails for field gates are often cleft. Sawn wood, however, is cheaper than cleft.

No wood, except perhaps mahogany, has been so much used for English furniture. Oak is also used in building. Rooms are occasionally panelled in oak, while in large houses and public buildings it is sometimes used for floors, staircases, doors and other interior woodwork. Oak contains an acid which corrodes iron and causes a dark stain in the wood around the metal.

POLISHING OAK. There are several polishes for old oak. One of the best is made by dissolving ¼ oz. each of shredded beeswax and brown sugar in a pint of warm beer. This should be applied while it is warm and then allowed to dry on the wood, afterwards being polished with a soft cloth.

To restore dirty old oak furniture, it is well to clean it thoroughly first. This can be done by adding 1 lb. of American potash to 3 pints of boiling water and applying it with a swab made by tying a piece of coarse rag round a stout stick or lath. The hands must not be put into the mixture or the skin will be injured. After going over the work a few times it will be soft enough to be scrubbed off. This must be done with a fibre brush, not a hair brush. When all the dirt has been removed the work must be allowed to get dry, when it will be ready for the necessary repairs. The work must next be oiled with linseed oil and given a coat of yellowish polish. When this is dry it should be rubbed with fine glass-paper, and any new wood shaded by mixing a little vandyke brown with yellow polish or gas black, if necessary. It should be laid on with a camel-hair brush. To remove the linseed oil, the whole of the work should be rubbed over with a little turpentine and should then be wax-polished.

FINISHES FOR OAK. Antique oak, as it is called, can be made by darkening the wood, which must be straight-grained oak, with burnt umber or vandyke brown, or a mixture of both, or with burnt umber and drop black. Antique oak stain can be made from 1 lb. of raw umber, 2 lb. of vandyke brown, and ½ lb. of drop black, all ground in oil. Mix them all with a pint of the best brown japan, and thin the liquid for use with turpentine. Several coats of ammonia water will also give the antique appearance, which can be simulated in another way with a stain of iron filings in vinegar or with a concentrated solution of permanganate of potash.

OILSKIN. Cotton cloth coated with boiled linseed oil and dried, becomes waterproof and airtight. Seamen's overalls made thus are called oilskins. They are stiff and heavy, and cold to the touch.

Lighter oilskins made in oiled silk are translucent, but tear easily. Efficient ventilation is a difficulty, as body moisture condenses upon the underside of the cold, wet garment.

OILSTONE. Stones composed mainly of silica and quartz, when polished and suitably mounted are invaluable for tools of all kinds. Oilstones are usually lubricated with machine oil ; in a few cases water is used for the purpose.

For sharpening chisels and the like, the Washita stone is as good as any. The stone should be fine in grain, and should cut freely. A finer-grain stone, known as the Arkansas, is excellent for sharpening delicate tools requiring a very keen edge.

Rougher oilstones are made of various compositions, employing emery and carborundum ; they are very quick cutting. For sharpening gouges, bevelled slips are obtainable, shaped to suit the curvature of the gouge.

USING THE STONE. The whole secret of tool sharpening consists in rubbing the tool on the stone so that the cutting edge is formed at the right angle. In the case of a chisel, the cutting edge of the tool is sharpened by rubbing the chisel on the stone, pushing it steadily backward and forward.

Press upon the chisel with the fingers of the left hand, while the right hand guides the direction of the tool. The great object should be so to sharpen the edge that the end of the chisel is straight and square with the sides, but the face inclined at a slightly steeper angle than the other bevelled portion produced by the grinding process.

The plane iron is sharpened in a similar manner, except that, as it is much broader, it may be necessary to sweep the iron diagonally across the stone, so that all the parts receive their full share of it. The gouge is sharpened by rolling it to and fro, and at the same time traversing it up and down on the face of the stone, thus sharpening the whole of the cutting edge. In general, when sharpening cutting tools, keep the handle as low down as is consistent with easy sharpening, as the longer the cutting edge, the keener the tool.

ORGANDIE. This is a thin, semi-transparent material which can be obtained in colours, and its chief virtue lies in the stiffness which prevents it from creasing so easily as most of the other cotton summer fabrics.

OSIERS FOR BASKET MAKING

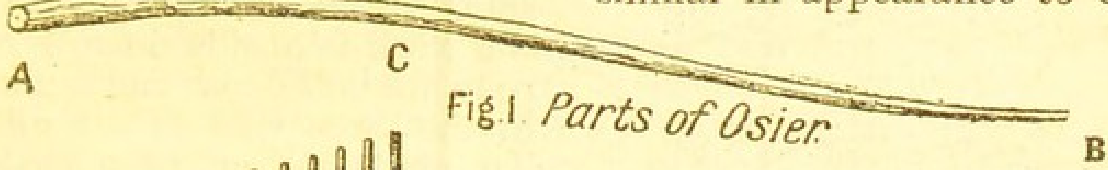
Apparatus and Weaving Methods Fully Explained

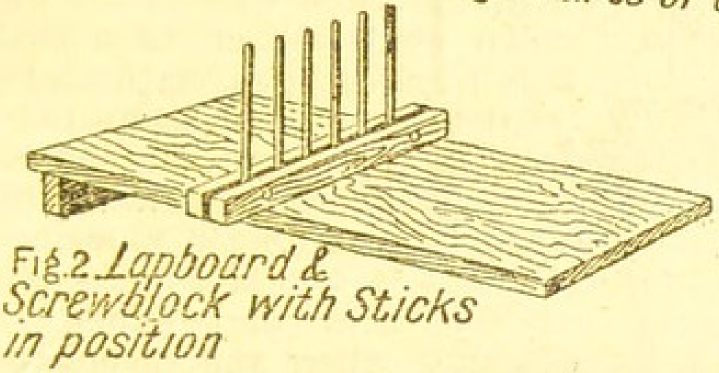
This article may be described as a continuation of the one under the heading of Basket Making. Entries on other related handicrafts will be found throughout this volume, examples being Cane; Raffia; Rush Work

In Great Britain there are about 40 varieties of the osier used by the basket-maker. They are grown in the low-lying land of the river valleys. When cut the osiers are known as rods and are sold as either green, brown, buff, or white. The freshly-cut green are partially dried in stook in the field and are afterwards stacked in a shed or in the open and thatched until quite dry, losing 50 per cent in weight. Fully matured brown rods are used for coarse basketry in making all kinds of hampers and fruit baskets. Buff rods are prepared by removing the bark from either green or brown rods after they have been boiled in water from 2 to 5 hours; they are then dried in the sun to intensify the colour.

White rods are prepared by removing the bark from green rods, either directly after cutting or after they have been kept during the summer stacked with the bottoms in running water. Peeling is effected by splitting the bark. This is done by pulling the rods between a pair of upright iron rods, termed a break, and then removing the bark by hand. A rod has 4 parts, as illustrated in Fig. 1; the butt A, the top B, the belly C, and the back D. All rods are sorted into lengths; the short lengths of brown are called luke, the medium lengths long small, threepenny, and middleboro, and the long are great or rods. Buff and white rods in the small lengths are termed tack and small. Brown rods must be soaked from 2 to 7 days, according to size, before they can be used, buff and white rods from half to 4 hours, and allowed to mellow for several hours. The uprights or "sticks" used for bottoms are cut from osiers of 2 or 3 years' growth for large baskets. The radials in a round bottom or cover are also termed sticks.

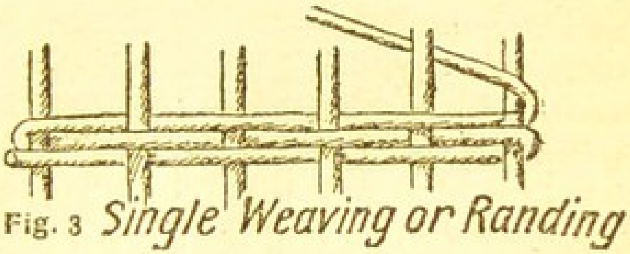
Tools Required. The tools and apparatus used in working osiers include a lapboard and a screwblock (Fig. 2), the former for holding the work in progress and the latter for securing the upright stakes in square work. A shop knife is used for cutting the rods; a picking knife for trimming the short ends and bending; bodkins for preparing a path for the insertion of rods; a maul for a hammer; a commander for straightening stout rods. Shears for cutting are required, and 3 or 4 way cleaves for splitting. A shave is employed for trimming the split rods to form skein, the latter being similar in appearance to chair



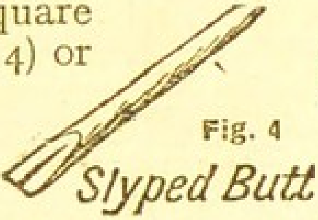


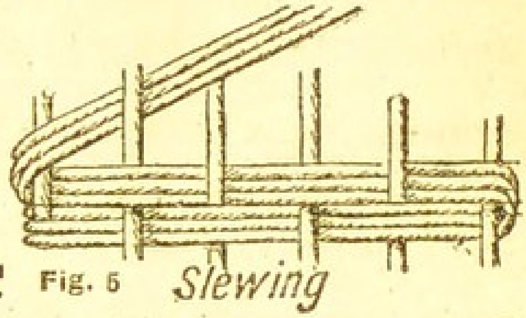
OSIER. Fig. 1. Typical rod for basket work. **Fig. 2.** Board for holding work and block which secures upright stake

cane, and used for finishing handles, etc. The worker also needs a lead weight to keep the work on the lapboard, a yard measure, a piece of sponge, and a grease-horn for use with the bodkin.



METHODS OF WEAVING. Single weaving (Fig. 3) between stakes is done in square work by slyping (Fig. 4) or trimming the butts of upright sticks, and securing them in the screwblock. The rod is slightly bent as it is carried round each stick, and when the end uprights are negotiated, the rod is gradually brought upright, passed round the stick and worked down on top of the others. Slewing, as it is usually called (Fig. 5) is a quick method of weaving, several rods being worked at the same time. It is employed for rough work, but is not so neat or strong as single or randed weaving. If, however, the rods are the same size, the weaving can be kept level. Bye-stakes are used mainly in round work, and consist of supplementary stakes inserted between the original stakes and held in place by the first rows of weaving, called the upsett.





OSIER. Fig. 3. Single weaving. **Fig. 4.** Trimmed butt of upright stick. **Fig. 5.** Weaving with several rods at a time

Fitching (Fig. 6) is a method of working two rods alternately under and over each other, so as to hold a stake or bye-stake at each turn. It is useful for open work when it is not necessary to fill up the sides of a basket with weaving. It may be commenced with either the tops or butts, and in practice the rods are worked one after the other in the order shown. Cross fitching is done with double stakes in cases where the stakes are crossed, a common method of dealing with opensided baskets. The foot of a basket is formed by driving short stakes in the sides when the work is upside down; the rods are laid down and worked in the same way as a border. An oval bottom of a basket is formed by a slath and the sticks or radials separated by working a pair of rods together, as clearly shown in Figs. 7 and 8. A pair of rods if worked alternately over and under each other, the reverse of a fitch, is called a pair. This method is used in forming round bottoms and also in adding a second round of weaving on top of a fitch.

Picking is the operation of cutting off the projecting ends of rods which are left after the weaving is completed. The edge of the knife must be very sharp, and care must be taken at first to avoid cutting the woven rods. Sufficient material should be left to prevent the end working out past the stake. Pricking up the stakes to bring them to an upright position ready for weaving the upright sides is effected by the point of the shop knife. This operation prevents the bark or skin from breaking, but this is effective only if the rod has been properly soaked and allowed to become mellow.

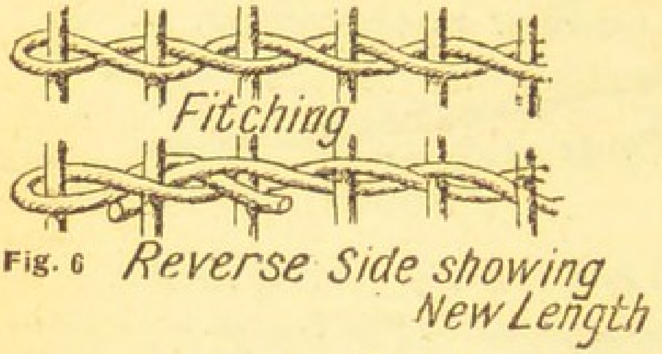


Fig. 6

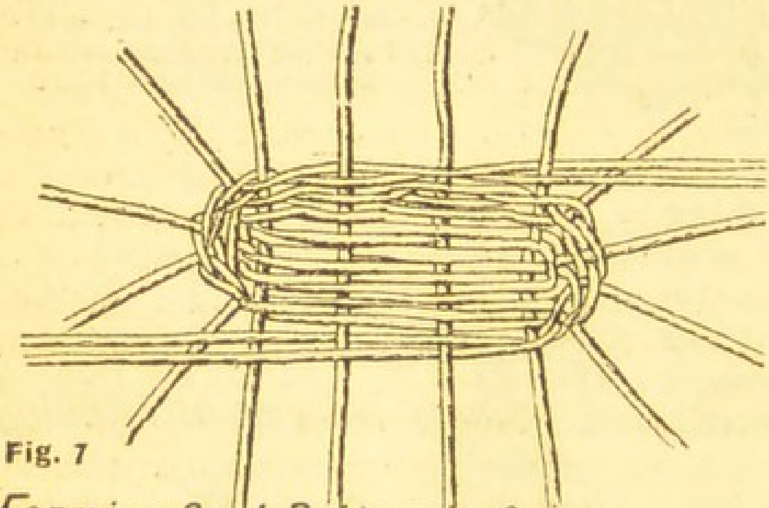


Fig. 7

Forming Oval Bottom in Osiers

OSIER. Fig. 6. Rods worked alternately under and over, enclosing a stake at each turn. **Figs. 7 and 8.** Oval bottom formed by a slath

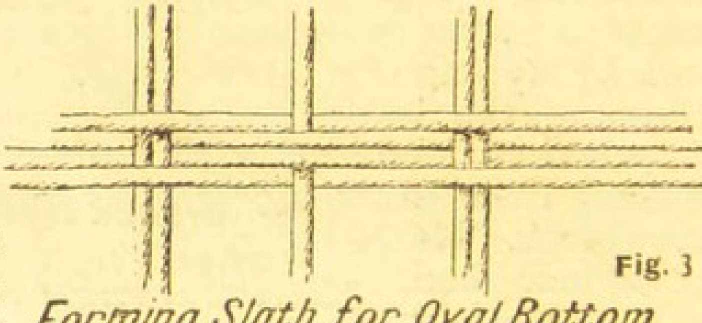


Fig. 3

Forming Slath for Oval Bottom

Scallomed Work. This method (Fig. 9) is used in making a frame for a bottom or cover and also for staking some forms of basket. It consists of making a long cut at the butt end of a rod (Fig. 10) so that the rod may be turned round the frame and held in place by the next stake. It is useful in making light round and oval baskets and all kinds of covers where lightness and strength are required. The frame to which the scallom rod is attached is called a hoop. Any kind of shape can be made. Scallomed stakes are commonly used in the light and cheap hampers made with slewed weaving. This is because they can be made in much less time by employing this method.

PREPARING SKEIN. Skein formed by the trimming of split osiers is used in covering handles and for filling up the sides of small baskets used for holding letters and for picnic, lunch, and linen baskets. The method of preparation is to take a long, straight, dry white rod and cut a few inches off the top. Suitable cuts are made at the top, either 2 or 3 according to the cleave used, and then it is pushed down towards the butt, the rod being guided with the hand in order to ensure a uniform cleavage. The split length is placed pith side uppermost on the shave. The distance between the plate and the knife edge should be carefully adjusted to take off the pith first. The length is again passed under the knife, set a little closer to the face, and a further shaving taken off, this operation being repeated until a finely shaved and even skein is produced. It is necessary to keep the rod close to the face of the shave, and it is usual to use a leather thumb stall. The upright shave is used when even finer skeins are required. The skeins are used after dipping in water; they do not require soaking, the process being called lapping when they are wrapped round a handle.

STAKES. Stakes to form the framework of a basket are generally chosen from the stouter lengths of osier. They should

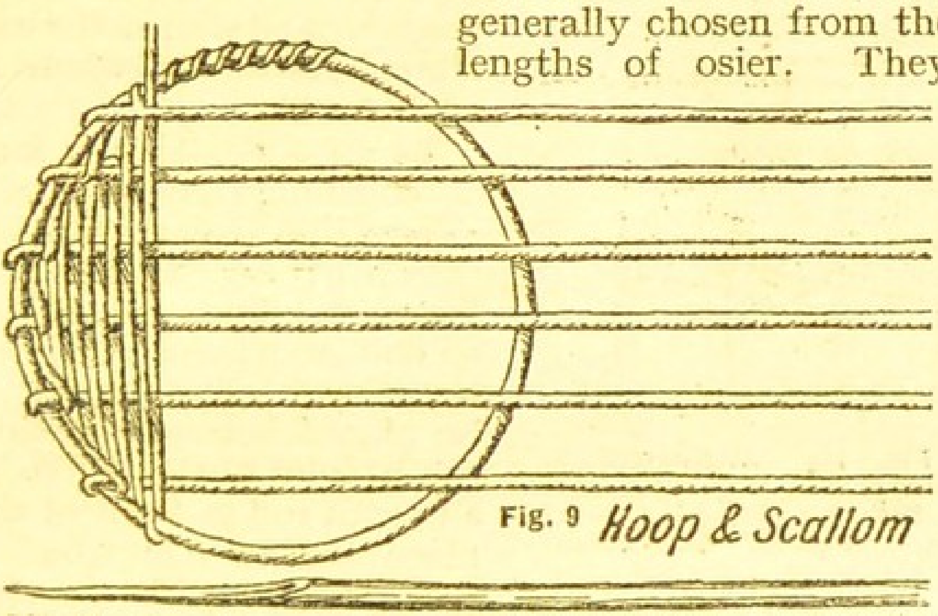


Fig. 9 *Hoop & Scallom*

Fig. 10 *Scallomed Rod*

OSIER. Fig. 9. Scallomed work in progress. Fig. 10. Butt end of rod

be straight and smooth, the hand being used to press the successive rows of weaving down on one another. In square work where the stakes are held in a screwblock, when they are termed sticks, they should be of the same size and the ends trimmed with the knife. Stakes to form the upright framework are driven in alongside bottom sticks after being slipped or pointed, room for them being provided by means of the bodkin. In the sides of square bottoms the outside sticks in the bottom must be pierced by the bodkin and the pointed stake driven in after being dipped in water.

In driving a stake home, it should be grasped firmly in the left hand a few inches above where it enters the weaving, and the right hand should be slid down the rod on to the left. A fair amount of force should be used, especially when the stake is nearly far enough in. An odd number of stakes is necessary in slewed work, but is not required in randed work. After the stakes have been pricked up, the tops should be gathered together and held within a hoop. In siding up or weaving, the stakes must be kept upright and parallel with each other when working straight sides, and when doing work where the sides are splayed outward or worked inward the spacing should be quite even. It is important that the rods used in siding up should be worked to the stakes by pressure of the left thumb. As it is essential to the appearance of the resulting work that the stakes should be even, the latter should be held in the right hand while the left hand shapes the weaving. Herein lies the whole art of basketwork.

Fig. 11 *Tracking*

Fig. 12 *Rib Randing*

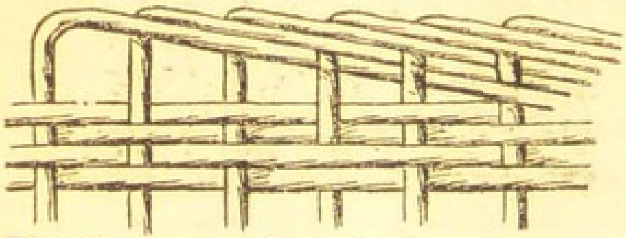


Fig. 13 *Simple Border*

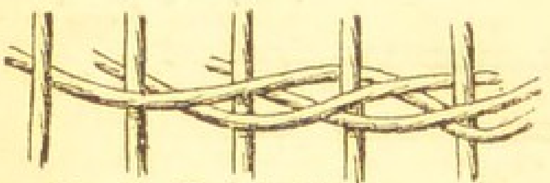


Fig. 14 *Triple Twist*

OSIER. Fig. 11. Alternative to plaiting. **Fig. 12.** Effective close weaving. **Fig. 13.** Method of working a border. **Fig. 14.** Strengthening stakes for a border

TRACKING. This is a method of finishing covers, and is an alternative to a plait. It is shown at Fig. 11 on this page. Place the first rod behind the second and leave it in front of the third. The second should be placed behind the third and left in front of the fourth. Place an extra rod in front of the first, place the two in front of the third, behind the fourth, and leave in front of the fifth. Next place the third alongside these two, add a second rod in front of the second, and place them both in front of the fourth, behind the fifth and in front of the sixth, with the fourth alongside. Continue with the first two of the three (the remaining one, the first commenced with having done its work), place in front of the fifth, behind the sixth and in front of the seventh. To continue, place the fifth alongside, dropping the outside of the three at each stroke, and when the round is complete, work each one of the rods through to its proper place.

Upsett is the commencement of the weaving in all except the coarsest work and comprises two, three, or more rods worked alternately on the upright stakes to secure them firmly in position. Wale is the name given to the stroke used in upsetting and other parts of weaving, and formed by working two or more rods alternately, one by one, in front of two or more stakes, and then behind one. Weaving is effected in osiers by coarse randing for heavy work with stakes 2½ in. apart, slight randing with stakes 2 in. apart, light randing with stakes 1½ in. apart, and fine or close randing with stakes about 1 in. to 1¼ in. apart, the work being driven in close with the iron. Ribranding (Fig. 12) is an effective method of siding up, and consists of working each rod alternately in front of two and behind one for two strokes before being worked out in simple randing.

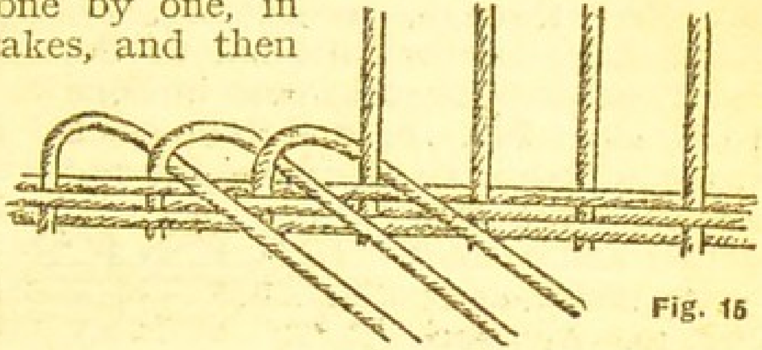


Fig. 15

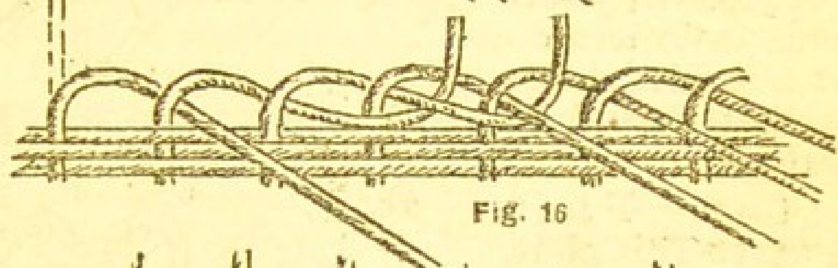


Fig. 16

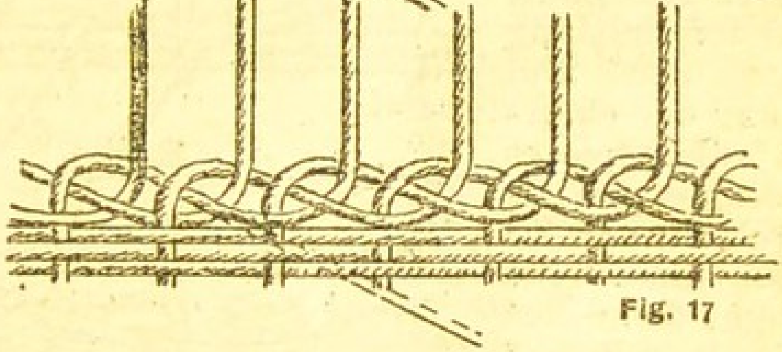


Fig. 17

OSIER. Figs. 15 - 19. Progressive stages in the making of an upright plait. Details are given in text

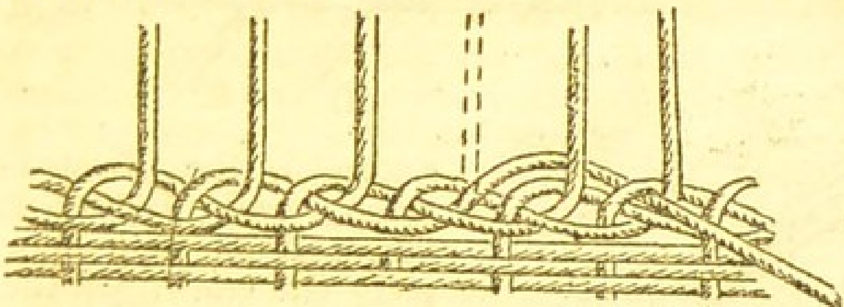


Fig. 18

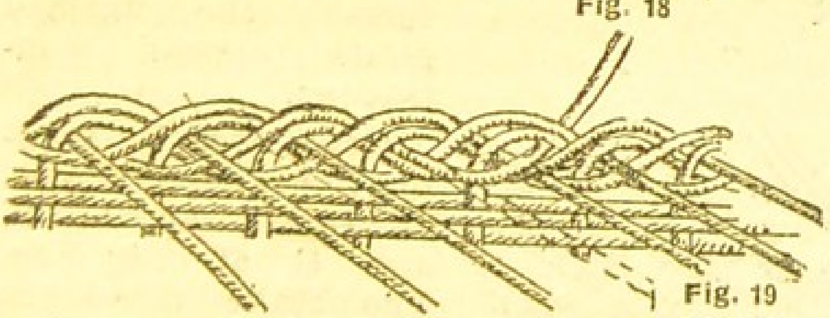
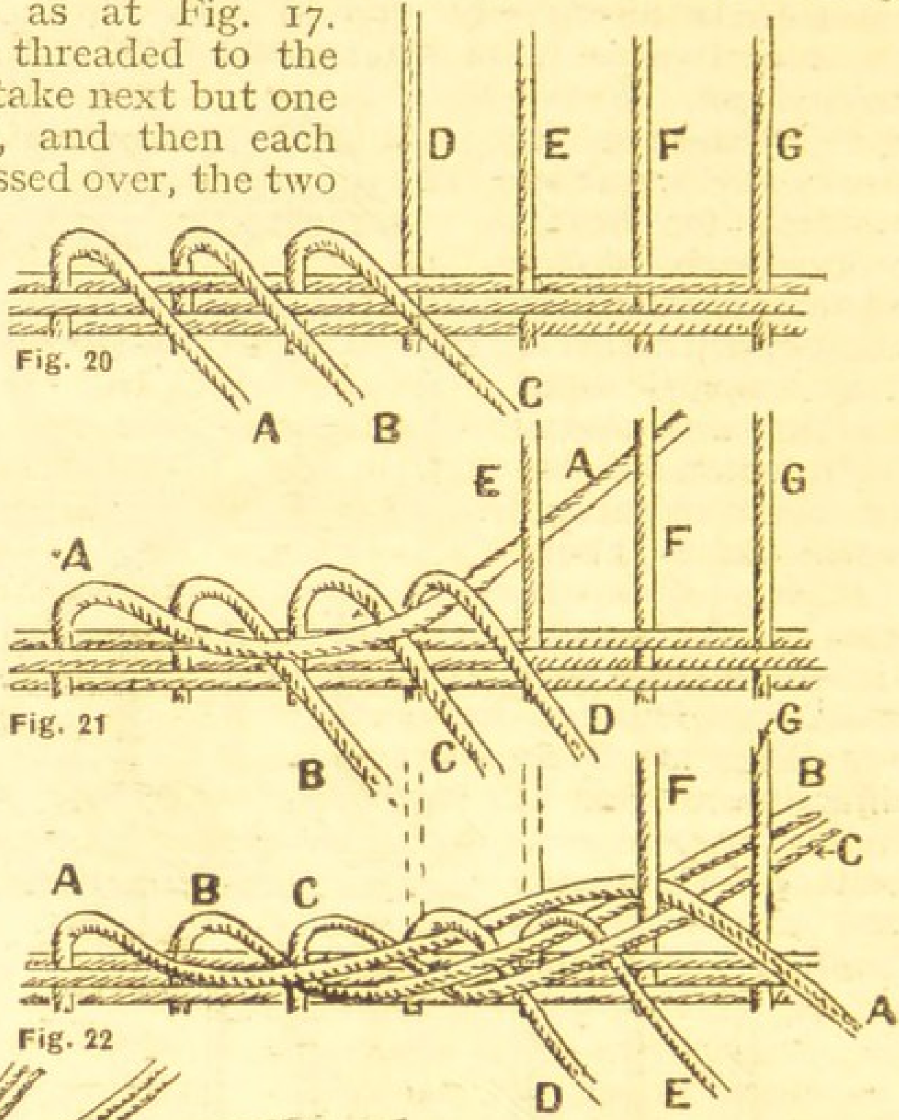


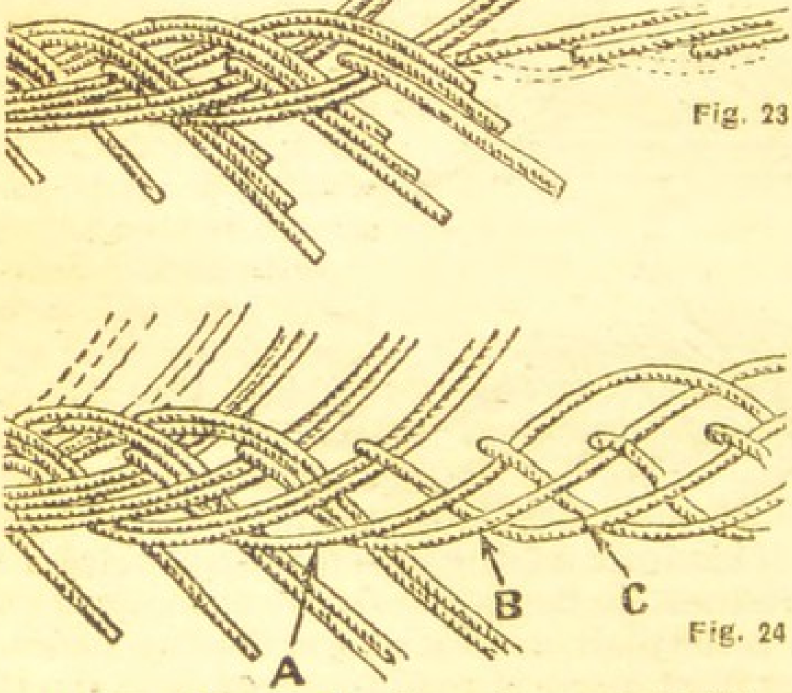
Fig. 19

BORDERS. Simple borders are worked as at Fig. 13, but the stakes may be strengthened beforehand by working the triple twist shown at Fig. 14. This form of stroke may take the place of fitching where extra fullness is desired. Another method of forming a finishing border is the plait, of which there are two forms, upright and flat. The upright plait is made by bending down each upright stake, or spoke, in turn, and placing each one behind the next one on the right as shown at Fig. 15. When the last stake is reached it will have to be threaded under the first one that has been turned down, as at Fig. 16. Each stake is now taken in turn and placed under the next on the right and made to stand vertically alongside the second stake, the last one being threaded through, as at Fig. 17. Each stake is now threaded to the front, behind the stake next but one to it, as at Fig. 18, and then each stake in turn is crossed over, the two stakes lying together and passed to the inside, as at Fig. 19. Any surplus ends left on the inside of the basket should be cut off.

THE FLAT PLAIT. This plait, used for finishing trays, arms and backs of chairs and other pieces of basketwork, is more difficult to make than the upright form, but if it is followed out with actual material, the illustrations and following instructions will simplify the work. On the surface the finished plaits appear continuous.

Commence by turning down three stakes as shown at A, B, and C at Fig. 20. The stake at A is curved round to the right, passed over B and C and placed in front of D, which is now turned





OSIER. Figs. 20-24. Stages in weaving a flat plait, used for arms and backs of chairs, etc.

down over it and the end left in front, as shown at Fig. 21. The stake at B is now picked up and carried in front of the next two and the first upright of those standing is turned over on it as at E. The same method is followed with C, but, before the upright at F is brought down over it, the stake A, which was left on the inside, is brought across C, and then F, as shown at Fig. 22, is brought down beside it and the two are treated as one stake.

At this stage of the work there are three rods outside, one being a double stake, and the two rods inside. The first of the three is taken round the first upright stake to the inside, crossed with the first of the two to the outside and then the upright stake is drawn down. This method is continued, remembering to draw down the upright stake at every cross of the osier. When the double rods are reached they should be treated as one, both inside and outside. When the triple rods are reached, the two longer or outside ones are used, the shortest one being dropped and cut off at the finish. When the last upright stake has been turned down, there will be three triple rods outside and two double rods inside the basket. The method as far as this is illustrated at Fig. 23.

The first two long rods on the outside should be passed under the first stake A, which was turned down, leaving the short one as usual to be cut off at the finish. The next two long rods are passed over the first stake A, and under B, the second that was turned down. The remaining two long rods are passed over the first two, A and B, and carried under the third, C ; this gives five double rods on the inside of the basket. Each two in turn should now be threaded to the outside under each single stake, as shown at Fig. 24, until all the five pairs are threaded to the outside. There are now five double rods on the outside, and the longer of the two is threaded from the underside, through the first single stake. Follow to the inside of the basket, and out again to make it double, like the rest of the plait. A bodkin will be needed to lift the stakes in order to make room for the last five single rods.

OVERCASTING. This stitch is used for finishing the raw edges of seams, to prevent the threads from ravelling or fraying. As a rule, the stitch is worked along each edge of the seam separately, though in some cases it is worked over the two edges at once ; for the latter method the seam must be well pressed beforehand, as no thorough pressing can be done after the stitch is taken over both edges.

To work it, secure the end of the cotton in the material at the left-hand end of the seam with one or two back-stitches, and push the needle through the material towards you, a few threads below the edge ; draw through, and again push through from back to front a little further along towards the right. Repeat until the seam is done, and lightly press to take out any puckered effect. Do not draw the cotton tightly when making the stitches, or a puckered effect is bound to ensue, and to get a neat effect make the stitches all of the same size and to slant at the same angle.

When oversewing a curved seam, in order to prevent any dragging, first snip the seam edges at intervals with the scissors, and round off the corners caused by the snipping. Failure to attend to this matter will make the work unsatisfactory.

OVOLO PLANE. This is a specially shaped plane, which is used for working an ovolo moulding on wood. The sole is shaped to a reverse of the shape of the moulding which the plane will produce. The plane iron is similar to other plane irons, but is shaped on the cutting edge to correspond with that of the ovolo moulding. In use the plane is traversed along the wood in the same way as a jack plane, but should be guided on the wood by a temporary strip tacked to it.

OXIDIZING. Oxidizing is a general term given to the coloration of metal objects by changing the surface to a brown-bronze or black tint by a chemical or electro-chemical process. As every metal is attacked by chemicals in varying degrees and with various results, it is best to treat each separately. In general there are three methods, chemical, electro-deposition, and heat treatments, which latter may or may not introduce chemical changes in the surface.

The amateur can electro-plate on base metals some of the finer metals, such as copper, silver, nickel, brass or gold, with a view to applying an oxidising process. Among these preparatory processes brassing may be mentioned, silver, nickel and copper plating being referred to under the heading of Electro-plating. It is usual to adopt a brass coating on the baser metals, iron, zinc, white-metal alloys, etc. The finishing coat for oxidising may be applied as in the case of a solid brass. The electro-deposit should be thick enough to withstand the penetration of the chemicals used in colouring.

Most of the chemicals employed are highly poisonous, and the greatest care should be taken in handling them and in disposing of the spent solutions so that no danger to animals or human beings is incurred.

The brass plating bath may be made of 1 oz. each of zinc and copper sulphate, 2 oz. of carbonate of potash, and 3 oz. of cyanide of potassium. In the preparation of this solution, the first two are dissolved in hot water, the potassium carbonate separately, and added a little at a time. The cyanide is made up into a 25 per cent solution and mixed with the others, stirring the bath all the while, the final result being a muddy yellow liquid of about 2¼ pints in bulk.

The solution is boiled for about half an hour, filtered, and watered out to 2½ pints. The intensity of the current largely controls the depositing. If the coating is too white, denoting the zinc, a reduction of the current will deposit more copper. Brass may be used for the anode, but separate strips of copper and zinc are perhaps better. It is best to deposit mainly copper towards the end of the process. For coppering only, the solution is the same except for the zinc sulphate, and a copper anode would obviously be employed. The processes involving electro-deposition require electrical power of low voltage and comparatively large amperage.

TREATMENT OF SILVER. Silver oxidising is a process with quite a misleading name, as silver oxide is not formed, and is not a part of the colouring film. Sulphur is the chief agent. For oxidising silver or silver-plated articles from light golden to brownish-black, a hot solution of barium sulphide, 1 oz. to the gallon of water, is often employed. The work, if not just emerging from a plating process, must be cleaned in a hot potash solution, rinsed, and given an acid dip, swilling afterwards in a large body of water, and then passed through a cyanide dip, rinsed in hot water, and dried. For producing a matt surface, the acid dip is composed of sulphuric acid, 1 part; nitric acid, 2 parts; sodium chloride (common salt) and zinc sulphate, each about one-tenth of an ounce to the pint.

When in the oxidising solution the silver work is shaken about until the desired blue-black density is obtained. It is afterwards rinsed in boiling water. Oxidised silver work can be locally lightened as desired. Brushing with bristle brushes and pumice powder will give a grey colour, and the original silver may be exposed where necessary for artistic effect by rubbing in the pumice powder with the fingers. Varnishing may be accomplished with a colourless varnish of the nitro-cellulose type, or one of the proprietary brands of lacquer may be used.

Another oxidizing formula is ½ oz. of potassium sulphide and 1 oz. of ammonium carbonate to the quart. The solutions are mixed separately and worked hot. This coating is quite robust, and will stand the scratch brushing process employed in ordinary plating. The work only requires immersing for a short period. To produce a matt, or dead surface, the article should be dipped in a sulphate of copper bath, after electro-plating with silver in the ordinary way. A frosted white results, and the whole or any portion of the work may be treated in order to obtain the desired effect.

The paste method involves a mixture of plumbago (black lead) and turpentine, with a little red ochre or rouge. It is spread over the work and allowed to dry. The parts in relief in the article are then rubbed with a chamois leather or soft rag dipped in methylated spirit. This is only applicable to engraved, moulded, or chased articles, and, with such, gives the old silver effect. The work can be cleaned off in a caustic potash or cyanide bath. Sulphuring silver gives a blued steel colour. The work is subjected to the action of sulphur fumes in a tin box with a tray to hold red hot charcoal or cinders. Powdered sulphur is spread over the cinders and the lid closed with the work suspended in the fumes. The work must be quite clean both chemically and mechanically.

OXIDIZING COPPER. For copper a solution of ammonium sulphide, ½ to 1 oz. to the quart of water, is used. The depth of tone, light brown to black, depends on the time of immersion, and the temperature of the bath, and the colour is more completely controlled if the bath is not hot. The work can be lightly scratch-brushed and rinsed. The uniformity of colour, independently of the cleanliness of the work, depends on the purity of the copper; therefore, it is better with objects that have been coppered by electro-deposition. In any case, a copper article might be passed through a copper plating bath as a preliminary, to improve the surface for oxidizing.

Potassium sulphide, ¼ oz. to the quart of water, with a few drops of ammonia, provides a brown tone imitating Japanese bronze work. The solution is used warm. Copper nitrate, 8 oz. to the pint of water, gives a deep black tone. It is used warm, and the work should be immersed several times, allowing it to dry between the dippings. Brass oxidizing is more difficult to control and to predetermine in the matter of colour, because of the varying characteristics of the alloy. Such work is often plated with copper first.

Black nickelling is an electro-plating process which gives a similar effect to many oxidising processes. It is worked in the same way as bright nickelling, but with about ½ volt only. The plating bath for this is: Double sulphate of nickel and ammonium, 9 oz.; ammonium thiocyanati, 2½ oz.; zinc sulphate, 1 oz.; water, 1 gallon.

IRON AND STEEL. In iron and steel oxidizing, brown colours may be obtained by covering the work with a paste of antimony chloride and olive oil in equal parts and heating it slightly for 12 hours. The paste is rubbed off with a soft cloth and finished with a waxed brush. The work requires a preliminary cleaning in a pickle of nitric acid. A black colour may be obtained on iron or steel by an immersion in a hot solution of sodium thiosulphate, ½ oz. to the pint, and greys in a hot pickle made by diluting a mixture of 2 oz. of arsenious oxide in strong hydrochloric acid in one gallon of water. The heat treatment of iron and steel by the Bower-Barff process provides a protective coating of black oxide of iron, Fe_3O_4 and involves heating the work to redness in superheated steam.

Perfect cleanliness is absolutely necessary in the colouring of metals by any of the processes described, and it must be remembered that acids do not remove grease, and contact with oily or naturally greasy fingers should be avoided. If ostensibly clean objects are handled promiscuously before oxidizing they are likely to show marks where the oxidizing reactions have been prevented by the finger marks. The use of rubber finger-stalls or gloves is to be recommended in all operations where they can be employed. Permanent results are also often dependent on the final lacquering, as many suitable coloured and colourless varnishes are obtainable from the stores and shops. *See* Bronzing; Electro-plating.

PADDING : In Dressmaking. The padding of a coat with cotton-wool at certain parts is resorted to both in dressmaking and tailoring, to give a better effect to the coat when worn.

To pad the back of a coat round the armholes, take the lining for the back, and cut a strip of cotton-wool to the shape of each armhole portion, cutting the strip about 3 in. wide and deep enough to extend to within 1 in. of the shoulder, and side or underarm edges. Tack the padding to the wrong side of the lining and thin out the edges of the wool with the fingers, except at the armhole edge, so that they will not cause abrupt ridges where they terminate ; then secure the wool to the lining with several lines of machining, about ½ in. apart. Padding for the chest or shoulder is done in the same way as for the back, except that for the shoulders the shoulder seams of the lining are joined before the wool is applied.

A strip of cotton-wool about 2 in. wide by 7 in. long is always sewn inside the top of a 2-piece coat sleeve, right over the shoulder part to make it set well.

PAINTING: INDOOR AND OUTDOOR

Some Practical Directions for the Amateur

The following is one of the principal articles dealing with home decoration. Others that fall into this category are paperhanging, wallpaper, etc.

Every householder is faced sooner or later with the necessity of undertaking some sort of painting operations, and although it is perfectly simple to purchase a pot of paint and a brush from an oil shop, it has to be remembered that something more is required than merely to smear the paint on the surface of the object to be renovated.

Certain precautions have to be exercised in paint work of almost every kind. If the paint is to dry nicely, the surface to which it is applied must be clean and free from grease or dirt ; the paint itself must be of good quality and suited to the class of work ; while the material to be painted must be prepared by coating it with mixtures known under such names as fillers, stopping and undercoating. The brush also should be of suitable shape, size and quality ; the cheaper brands of brushes, as a general rule, cause trouble of one kind or another.

Paint is applied to improve the appearance and to assist in the preservation of the object painted. A good coat of paint applied in an efficient manner is a wonderfully effective preservative from the effects of the weather, both in winter and summer, and every property owner knows that if the exterior of a building is kept in a proper state of repair by adequate and regular painting, the cost of such maintenance is more than repaid. On internal work paint has a double value in being decorative as well as being a preservative. It has also a sanitary and hygenic value. If the surface to be painted is greasy and dirty, and the paint is applied to it in this state, it is obvious that the dirt will remain, although covered by the paint. The proper method is to remove the dirt and grease before applying the paint, and this can be done by scrubbing with hot water and soda.

THE INGREDIENTS OF PAINT. In connexion with the home, painting is generally done with oil colour paint, but in a more comprehensive sense it includes the use of water paints and other decorative material applied in the form of paint. There are also available the various nitro-cellulose finishes. Oil paints often have white lead as a base, or body. This material has great covering power and weathers well, but as it is very poisonous, a zinc white base, composed of oxide of zinc, which does not possess the poisonous qualities of white lead, is largely employed. The base is diluted with a thinner, generally composed of linseed oil, and both this and the base should be of first quality. Oil of turpentine, commonly called turps, is also used for thinning the base, and making the paint more easily worked; but it reduces the protective qualities of the paint, and if used in excess produces a thin, quick-drying coat, which dries with a dead or flat surface.

For the purpose of hastening the drying of the oil in the paint, materials known as dryers are used. For dryers, terebene is often added to make the paint dry quickly, but litharge, lead acetate, zinc sulphate, and red lead are very much used. A common practice is to embody with the base some other material, known as a filler, which is added by paint makers, and varies according to the purpose of the paint. Silica or barytes may be used for a paint to be applied to woodwork; while silicates, alumina, whiting, and gypsum are used in paint for masonry and metal work.

The ordinary linseed oil is obtainable in two forms, raw and boiled. The raw oil is used for delicate work, pale colours, and internal work, and the boiled oil for general external use. Owing to the cost of turpentine, a number of substitutes for this material are obtainable, and although the genuine turpentine is to be preferred, the substitute answers very well for most paint work. Pigments are finely ground colouring materials used to colour paint for ornamental purposes and to give opacity. They are made from various animal and mineral substances, and are obtainable either as finely ground powders or ground in oil; in the latter case they are paste-like in substance, and are used in that form for tinting oil paint. Knotting and fillers ready for use can be purchased from most oil shops.

Ready mixed paints, if made by a reputable firm, are very convenient to the amateur, but for matching up existing work, or preparing a special tint, it is preferable to use white lead, or zinc white, diluted with linseed oil or turpentine, and stained or coloured by mixing with it sufficient of the desired colour to impart the requisite tint. Many of the ready mixed paints are available either in the form of the common paint, which dries with a lustreless surface, or with the addition of a little varnish, which results in the paint drying with a semi-glossy surface. Generally the common paint answers very well for the second coat and the varnish paint for the finishing coat. Water paints are really a form of distemper, in paste or powder form, and only require to be mixed with water. For interiors they are particularly effective.

To carry out painting work properly the amateur should possess several clean tins with handles, known as painters' kettles, a large sized sponge, a good piece of pumice-stone, a blow lamp for burning off the old paint, a scraper, or stripping knife, hacking and stopping knives for cleaning out the bad places and working the stopping into them.

When the colours are to be blended, a clean earthenware jar is required for mixing; a palette and palette knife, and some fine muslin for straining are necessary. A dusting brush, leather, clean duster, and regular painter's apron are very handy, and the amateur will find it a good plan to wear a pair of old gloves.

PAINT BRUSHES. A selection of brushes for general use consists of an oval ground brush about 2 in. wide, a varnish brush about 1 in. wide, two or three sash tools of various sizes, and a fitch about ½ in. wide for painting the edges of narrow work. The best brushes are made of hogs' bristles; some are adulterated by the addition of vegetable fibre.

The size of a brush is denoted by a number, 1–0, up to 8–0, and 10–0, the latter being for house painters. In some cases the bristles are bound to the stock or handle with cord or twine, in others with copper wire or tin band or ferrule. The bristles are arranged to form flat, oval, or round brushes, and for general purposes the oval is preferred. Smaller sizes, termed sash tools, are useful when painting the smaller surfaces in door and window frames.

There are also brushes for dusting the surfaces preparatory to putting on the colour. They are usually round in shape, with much longer bristle than ordinary brushes, curving outward. Brushes for varnish are of a finer bristle, and flat or oval; the former are bound with tin, and will be found most useful for general purposes.

A brush known as a stippler is used for going over painted surfaces whilst still wet to remove brush marks. It is a large flat brush, rather wider than a boot brush, and the bristles are set so closely together that when the brush is lightly and evenly dabbed all over the surface, a minute and even granulation results.

Brushes for use with cellulose finishes should be set in rubber, as the solvent employed would dissolve the binding material of the ordinary type of brush.

On no account should a new brush be put into immediate use without some previous preparation. The bristles will have become dry since the brush was made, and are liable to come out on to the painted surface, spoiling the work and ruining the brush.

All new brushes should be soaked in clean, cold water for at least 24 hours. This will cause the bristles and the stock to swell so that they will not so readily part company. Brushes bound with a tin band should not be soaked for quite so long, or the band may burst.

New brushes should not be placed in an upright position when soaking, but should be laid in a flat, shallow vessel, and this also applies to brushes that have been lying aside unused for some time. Brushes should never be put away without cleaning them of paint; this can be accomplished by washing thoroughly in a little turpentine, and rubbing dry with a clean cloth. A loop of string should be tied on the end, and the brush hung up, the bristles being covered with paper to exclude dust. Treated in this manner brushes will last much longer.

Exterior Work. As an example of outdoor work, suppose it is desired to paint the rainwater gutters and down pipes with, for instance, middle purple brown. The first step is to rub down the old paintwork, if in fair condition, give it a coat of anti-rust priming, and after this is dry apply two coats of ready-mixed varnish paint. A wooden fence, if in fair condition, should first be brushed down with a stiff brustle brush, like a scrubbing brush, dusted with a dusting brush, given a good coat of undercoating of any reputable make intended for outside work, or known as outside quality, and then given a coat of the common ready-mixed paint; when this is dry and hard a coat of ready-mixed varnish paint is applied. If the work is not in good condition, the old paint should be burned off with a blow lamp, the surface levelled up with stopping, and the painting operations proceeded with as if for new work.

On the exterior woodwork of the house the windows may require the old paint to be burnt off with a blow lamp. When the paint is slightly warmed and burnt with the flame from the blow lamp, this has the effect of softening it, and it is then cleaned off easily with a stripping-knife. The work should receive one or two coats of good quality outside undercoating or stopping, and be finished with two coats of ready-mixed paint.

A door is treated in the same way, except that it should receive particular attention in the way of stopping all the cracks and holes. This may be effected with any of the special stoppings sold for the purpose, or ordinary putty may be used if the work be given a primary coat of undercoating, the putty being applied after this has dried.

If a particularly good finish is required, the work should be well sandpapered when the undercoating is thoroughly dry. Exterior stone or cement work should be prepared by brushing it over with a hard brush, filling in the holes or cracks with Keene's cement, and preparing the surface with red lead priming. This is followed with a coat of stopping or undercoating of outside quality, and finished with the paint, or may be painted with liquid cement, if cement colour is preferred.

INDOOR WORK. Interior work is prepared in the same way as the exterior, except that more attention should be given to the surface to make it as smooth as possible. This is followed with a primer or undercoating of inside quality, and the work then painted in the desired colour.

In painting new wood all the knots should first be brushed over with knotting, and then given a coat of priming or undercoating, the work well glasspapered and cracks stopped up where necessary. To stop the pores of the wood and make a good foundation for the paint, apply one coat of stopping or first undercoat, sand-paper this when it is quite dry, dust it down, and give it a coat of undercoating or flat paint, and then finish it with a glossy or flat paint, whichever is desired.

The flat, or wall paints, as they are called, are intended specially for painting walls ; but if the surface is new plaster the result is seldom entirely satisfactory. The procedure is to apply a priming coat and follow this with a flat colour, using the primer supplied by the makers of the wall paint. Water paints are generally applied to plaster work after it has been given a coat of size or priming, whichever is recommended by the makers of the particular paint to be used.

Wooden floors are often painted in the same way as any other work, so far as the preliminary cleaning and preparing are concerned, but the finishing may be carried out with one of the special floor paints. Wooden toys and home-made articles of all kinds are painted in the manner described for doors and windows, but generally these articles are embellished with designs or lines painted upon them. Much of this work can be done with ordinary artists' oil-colours in tubes ; they require thinning with linseed oil or turpentine, and they are best applied with artists' brushes as sold by artists' colourmen. When the paint is dry the work should be finished off with a coat of clear varnish.

IRONWORK. The decoration or repainting of a stove is often carried out with a good quality Brunswick black when a glossy effect is required, but if a dull or so-called antique black is wanted, it is best to use Berlin black. If either of these colours is too thick to work nicely, it may be thinned with oil of turpentine. For painting radiators, interior water-pipes, cisterns, and the like, an aluminium paint is very effective. The first thing is to thoroughly clean the ironwork, removing all traces of rust either by scraping or by using a wire brush. Water should never be applied to metal work ; if necessary use instead one of the recognized paint removers, or wipe over the metal work with a rag saturated in turpentine.

When undertaking any painting operations, it is best to work in dry weather, and this applies specially to outdoor work. The paint should never be applied on a damp surface, as the dampness will almost certainly make the paint crack and peel off. To avoid dust settling on the wet paint surface, when dealing with interior work, water should be sprinkled on the floor, or wet cloths may be placed about the room to keep the dust down, and the doors and windows should be kept closed.

CLEANING PAINTWORK. One of the simplest methods of cleaning painted woodwork is as follows : The surface is first washed over with warm water which has been whisked into a soapy lather with a good soap, a clean, soft flannel being used for this purpose. The surface is gone over a second time with a cloth dipped in clear warm water and left to dry. A clean flannel is soaked in linseed oil, and when it has absorbed all the oil it is put aside until it is just moistened with the oil. The woodwork is then wiped over with the oily cloth, rubbing it one way all the time. This process makes the paint look like new, and the linseed oil applied in the operation acts as a preservative to the wood.

Where the paint is very dirty the following method may be tried : To 2 quarts of hot water allow 2 tablespoonfuls of turpentine and 1 of skimmed milk or milk and water. Stir these ingredients together and add just enough soft soap to make the mixture soapy, but not a thick lather. The paint should be gone over with a clean flannel dipped into the preparation and wrung out so that the woodwork does not become sloppy. When all the paint has been wiped over, it is gone over again with a clean dry flannel, and will then be found to have taken on a nice lustre.

Paint that is badly soiled should be cleaned with a mixture of whitening and soap flakes. To make this, a packet of soap flakes is dissolved in sufficient hot water to make a thick, creamy lather. Crush to a powder a lump of whitening, and add enough of this powder to the soap lather to make it creamy.

Two bowls of hot water and the whitening and soap mixture in a basin should be at the worker's hand. A clean piece of rag is moistened from the one bowl of water, dipped in the whitening and soap, and then rubbed well into the dirty paintwork. It is advisable to attempt to clean only a small surface at once. When the stain has been gone over with the preparation, the rag is dipped in the bowl of clean water and the paint wiped over with this. Another dry rag is used for wiping it dry. The whole surface of the paint is cleaned in this way.

White paint can be cleaned with onion water. Boil 3 or 4 onions, or more if a large surface is to be cleaned, until all the goodness has gone out of them ; then strain off the liquid. This can be used without soap for cleaning white paint. A clean rag should be dipped in the onion water and this rubbed over the paint. Polishing should be done with a dry duster, but a very slight rubbing up will result in a high gloss on the paint.

Milk can be used for white paint, or milk and water, the same method being followed as with the onion water. Fuller's earth can be used instead of soap for cleaning white or coloured paint ; it is useful for cleaning a painted wainscot that has become very grimy. The fuller's earth is made into a paste with water, and a rag dipped into this is applied to the paintwork. A clean rag is used to wipe away the preparation and another rag to polish the paint after it has been cleaned. Soda should never be used. An excellent result is obtained after any of the above methods of cleaning have been followed if a little furniture cream is rubbed into the woodwork and a final polish given with a duster.

PAINT STAINS. Paint marks on clothes should be treated while they are still wet, otherwise they may be difficult to remove. Wipe off as much of the paint as possible, then rub the affected part with spirits of turpentine or spirits of wine, applying it with a soft rag or flannel. The same method should be adopted for dry paint marks, though the result may be less successful. If preferred, benzine may be used instead, but owing to its inflammable nature the operation should be carried out in the open air well away from any flame or fire.

PAINTING ON TEXTILE FABRICS

Simple Ways of Decorating Home Accessories

Directions for other methods of applying ornamental designs to fabrics are given in the articles: Embroidery; Pattern Printing; Pen Painting; Poker Work; Stencilling. For further related information see Bag: Fan; Gesso Work; Lampshade; Pencil Painting

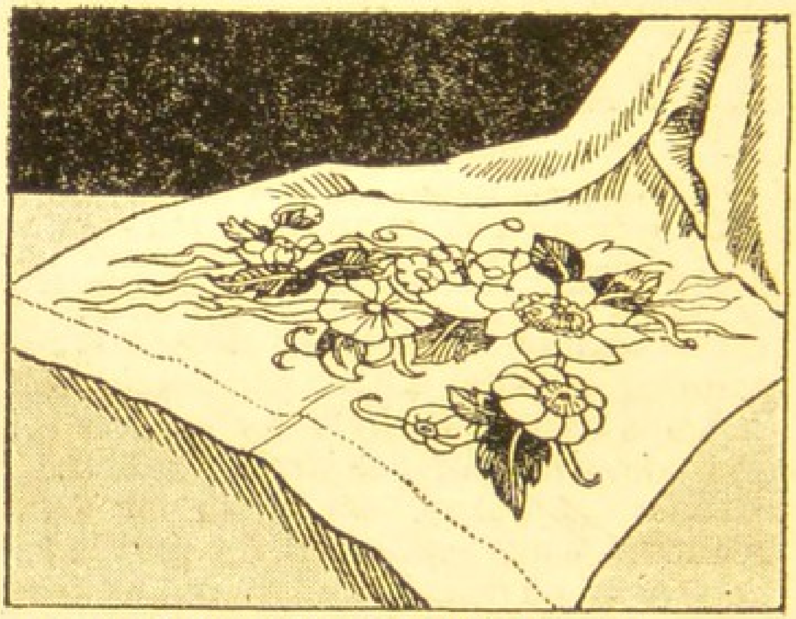
In common with other decorative arts for the home worker, painting on silk, satin, georgette, velvet, gauze, cloth or linen depends almost entirely for success on suitable choice of design and colouring for the article selected to be ornamented in this manner. Painting on linen or canvas can be particularly beautiful when employed for panels to be used as mural decorations or to be framed and glazed as fire screens. Special mediums are required for painting on woven fabrics and can be obtained at shops which stock colours and materials for artistic crafts.

Perhaps one of the most important things is to find the correct consistency of the colour for the material on which one is working. For instance, a delicate, transparent effect is essential for linen and taffeta, while velvet or cloth must be treated with opaque methods. Satin in light colours requires the delicate method, and in dark colours the opaque. Either effect may be successful on gauze.

Ivory coloured taffeta or satin can be painted in a style which has somewhat the appearance of etching. It is done with moist water colours, fine sable brushes, preferably Nos. 1, 2, or 3, and delicate effects are obtained by using tints of sepia or black. The piece of silk or satin, with white blotting paper beneath, is fixed to a drawing-board with drawing-pins, and the selected design is drawn in pencil or transferred by means of tracing paper The outline is lightly defined with a brush and the shadows indicated. The brush must not be too full. Details are added and shading accomplished by cross-hatching lines, sky and water being lightly washed in. Seascapes and old prints are successfully copied in this method.

A combination of needlework stitches to raise portions of the design and of painting produces beautiful and uncommon panels for small screens or for use under glass tops on dressing tables Flower pieces can be painted in the same way, but require flat washes of delicate colour after the manner of old prints. For other styles of painting on silk suitable for lampshades or candle shields the reader may consult the article on Lampshade. These methods can be adapted for designs for dessert doilies and for handkerchief sachets. Black or blue carbon paper should not be used for transferring designs on to delicate materials, but the design should be traced on to tracing paper, turned so that the heavily-pencilled lines face the material and these are then gone over with a bone or ivory tracer. Special transfers may also be obtained from a good art department in a store.

Ordinary oil colours or stencil colours can be employed for painting on textiles, but must be used with the correct medium to prevent the paint from running or cracking. Pen painting is also used, and is described under a separate heading. It is well to avoid loaded materials. The preparation used to stiffen certain silks may appear on the painted surface like specks of gummy substance. Such a material should, if possible, be washed before painting, in order to remove the dressing.



PAINTING ON TEXTILE FABRICS. Silk runner with floral design in pastel shades of green, mauve, blue and pink
Courtesy of Winsor & Newton

AN EFFECTIVE METHOD. A good method of decorating gauze, silk, satin or cloth is by using a special outfit of colours made for painting on these fabrics. A feature of this style of painting is a raised edge which forms a setting for the design and makes it effective for such accessories as satin night wear sachets, pochettes, cushions or gauze doilies. Bronze colours are used to outline the work, but these must be employed very cautiously or a garish appearance will result. Special coloured gold and silver flakes are also obtainable.

To paint a set of dessert doilies a 7-in. square of silk gauze will be required for each piece. Place this over the design selected (if a transfer is used, lay a piece of tracing paper between it and the gauze or the transfer ink may spoil the material) on a drawing-board covered with clean white blotting paper. Pin the gauze, as in Plate 31, on to the board with drawing-pins. Do not stretch too tightly. On a saucer or china palette put out a little of the colours required; thin with turpentine and a little medium. A No. 3 sable brush can be used for filling in the design. The colour must be laid evenly on the gauze and the paler shades used first. When these are dry the darker shades are painted in.

The blotting paper should not be removed until the painting is finished. The colours percolate through the gauze to some extent, and unless left on the blotting paper or tracing paper till dry, the tints will be very pale.

The raised edge is made almost as if using a funnel for forcing icing on a decorated cake. A tiny paper cone can be used, filled two-thirds full with special enamel, the top turned over and pressed down till the bag is taut, and then a minute hole cut at the point. The bag is held between first finger and thumb and the point must not touch the work or the hole will be stopped up and the line become uneven. The enamel flows in a thin line to form a fine cord. A tube of silver or gold flake or a bronze powder as used in gesso work is kept at hand to sprinkle over the line. This is allowed to dry, and then the surplus flake is removed with a soft brush. For rather bolder outline a tin nozzle can be fixed to the tube of enamel. Nozzles are obtainable in two sizes.

When painting on dark materials, as, for instance, dark satin for a nightdress sachet, yellow carbon paper can be used for transferring the design. Fix the work as already described. To paint, first fill in the design with white to kill the dark material and proceed, using stencil oil colours. Outline with the enamel, putting the small nozzle on the tube, and dust on gold flake for flowers and silver for leaves.

The special paints, medium, tin nozzles, paper cones, enamel, and flakes used for this work are known as Dargeena materials for painting on fabrics. Other somewhat similar paints are known as Silkart.

Washable silks and georgettes which have been painted with these colours can be cleansed in a lather of good soap flakes and warm water. The best method is to shake the article up and down in the lather in a glass preserving jar with a screw top.

Having rinsed it, press the article gently with a clean cloth to absorb the moisture, then iron carefully, placing a clean cloth between the material and the iron. Iron on the wrong side, and use a blanket or a soft folded towel to avoid flattening the raised edge.

Painting on Linen. When painting on linen, canvas or Arras cloth, oriental designs or simple tapestry ones are most suitable to use. A delicate, dull-surfaced effect is obtainable on such fabrics which is quite desirable for these designs when treated artistically. Oil stencil colours may be used with the correct stencil medium. Use a clean brush for each fresh colour. For a frieze or big panel, lay the piece of fabric flat on a large board and pin down the section which is being worked on. The design may be traced, ironed off from a transfer, or drawn freehand.

A good method of painting on linen, and one which has the advantage of being clean and simple to use, is by means of Aquarello water colour sticks and pencils. The sticks are for filling in large surfaces of colour and the pencils for outlining and washes over small spaces. The pencils are often used alone, and an experimental outfit can be purchased for 2s. The coloured leads are soluble in water, can be applied to a linen or other textile surface, are fadeless and washable when properly fixed, and the colours can be blended.

Decorative linen panels with Japanese designs, measuring about 27 in. long by 18 in. wide and framed in narrow black and glazed, form a delightful picture above a fireplace. The fabric to be painted is placed over white blotting paper and pinned down to a drawing-board. For obtaining a very pleasing effect a Japanese print could be copied on to the linen in pencil, but the amateur, unless skilled in drawing, should practise with some simple design, such as a galleon in full sail or a floral pattern which can be traced in the ordinary way. Scraps of linen will do to experiment on before attempting an ambitious panel. Unbleached linen gives a beautiful effect, a white pencil being used for high lights and the colour of the linen being left in places for half tones.

To paint, dip a paint brush in water and moisten a small portion of the design. The colour is applied in strokes with the stick or pencil and afterwards distributed evenly with the brush. Be careful not to spread the water over the edge of a piece of the design where a firm outline is desired for the particular colour. Fill in the tints as desired, beginning with the pale ones. Detail can be superimposed by outlining with a pencil dipped in water. Before using carmine, yellow or sap green, fill in the portions of the design with the white pencil and work the colours over white.

For darkening red, and for outlining when shading, use violet over scarlet. For darkening green, use dark blue over green ; to darken orange, use carmine for the shaded portions. To lighten any colour use the white pencil, either over or under the colour. In darkening colours apply the second colour carefully. Here again a little practice on odd pieces of fabric is advisable.

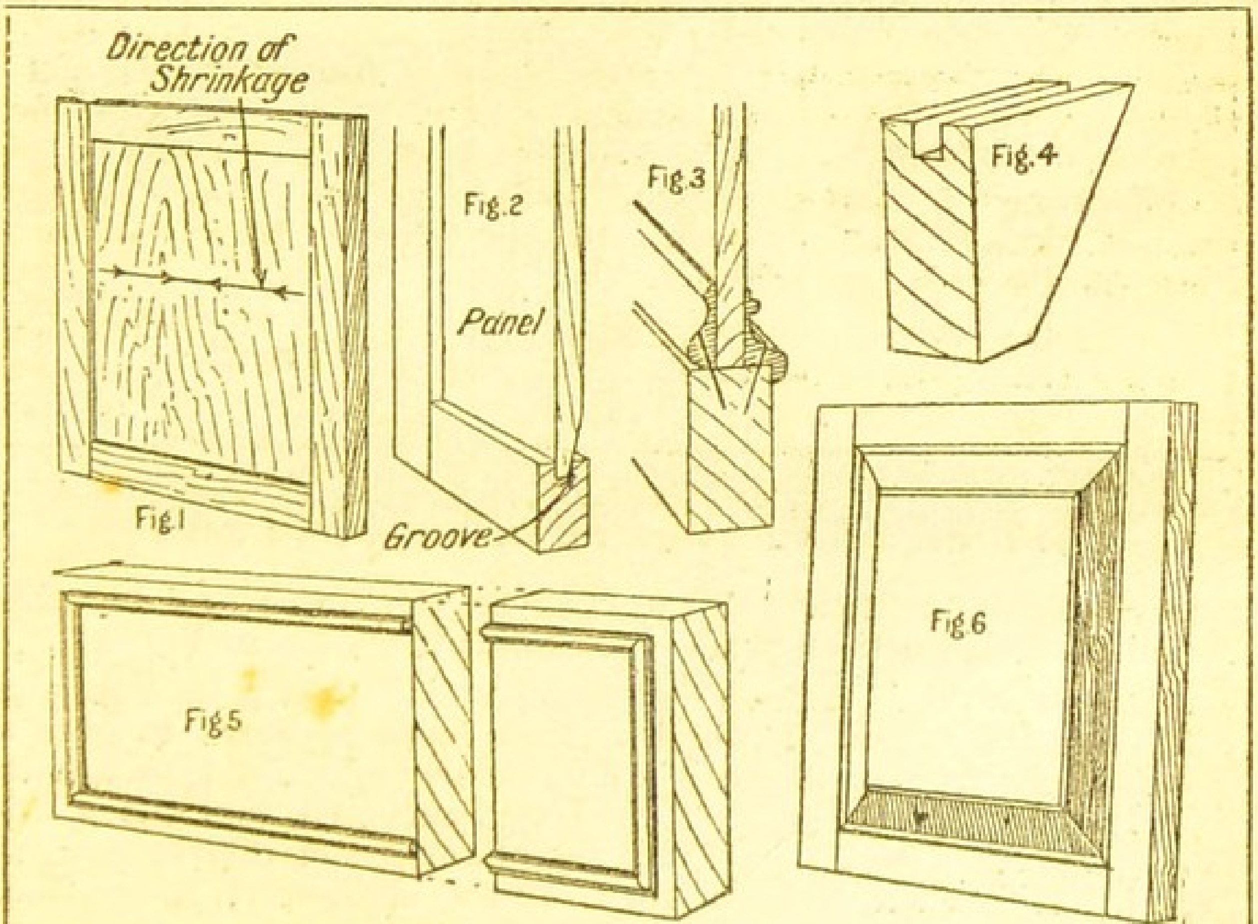
After completing the art work, allow the material to dry thoroughly. To fix, dissolve one tablespoonful of plain gelatine in a pint of hot water. When cool lay the painted linen in it. Take out without wringing, lay it flat on a towel, and leave it for 24 hours to set. Then press out by ironing on the right side. When soiled, the panel, or other article made of linen painted in this method, can be washed in the following way. Put three tablespoonfuls of table salt in a quart of water and let the fabric soak for five minutes. Then wash lightly in soap flakes. Rinse in clean cool water without wringing. When this has been done the material is placed so that it lies smoothly on a towel ; roll it up for a few minutes, and then iron on the right side.

Water colour pencil painting can also be used on georgette and other silks. It has a softer appearance on these than the other mediums described, but excellent effects are possible.

PANEL, Making a. While the term panel is used with various meanings in different industries, its most general application is to woodwork, being the name given to an area recessed below the general surface. Usually the panel is a separate piece of wood to that of the framework enclosing it, and in the majority of cases it is thinner.

Roughly speaking, the object of the panel is threefold. It is the result of an effort to obtain lightness in construction without detracting from the strength of the work; it reduces the risk of warping and splitting, and it effects an economy in material. Panels are found in great variety in every branch of woodwork, and are decorated in many ways when the particular use for which they are required calls for some form of ornamentation.

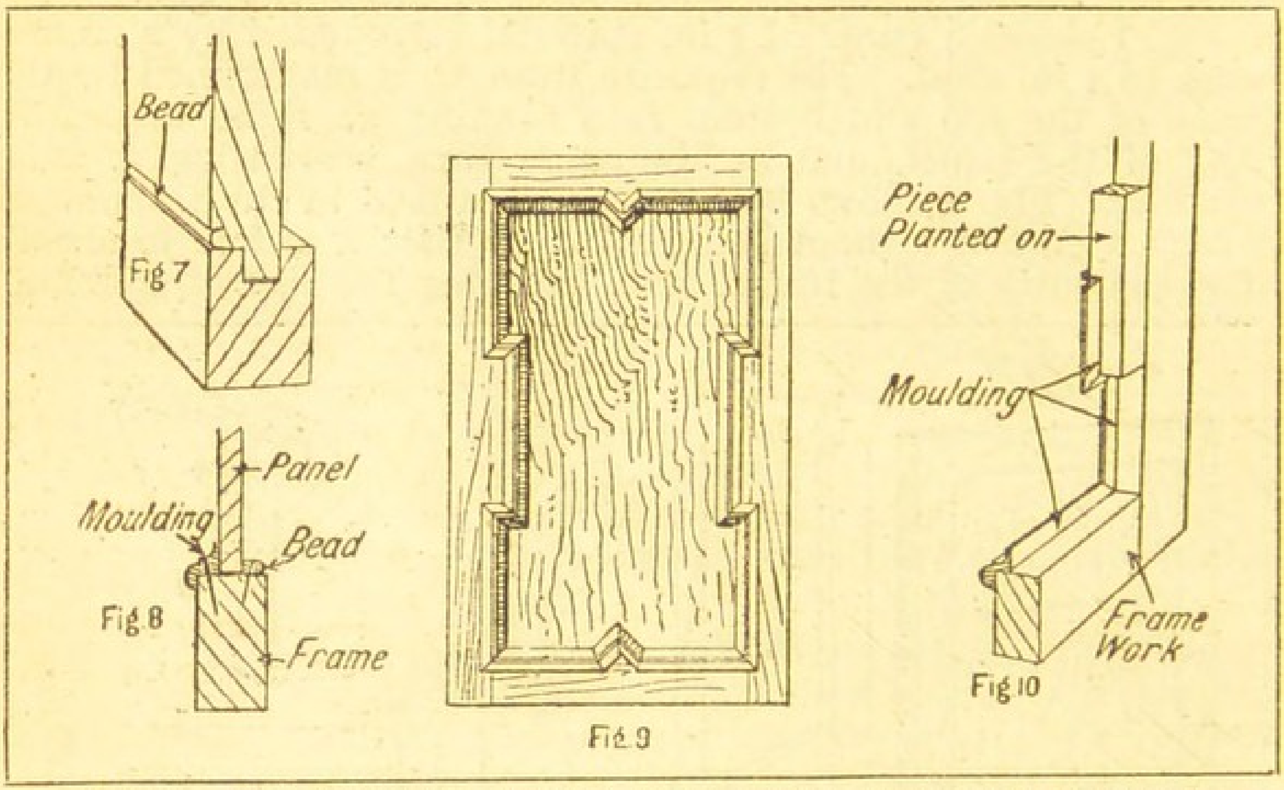
Fig. 1 shows a panel of ½ in. material surrounded by a framework of 1 in. stuff. The requisite strength is maintained by the grain of the top and bottom rails running at right angles to that of the panel, and at the same time preventing it from twisting. Fig. 2 shows how the panel is held in the framework within a groove without being fixed, so that it is free to shrink independently of the frame, thus lessening the risk of splitting.



PANEL. **Fig. 1** Simple type. **Fig. 2.** Section of same, showing how it is held by groove in framework. **Fig. 3.** Section of panel held between two mouldings. **Fig. 4** Mullet. **Fig. 5.** False panel, with mitred moulding. **Fig. 6.** Raised panel.

On no account should a panel be glued or otherwise rigidly fixed to the frame. If the panel in Fig. 1 had been glued in, the pull caused by its shrinkage, as shown by the arrows, would be opposed by the fixed resistance of the top and bottom rails, and this would result in splitting.

Where a panel is not grooved into the frame, but kept in position by two mouldings, as in Fig. 3, the nails holding the mouldings must be driven into the frame as shown, and must not pass through the panel. When it is desired to groove a panel of more than $\frac{5}{16}$ in. thick into a framework of 1 in. stuff, the panel should be bevelled off at the edges, as in Fig. 2. It is not necessary to make a groove of more than about one-third the thickness of the framework, as a wider groove weakens the whole by leaving the projecting portions too thin. The panel should fit just hand tight in the groove, and the best method of testing it is to groove a spare piece of wood, called a mullet, with the same



PANEL. **Fig. 7.** Section through panel, fitting flush with framework. **Fig. 8.** Section of panel fixed between moulding and bead. **Fig. 9.** Oak panel with applied moulding. **Fig. 10.** Diagram giving details

size of groove as that to be worked on the frame and test this round the edge of the panel. A mullet is shown in Fig. 4.

False Panels. A false form of panel is shown in Fig. 5, a moulding being mitred round a solid piece of wood to give a panelled effect. Fig. 6 shows a particularly effective type known as a raised panel. The stuff is first thicknessed, and the width of the bevelled portion and its inner and outer depths gauged round. It is then rebated down to the shallowest gauge line, working across the grain first, and then bevelled down to the lower gauge line, care being taken to prevent the corners from chipping out; the small hollow moulding is worked last. First thickness

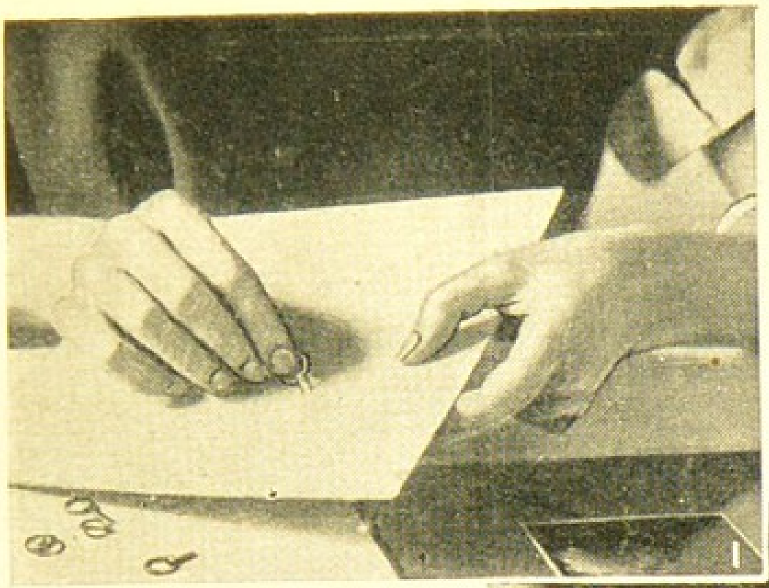


Fig. 1. The cardboard is pierced with holes for the hangers

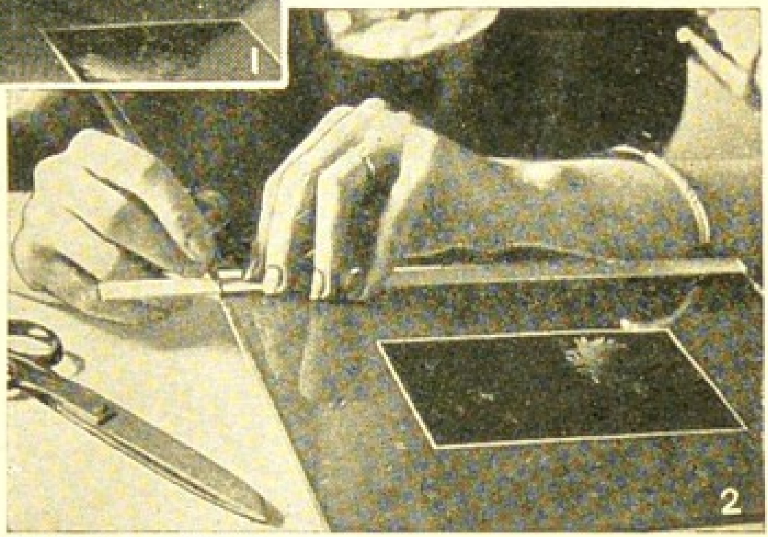


Fig. 2. Two lengths of cardboard strips are cut off to the exact length of the glass

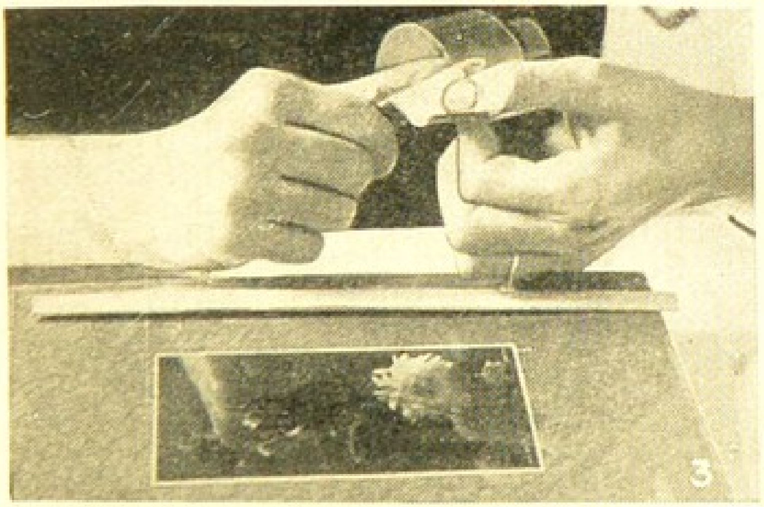


Fig. 3. A piece of gold passe-partout binding ½ in. longer than the cardboard strip is cut off, moistened and laid on it, being firmly pressed down with a bone creaser

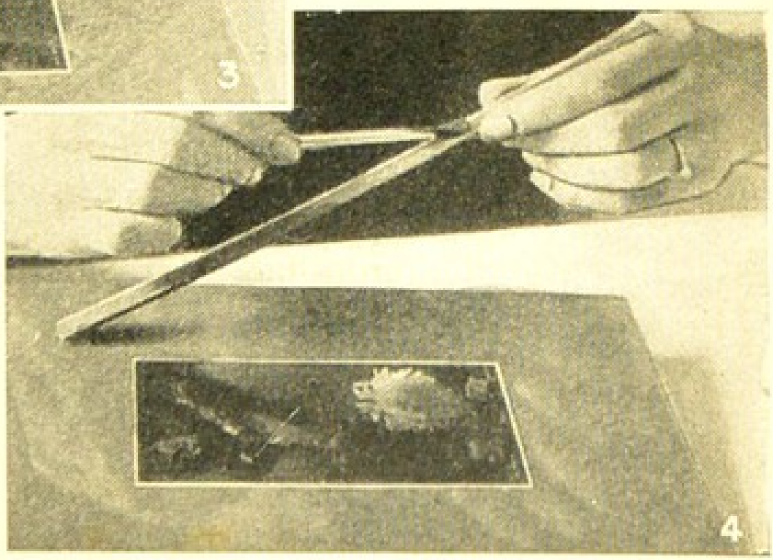
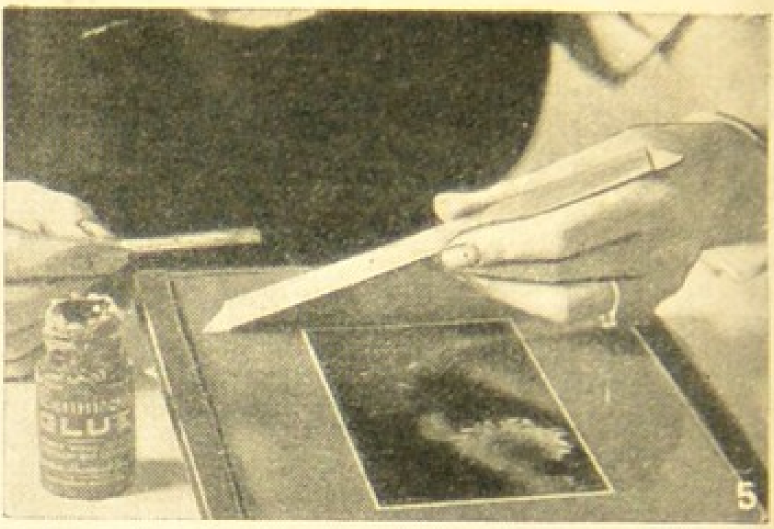


Fig. 4. Glue is applied lightly to the two covered strips and they are then placed in position on the glass exactly level with the edge

PASSE-PARTOUT : FIRST STAGES IN THE FRAMING OF A PICTURE

Fig. 5. Two more lengths of cardboard strips are cut to fit exactly between those glued on the glass, the ends being mitred, and the same process of glueing is followed



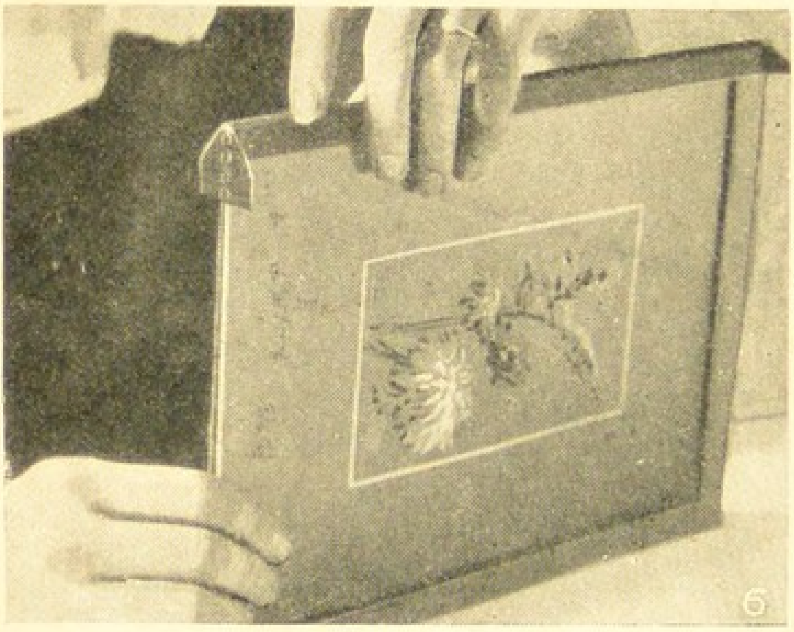
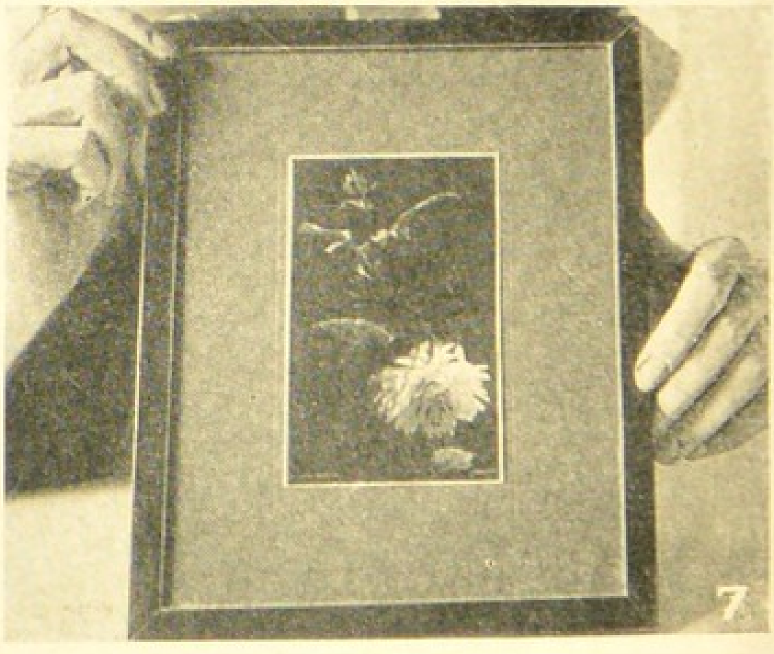


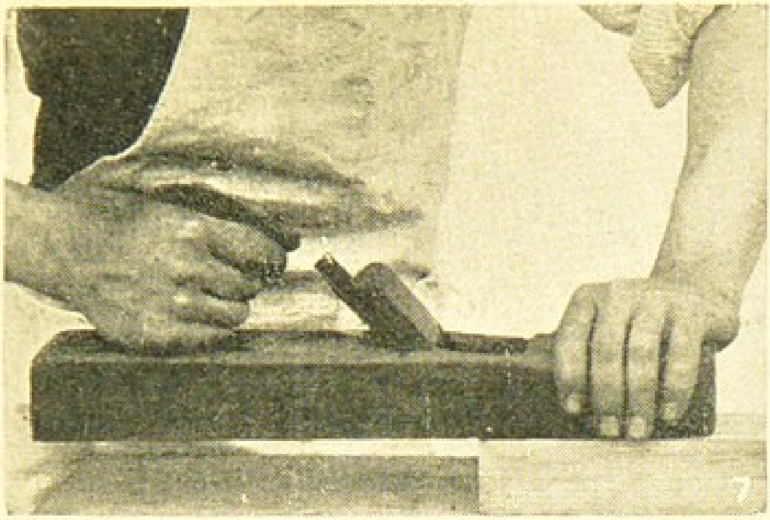
Fig. 6. Two pieces of binding are cut and laid over the inner binding. Picture, backing, mount and glass are placed together and the binding brought over to the back

Fig. 7. The finished picture, showing the pleasing effect of this style of framing.

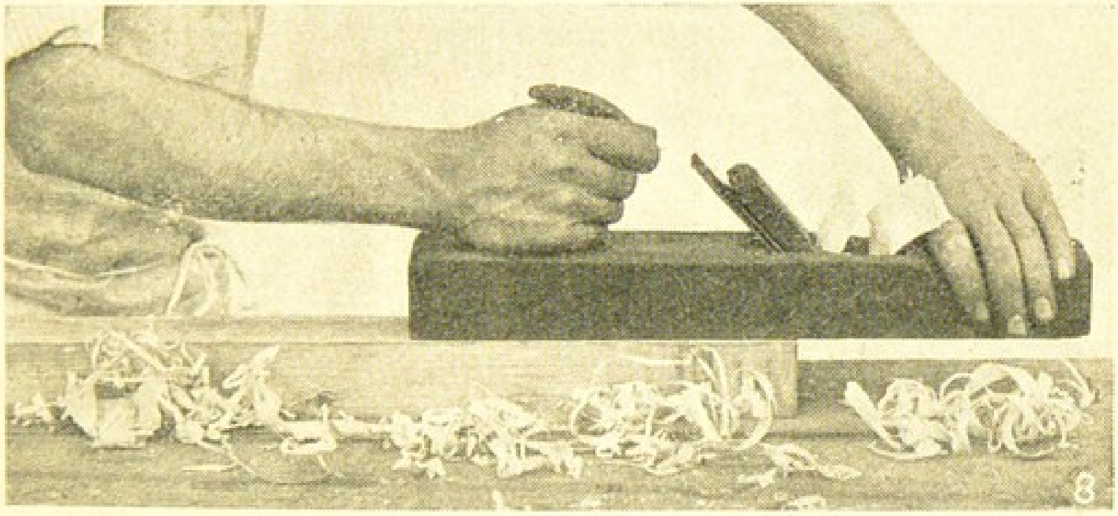


PASSE PARTOUT : THE FINISH OF THE WORK

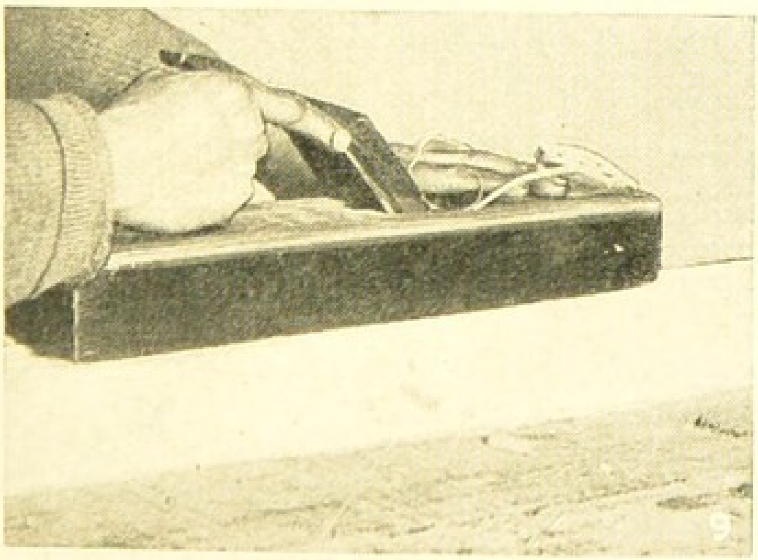
Courtesy of Dennison Manufacturing Co., Ltd.



Start of the stroke with a jack plane

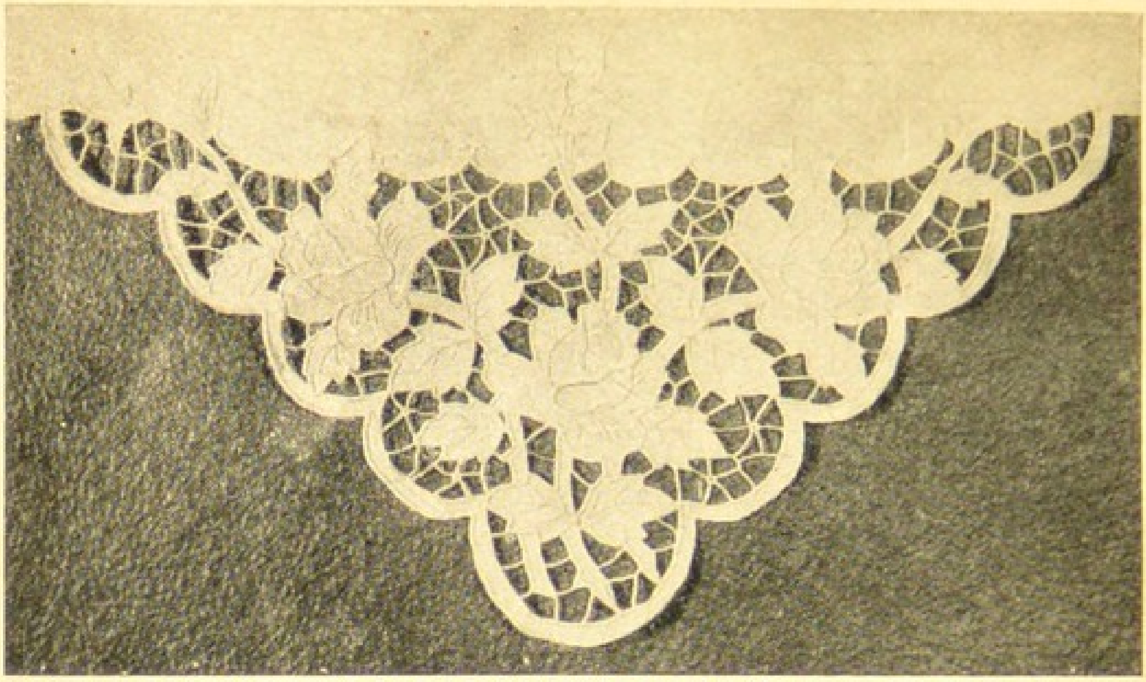


How the plane is held at the finish of the stroke

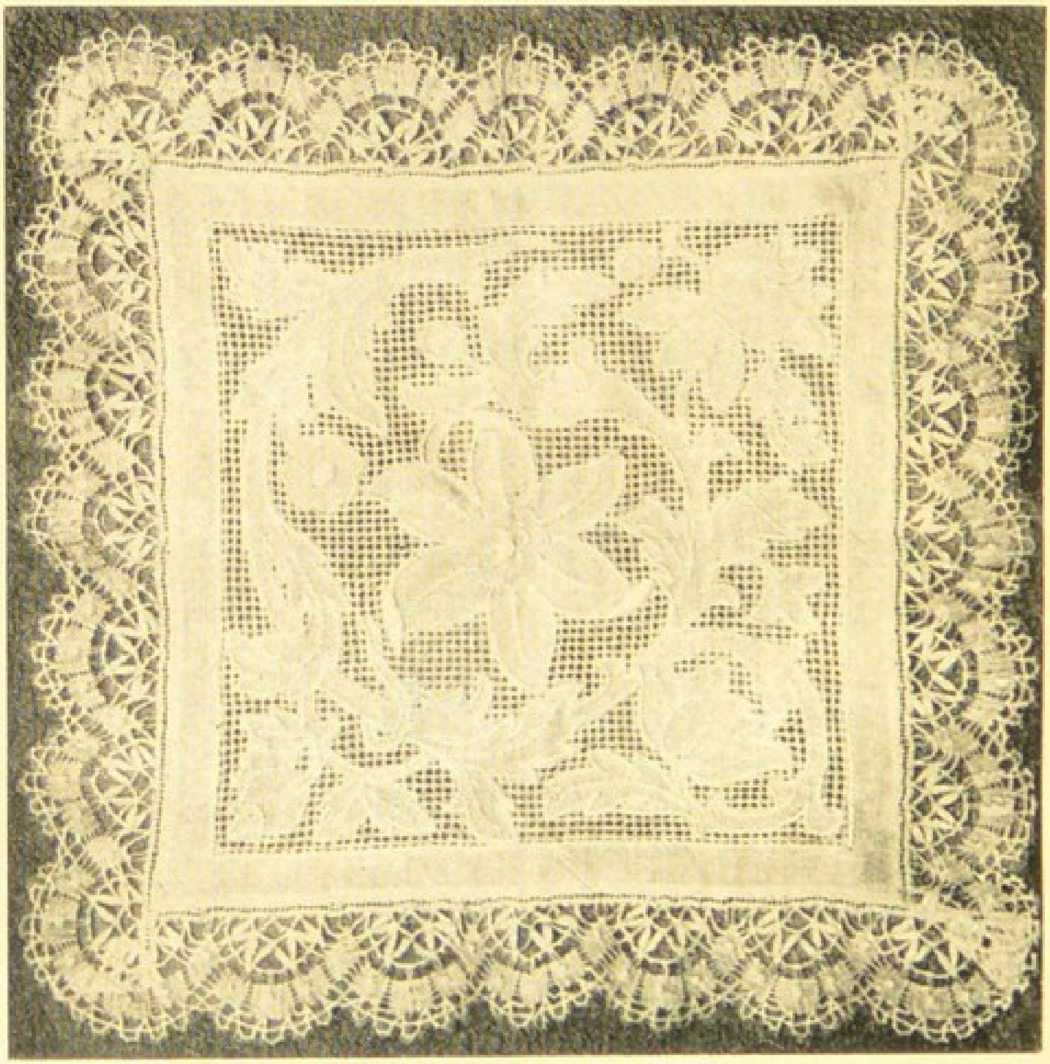


Shooting the edge of a board with a jack plane

LESSONS IN USING A JACK PLANE



Renaissance work, an effective form of embroidery for white materials, as in the tablecloth shown here



Punch work, effective design for linen mats edged with lace, suitable for a luncheon set

TWO DELICATE EMBROIDERY DESIGNS

Courtesy of Harrods, Ltd.

the stuff carefully, or the bevelling will result in the edges being uneven in thickness, causing a bad fit.

All the stuff used should be as clean as possible, and when the work is to be polished should be, wherever possible, of one piece. This is not possible in the case of very wide panels when they are jointed up in their width, using either dowels or a tongue and grooved joint when the wood is sufficiently thick to take them. Another type is that used when conditions require that the panel shall finish flush with the framework, as in certain large table tops. The face side is rebated, forming a tongue which fits into the groove in the frame, as in Fig. 7. A good plan is to run a bead along the rebated edge of the panel with the grain as shown, so that in the event of the panel shrinking the open joint will not be so obvious.

The best method of securing a panel not grooved into the framework is to pin a bead in the rebate at the back, as in Fig. 8. This not only leaves it quite free to shrink independently, but the panel can be removed easily by raising the beads. Fig. 9 is a decorative panel for use in oak work; as in the case of the other panels, the mouldings are attached to the framework and not to the panel. Fig. 10 shows the main construction, consisting of a plain square edged frame mortised together and having pieces planted on to the edge wherever the break-forward parts occur. A rebated moulding is mitred round as shown, and the panel is then cut to a corresponding shape and fastened in with beads.

PANEL PIN. The fine straight nail known as a panel pin is used for cabinet work and other woodworking processes. It has a flat head with a tapered portion that blends into the shank of the nail. The panel pin is intended for use on panels and thin material, as owing to its slender form it can be driven in with little risk of splitting the wood, and is easily drawn or punched below the surface. The amateur woodworker should make good use of this handy nail, as it is far less prominent than most other kinds. For many domestic purposes a panel pin 1 in. long and 16 gauge can very well take the place of a larger nail.

PANEL PLANE. The chief use of the panel plane is to true up wood after it has been roughly planed with a jack plane. It is made usually of metal, from 9 in. to 16 in. long with a cutting iron from $2\frac{1}{4}$ up to $2\frac{1}{2}$ in. wide. The metal is either cast or malleable iron or steel. A panel plane about 15 in. long is useful for many purposes and is more convenient to handle than the longer jointer plane. It is possible to plane a perfectly true joint even of considerable length with a panel plane 14 in. or 15 in. long. The iron of the plane should be sharpened in a similar way to that of the jointer, i.e. with a very slightly curved edge, sufficient shape being allowed to prevent the corners digging into the wood. Some workers, however, prefer to give a perfectly straight edge to the iron with the corners taken off.

PAPERHANGING FOR WALLS AND CEILINGS

Instructions on the Re-decoration of Rooms

This article belongs to the important group that deal with the decoration of the house, among these being Painting; Panelling; Wallpaper. The information given will be found by the handyman to be of the greatest value in carrying out home renovations

Paperhanging is the process of covering the surface of wall or ceiling with paper manufactured for the purpose, allied with the aid of a suitable adhesive. It may appear at first glance that there is no great difficulty in papering a room, but the amateur will speedily discover that it is necessary to pay close attention to certain details which, if observed, will result in a satisfactory job, but if they are ignored or omitted the result will be disastrous. The tools necessary are a large pair of scissors with blades about 7 in. long; a large paste brush; a brush with long bristles closely set into the back, which is also its handle, used for smoothing the paper when putting it on the wall; a roller about 8 in. long, covered with thick felt; another an inch wide for rolling edges; a stripping knife and a plumb bob and line.

A table is required on which to paste the lengths of paper; a width of 24 in. is necessary and the length should be 6 ft. A couple of light planks hinged or fastened together side by side make a good table. These must be supported at a height of about 2 ft. 6 in., preferably by trestles, although boxes or other supports can be utilized.

Wallpapers are produced to accord with the purpose of every type of room and in a great number of different qualities. Papers with well-distributed patterns show joins least when hung, and if of medium weight are among the easiest to apply. Quite plain papers require greater skill to hang successfully. Between these two types there is a large variety of mottled, grained, stippled and indefinitely patterned papers, which give excellent results and are easy to handle.

Wallpapers of light and nondescript tints (cream, fawn, etc.) can be used in any room, but bright colours and deep shades have definite character and use. Bright yellow and orange can be employed for hall and staircase; amber, maize and golden tints for sitting room, lounge or dining room. Browns and greens are also in favour for dining rooms. Mottled effects resembling vellum and old parchment are very decorative.

Choosing Paper. When selecting paper the purpose or use of the room should be given first consideration, and the aspect is of scarcely less importance. Warm tints, such as yellow, brown, and shades of red are helpful in north and east rooms. Blue and grey should be reserved for rooms with southerly aspects. Special types of paper are made for particular purposes. White grounds with "satinette" prints are made for ceilings, also embossed papers. Some of these, with definitely geometrical patterns, are also useful for dado decoration. Bathroom papers should be either varnished or of the "sanitary" type. The latter is printed with an oil medium, so that the colour is unaffected by moisture. The most satisfactory treatment for bathroom walls is, however, to hang an unvarnished paper and apply the varnish after it is hung. By so doing the joins of the paper are sealed. Two coats of size must be given before varnishing.

QUANTITY OF PAPER NEEDED. To estimate the quantity required to cover the walls of a room, add the total length of the room to the width, multiply by twice the height, and divide this total by the area of one piece of paper in square feet, which may be taken as approximately 60 sq. ft. The result is the number of pieces required. When measuring the room, include the window openings, fireplace, and doors, as in practice it is found that by including them in the whole area it allows for cutting and waste in the paper. The following table gives the number of pieces required for a room, provided the height to cornice and total feet run in inches round the walls are known.

Feet run including Doors and Windows	Height in Feet from Cornice to Skirting								
	7½	8	8½	9	9½	10	10½	11	11½
28	4	4	4	4	4	5	5	5	5
32	4	4	5	5	5	5	5	6	6
36	5	5	5	5	6	6	6	7	7
40	5	5	6	6	6	7	7	7	8
44	6	6	6	7	7	7	8	8	8
48	6	6	7	7	7	8	8	9	9
52	7	7	7	8	8	9	9	9	10
56	7	8	8	8	9	9	10	10	10
60	8	8	8	9	9	10	10	11	11
64	8	9	9	9	10	10	11	11	12
68	9	9	9	10	10	11	12	12	13
72	9	10	10	11	11	12	12	13	13
76	9	10	10	11	12	12	13	13	14
80	10	11	11	12	12	13	14	14	15
84	10	11	12	12	13	14	14	15	16
88	11	12	12	13	13	14	15	16	16
92	11	12	13	13	14	15	16	16	17
96	12	13	13	14	15	15	16	17	18
100	12	13	14	14	15	16	17	18	18

This scale is for papers of English measurements (21 in. by 11½ yds. approximately). For papers 7½ yds. long 28 in. wide add to the above table in the proportion of 1 in 7.

In dealing with ceilings, multiply length by breadth in feet and divide by 54. The result will give approximately the number of pieces required.

STRIPPING OLD PAPER. Old paper should be stripped before new is hung, not only for hygienic reasons, but also because paste perishes in the course of time and the application of new paper is likely to raise blisters which cannot be smoothed out. If, for some reason, old paper cannot be removed, all edges and angles of walls should be carefully examined and loose places pasted down. When dry, a coat of size should be given over the whole surface. It is advisable to obtain the best powder size and mix according to the printed instructions. Size should be diluted so that when cold it will set in a weak jelly. It is better to apply two coats of weak size than one strong coat.

Old paper is removed by soaking with water until it has penetrated to the plaster. The stripping knife is then used to release the paper, and must be handled so that the points do not damage the plaster. The vigorous use of the knife is unnecessary. It is better to apply more water. A large distemper brush is best for wetting the paper. Commence at the top of the wall, working right and left as far as the arm can reach, and proceed downward. A sponge wrung out in clean water must be used frequently to absorb the water which will collect at the skirting. After stripping, the wall should be sponged with clean water and, when dry, a coat of size should be given.

Papering New Walls. New walls are sometimes distempered and left for a while before papering, on account of the risk of detriment to the colours if papered before the walls are properly matured. If, however, the risk of discoloration is accepted, it is wise to hang inexpensive papers at first, choosing those in which shades of maize and yellow predominate, and avoiding blue and green as much as possible. Light grounds with well-covered patterns are very serviceable.

If possible a "lining" paper should be hung as a preparatory whenever good quality papers are to be used. Lining gives a uniform surface which enables good joins in the finished work to be made more easily. Lining paper is of distinct value on outside walls, especially if their surface is of hard and non-absorbent nature. On such walls in cold and damp weather moisture readily condenses inside and is frequently the cause of paper loosening at the edges.

Before hanging, wallpaper needs to be trimmed. It is sometimes possible to have this done by machine when purchased, but it is not difficult to accomplish by hand. Take a low seat and, with the legs extended, unroll a piece of paper, holding the end in the left hand and letting the roll rest on the feet. Operate the scissors with the right hand whilst the left rolls up the paper on the lap. The paper must be trimmed to the edge of the pattern, or to the line which on many papers is printed to ensure accuracy.

Making Paste. Good paste powder, to be mixed with either hot or cold water, can be procured in convenient size packages, but the best paste, however, is home-made. To 3½ lb. of best household flour add only sufficient cold water to make a stiff batter. Mix in a clean pail and add 1 gallon of boiling water in which two small tablespoonfuls of ground alum have been boiled. The batter should be well beaten up as the water is added, and the paste should be free from lumps, or it will need straining through butter-muslin. When the paste is cool, cover the top with a little cold water to prevent a crust forming, and then leave it to get cold. This paste should be made of a stiff consistency, requiring thinning with cold water before use.

Paste should not be used thinner than can be easily spread. A stout paper can be pasted with thicker paste than one of less substance. Heavily embossed papers may require paste to which a little glue has been added. The glue should be made in the usual way, and poured on to the paste while hot, mixing thoroughly. Alum must be omitted from paste if the latter is to be used for papers with any " gold " or metal in their printing. Washing soda must be added to the water instead, but not more than $\frac{1}{4}$-oz. to 1 lb. of flour.

Cutting Paper to Length. Before pasting, the rolls must be cut into the required length. If the paper is plain or does not require special matching at the edges, this length will be the vertical dimension of the space to be papered plus six inches, this for trimming at top and bottom (i.e. 3 in. at each end).

If the paper is patterned further consideration is necessary. The design must be examined and choice made of a suitable place for finishing at the top so that the details of the pattern shall be as complete as possible. It is wise to select the most important details and choose a line across the width so that these shall not be mutilated. At the bottom of the wall the line is not so important, but with care it is often possible to arrange that the lengths are finished so that both top and bottom are pleasantly completed. Three inches beyond the line selected for finishing at top and bottom must be allowed for trimming.

Always examine the edges of rolls before trimming, to see whether there are marks indicating where the pattern joins. These joining points are given in cases where any difficulty might arise, also arrows showing the correct way up.

Pattern Repeats. In large patterns it may be that the important features do not repeat horizontally on each length but on alternate lengths. This characteristic constitutes a " drop " repeat, and in such cases the second length requires consideration at top and bottom in the same manner as the first. It is advisable before cutting, to unroll three trimmed rolls on the floor, joining up the pattern and laying rods at top and bottom, the distance between the rods being the vertical dimensions to be papered. Thus the choice of line for finishing on both lengths is easily made.

To take the curl out of the roll of paper, unroll about 24 in. and let it drop over the edge of the table and back to it. Hold the opened roll in the left hand on the edge, with the right hand lightly pressing on the face of the paper. Then with the left draw the paper upward between the right hand and table edge.

Repeat the operation two or three times, and the most obstinate curl will be flattened.

PASTING THE PAPER. When the lines for cutting and dimensions are decided, the paper can be unrolled on the table face upward, with the uncurled end dropping over one end of the table, the dimension marked off and the required length cut. Repeat this until the roll is finished. Then turn the lengths face downward, any surplus beyond the ends of the table being equally distributed right and left. Push all the lengths about 6 in. away from the front edge of the table, then bring the top length toward the front, so that its front edge is quite level with the front edge of the table, and at the same time, with the right hand, pull the length so that its left end is resting on the table ready for pasting. Work the paste from the centre towards the edges, completing the left and farther edge before the front edge. The paper should be lifted between finger and thumb, while the edges are pasted, so that the paste does not get on the face of the paper.

When rather more than half the length is pasted it must be folded over, pasted surface to pasted surface, with edges meeting exactly and lightly pressed with the hand. This folded piece can be folded again and the folds drawn to the left end of the table so that the unpasted right end can be dealt with in the same manner.

The right end should be folded over with the extreme end overlapping about an inch and then turned back, so that it can be gripped when releasing the folds for hanging. The extreme end of the left fold should be turned up in the same way, but no pasted surface must be left exposed between these two ends. When complete, the pasted length can be lifted off the table and placed on one side whilst another length is pasted, unless the paper is thin or absorbent, when it may be necessary to hang immediately after pasting. Avoid the use of sloppy paste. Enough paste must be applied so that when the paper is folded over the surfaces will just slide easily under slight hand-pressure to bring the edges together. Heavy papers may require to be "freshened up" with a second application of paste. It is no use to attempt to hang paper before it has become supple; this does not mean saturated, however. A little experience will quickly enlighten the worker on these points, and the processes themselves which, to the reader, may appear elaborate, will be found simple in practice.

WHERE TO BEGIN THE WORK. Paperhanging should be begun at an angle of the room nearest to the light. If there are two important windows, start work centrally between them, working away to right and left. In this way succeeding lengths on each side are laid towards the light. The work should be finished in an angle where any join would be inconspicuous.

Presuming that the first length of paper is to be hung at the angle of a wall, commence by marking off the width of the paper from the angle at about half the height to be papered; then using the plumb bob and line as a guide, mark several points above and below the centre so that a vertical line can be made by using a straight edge. This line is to be the guide in hanging the first length. If a long flank is to be hung, succeeding lengths should be tested with the plumb line and corrections made, if necessary. It is advisable to plumb a line at every angle, as walls are rarely as accurate as the paperhanger's joins need to be.

When ready for hanging take a length of the folded paper on the left forearm, the top nearer to the body, mount the steps (which should be placed so that they are opened out in the direction away from the space to be papered), and when sufficiently high to reach the top easily, take the near loose end between finger and thumb of each hand and let the length fall gently, opening the pasted surfaces in falling. Apply the top of the length lightly against the top of the line, allowing the 3-in. surplus for trimming to hang over. With the left hand holding the left top, use the right hand to adjust the edge of the paper against the line. Run the hand lightly up and down the edge, then use the smoothing brush, smoothing out toward the centre, upward and downward. When the paper is smoothed out, hold the surplus top edge with the left hand and press the paper with the right hand against cornice or picture rail, and then with the back of the scissors, or a soft pencil, run a line along where the paper has to be cut off. Pull the paper away sufficiently to enable the scissors to be accurately handled, and when cut replace the end and fit down, making a good finish.

The lower portion of the paper has to be dealt with in a similar manner, the lower end being taken between finger and thumb and opened out. The bottom edge is finished the same way as the top. Use the padded roller lightly to get rid of blisters. In the case of embossed papers use the smoothing brush only for this.

The second length must be hung to fit closely up to the first. The position of the steps must be reversed for this length, as the adjustment is to be made in the opposite direction in relation to the plumbed line. When several lengths have been hung the edges should be rolled down, but not immediately after hanging.

How to Paper Ceilings. Ceilings are papered in the same way, but the paper has to be folded in a number of short folds after pasting. These are made under one another in succession until the length is in a neat pile of folds which must be turned upside down, and can be held on a roll of paper in the left hand, whilst the right opens out the folds, and adjusts and brushes the paper on the ceiling.

Papers in high relief require to be well pasted, and need time for the paste to render them applicable. The raised pattern should be carefully guarded, and rollers should not be used except on flat surfaces which adhere to the wall or ceiling. Manufacturers of these relief materials issue special instructions for hanging, and these should be carefully observed.

Borders are frequently used with unpatterned papers, and present no difficulty in hanging, except that they must be placed with accuracy so that paste is not transferred to the paper which the border does not cover. Borders which have a "cut-out" edge are generally supplied perforated in the roll, and should be pasted before tearing apart. Any waste lengths of paper are useful for laying borders on, face downward, for pasting. Use fairly stiff paste for this purpose.

Panelling with borders is a very effective method of decoration and adds importance to the appearance of a room. Special borders termed "stiles" are made for the purpose and can be obtained in several widths, the narrower being used for bedroom and the wider for reception rooms. Setting out requires to be carefully done, and the proportion of the panels in the relation of height to width is important. A rectangular panel does not look well if the width is more than three-quarters its height. A square panel is satisfactory, as is also a double square. Very fine examples of panelling are frequently to be found in Georgian and Adam houses.

General Hints. Old distemper should be removed by scraping and washing before papering. Walls that have been painted should be cut down with coarse glass paper, treated with clearcole and then lined, otherwise the paper will not adhere but open at the joins. If a straight edge is not available, lines can be "snapped" on a wall by the use of a chalked line, this being a fine cord covered with coloured chalk. Fasten the line with pins at the ends or otherwise hold it tautly in position, lift the centre and let it snap, when a chalk impression will be left on the wall. Printed instructions for hanging papers are frequently enclosed in rolls by the makers. Such instructions should be carefully followed.

PAPIER MÂCHÉ: PLAIN AND DECORATED

How to Make Useful Household Pieces

Additional information on the subject of decorating papier mâché articles can be found under the headings Italian Renaissance Work; Lacquer Work; Pattern Printing; Stencilling. See also the articles which appear under the headings Artificial Flowers; Paste; Tray

Papier mâché is manufactured from highly compressed paper pulp moulded to shape during the process of making and then painted and varnished or enamelled. The commercial articles are machine made, but papier mâché can be made at home. Vases, bulb bowls, trays, fire screens, powder bowls, waste paper tubs, and washing-up basins can be constructed from materials which cost very little beyond the time and skill expended on them.

Although used for the simplest objects, this material affords a light and excellent basic composition for painting and lacquer work and has been decorated for centuries by artist craftsmen of many nations. Some beautiful examples are illustrated in Plate 32.

MOULDING THE SHAPE. For a first attempt a bowl or tray should be made, as the method is simple. Procure a bowl of china or metal to serve as a mould. Take any old newspapers or magazines and tear them into irregular shaped pieces, the size depending on whether a small or large object is being made. On no account must the paper be cut; tearing gives it a bevelled edge, which ensures a better fit when pasted on to the mould. Leave the paper in water until it is thoroughly soaked through, and meanwhile prepare some ordinary flour paste, to which a little alum is added, as this makes the paste more adhesive. It should not be very thick, but should be of a semi-liquid consistency.

Coat the inside of the bowl with soft soap, to prevent the paper sticking to it. Then take the paper from the water, dipping one piece at a time in the paste and drawing it through the fingers to make sure the paste is evenly distributed. Spread the paper over the bottom of the bowl. Repeat the process until the whole of the interior is evenly covered; each piece must overlap slightly so that they adhere to each other. Allow the paper to extend from $1\frac{1}{2}$ in. to 2 in. beyond the rim of the bowl, and continue laying on the pieces until the layers are $\frac{1}{16}$–$\frac{1}{8}$ in. deep.

Large objects require to be thicker, whilst small bowls need not be more than $\frac{1}{16}$ in. thick. Now place the bowl before a bright fire or in a moderate oven until thoroughly dry. Draw a pencil line round the rim of the mould on to what will be the outside of the new bowl. Remove the mould, and with a sharp keyhole saw or strong scissors cut off the edge along the pencil line. Rub down this edge as well as the whole of the interior and exterior of the papier mâché bowl, first with a medium, then with a fine glass paper. Number 00 is best for the final rubbing down. To finish, size, paint, and varnish the object. A bowl or anything that is being used for a mould can be equally well coated with the paper from the outside. This method is necessitated when the mould in use is vase-shaped.

For a washing-up bowl, such as that shown in Plate 32, two or three coats of ordinary white enamel are most suitable for the interior, while blue, grey, or brown can be used for the outside. A marbled or mottled effect can also be obtained. Very attractive and decorative bulb bowls can be made by painting the inside in some bright colour that contrasts with the outside, such as orange and black, primrose or grey and apple green. A still more artistic effect is obtained by lacquer decoration in colours as well as gold, bronze and silver. A fruit bowl lacquered black with a design of gold or merely lined with gold is uncommon, and goes well with schemes where a brilliant colour would be out of keeping. Stencils can be employed with good results, and so can gesso decoration. A good hard varnish must be used in the case of bulb bowls to withstand the damp from the fibre.

A tray or any article which tapers towards the bottom can be made in the way described. One similar to that illustrated can be modelled on an old tin tray and enamelled in a bright colour.

Should there be no object handy that can be used for a mould, a lump of modelling clay may be shaped into the form desired. A simple method is to roll out the clay on a board in the same way as pastry to a thickness of 1 in., and cut it out into circular pieces varying from the smallest to the largest diameter. Place one on to the board and build up the mould with the rounds in required order of size, filling in the steps between each layer with clay. If the mould is not going to be used immediately, keep it covered with damp cloths to prevent cracks appearing. Well cover the clay model with soft soap and also the board round it for about 4 in., or the edge of the paper will stick to the board and so prove a hindrance.

Any skilled worker who wishes to produce narrow-necked vases, jugs, etc., in papier mâché, can first make 2 models in clay, each one a longitudinal section of the object. The edges of the papier mâché, after the preliminary moulding has been completed as already described, are cut absolutely true and then glued together; when the glue is quite set 2 or 3 coatings of paper are applied to the outside of the vase or jug. These last coats of paper must not be dried artificially, but merely left in a dry room, or the object will warp and get out of shape, as it has no mould inside.

To make a waste-paper tub or basket from papier mâché is an easier task. An old size tin, or any other round tin of suitable dimensions, will make a good model. Failing a tin, a piece of stout cardboard can be rolled to fit a circular bottom, then glued and allowed to harden. Plasticine is used to round off the join on the outside so that any cracks are eliminated in the finished article and it is given a slightly moulded base. The procedure is the same as for the bowl. Special attention must be paid to the rubbing down, as if the surface is large any roughness will be very noticeable. The old papier mâché workers used pumice-stone for the final rubbing down, and then polished the work laboriously with a chamois leather.

Flower, sporting or other prints form excellent panels for decorating such articles after the final enamelling is completed. In order to ensure better wear the whole article is varnished after the print or, if preferred, a hand-coloured panel has been pasted on and outlined with black. The top is given a finish of gold or silver bronze paint outlined with black. Mottled paper may be used to line the basket or it may be finished in enamel. Chinese lacquer designs are particularly suitable for a handsome waste-paper tub. Cheap enamel dishes and sugar basins make serviceable moulds for small trays and bowls.

Decorated Panels. A papier mâché panel for a table top o1 fire screen is made on any flat tin or metal plate. If really good decoration is intended by a skilled amateur, the old method of making the panel may be followed. An odd length of cheap mat-surfaced wall-paper is quite a satisfactory substitute for the special paper that was used. About 12 sheets should be cut out of the desired size for the panel.

The metal plate is oiled before the first damped sheet is laid and covered with paste and alum. The old workers used a mixture of glue, flour, and resin. Another sheet was laid over perfectly flat and then plate and sheets were placed in a cool oven to dry. The surface was then rubbed down with pumice-stone to ensure smoothness before the next sheet was applied. All the sheets were thus applied and dried in the oven before the panel was completed and strong enough for a table top or tray. To form a moulded edge the paper would be taken over the edge of the metal, shaped by hand, and cut off with keyhole saw.

In some of the beautiful floral designs of the first half of the 19th century pearl was used. In others large flowers and leaves were painted in bronze colours and gold. After 1845 oil colours and bronze colours were utilized in the same designs. Pearl was still employed, but was less seen as the more gorgeously coloured designs became popular.

The pearl effect was gained by use of thin layers of nautilus shells and these were stuck on to the surface of the papier mâché with glue. In modern papier mâché decoration the thinnest shells obtainable for artificial flower making can be specially cut and coloured with spirit stains sold for the purpose. Fish scales can also be used. Very rich effects can be obtained by use of such shells or scales for portions of flowers with oil and bronze colours, for other portions and for leaves, when carrying out a floral design for a panel.

Care of Papier Mâché. Old pieces of decorated papier mâché require careful cleaning. Sometimes a beautiful piece has been so neglected that the original colour and lustre seem quite lost. A soft flannel, damped with a very little pure curd soap on it is the best cleansing agent. When the dirt has been removed the papier mâché must be gently dried with a flannelette duster, a little furniture cream put on with the tip of a finger and the surface immediately polished with an old piece of softest silk. Valuable decorated papier mâché articles should not be exposed to damp.

PARCHMENT. Made from the skins of animals, parchment is used for bookbinding and illuminating, coarser kinds being used for drumheads, banjoes, and tambourines. It is prepared by freeing the skin from hair and flesh while it is attached to a stout wooden frame, subsequent treatment being similar to that adopted for leather.

For the repair of musical instruments it is not necessary to use new material, old deeds, which are often obtainable, are quite suitable For use in the panels of lamp shades, parchment may be made nearly transparent by soaking a thin skin in a strong lye of wood ashes, wringing it out again and again until it is fairly transparent. It may then be varnished with mastic varnish.

Staining is effected with aniline dyes or waterproof inks, but the skins must be stretched tight while drying. Illuminated parchment which has become dirty and greasy may be cleaned with benzine, and if the colours require touching up, ordinary water colours mixed with Chinese white can be used, but specially prepared colours are supplied for the purpose. Stiff parchment will soften in water, but a fairly permanent flexibility is obtained by soaking the skin in glycerine. For new drumheads or tambourines preliminary soaking in water will be quite sufficient.

The parchment mainly used in the home is made by dipping ordinary, unsized paper for a few seconds in diluted sulphuric acid in the proportions of one part of acid with half its volume of water. It is thoroughly washed in water and acquires a parchment-like texture and becomes about five times stronger than ordinary paper. It is impervious to water, though soft and limp when dipped in it. The stout qualities are used for bookbinding, and although not so durable as animal parchment, it may be worked up in the same way. For making lampshades and covering small screens or writing desk sets it is very useful, as it may be varnished to render it more durable; it can be stained to any colour and may be painted.

Such parchment is employed for covering jars containing preserves or anything that can be contained in a jar from which air must be excluded. Several thicknesses are obtainable, but before use it should be cut to the approximate shape and dipped in water to soften it. Owing to its property of stretching when wet, care must be taken to prevent it soaking too long; if this is allowed and the jar is covered with it and tied up tightly, it is very likely to split when it dries.

Vegetable parchment is an excellent material for making moth-proof bags; it can be obtained in large sheets; it is not expensive, and when the bags are properly made the contents are airtight as well as moth-proof. The bags should be made with a double fold at the edges secured with thin fish glue rubbed on evenly.

PARING CHISEL. The blade of a paring chisel is considerably longer than that of the ordinary firmer chisel, and there are two forms, the ordinary parallel type of blade, and that with a bevelled edge. The latter is preferable for paring, that is, cutting wood across the grain, as the blade is thin at the edges, due to the bevelling.

As the tool is intended chiefly for cutting across the grain, it must be kept in very good condition, properly ground and well sharpened. It is handled in substantially the same way as the ordinary firmer chisel. Under some conditions the extra length of blade is an advantage, as, for example, when working at the bottom of a deep slot for a mortise, or under any other conditions where a deep hole has to be dealt with. Paring chisels are obtainable in widths from $\frac{1}{4}$ in. to 2 in., and the sizes most useful for the amateur are $\frac{1}{4}$, $\frac{3}{8}$, $\frac{1}{2}$ and 1 in.

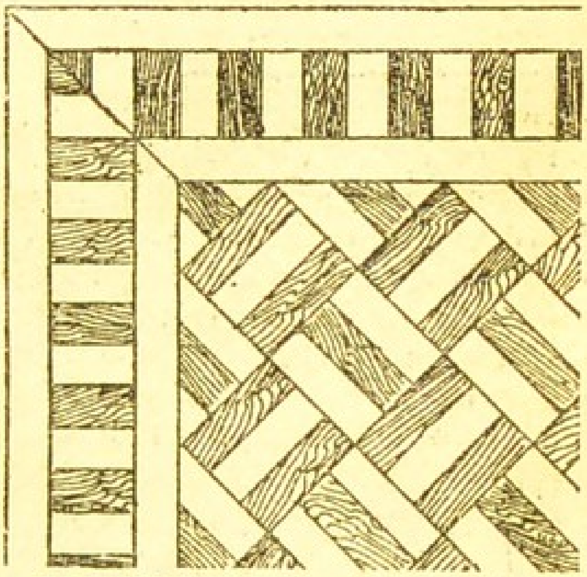
PARQUET FLOORING AND ITS APPLICATION

Effective Methods of Decoration and Construction in Floor Coverings

An article that should be consulted in connexion with this subject is the one on Floor. See also Carpet; Polishing; Rug; the entries on various rooms of the house, e.g. Dining-Room; Drawing-Room; and those on various woods, e.g. Oak; Teak

Before the laying of a parquet floor can be commenced a design has first to be drawn. To do this, the room is measured, the size of the angles being noted as well as the length, breadth and the various breaks, such as the breasting of the fire place, and a scale drawing made. Figs. 1 and 2 show two typical designs. A decorative border should be made sufficiently wide to extend beyond any of the smaller breaks or projections of the walls, so that the plain centre portion will thus finish against a straight line, as in Fig. 3. All larger projections or recesses must be followed round. From this drawing, the number of blocks required can be estimated and the length of the border definitely decided upon.

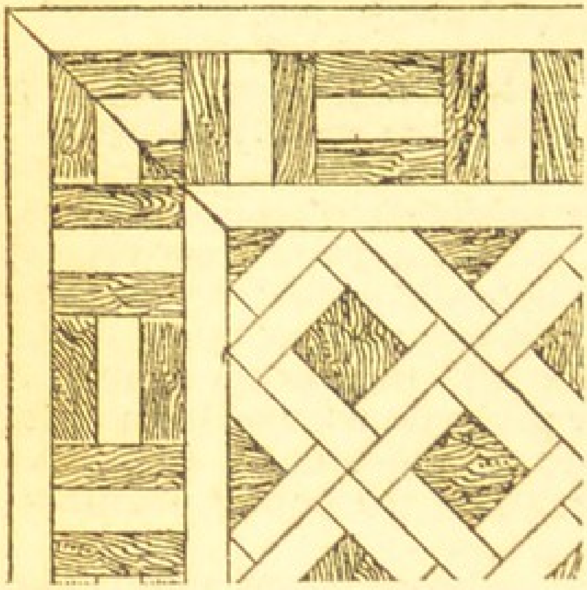
The next consideration is the groundwork upon which the parquetry is to be laid. In new buildings it is usual first to lay a counter-floor on to the joists, this consisting of deal battens ¾ in. thick placed diagonally and butted square into each other at the ends so that the joists will run diversely to those of the upper flooring. When levelled and cleaned off, this forms a good surface for the laying. In older houses a common practice is to disguise well-worn deal floors with a layer of thin parquetry, for which purpose this latter is very suitable as the original floor, being old, is well seasoned and will not be liable to pull the parquetry out of shape.



PARQUET. Fig. 1. Design in two different coloured woods with simple borders

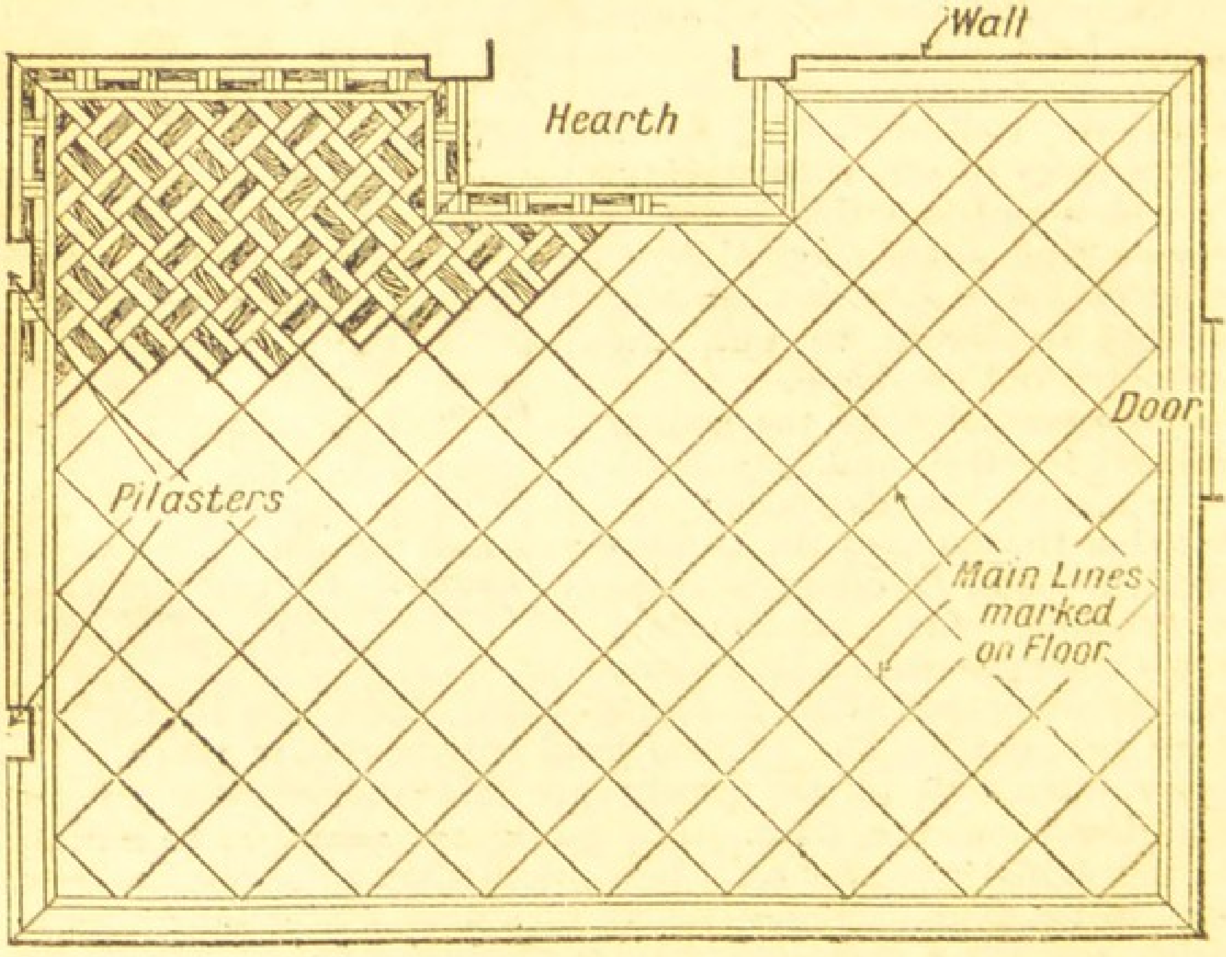
It is essential that the boards are first levelled, and any weak or creaking boards either replaced or the cause of the trouble rectified. The levelling is done by planing, first transversely across the grain with a jack plane and finishing off with a trying plane, the edges by the walls being brought to the general level with a rebate plane. It is very seldom that all the blocks are laid individually in position direct on the floor. The usual procedure is to build up the individual patterns on a bench and then to apply these patterns to the floor.

Fig. 4 shows a complete pattern ready for fixing. With very thin parquetry and in the cheaper kinds there is sometimes no binding joint between the blocks. In this case the patterns are built up on the bench and a piece of canvas glued to the back and, when set, placed in position on the groundwork and nailed through the face, the nails being punched in. Long thin nails are used, similar in shape to pins used for laying oil cloth, having no heads and tapering to a point. In better-class work, and in the thicker varieties, the sides of the blocks are grooved to receive metal tongues, or are dowelled. Wherever possible the patterns are first built up, this being comparatively easy when the blocks are dowelled. The decorative borders are treated in a similar way, being put together in lengths of about 18 in. to 3 ft., according to the pattern.

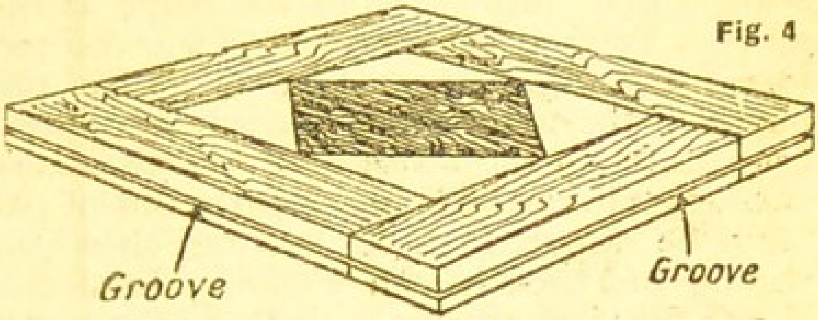


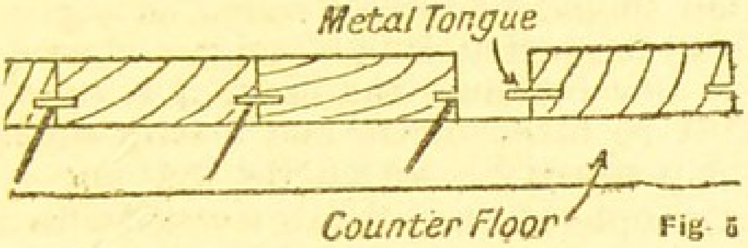
PARQUET. Fig. 2. Showing use of both rectangular and square slabs

Figs. 5 and 6 show methods of securing the blocks to the floor when it is required that no nail holes shall show on the surface. In Fig. 5 the block is fitted over the tongue of the preceding



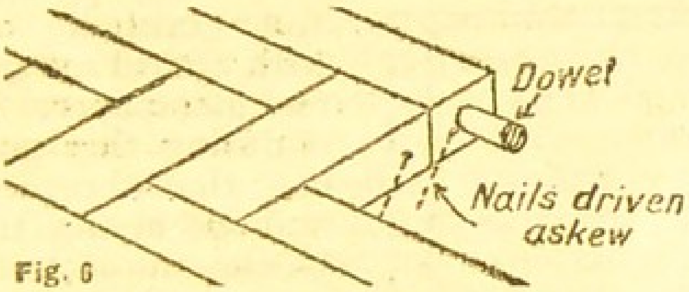
PARQUET. Fig. 3. Plan of the room, showing parquet design to be employed, and arrangement of border block and a nail driven askew through the groove at the other side, so forcing the block well towards the other and making a close joint. The procedure is repeated with another block as shown, the grooves of both blocks being thus automatically locked with one nail. The dowelled example in Fig. 6 is treated in a similar way so that one nail locks the adjacent ends of two blocks. For first-class work the blocks



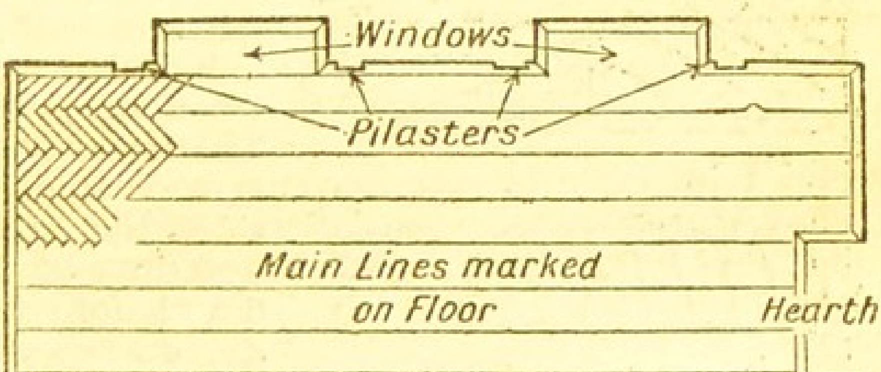


are also glued in position, the underside being left roughened so that the glue will obtain a firmer grip.

In all phases of the work it is customary to fix the border before filling in the centre. This requires some care when turning it round shaped projections and recesses, as all parts should fit perfectly to



obtain a good result. In the event of a large bow window requiring a curved bordering, a template of the shape is made and the pattern drawn on it. The blocks are then assembled on this and fastened together in sections, their relative positions being marked so that they may be reassembled in position on the floor. It is advisable to commence with all awkward portions such as this, fitting the straight pieces to them. In order to keep the pattern regular and symmetrical, the main lines of the design should be



PARQUET. **Fig. 4.** Pattern unit of grooved blocks ready to fix. **Fig. 5.** Blocks fixed by tongues and grooves. **Fig. 6.** Blocks fixed by dowels. **Fig. 7.** Plan of floor where no border is required marked out on the floor, and the sections of parquet laid in accordance with them. These lines are indicated in Fig. 3, which shows the floor partly covered with the blocks. When no decorative border is required, a length of stuff is first mitred round the edge, as in Fig. 7; this not only gives a finished appearance to the completed parquet floor, but forms a straight clean edge to fit the pattern against. It also obviates the necessity of cutting the blocks round any awkward projections in the walls, and is occasionally useful in the event of two opposite walls being slightly out of parallel, as the two strips may be tapered, thus leaving their inner edges equidistant throughout their length (Fig. 8). In all cases where the parquetry is not finished against a wall, as for instance by the hearth and the door in Fig. 7, a batten should be mitred round as a protection to the edge. When parquetry is laid on an already existing floor, i.e. not in a new building, the door, if it opens inwards into the room, must be taken down, and a strip equal to the total thickness of the parquetry sawn off the bottom.

When the laying has been completed, the whole is levelled with a smoothing plane and finished off with a steel scraper and glasspaper. It is during this process that the method of laying the blocks in sections comprising a complete pattern is appreciated, as only the juncture of the several patterns will require planing, the individual sections having been trued up prior to this being laid. The usual polish for these floors is wax thinned out with turpentine, the mixture being rubbed well in and left to stand for a day before being polished with dry dusters or with a brush. In some cases a body of french polish is put on to keep the dirt from begriming the surface. Another method is oil polishing, which has the advantage of not being so liable to tread off or mark; it takes however, a great deal of labour to keep it in a fair condition of freshness.

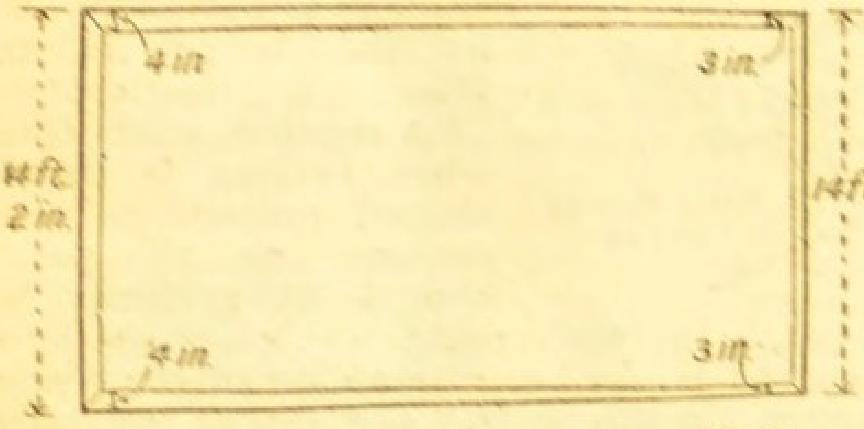


Fig. 8

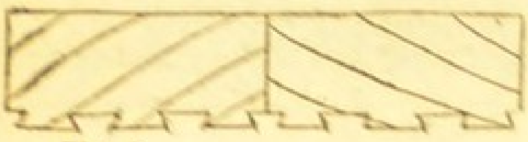


Fig. 9


Fig. 10.


Fig. 11

PARQUET. Fig. 8. How to arrange for walls that are not parallel. **Figs. 9 - 11.** Sections through three types of block

METHODS OF FIXING. The laying of the thicker wood block floors entails a more elaborate process; no nails are used to fix it, the blocks being held down through the medium of a coating of mastic under the blocks. Figs. 9, 10, and 11 are sections through a few types of blocks, the under sides and edges being grooved in the form of a dovetail into which the mastic is forced, forming an exceedingly strong fixture. When the blocks are to be laid on a counter floor, a mixture of glue and whitening is used to fix the blocks, but in other work a mixture of pitch and coal tar is more often employed.

Fig. 12 shows a section through the flooring. A bed of concrete about 6 in. to 1 ft. in thickness is first put down and allowed to thoroughly harden. It is essential that this should completely dry, as otherwise the moisture will cause the woodwork to swell. This bedding is levelled by floating a coat of cement over the top, and is again left to set, the time varying according to the weather. In some cases a series of plugs are floated in the concrete level with the surface of the cement at a distance of about 6 ft. apart, as in Fig. 10. and to this the blocks are secured with screws.

LAYING IN MASTIC. Fig. 13 shows a method of interlocking the blocks with tongues fitting into grooves cut in the side of the blocks. Another system is that in Fig. 14, in which the same result is obtained by dowels. When laying the blocks the latter are stacked in a handy pile, and a small portion of the floor boarded round to keep the mastic in bounds and to prevent it from spreading over too large an area at a time.

The mastic is then poured within the space at boiling heat and the blocks quickly rubbed in position, having been first dipped in the mastic up to about half their thickness. The size of the area boarded off will vary according to the number of men engaged on the task, two men being able to tackle an area of about 2 yds. Fig. 14 shows a herringbone floor, the blocks being numbered to show the order in which they are laid. When the laying has been completed it should be left to set for a few days, and is then levelled off.

The amateur can readily construct a wood block floor covering from strip material. This may be oak or any other ornamental wood, or it may be ordinary builder's deal of the kind sold as door stopping and known as 4 in. by $\frac{1}{2}$ in., but which actually measures $3\frac{3}{4}$ in. wide and $\frac{7}{16}$ in. thick. It is cut to lengths of $11\frac{1}{4}$ in., as the length of the strip must be exactly equal to three times its width. If some other width material is used the length should be adjusted accordingly. A simple sawing gauge should first be made. This comprises a baseboard constructed from 9 in. by 1 in. deal. At the left-hand end a cross batten is secured by glue and screws. Two tapering upright pieces are screwed to the sides of the board, and a vertical saw-cut made through them exactly $11\frac{5}{16}$ in. from the stop. The extra $\frac{1}{16}$ in. is provided to allow of the end grain of the material being planed up.

A few pieces only should be cut out at the start, and the ends planed by the use of an ordinary shooting board. A smoothing plane or jack plane may be used. To ensure all the pieces of timber being of uniform length, they should be inserted into a gauge, comprising a wooden baseboard to which cross pieces of batten are fitted to either end, the space between the inner faces being exactly 11¼ in.

Having prepared a few lengths in this way, they should be tested by laying three of them side by side and placing a fourth at right angles across them. The ends of the cross pieces should exactly coincide with the outer sides of the three pieces. Should there by any variation, adjustment should be made accordingly until the length is exactly three times the breadth. This having been determined, the necessary number of blocks may be prepared. If it is desired to stain them, this can be done before commencing to lay the blocks, as the colour effect is better than if the blocks are stained after they are in position.

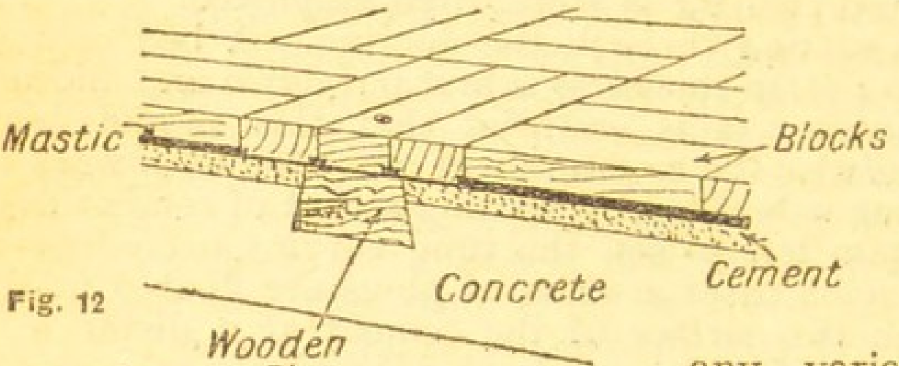


Fig. 12

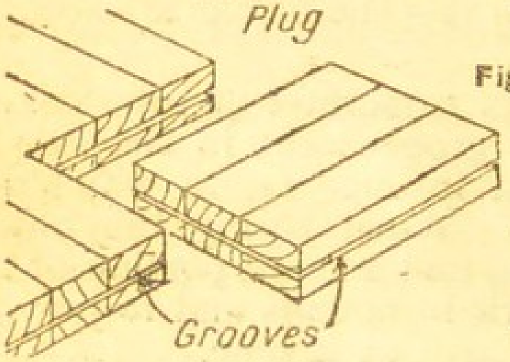


Fig. 13

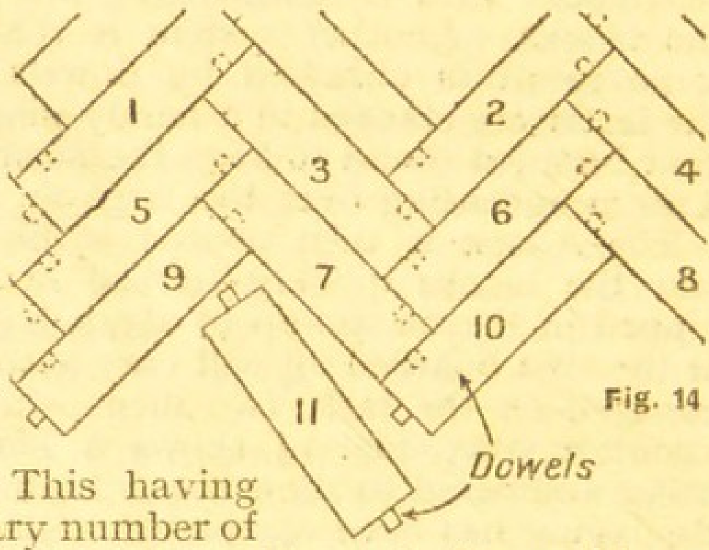


Fig. 14

PARQUET. Fig. 12. Section through entire flooring. **Fig. 13.** Blocks fitted by means of tongues and grooves. **Fig. 14.** Block fitted by means of dowels

Choosing a Design. The next step is to determine the pattern. Generally the blocks can be laid direct on the floor boards provided the latter are reasonably level and sound. They may be attached by glueing the underside of the blocks and further secured by secret nailing. Supposing that the blocks are to be laid in the simplest possible manner, the first step is to prepare a long strip of stopping equal in thickness to the blocks and about 2 in. broad. This is fitted all around the walls butting against the skirting board.

If the latter is unequal, or displaced, the stopping should be accurately scribed to fit, so that when secured in its place the narrow strips of wood will fit tightly against the skirting and present a perfectly straight lining on the other side; the object is to provide a good working surface against which to build.

Fundamentally, all wood block floors are laid on geometrical lines, and consequently they must start on some straight line, and anything in the nature of curved work is practically impossible. Having prepared the strips for a sufficient area for the room, and glued and bradded them to the floor, the blocks may be laid in position. They are laid one after the other, so that the second row overlaps the first by the width of one block. A fair number of blocks should be laid, commencing with one corner, before they are glued, just to get an idea of their arrangement and the way in which they are to be placed, after which they may be drawn aside and glued and bradded to the floor. In this case 1 in. oval brads will be strong enough for the purpose; they are driven diagonally through the edge of the block, the heads of the nails being punched well into the wood.

The work proceeds in the same manner until the opposite corner is reached, but as it is possible that the distance to be covered will not be an exact multiple of the lengths of the blocks, it is best to lay one row and ascertain whether they will fit exactly, or whether some of them must be cut specially. There are several ways of dealing with the problem. In some the blocks are laid from corner to corner, and the closers or specially cut pieces fitted about the middle of the room. In others the fit is arranged in the most inconspicuous corner, or at some other part of the room—as, for example, where the chimney breast or other projections intercept the natural run of the blocks. Alternatively the strips around the wainscot can be increased or decreased in width so that all the blocks can be fitted without having to cut any of them. This is the preferable plan, but it requires the blocks to be laid in position and the skirting strips scribed to fit in the remaining space. The blocks should be driven up closely into contact with a mallet.

Good results are obtained by the use of strips of darker coloured wood, inserted in the form of a framework or border. Alternatively, a series of patterns can be laid over the whole area of the floor. The method of laying these follows the same lines already described, and comprises an outer string, or framework, and then a row of blocks, followed by a second string, which may be about 2 in. broad and of the same thickness as the blocks. The panel is filled in with other blocks laid in a herring-bone pattern. To complete this, the ends of the blocks are cut to an angle; and other small angular pieces cut and fitted to fill up the odd spaces. If the proportions are carefully arranged, these special cut blocks will be few in number, but they add to rather than detract from the appearance of the job when finished. Blocks can be fitted without any angular cutting, but it will be found best to make a large scale drawing, showing the arrangement of the blocks, or to lay them out on the floor before commencing the actual work, as often a slight modification in the size and proportion will enable the blocks to be used without cutting them specially to fit.

Where the floor is very uneven the blocks may be bedded in mastic cement, or superimposed on thin felt paper, such as is used under ordinary linoleum. It should be a hard variety that will not yield unduly, as if it does the blocks might be displaced. A little care in laying them, and especially in the nailing, will result in a satisfactory job. Such a floor covering is extremely attractive in appearance, has the merits of being durable, and is by no means expensive when made up in the manner suggested.

A Prepared Flooring. Another type of flooring, known as parquetine, is similar in all respects to the usual parquetry, except that it is much thinner, and is built up in sections and mounted on canvas. The average thickness is about $\frac{1}{8}$ in.; it is prepared in sections measuring usually 3 ft. by 1 ft. The woods used are mostly oak and walnut, and patterns with borders to match are made up separately.

Parquetine should be laid only in thoroughly dry rooms, as any dampness is apt to cause the woodwork to swell and thereby buckle. If it is required in a new house, the building should be dried as far as possible with fires before any parquetine is laid down. It may be fixed either by nailing only, or also by glueing.

It is essential that the flooring should be level, and any inequalities must be rectified before the laying is commenced. In old houses the trouble is caused usually by uneven joints and knots. The former is often due to the shifting of the boards and may be rectified by driving in fresh nails near the joints. The knots should be planed flat and any upstanding nails punched in. Before securing the parquetine, it is advisable to let it stand in position for about 2 days to get acclimatized. It is necessary to plane the edges of the sections with a trying plane to get a perfectly close and good joint, as the size of the parts is inclined to vary with the change of atmosphere after storage.

The procedure for fitting is similar to that for ordinary parquetry, the border being secured first. Ordinary glue may be used when a permanent floor is required, using only a minimum and applying it as hot as possible and placing the sections in position quickly so that the glue does not chill. It is advisable to do the work when the room is fairly warm to aid the glueing. When the whole floor has been laid, any discrepancy in the level of the sections may be obviated by the use of a plane finely set, and worked as near to the joints as possible, so that only a minimum of the surface is removed. Any parts thus planed should be glasspapered with No. $1\frac{1}{2}$ paper, and waxed.

The commercial parquet floorings, either in the form of sheets or with prepared interlocking blocks made of hardwood are preferable; but those wood workers who prefer to do their own work will find the suggested methods result in an excellent floor covering. The surface should be finished by waxing and polishing. Such a floor can be kept in condition with occasional washing and frequent application of floor polish and the use of the O-Cedar mop.

PASSE PARTOUT. The method of framing by means of passe-partout binding, for photographs, prints, small drawings and water-colours, is frequently more effective than by a raised frame. All that is required for framing a picture by this method is a piece of glass, mount, and cardboard back identical in size, 2 small metal hangers, made much on the principle of brass paper fasteners, a small pot of gum, and a roll of passe-partout binding, The binding should harmonize with the mount, being best, as a rule, darker in colour, while both should harmonize with the picture. Bindings can be obtained in a large range of colours, widths, and surfaces.

In the cardboard back, about 1 to 1½ in. from the top and equidistant from the sides, punch two small holes, and into these fix the metal hangers. It is important that these should be at exactly equal distances both from top and sides, or the picture will not hang straight. Next fix the picture to the mount and the mount to the back by means of dabs of gum at the corners. Make sure the glass is quite clean, then place it flat on the table on a piece of paper ruled with straight lines to indicate the required depth of the framing. This will act as a guide in getting the passe partout straight.

Cut 2 pieces of binding 1 in. longer than the sides of the glass, moisten about half the width, and apply immediately to the glass so that the edges just reach the ruled lines and ½ in. juts out at either end. Press them down until firmly fixed. Turn the glass over and put on it the picture, mount, and back. Moisten the projecting binding, fold it over the back, and press it down until set. Cut off the ends, both top and bottom, to about ⅛ in. from the glass.

Cut 2 pieces of binding 1 in. longer than the top and bottom of the glass and mitre them at each end, so that the shorter side is exactly the length of the space between the side bindings. Moisten the shorter side of each strip, apply them to the glass, and press them down. Be sure that the part fixed to the glass is exactly the same in width as at the sides. Turn the picture over and fix the rest of the binding as before, folding in the ends neatly.

MAKING A RAISED FRAME. The passe-partout method of framing can also be applied to make a raised frame. The articles required for this include, as well as those mentioned, some strips of pasteboard ¼ to ½ in. wide, and 2 rolls of binding, one for the frame itself, the other for a frame lining. Fix the metal hangers in the back, Fig. 1, and fasten picture, mount, and back together as described above. Cut off 2 strips of the pasteboard exactly the length of the glass, Fig. 2, and also cut off 2 pieces of gold binding ½ in. longer, Fig. 3. Moisten the binding and cover the pasteboard with it carefully and evenly; then gum lightly the underside of the strips, Fig. 4, and fix them to the glass, level with the edges. (*See* Figs. 1-4 on Plate 33.)

Two strips of cardboard must now be cut for top and bottom. to fix exactly between the side pieces (Fig. 5). These are also covered with binding, so that the binding projects ½ in. or ¼ in. at each end, according to the depth of the pasteboard. These ends of binding should be cut off at an angle of 45° before the pasteboard is gummed and fixed in place on the glass. Moisten the triangular ends and fix down to neaten the corners. The passe-partout framing is then carried out as described in the earlier method, the inner binding being all but covered by the outer framing (Figs. 6 and 7 on Plate 34).

PASTE. A paste made of flour and water is capable of joining many light articles. To make the ordinary household paste, mix 1 lb. wheaten flour with 1 oz. alum and add 4 pints of cold water, stirring all the time. Run the mixture through a sieve and boil for five minutes, stirring all the time. To ensure it keeping for a few weeks add thirty drops of oil of cloves and the same quantity of carbolic acid.

FOR MOUNTING. As an adhesive for mounting photographs it is necessary to avoid the use of acid ingredients, such as alum, as this would act on the photograph and cause it to fade. Professional photographers use freshly made starch paste, made by first mixing powdered starch with a little water to form a paste and then adding boiling water, stirring all the time. Dextrin can be employed for an adhesive that keeps, one pound of dextrin being boiled with 25 oz. of water until it has dissolved, then, after adding 30 drops of oil of cloves as a preservative, pour into small jars for use.

FOR PAPERHANGING. Paste for paperhanging is made from 3½ lb. flour mixed with cold water to a stiff batter. A gallon of boiling water is then added in which two tablespoonfuls of ground alum have been boiled. The top of the paste should be covered when cold with a little cold water to prevent the formation of a crust. This paste should be quite stiff, and requires thinning down with cold water before use. It should not be employed thinner than can easily be spread.

FOR LINOLEUM. A paste for linoleum is made by mixing rye flour with cold water to a somewhat stiffer consistency, and adding boiling water. Some glue size is melted down and added to the paste, whilst both are hot. They should be well stirred and allowed to cool, when the paste will be ready for use. The more size that is used, the stronger the paste will be. Alum may be used as a preservative. In connexion with leather or strong papier mâché work a paste which is similar to linoleum paste is prepared, but instead of employing size, powdered resin is added. Boiling should be slow, and the paste should be of the consistency of butter.

PATCHING. The method used for patching depends upon the article to be patched. Usually a patch is sewn on the wrong side, but one made of printed material is best put on the right side. If the patch is to form one with the garment, care must be taken that the pattern matches surface.

To mend calico articles, cut a patch a little larger than the hole and the worn part round it, and turn down a narrow fold all round on the right side. Place this on the wrong side of the garment, arranging it so that the folds will be inside and the hole in the centre. Pin it in place, tack it all round and then hem it down (Fig. 1). Pull out the tacking stitches, turn to the right side

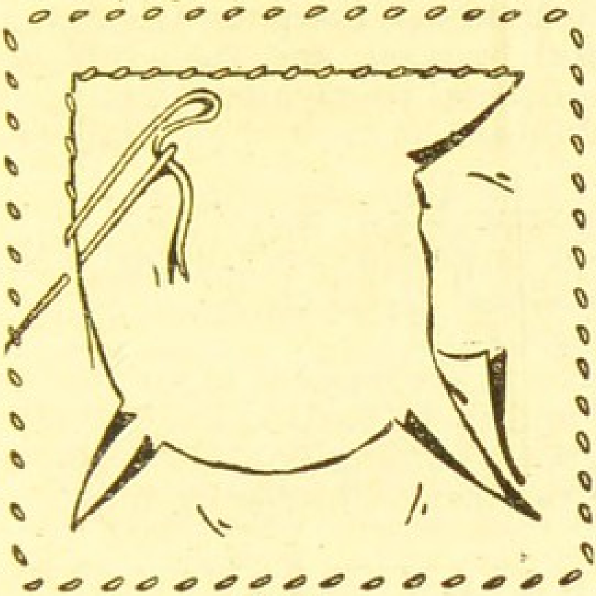


Fig. 1

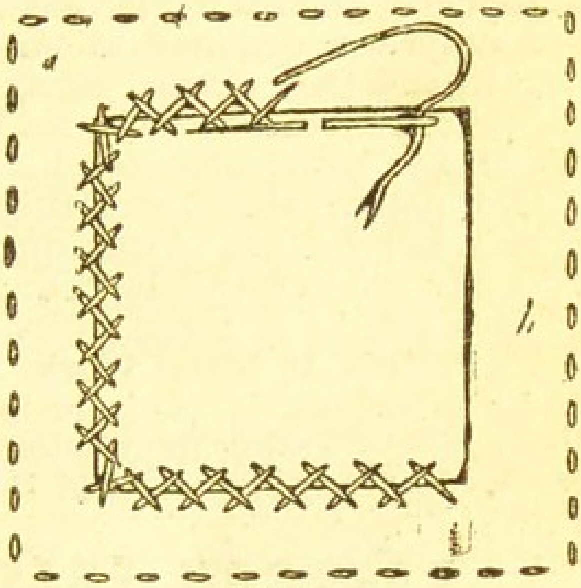


Fig. 2

PATCHING. Fig. 1. Right side of calico sheet, showing hemming and arrangement of corners **Fig. 2.** Herringbone stitch used in patching flannel. **Fig. 3.** Overcasting edge to prevent fraying when patching thick material.

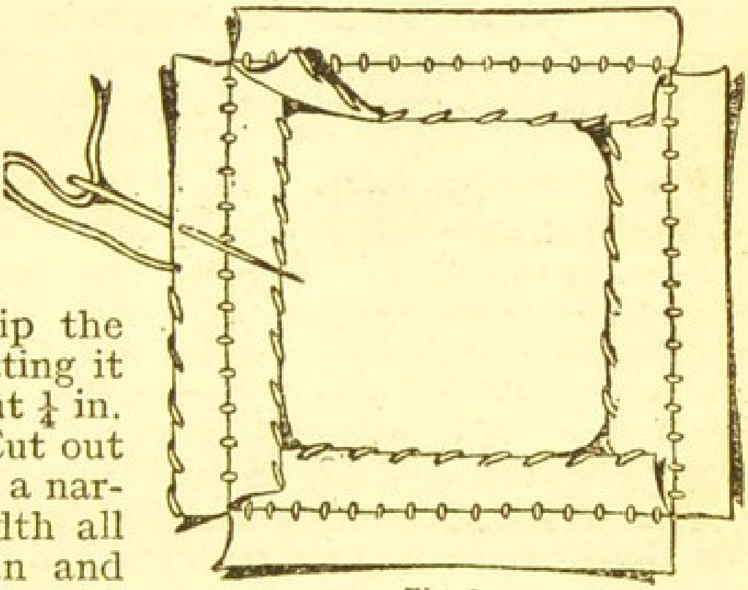


Fig. 3

of the garment and slip the scissors into the hole, cutting it diagonally to within about ¼ in. of each corner (Fig. 1). Cut out the worn portion, leaving a narrow edge of uniform width all round; turn this edge in and sew it down neatly.

When patching flannel, each side should be cut straight enough to keep it to the same thread, and herringbone stitch is used for sewing the patch (Fig. 2). Fig. 3 shows a good method for thick materials. Lay the patch on the garment, making it 1 in. larger all round than the hole. Turn in and tack a single hem, ½ in. deep, all round the wrong side of the hole and a similar one round the wrong side of the patch. Fit the patch into the hole and overcast them together. Overcast the raw edges to prevent the patch fraying, and then press the patch well on the right side. For very fine work a darned-in patch is the best. The patch must fit right into the hole and the edges be darned together.

PATENT LEATHER. New shoes of patent leather may be treated to an application of vaseline and put aside for a week so that the grease may soak in. This softens the leather and prevents cracking.

In cold weather, before being placed on the feet, the surface of the leather should be warmed gently before a fire. Patent leather will not stretch and if the shoes are tight when bought, no amount of wearing will ease them until they crack.

Glycerin and castor oil are good dressings for patent leather, but only a very small smear should be used, and that rubbed well in and then rubbed off again. Special transparent dressings for patent leather, which can be obtained at most shoe retailers, are also to be recommended.

Old patent shoes sometimes become lined or covered with crow's feet cracks. A rag dipped in turpentine and rubbed well over the surface will be found to anneal these cracks, and the surface will be restored to its original gloss.

PATTERN, in Metal Work. Patterns are replicas of an object to be subsequently made in metal and more particularly for the purpose of forming depressions in the moulding box, into which the molten metal is poured in the production of the castings.

PATTERN PRINTING ON FABRIC

Simple Methods for Applying an Effective Art Craft

The reader interested in art crafts will find information related to this article in the entries: Painting on Glass; Lampshades; Painting on Textile Fabrics; Stencilling; Transfer

Pattern printing within the limits of simple designs is one of the easiest of the genuine art crafts, and can be used to decorate many objects in the home. Another excellent service which its study can render is the training of school children by cultivating their appreciation of line and colour when forming patterns. Results are accomplished with comparative quickness and at a very small cost. The materials for the craft are simple to use, and obtainable through any artists' colourman.

Two of its advantages are that it can be successfully carried out almost from the first attempt, and that fabrics can be printed with washable and permanent colours. The most delicate georgette scarf can be patterned without injury, while pieces of silk or cotton which have lost colour can be renovated with pleasing results. This is particularly the case with unpatterned window curtains, bedspreads and cushion covers, the fabric of which is not worn out, but the original colours have been laundered to a drab shade. Re-dyed and bordered with pattern printing, articles which have been considered unsightly and practically worthless are transformed into attractive furnishings.

In addition to the articles to be decorated, all that is required to print in almost any colour on woven fabrics, or on hard-surfaced ones, such as glass, wood and pottery, are pattern printing liquid colours in bottles and tubes of oil colours ; a set of a dozen pattern printing sticks ; a palette containing small square pads to hold the colour ; a saucer or white tile for oil colours ; some rubber stamps (or these can be cut on ordinary pieces of rubber, as will be explained later in the article) ; pieces of lino ; a bottle of copal and one of wood varnish. Bronze powders and stencil medium can be utilized in this work when it is wished to gain a richly decorative effect.

The liquid colours in bottles are specially prepared for printing on soft materials and are of the exact consistency for immediate use, while oil colours must be used for printing on glass, wood or pottery.

Oil colours may be used on woven fabrics when thinned with turpentine, but the results are not so satisfactory except for surfaces which remain flat, such as lampshades or sachets. Soft fabrics tend to become stiff when printed with oil colours, and if the pattern is large the fabric thus treated may not hang or drape in good folds.

Printing on Textiles. Some soft materials are more absorbent after washing, and thus receive colour more easily ; this applies to cotton and linen. Silks and other thin woven fabrics need not be washed before printing is done. A few experiments on scraps of material washed and unwashed can be made before starting to print any larger piece. Throughout the work it is advisable to have a small piece of the same material at hand on which to make a few trials and to see the effect of combinations of colour. The best way to become accustomed to the printing process is to collect some scraps of differently textured and coloured materials and make experiments, rather than risk spoiling a piece of work.

The method of working is well illustrated in Plate 37. An inexpensive tray cloth is being printed in chrome orange, chrome yellow and ivory black. The article is laid on a board which has been padded with sheets of newspaper and a sheet of white blotting paper on top of these. Drawing-pins keep the work taut and straight. A little pattern printing colour (or oil colour, if preferred) is spread on to the pads in the palette. The pattern stick (one is seen in use and others required for the pattern are on the table ready to hand) has been pressed on to the colour so that the end of the stick is evenly covered and is now being pressed on to the cloth to make the print. The actual process is simplicity itself.

The colours provided—red, orange, yellow, green, blue, and violet—are brilliant and pure. Mixed with white or grey as well as with one another, hundreds of distinct shades and hues can be obtained, ranging from deep full tones to delicate pastel tints. As experiments are made with the printing sticks, and each separate shape appears on the fabric, patterns will be found with delightful ease. For those who wish to try experiments before attempting original designs, transfers printed full size on thin paper are obtainable for scarves, table mats, cushion covers, etc. Possibilities of combinations of printing forms can be seen from the study of one or two transfers.

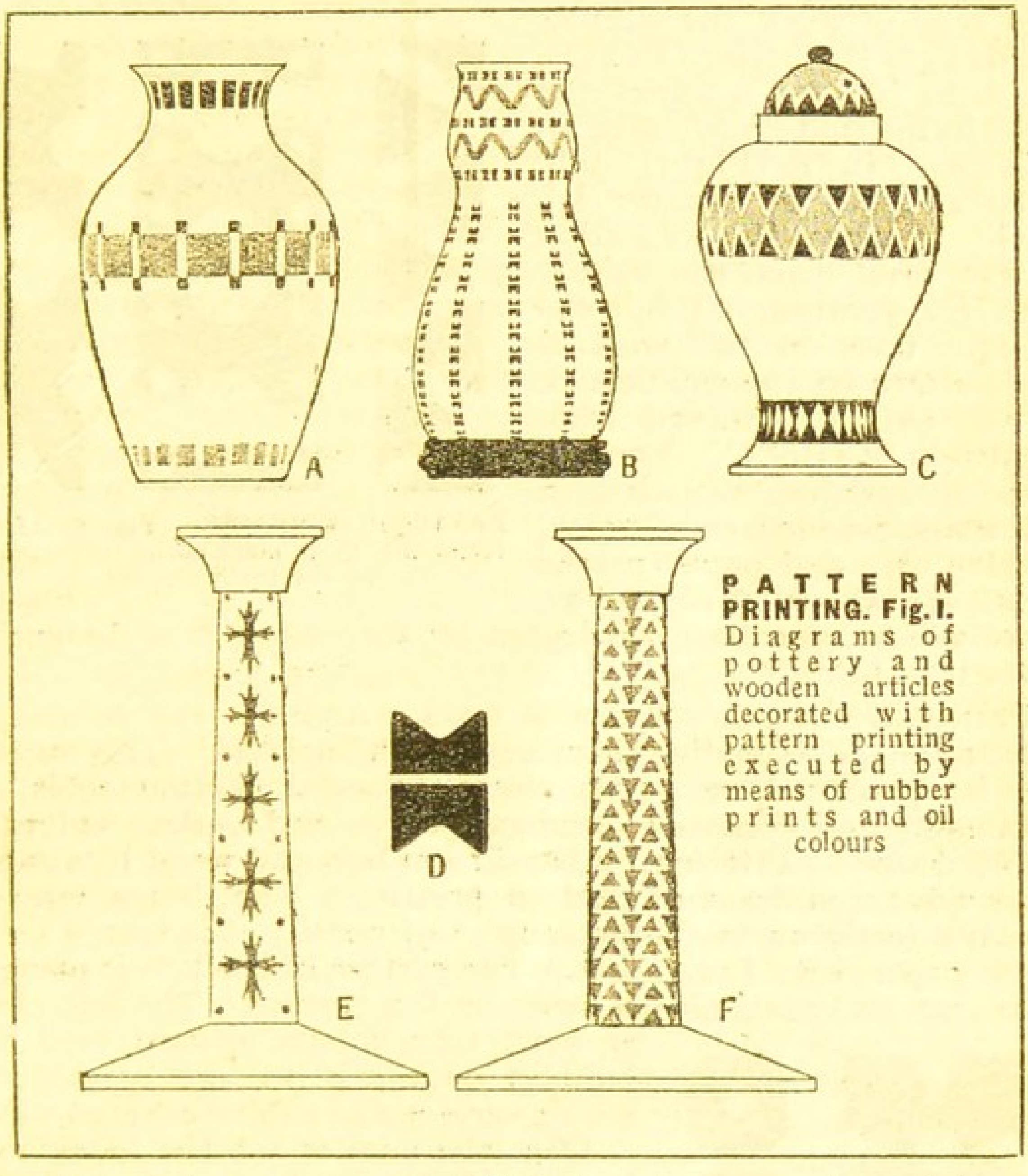
Although colour is a matter of taste, there are certain rules which are useful to remember with reference to harmony of tints. Any pure colour will harmonize with black and white or grey, or with itself mixed with black or white to make deeper or paler tones. Two colours will harmonize if grey is mixed with both. Brilliant effects require marked contrasts, such as blue and orange, purple and green ; quiet restful effects can be worked with tones of the same colours, or with those which are closely related, such as blue and violet, or yellow and green.

A trial border can be quickly printed on a piece of nainsook. First take a pattern stick which prints a half-inch square and place it diagonally and join to it a quarter-inch square. Repeat the arrangement along the border. This is such a simple pattern that it may seem uninteresting, but it is useful for experiment with even pressures of the printing sticks, and also for colour combination, while it forms a good surround for more elaborate designs. With regard to colour it will soon be seen that the small squares look better in a darker shade and the large squares in a lighter. With three or four printing sticks, printing different geometrical shapes, a number of simple borders can be worked, and the most interesting experiments can be made in colour.

The simple pattern illustrated would not be effective if orange or black had been used for the large squares. By keeping these in the palest of the three tones selected they do not overpower the tiny black squares set diagonally, nor the orange circles, and thus balance is preserved in the design. It is necessary from the beginning of learning this craft to consider not only which colours go well together, but how much of each colour is required, and on which part of the pattern it can most decoratively be employed. Most people will want to originate designs after they have practised a few simple borders and patterns and used a transfer, ironed off on to the object to be printed in the ordinary way. Pattern printing paper is obtainable, which is marked with quarter-inch squares, on which the designs can be worked out with gouache colours.

When completed the original design may be transferred to the fabric in one of two ways. (1) If the material is very thin the design can be placed underneath and will show through sufficiently to guide the printer. (2) If the fabric is not semi-transparent, a sheet of transfer paper will be required. This transfer paper must not be confused with the pattern printing transfers. It is coated on one side with red, blue or black, and is used in the same way as carbon paper. At the other end of some of the printing sticks are more fanciful shapes which greatly facilitate the production of elaborate designs, once the simple process has been mastered.

PRINTING ON HARD SURFACES. Wood printing sticks are not suitable for printing on wood, pottery or metal. Such unyielding surfaces require a softer substance, and india-rubber is the ideal material for this purpose. Flower and other shaped stamps

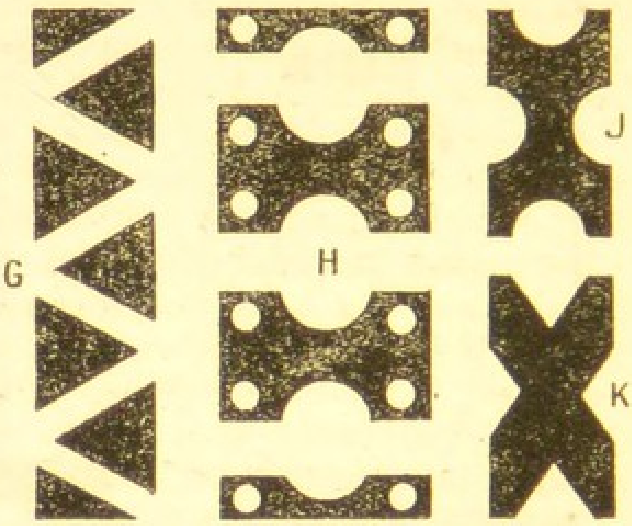


PATTERN PRINTING. Fig. I. Diagrams of pottery and wooden articles decorated with pattern printing executed by means of rubber prints and oil colours

are obtainable, or pieces of soft india-rubber can be cut to correspond with the wooden printing sticks. Another way of turning rubber into interesting shapes is to heat a knitting needle, and when red hot, burn round holes with the end, and lines with the side of the needle, on the pieces of rubber.

For all hard surfaces the oil colours in tubes are used. The colour is squeezed out on to a piece of thick glass or a white tile, a little varnish is used with it, and it is spread evenly so that a palette knife will just take it up when the printing rubber or stamp is pressed into it. When the colour is dry the whole work should receive a coat of varnish.

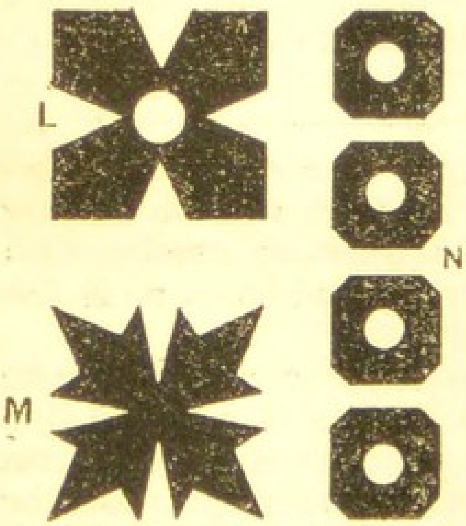
The application of pattern printing to pottery and wood is illustrated in the various diagrams (Fig. 1, 2 and 3). Pattern transfers cannot be used for such pieces of work, as it would be impossible on a hard and curved surface to keep a transfer in position. After the proposed pattern has been sketched out on a piece of paper, the worker will need to make dots with pencil or coloured crayon directly on to the article to be printed. For this type of work the simpler the designs the better. In Figs. 2-3, G to N show a variety of print forms that go to make up patterns. In A (Fig 1), only different sizes of squares are used. D shows the formation of the print from the rubber used for printing all but the straight lines on the vase B. The pattern on the candlestick F was entirely evolved from repetition of print G. A collection of articles, including a silk scarf, wooden candlestick, pottery case and papier mâché bowl, are shown in Plate 37, all of which have been decorated by the simplest of designs in pattern printing.



PATTERN PRINTING. Fig. 2. Print forms that go to make the patterns shown on the previous page

PRINTING FROM LINOLEUM BLOCKS. Another way of making printing shapes is cutting them from thick linoleum. This method can be practised on small pieces. Special cutting tools are obtainable and comprise dividers, gouges and outline knives of assorted sizes. Printing by hand from lino and wood blocks is a more advanced form of pattern printing. The design may be drawn directly on to the linoleum, but usually it is traced on to tissue paper, with Indian ink. The surface of the lino is covered with gum and then placed down on the tracing. The lino block is next turned face upward, and any bubbles on the paper are pressed out with a scrubber or rubber covered roller.

After the gum is set the block may be cut. With the knife cut round the edge of the design. A clearing cut is then made, sloping towards the base of the first one, leaving a V-shaped trench round the design. The portions of the design not required to print are then cut away with a small gouge, or a wider one is used for larger waste pieces. Very beautiful results can be obtained from these printing blocks, but such a development



PATTERN PRINTING. Fig. 3. Other print forms cannot be dealt with adequately here. Interesting shapes cut into lino can, however, be utilized to give freer scope to original ideas. These are mounted with glue on to pieces of wood and used in much the same way as the printing sticks, but as lino is rather unyielding it is not so suitable for hard surfaces, though good results have been obtained on wood and papier mâché.

PEAR WOOD. The wood is hard and heavy with a short and close grain. As it cuts cleanly in all directions it is an excellent wood for carving, but it seasons badly, and without care in the cutting and drying is apt to warp and twist. It absorbs stain well, and as a result most of the dyed stringing and banding material is prepared from it. Mathematical instruments such as rules, tee squares, and set squares are made from it.

PEGAMOID. This is a substitute for leather, and is used for upholstery. It is easily cleaned with soap and water, and kept in condition with ordinary furniture polish. Like all leather surfaces, it becomes cracked with continual use ; if treated with one of the specially prepared paints sold for the purpose, the surface can be rendered equal to new.

PENCIL PAINTING. Pencils specially prepared for this work are known as Aquarello and are obtainable in 24 colours. They may be used dry, or with water.

There are two methods of working the colours. Part of a design is filled in with the desired tint, as if using an ordinary crayon, and then spread and smoothed with a brush dipped in water.

The other method of application is to damp the paper, or portion of a design on a piece of fabric, slightly with a clean, wet brush and then draw in with strokes of the pencil the colour required. Unless there is an excess of water the colour will not run, but in this way shades can be softly blended.

To make a strong outline the pencil itself is dipped in water and used, as shown in plate 11. Colours may be superimposed, and distributed over surfaces by a piece of damped felt wrapped round index finger.

The simplicity of the outfit will appeal to many people and pencil painting is a delightful and clean method of colouring for children to use. It is excellent for sketching or for map tinting, and may also be used for colouring photographs on either dull or glossy paper. For this last purpose the pencil is applied dry, and the markings gone over with a damped brush. If too much colour is applied, or put in the wrong place, erasures can be made before water has spread the tint.

The wooden boxes shown in the illustration were first painted a pale colour. The rose designs may be transferred or copied, but original designs can be created. Before using carmine for the red rose on the small box and yellow for that on the cigarette box, the flower was filled in with the white pencil and the colour worked over the white. For shading the red, violet was used, orange for the yellow rose, and blue over the green for shading the leaves. For the high lights a little more of the white pencil was used over the colour. Leather is pencil-painted in the same way as wood. For either work to ensure permanence against wear, spray with an ordinary solution of shellac and alcohol, or brush over with clear varnish, to protect the design.

PEN PAINTING. This form of decoration can be applied to cotton, silk, velvet, leather, papier mâché, wood, pottery, glass and metal. Oil colours are used with a special powder and medium; pens, palette, palette knife, drawing pins, drawing board, and blotting paper are also needed.

When used on textile fabrics care is necessary to prevent spreading of the oil colour. This may be achieved by removing the work from the drawing board immediately the pen painting is finished and placing it on a sheet of clean blotting paper which has been dusted over with absorbent powder. The back of the silk or other fabric must touch the powder while the colours are drying and this prevents their tendency to spread.

Wooden articles to be decorated in this manner should be lacquered or enamelled first, the design being pounced on when the background is quite dry. Glass and pottery must be washed, rinsed in cold water, and polished with methylated spirit. Stencilled designs may be outlined in pen painting.

Floral and conventional designs are the most suitable for pen painting. The finished appearance of the work has some resemblance to embroidery, as the strokes of the pen by means of which the oil colours are laid on take the form of stitches.

The first step is to trace the design on to the fabric in the case of textiles, to pounce it on for wood, or to paste it on the reverse side for pen painting on glass. Designs may also be placed under gauze, which is an admirable fabric for pen painting. Black gauze mounted afterwards on satin is effective when pen painted for central pieces on nightdress, glove, or handkerchief sachets. In white it is used for dessert doilies. Silk gauze is obtainable for the work by the yard or in pieces; also traced gauze doilies and table centres for pen painting.

Special oil colours are sold for this purpose and a convenient method of mixing is to squeeze a little white on to the palette and mix the powder with it till it is of the consistency of thick cream and no specks of free powder are left. The white is then tinted a very pale shade of the colour required and a third of it put aside. The remainder is tinted a deeper shade and half of this is put aside, while the part left over is coloured a still darker shade. This gives a medium tone for a flower, leaf or groundwork, a pale tone for high lights and a dark tone for shadows. The various colours may be prepared in this way, and a drop of medium added to each before starting work.

The shades in use may be placed on the blade of an old knife. A thin piece of colour is then modelled on the knife and picked up with the pen and applied to the fabric as if making a down stroke in writing, a slight but even pressure being maintained. The design is then filled in; the darker and lighter tones of the colours being used for the high lights and shadows. A set of dessert doilies with a different flower on each one is an excellent piece of work to undertake after experiments have been made on a few scraps of silk or cotton to gain some skill with the strokes. English and French makes of pens are obtainable for a few pence a dozen.

Bronze and lustre powders can be used to give a richly varied appearance to designs. The former are painted on finely with a No. 1 sable brush, using the quick-drying medium supplied for them. The latter are dusted over portions of the work, while still wet, to give a raised effect. For instance, they might be used to give a touch of realism to the mimosa leaves and flowers on the glass vase illustrated. The leaves should be worked first in greens and, while wet, covered with green lustre powder. When dry enough for the surplus powder to be shaken off, the mimosa should be painted in with the pen in chrome yellow and white, and then covered with yellow lustre powder to give the fluffy look to the mimosa balls.

In pen painting the work takes some time to dry, one week being the usual time allowed in winter. Afterwards the work may be brushed, washed, or rubbed without harmful results. If the colours fade with time, they can be freshened up by a second but light application of paint.

PEWTER. A silvery-grey metal, very soft and ductile, pewter is composed of a similar group of metals to those known as Britannia metals, or alloys which contain a large amount of tin. Pewter is used in the form of sheet, and can be cast in a ladle or in a simple furnace. In some typical compositions of pewter the percentages of the metals are as follows:

Tin	Antimony	Copper	Zinc	Lead
91.5	6	1	—	1.5
88	8	2	—	2
85.5	7	2.5	3.5	1.5

If bismuth is added to the extent of 5 per cent the melting-point of the alloy is lowered. Copper and antimony both tend to harden the alloy. With lead there is the danger of lead poisoning. Pewter melts at about 400° F. Articles to be made in pewter in the form of castings are first modelled or a pattern made, and the mould is prepared with moulding sand or plaster of Paris. The latter must be well dried before the metal is poured. The casting is finished by polishing in the lathe.

Suitable solders for pewter are composed as follows: 1 part each of bismuth and tin, melts at 286° F.; 3 parts tin, 1 part lead, melts at 334° F.; 1 part bismuth, 2 parts tin, melts at

336° F.; 1 part bismuth, 3 parts tin, melts at 392° F. A commonly used solder alloy consists of 1 part of bismuth, 1 part of tin, and 2 parts of lead. The larger amount of lead may be safely used on outside work. Of the fluxes for pewter work, Gallipoli oil, tallow, resin, and chloride of zinc are the most used. The oil is to be preferred; it is simply applied to the work and the solder run on in the usual way.

To get a bright finish on pewter the piece should be first cleaned with benzoline to remove any fingermarks and then rubbed all over, both the worked and unworked parts, with ordinary knife powder until the necessary polish has been given. If after cleaning as described the owner desires what is known as a satin finish to his pewter, he should obtain some very fine powder, such as is used by dentists, and use it on a flannel to polish the piece. The flannel should be rubbed round, not up and down.

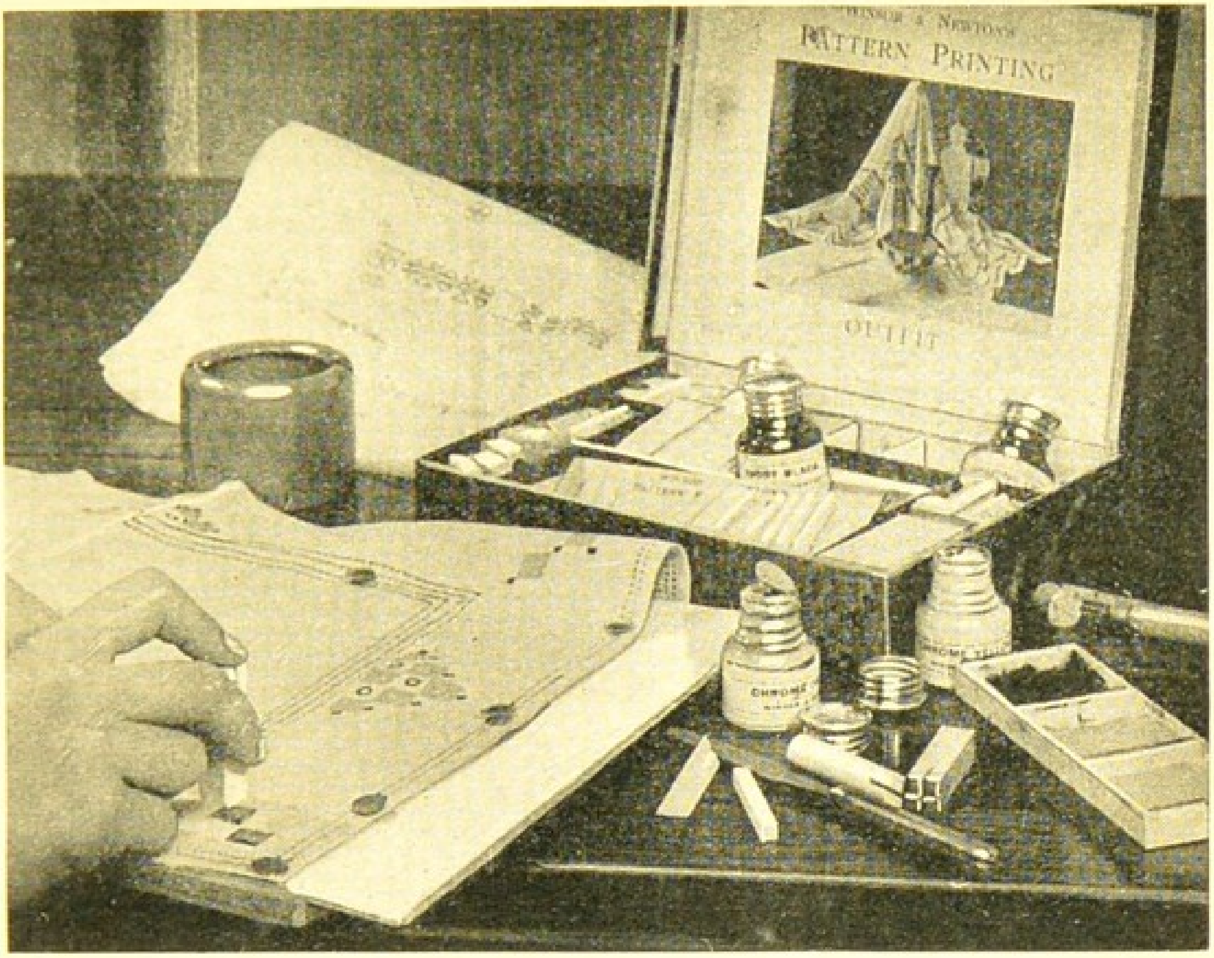
PHOSPHORUS. Ordinary phosphorus is a waxy solid substance which, when exposed to the air, rapidly oxidizes and bursts into flame. It therefore must be kept under water, in which fluid it is insoluble. Phosphorus has the characteristic of being luminous or glowing in the dark. There are several kinds; the white or yellow is virulently poisonous, and the red or amorphous is not poisonous. Poisonous phosphorus is present in some matches and in many rat poisons.

PHOTOGRAVURE. Photogravures that have been damaged by exposure, dirt or grease can be cleaned by immersion for several hours in benzine in a flat, shallow photographic dish. The dish must be kept covered, and no naked lights permitted in the room, owing to evaporation of highly inflammable vapour. Afterwards dry and brush over with clean, soft linen. This removes grease and dirt held by it. Other discolorations can be got rid of by bathing in hydrogen peroxide, 10 vols. strength, diluted with 1 part of water, in a photographic dish, the photogravure being exposed to strong daylight while in process of immersion.

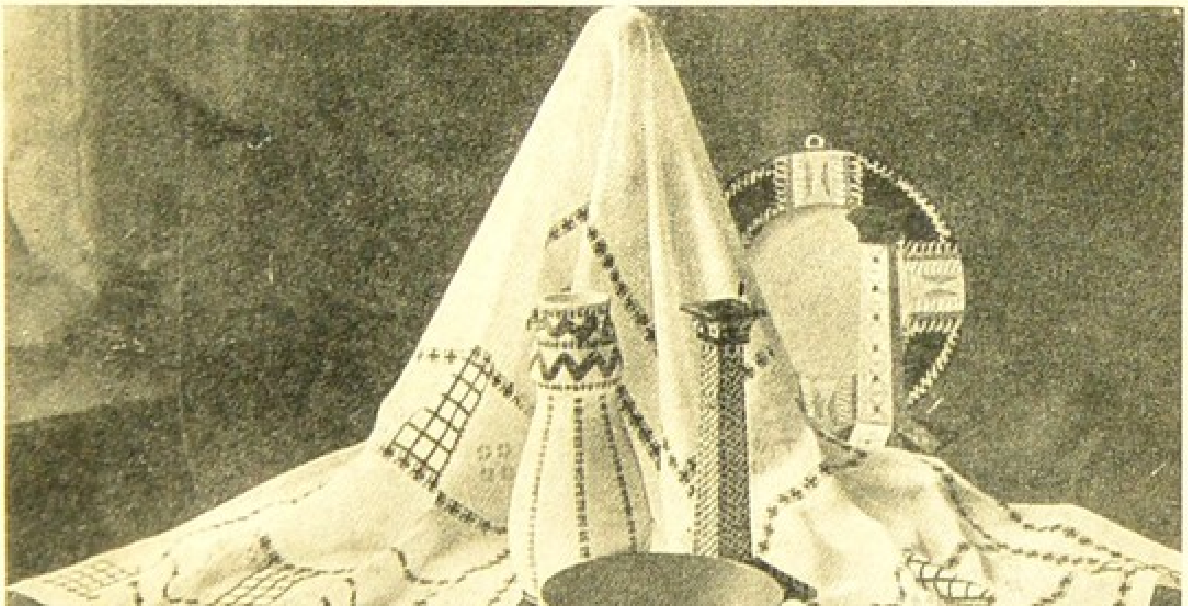
An alternative method is to follow the benzine bath with a prolonged immersion in sodium carbonate solution, 2 oz. of washing soda to 8 oz. of water, finishing by thorough washing in running water to remove all soda.

PICOT. In needlework a picot is a tiny loop, and a picot-edging is a favourite trimming for the edges of such soft materials as crêpe-de-chine, satin, taffeta, net voile, and even lace.

One effective type of picot edging is shown in Fig. 1. It consists of a series of small loops of embroidery thread, between each two loops a simple oversewing or buttonhole stitch being made in the material, to ensure that if one loop is accidentally dragged, it will not pucker up the rest of the loops. The edge to be trimmed must first be neatly faced in or hemmed. Commence at the left-hand end of the edge by pushing the needle through the material from the back to front. Carry the needle

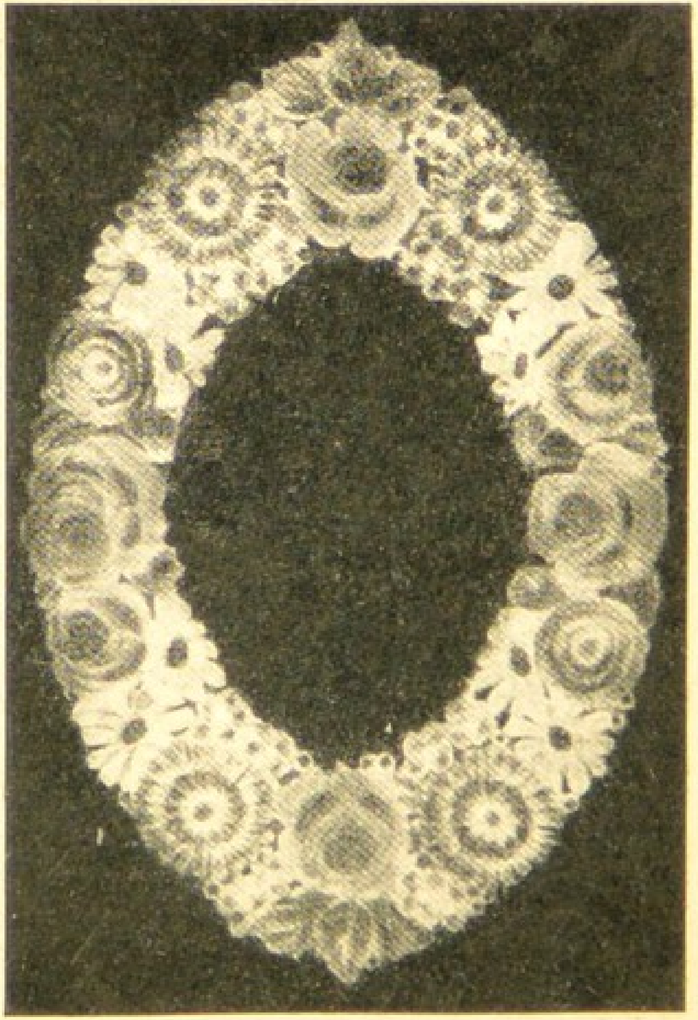


Printing a pattern on a white tray cloth by means of wooden printing sticks



Examples of pattern printing on silk, pottery, papier mâché and wooden articles

PATTERN PRINTING ON VARIOUS MATERIALS



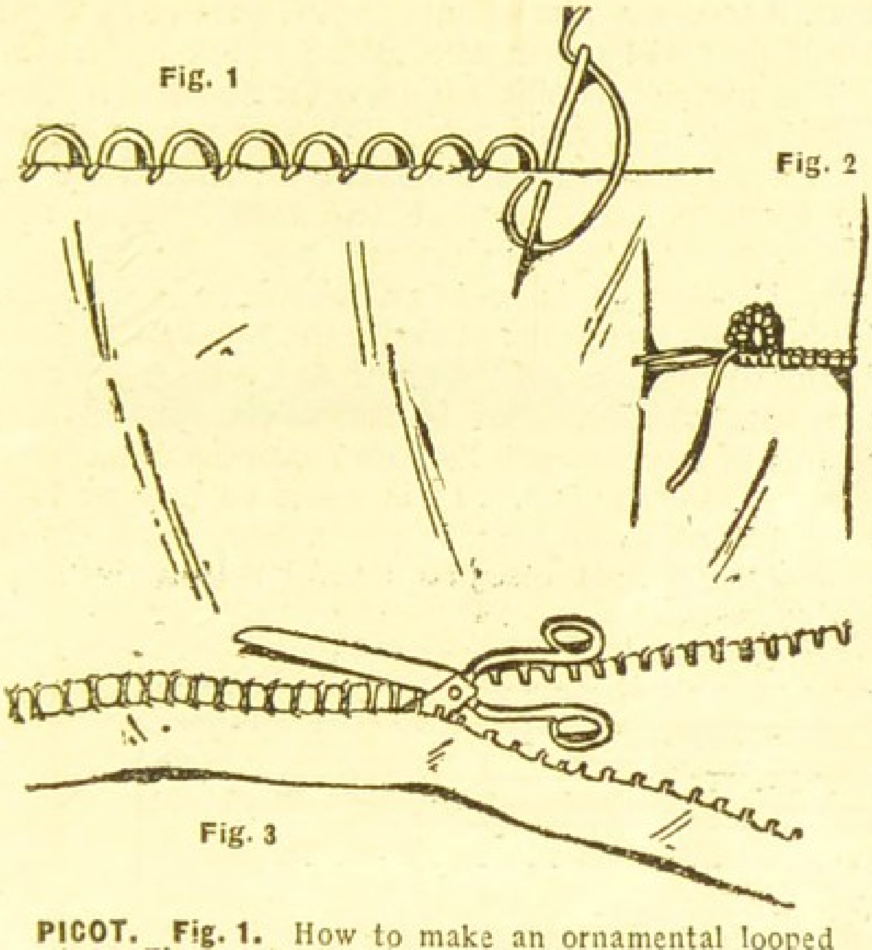
Left. Cabinet in surface poker, the finer lines of the design being worked with a horn point, and the whole finished in stains, gold bronze colour and enamels. Right. Silver work on black velvet coloured with spirit stains

POKERWORK DESIGNS ON WOOD AND VELVET

a little farther along towards the right, and again push it through the edge in the same way, and draw through the cotton or silk until a loop of the size desired is made; then make a tiny buttonhole stitch in the material to the right of the loop. Continue in this way along the edge, and fasten off on the wrong side.

Another type of picot is shown in Fig. 2. This is a buttonholed picot, and is used in Richelieu work. A trimming for table mats can be made by buttonholing the material edge and working these picots at frequent intervals. The edge that is to be decorated in this way need not be previously neatened, because the buttonholing will itself make it quite neat.

Commence by buttonholing along the edge of the material, beginning at the right-hand end; then, when the position at which the first picot is to be made is reached, work 3 more buttonhole stitches. Carry the needle back to the right, and slip it through the head of the first of these 3 stitches, and draw through to leave a tiny loop of the cotton or silk. Buttonhole stitch along this loop in the same way as a loop is made for fastening purposes, and when the left-hand side of the loop is reached, proceed to buttonhole the edge as before, until ready to make the next loop.



PICOT. Fig. 1. How to make an ornamental looped edge. **Fig. 2.** Buttonhole picot used in openwork embroidery. **Fig. 3.** Substitute for picot formed by a cut line of hem stitching

Imitation picot edging is formed of a line of hemstitching which is worked by machine, and afterwards has the outer cord cut away, to leave the cut bars of the hemstitching forming a series of cut ends, as in Fig. 3. To obtain this picot, simply run a coloured tacking along the edge that is to be trimmed, and take the fabric to a sewing-machine shop to be hemstitched along this line; then cut the outer cord of the hemstitching away. With this edging there is no need to hem the edge of the material.

Picots in crochet are chiefly used to form a background or filling for Irish crochet.

PICTURE FRAMING

Instructions for Framing Prints and Paintings

The amateur woodworker will find in this article information which, if followed, will enable him to frame his own pictures with the skill of a professional. See also the articles Glass; Mitre; Mortise; Moulding

Although the majority of picture frames are put together with the mitre joint, one which is usually regarded as troublesome to deal with, there is nothing specially difficult about it if proper tools are used. A fine backsaw is the first requirement. It is almost useless to attempt to use a coarse one, as it is sure to splinter out the grain, and will probably ruin the mitre block on which the mitres are cut. The mitre block is a device for cutting mitres accurately without elaborate marking out. The important point about it is that on no account must the saw be forced in it. It is purely a guide for the saw, so that the latter must run freely in it.

A useful appliance, though it is not an absolute necessity, is a mitre cramp. This holds the parts of the joint firmly together whilst the nails are being driven in. A hammer and punch are also needed. The Warrington type hammer is the most convenient, but practically any kind of carpenter's hammer can be used.

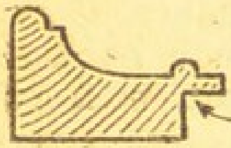


Fig. 1

MATERIALS. It is usual to buy picture frame moulding ready-made, as it is so cheap and cleanly finished that it does

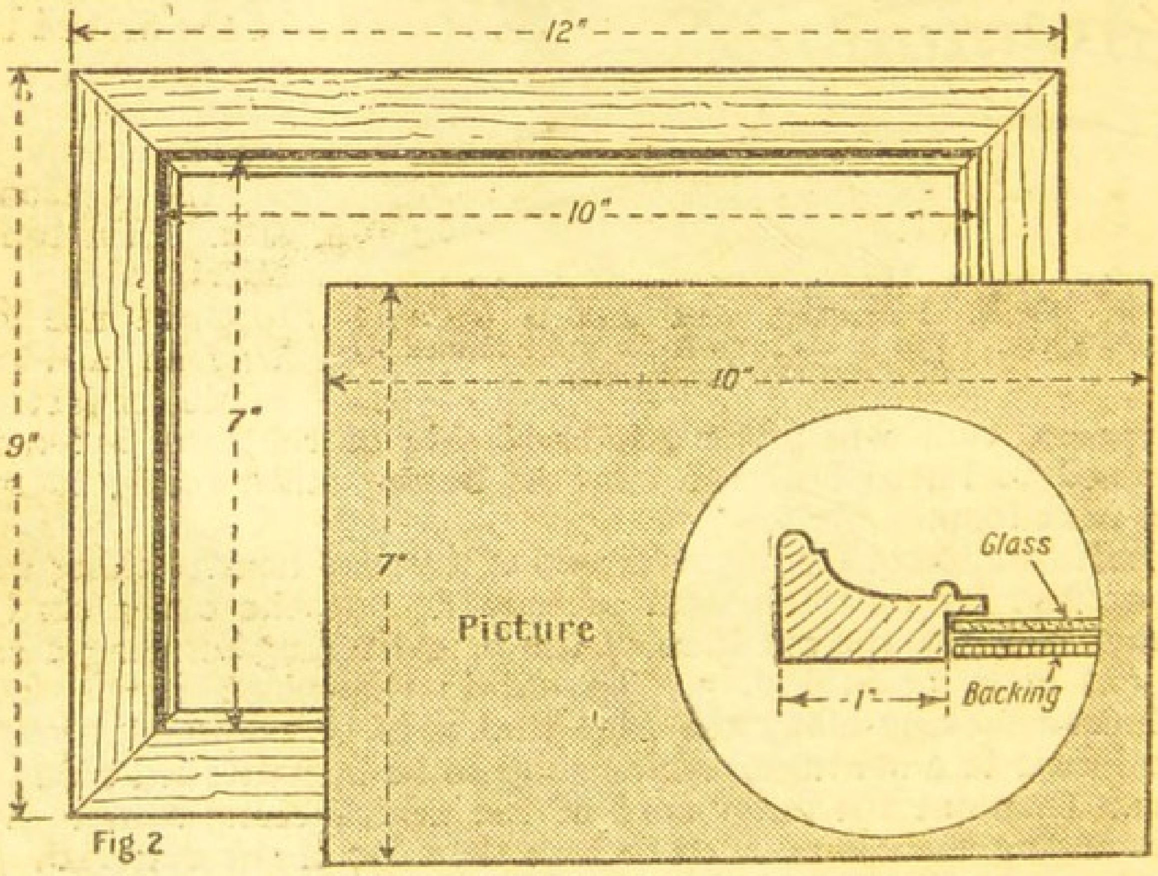
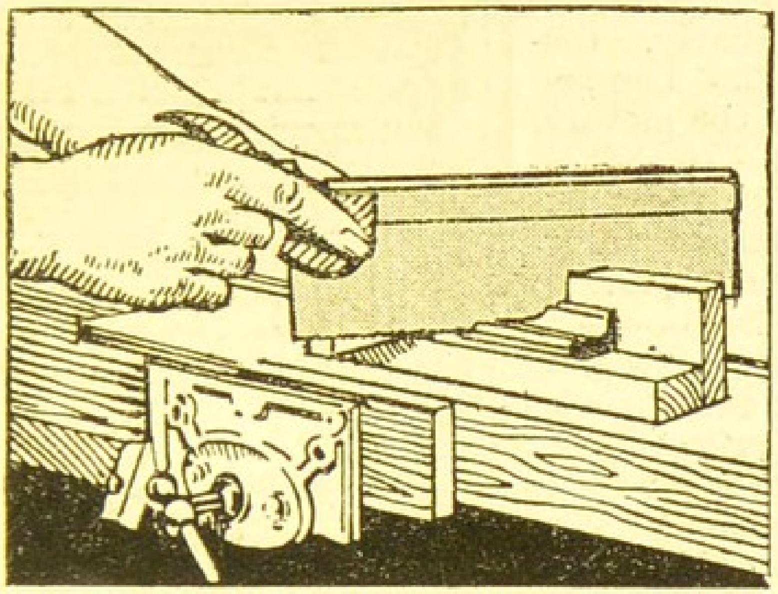


Fig. 2

PICTURE FRAMING. Fig. 1. Section through moulding, showing rebate. **Fig. 2.** How the moulding should be measured to ascertain the overall size of frame not pay to attempt to make it. All sorts of patterns are obtainable. Some are in plain wood, oak or some other hardwood, and may be just moulded or be partly embellished with an embossed design. The latter type looks attractive, but calls for extra care in mitreing because the pattern must be balanced.

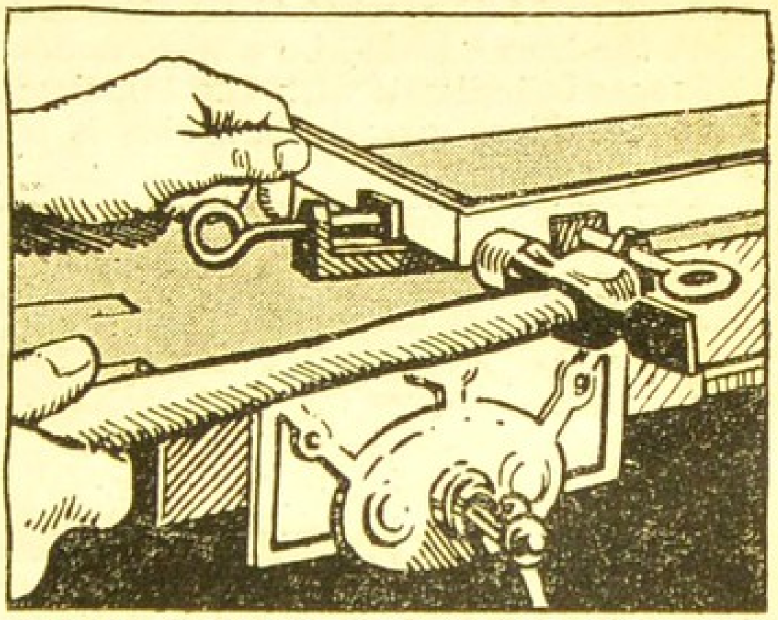
Another type of moulding has a highly-polished surface of composition. Here, again, care is needed in order to avoid chipping. A third kind of moulding is gilt. This usually has a fine, smooth finish and gives a different effect from those frames in which gold paint is applied after the frame has been put together. All picture mouldings have one point in common in that they have a rebate at the back in which to accommodate the picture and glass.



PICTURE FRAMING. Fig. 3. Cutting mitre on block

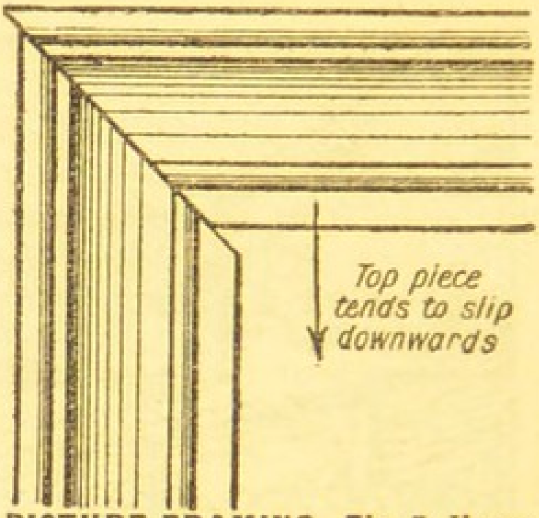
Other materials include cheap thin wood backing. Practically any thin wood can be used. Plywood is excellent for the purpose. A good-quality glass should be used; one of a good clear transparency, which will not give the picture a distorted appearance due to inequalities in thickness. Some brown paper to back the whole, screw eyes to hold the cord, and a few picture sprigs are the only other requirements.

As the picture has to fit in the rebate of the moulding, the size of the frame must be based on the rebate size. Fig. 1 is a section through a picture moulding and shows the rebate clearly. As a practical example, assume that a picture measuring 10 in. by 7 in. has to be framed. Whilst the rebate size is all-important it is necessary to ascertain the overall size because, when the moulding is placed on the mitre block, the back edge touches the kerf in the block. This back edge necessarily represents the overall size.



PICTURE FRAMING. Fig. 4. Nailing mitre in cramp

Fig. 2 shows how the calculation is made. The moulding should be measured on the under side from the rebate to the back edge, not the complete width. In this case it measures 1 in. Consequently, the overall length is 10 in. (the picture length) plus 1 in. at each end (the moulding), giving a total measurement of 12 in. To this it is advisable to add, say, $\frac{1}{16}$ in. to allow clearance for the picture. Similarly, the height becomes 9 in. full. The rebate causes a margin of the picture to be hidden all round. If this is to be avoided the picture must be stuck on to a slightly larger sheet of paper so that only the projecting part of the paper is hidden.

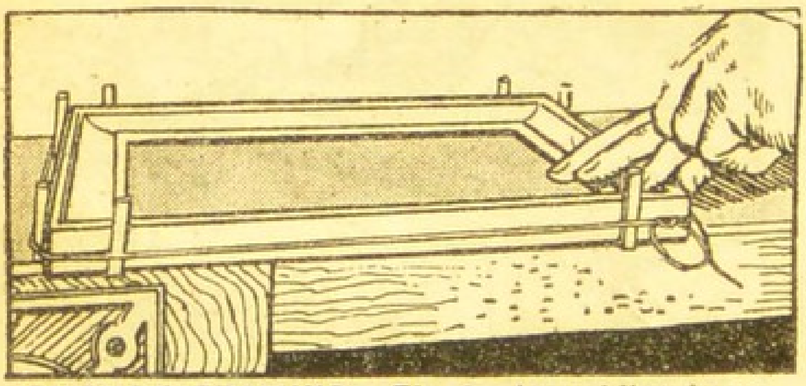


PICTURE FRAMING. Fig. 5. Upper piece of moulding is placed slightly high to counteract slip

CUTTING THE MITRES. Place a piece of moulding on the mitre block and, holding it firmly against the back, cut one mitre as shown in Fig. 3. Notice that back of the moulding touches the kerfs in the mitre block, not the rebate side. The reason for this is that the saw is not so liable to split out the grain as would be the case if the moulding were reversed. If cut carefully no trimming is necessary.

From the point of the mitre mark the overall length along the back of the moulding. Place it again on the mitre block with the mark slightly to one side of the kerf in the block. In this way the mark is just left in when the second mitre is cut. If this were not done the frame would be a trifle under size.

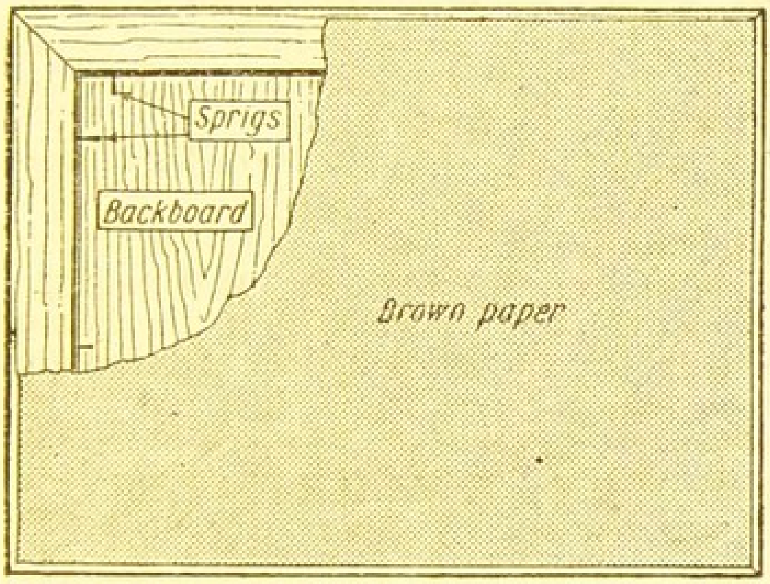
Proceed similarly with the opposite side, but take the length from the piece already cut, this is because the opposite pieces must be exactly the same length. When the two remaining sides have been cut the four pieces can be tried together on a flat board. Some workers prefer to trim the mitres on a mitre shooting board, but this should not be necessary if the work has been done carefully.


PICTURE FRAMING. Fig. 6. Assembling frame on a board with string and wedges

ASSEMBLING THE FRAME. There are various ways of doing this. Those who have a mitre cramp will find this a great advantage. The mitres of two adjacent pieces are glued and placed quickly in the cramp. When the members of the moulding coincide exactly the tightening screws are turned, and two nails are driven in, one in each direction. Fig. 4 shows the procedure. In the case of extra tough wood it is a good plan to first drill fine holes.

Next the two opposite pieces are put together in the same way, so that the work at this stage is in the form of two letters L. The moulding can be taken out of the cramp immediately after the nails have been driven in and punched home. It is now merely a matter of joining together the two parts, and this is done in exactly the same way.

If a mitre cramp is not available the bench vice can be used to hold the one piece whilst the nails are being knocked in. In this case it is essential to drill a hole in the upper piece and drive in a nail so that it just projects at the mitre. Otherwise the blows of the hammer simply cause the upper piece to slip down. In any case, a small amount of slipping is to be expected, and for this reason it is necessary to place the upper piece a trifle high, as shown in Fig. 5.



PICTURE FRAMING. Fig. 7. Back of picture, showing board held by sprigs and paper backing

When assembling the mitres in the vice the left hand should always hold the upper piece of moulding, partly to steady it and partly to prevent it from turning on the nail. It may be found after all four sides have been put together that the frame " winds " slightly; that is, the four pieces are not in a true plane. This is easily ascertained by laying the frame on a flat board. If it is not true the two diagonally opposite corners will stand up a trifle. This is easily corrected by placing the frame face downwards and tapping the corners lightly with the hammer, care being taken not to break the joints.

A third method of putting together a frame is shown in Fig. 6. It has the advantage that no nails are driven in until after the glue has set. There is thus no danger of the joints slipping. All the mitres are glued and the four parts are laid in position on a flat board. To squeeze out any surplus glue the parts of each mitre should be rubbed together. A piece of strong string is then tied round the whole, thus binding the sides together. To force the joints tightly together eight small pieces of wood are cut out and two are passed between the string and the moulding at each side near the centre. By sliding the pieces towards the corners the string is tightened. At least twelve hours must elapse before the string can be taken off and the nails driven in.

No matter which method of assembling is adopted, it is important that any surplus glue is cleaned off before it hardens. It is difficult to remove hard glue cleanly, and it looks most unsightly in a joint. If the glue is used carefully and sparingly, it will not be squeezed out on the surface of the moulding.

Putting in the Glass. If the worker has a glass cutter he can easily cut his own glass. Probably the majority, however, will prefer to take the frame to a glazier, who will cut a piece of glass to size. After the glass has been thoroughly cleaned and polished it should be laid in the rebate, care being taken not to finger-mark the inner side. The picture is laid over this and a piece of backing prepared. If thin wood is not available, a piece of stout cardboard can be substituted. It should be of such a thickness that the back is level with the back of the frame. To hold it in position a few picture sprigs are driven in all round as shown in Fig. 7. These are headless and can be tapped down so that they scarcely project. A piece of brown paper is pasted down over the whole. This gives a neat finish and excludes all dust. Small screw eyes can be put in at the side in order to hold the cord.

To hide the nail holes plastic wood or wax should be pressed in. If the latter is used it should be heated and dropped in from a pointed match stick. When it has cooled it can be levelled down with glass paper. If the frame is to be stained or painted this should be done before the glass and picture are inserted.

PIERCED METAL WORK

Directions About a Graceful Form of Ornamentation

This contribution is one of those that deal with the decorative working of metals. See also Bent Iron Work; Metal Spinning: Repoussé

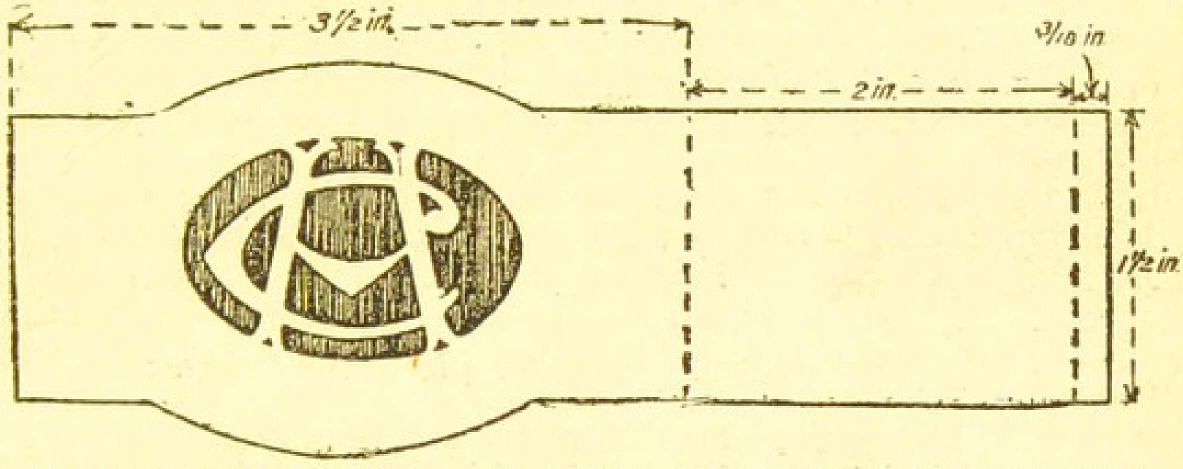
Pierced metal work offers many attractions for the home worker. It does not cost a great deal for the apparatus, and the tools are few and inexpensive. The most important are a metal-piercing saw, a sawing table, and a cramp.

The table can be made from a piece of 1 in. deal with a V-shaped piece cut from the front part. This open portion is to allow the saw to move while the jaws or side pieces support the metal. The width and shape of the opening can be modified to suit the work in hand. The material used for pierced metal work is thin sheet metal, either brass, copper, zinc, or pewter, and generally No. 24 gauge. The thickest metal that can be cut by hand is about No. 16 in copper or brass.

A napkin ring, the design for which is shown in Fig. 1, can be cut in copper, brass, or pewter, about No. 20 gauge in thickness. It is a D-shaped ring ornamented with a monogram. The expanded design is given, the leading dimensions being indicated. In cutting the desired monogram it is essential that the letters be formed by removing the metal around them, and that they have sufficient support from the framework.

A full-size design should be prepared on thin paper, and the sheet of metal is cut with a pair of tinman's snips to a rectangular shape with overall dimensions a little larger than the design. The metal is then flattened and cleaned up on the surface with fine emery paper. The design is placed over a piece of carbon paper, and is transferred to the metal.

The next step is to cut the outside of the metal to shape, doing this with a pair of snips or sawing it with the piercing saw if the outline is at all intricate. A pair of cutting snips with bent jaws would be a useful addition to the tool kit, and is for cutting curved outlines. A small hole must be made through the metal just inside one of the lines that define the outline of one of the larger holes. This may be done with a drill or an awl. The rough edges of the metal on the under side of the hole should be filed flat with the end of a small file, as unless this is done



PIERCED METAL WORK. Fig. 1. Design for pierced metal napkin ring laid flat and showing the measurements necessary for the work

there is a risk of a projection catching on the surface of the sawing table and spoiling the cut or breaking the saw blade.

The piercing-saw is clearly shown in Fig. 2. The saw clamp nearest the handle is fixed to the latter, and the one at the end of the frame is free to slide in and out of a square hole in the frame, its purpose being to tighten the blade.

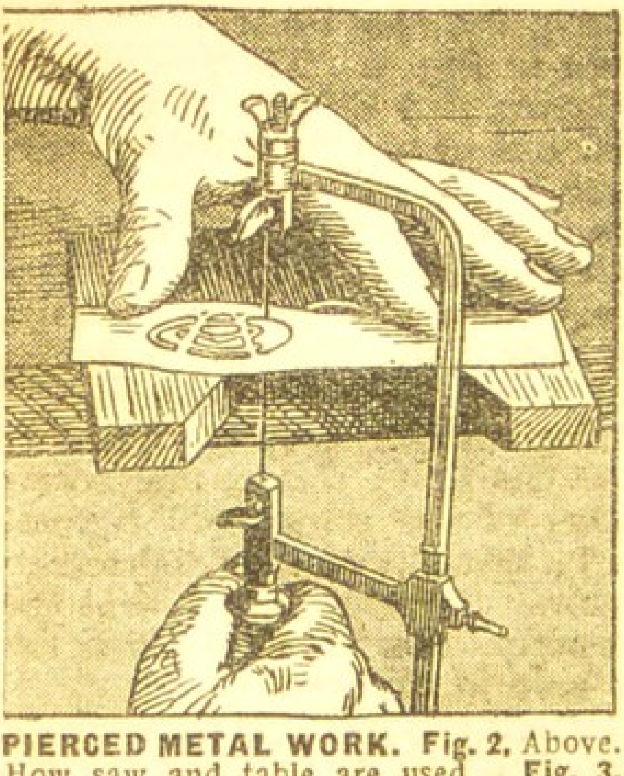
The effective length of the frame can be altered by sliding the back of the frame in or out after loosening the locking screw. The blade is fixed with the teeth pointing downward, that is, towards the wooden handle. For exterior work, fasten the saw into the top clamp, then press the end of the frame against the edge of the table, thus causing the frame to spring a little ; keep the frame in this position and fix the blade into the lower clamp, and screw the thumb nut tightly. The spring of the frame will tighten the blade and further pressure can be brought on it by tightening the thumb nut at the end of the frame. It is important that the blade be tight, or it will not cut properly. On internal work the saw has to be passed through the hole in the metal.

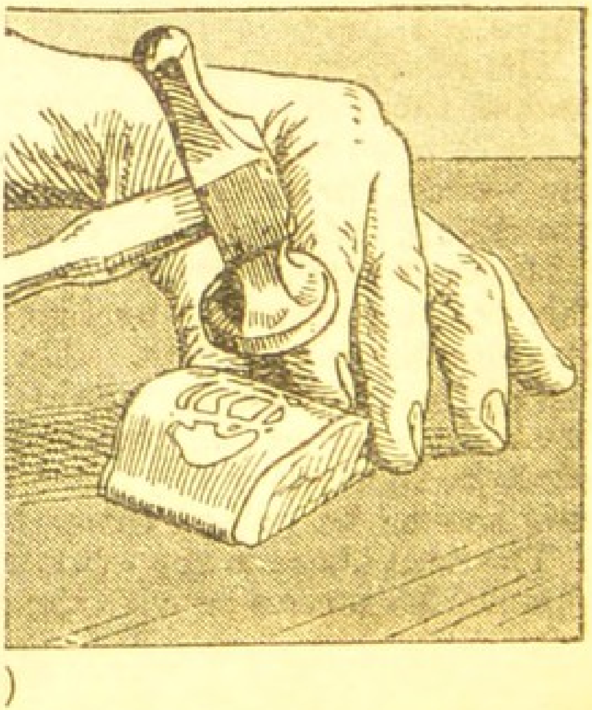
The next stage in the work is to fasten the saw table to the work bench with screws or with the clamp, and rest the work on the top of the saw table with the part to be pierced over the hole therein, and with the edge of the part to be cut as near to the sides of the table as is possible. Then with the left hand hold the metal firmly to the table, and with the right commence the sawing.

The whole of the cutting is done on the down stroke, and on the up stroke the saw blade should pass as easily through the saw cut as possible. Keep the saw perfectly upright, as in Fig. 2, and make about 2 strokes per second. Maintain this rate of progress, and continue the cutting steadily with an even pressure throughout the whole of the time the blade is at work. When the blade is working on a straight line there is not so much risk of it breaking; when cutting curved parts the blade must be kept going steadily all the while, as if it is twisted in the hole it will be almost certain to break. When necessary, it can be lubricated with a little oil or tallow.

After the first hole has been cut the others can be dealt with in the same way. The saws are made in various grades, or numbers of teeth to the inch, and as a general rule it can be taken that the harder the metal the greater the number of teeth per inch will be needed.

After the pattern has been cut out in this way, the edges are a little rough, and it will be advisable to clean them up with fine files. The work can be held in the hand or the metal can be grasped in the vice between two pieces of board. When filing, watch the progress carefully, as a few careless strokes with a file will destroy the appearance of the whole design. The metal is fashioned to the desired curvature by bending it over a shaped wooden block with the hands, finishing by gentle hammering with a repoussé or other flat-faced hammer, as in Fig. 3. The joint is afterwards brazed up or silver soldered, and the work is then cleaned up. Finally it is polished, lacquered, or plated, whichever is found to be most suitable to it.





PIERCED METAL WORK. Fig. 2. Above. How saw and table are used. **Fig. 3.** Right. Shaping ring on a wooden block

PINCERS. An indispensable tool in the home is a pair of pincers for pulling out nails and for other purposes. The ordinary type has broad jaws and two handles, one with a knob and the other with a fork or claw end. This is inserted under the head of the nail and used to prize it up sufficiently to enable the jaws to get a firm hold under the head, after which the pincers are closed together and pressed over sideways, thus partially withdrawing the nail, which may subsequently be pulled out.

PINKING. Pinking is a good method of finishing the edges of material that is not suitable for the usual double turning. The edge is scalloped in small triangles or half-diamond shapes. This is done to prevent the material from ravelling along the raw edge, and to neaten the appearance.

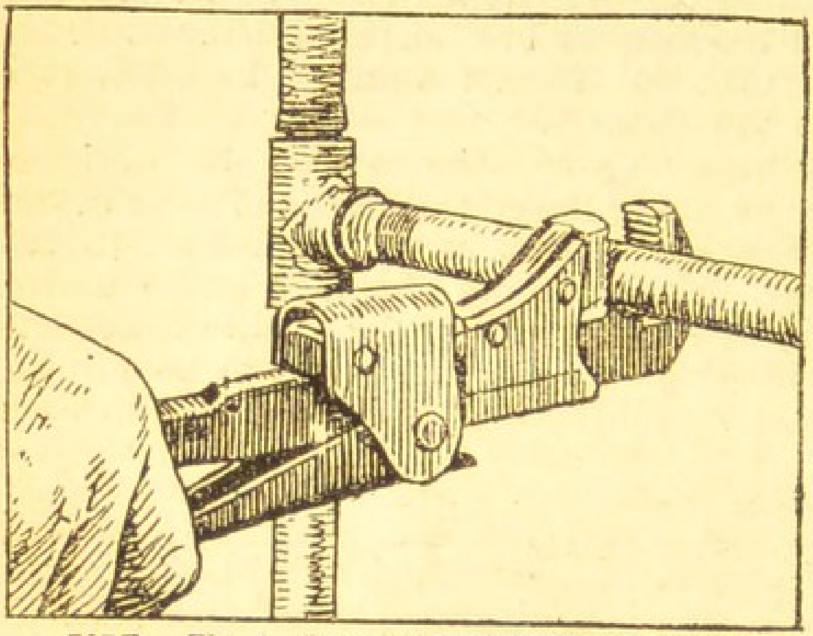
To pink an edging, ordinary sharp scissors may be used. A line of tacking should be run along the edge where the head of the scallops is to lie, or a scalloped transfer can be ironed on to the material to act as a guide. The material should then be folded between each scallop, and a slanting cut made to the depth required or to the line of tacking. If the pinking is to be carried out on oilcloth or leather, the points can be faintly drawn in with chalk or pencil.

PIPE. Pipes of all kinds play an important part in the home. Water is brought into the house through a lead pipe and taken to a cistern or receptacle in the roof. When it is intended to fit a hot-water supply the pipe is generally of iron and may be plain or galvanised, the latter resisting the attack of rust. In some cases the water is supplied through a copper pipe, especially in connexion with hot water supply in districts where the water has a corroding action on iron. Gas is conducted through a rough iron pipe known as gas barrel, which is made of wrought iron and is measured by the nominal bore of the pipe. Thus a $\frac{1}{2}$ in. gas pipe means that the pipe measures $\frac{1}{2}$ in. internal diameter, while the outside is about $\frac{3}{4}$ in. diameter. Hot water barrel and steam pipe, stronger varieties, are measured in the same way.

In contradistinction to gas barrel, brass and copper pipes are measured by the outside diameter and are purchasable in various thicknesses or gauge sizes. The higher the number the thinner the tube; a normal thickness for gas fittings is No. 16 gauge, nominally $\frac{1}{16}$ in. thick. This class of pipe is made in two grades. The one most generally used is made with a seamed or brazed joint; a superior tube is known as seamless and is made from the solid. The latter, or triblet drawn, as it is sometimes called, is usually more accurate to size and forms a stronger tube than the seamed. Larger diameters, such as 2 in. and upward, are made in thin gauges.

Pipes are jointed in various ways, according to their nature and purposes; for example, gas and hot water pipes are connected by means of fittings with screw threads cut on or in them, and screwing to corresponding threads cut on the pipe. Lead and compo pipes are joined by a soldering process, and the joint is known as a wiped joint. Brass and copper pipes are joined with screwed fittings, and also by brazing and soldering to suitable fittings.

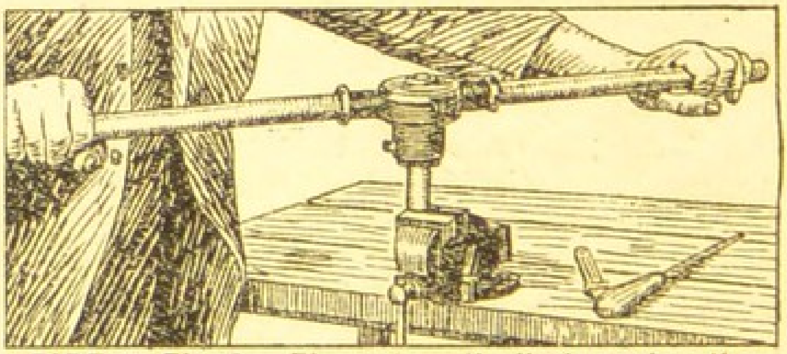
JOINTS IN GAS OR HOT WATER BARREL. The amateur should be very chary of doing anything to the gas service pipes, as there are many snags for the inexperienced. Gas barrel, however, has many other uses than its most common one, and can be employed in conjunction with certain stock fittings to make stanchions, handrails, etc.



PIPE. Fig. 1. Removing plug from T-piece

The home worker may at some time or other wish to alter his hot water supply system, or, for example, take a branch from the existing water pipe to a fresh point. This may be accomplished by unfastening one of the joints of the existing pipe, after having turned off the water or isolated that part of the pipe so that the water cannot escape. If there is a T-piece in a convenient position and the outlet from the T-piece has been plugged, the best plan is to commence the new work from it. Such a pipe is illustrated, the plug being removed with a spanner or pipe wrench.

A piece of pipe has to be cut to length, the ends of the pipe rounded off with a file, and the scale, or hard outer surface, removed by filing. The pipe is set vertically in a strong vice, or horizontally in a proper pipe vice, and a thread cut upon it with stocks and dies, as in Fig. 2. To test the thread, a socket or other standard screwed fitting should be tried in place, to ensure that a perfect fit results; if necessary the die is adjusted and run over the pipe again, so that the fitting screws on evenly and firmly. Both ends of the pipe should be treated in the same way. The next step is to screw the pipe into the T and to make the joint water or gas tight with a mixture of red lead and gold size or a good thick paint.



PIPE. Fig. 2. Pipe set vertically in a vice, the thread is cut with a large-sized stock and dies

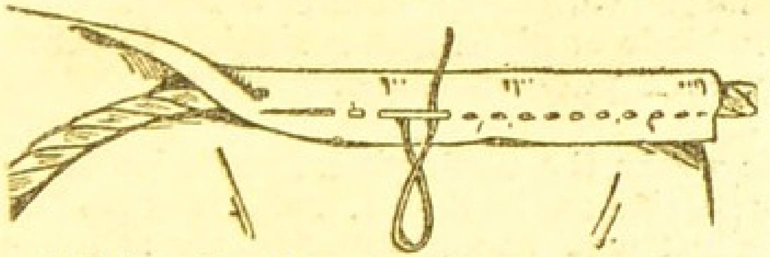
This is smeared on with a brush, a few fibres of hemp twisted into the screw thread, and the pipe screwed into the T-piece. To prevent the pipe sagging it may be supported temporarily with a nail, pipe hook, or a strut of wood. If it is desired to terminate the branch at one end of the length of pipe, this can be effected by screwing an elbow on the end of the pipe and screwing a plug into it, but if it is necessary to carry the pipe upward or downward, a sufficient length of it must be screwed into the elbow and T or branch fitting.

A great point is to make the screw threads a good fit, to make them tight with the aid of red lead, and to cut the lengths correctly at the start. Another point to bear in mind is to work progressively from one end upward, otherwise it will be necessary to use connectors. These are long sockets, and to use them one of the ends of the pipes to be joined must be screwed for a sufficient length to allow the socket to screw right on to it. The ends of the pipe are then drawn as close to one another as possible, the socket unscrewed from one and partly on to the other, both of them being secured with locknuts tightened up on the ends of the socket. The nuts have to be fitted before the socket is screwed on. A sound joint is made with twists of hemp soaked in a mixture of red lead and gold size.

When an iron pipe is to be joined to a lead pipe it is necessary to use a brass union fitting and to solder the lead pipe to the tail of the union; otherwise the fitting work may proceed as described.

PIPE CLAY. White clay resembling potter's clay is used for making tobacco pipes and other purposes. The peculiarity of this variety of clay is that it is soft and greasy to the touch and very tenacious. When used for whitening leather parts of military accoutrements its adhesiveness is increased by adding white of egg to a thick cream made by rubbing pipe clay with water.

PIPING, in Needlework. A length of piping cord encased in a tube of material is employed in dressmaking and in making covers, cushions, curtains, etc., to finish off the edges, in an ornamental manner. If these edges are curved, the piping is made separately, and applied afterwards.



PIPING. How the cord is enclosed in a tube of material

To make it, take a crossway strip of material $1\frac{1}{2}$ in. wide or more, according to the thickness of the piping cord, which may be had in many different sizes. Fold one of the longer edges over nearly down to the other, and slip the cord up into the fold; then tack along close up to the cord to keep it in position. Lay the piping over the right side of the article to be piped so that the narrower of the two strip edges faces this, and the cord lies inward; then stitch the strip down to the article close up to the cord. Roll the cord upward so that it lies along the top of the article, and hem down the wider of the two raw edges. If the edge that is to be piped is quite straight, it is just sufficient to turn the edge of the material itself in over the cord, and to run along close up to it; but this cannot be done if the piping is to be of a contrasting colour, as often happens. Piping can be used in rows as an ornamental trimming, by taking up a tuck in the material and setting the cord at the back of the fabric, so that this may be picked up inside the tuck, which is then stitched. Sometimes the material is pushed along the piping, to give a ruched effect. This style is used in making cushions.

PIQUÉ. A material often used for making detachable coat-slips, collars and cuffs, piqué is generally white or light-coloured. The surface is ribbed into cords, and in true piqué these run crossways on the cloth, although lengthwise cords are often sold under the same name. The cloth is a strong cotton one which wears and washes well. A silk material ribbed to look like this cotton cord is known as silk piqué.

Piqué embroidery is a form of white stitchery upon a strong foundation. The outlines are traced by a cord made in crochet chains or overcast, while the fillings are in different stitches to imitate a figured material, such as linen damask.

PLANES AND THEIR USES

One of the Tasks of the Woodworker Explained and Illustrated

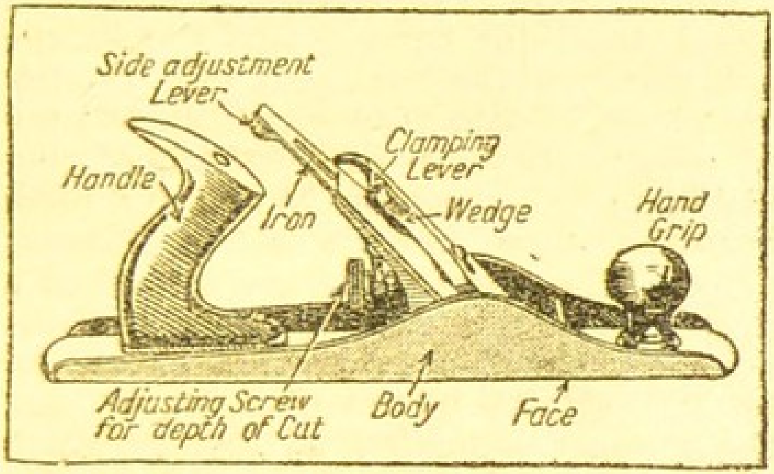
Facts regarding the use and care of one of the most important tools in the woodworker's kit. The reader should also study the articles Oilstone; Ovolo Plane; Router Plane

The carpenter's plane is used for producing a smooth flat surface on wood. In its simplest form it consists of a steel blade which is passed through a wood or metal block, the cutting edge projecting slightly below the bottom. The blade, which is inclined at an angle, is secured in its place with a wedge or some other device, and in the larger varieties a handle is fitted to the tool. In some planes the blade or plane iron is single; in others it is composed of two separate portions, the cutting iron and the back or covering iron.

The bottom of the hole where the blade protrudes is known as the mouth, and the upper portion as the throat, and it is important that the mouth should be just wide enough to allow the shavings to come away freely and pass through it; if too wide this will not press down the fibres of the wood in front of the plane iron, which consequently will have a tendency to tear the work badly. The principle on which any plane works is that the cutting iron is so ground and sharpened that the shavings are chiselled off with a regular and uniform motion, working with the grain and not against it. The function of the plane is to guide the direction or course of the plane iron, and to regulate the depth of the cut. In metal-bodied planes with screw adjustments, etc., the principle is the same.

The amateur should possess a jack plane, trying plane, and smoothing plane; with these three practically any ordinary flat work can be tackled. Other planes that may be added as occasion requires are the rebate, compass, plough, fillister, bead, round, and hollow planes, and a variety of various shapes generally used for making different kinds of mouldings; also a small metal block plane and router. When the expense is not too great, one of the Stanley universal planes will carry out a wide variety of jobs, including all kinds of moulds, ploughing, tonguing, and grooving.

The wooden plane is generally made of beech, which has a close grain and is fairly hard. The purchaser should see that the grain on the end of the plane is as nearly horizontal as possible, or level with the sole, or bottom of the plane. If short whitish lines are visible, known as medullary rays, these should be as nearly as possible at right angles to the sole of the plane, as such a tool will wear better than one in which these lines are at another angle. If the plane has been made by a reputable maker, it can reasonably be expected to be true and free from warp or twist; but this can generally be told by holding the plane horizontally on a level with the eyes, and looking along the level of the sole. The body of a new wooden plane should be soaked in raw linseed oil before using it for the first time.



PLANE. Fig. 1. Diagram of typical iron plane with principal parts named

To remove the iron of a jack plane, or trying plane, grasp the plane in the left hand, the thumb pressing upon the iron, and the fingers grasping the bottom or sole of the plane. With the aid of a hammer strike a sharp blow near the end of the plane and this will loosen the wedge, which can be withdrawn and the blade lifted out. The two irons are separated by laying them on the bench, holding them firmly in the left hand, and manipulating a screwdriver. The plane iron should rest on or be firmly held by some support such as the bench. When the screw is loose the back iron is slid along the slot cut in the plane iron until the screw is opposite a large diameter hole, when it can be lifted out of its place. The iron can then be sharpened if necessary. The cover iron is then replaced; the edge should be about $\frac{1}{8}$ in. or less from the cutting edge of the plane iron. The cover rests upon the front of the plane iron, that is, the side that is not ground.

The blade is replaced and held as if taking the plane apart, while the wedge is tapped lightly in position with a hammer sufficiently to hold the iron. The plane is tilted at an angle, and the edge of the iron will be seen to protrude slightly. If it does not, it may be tapped out gently by tapping the opposite end with the hammer, or be adjusted by the screw device on an iron plane. The iron should project slightly less than $\frac{1}{16}$ in. from the sole of the plane, and should project evenly over the whole breadth of the blade, except the corners, which will be slightly rounded off in the grinding process. The wedge should be secured tightly, and the plane is ready for use.

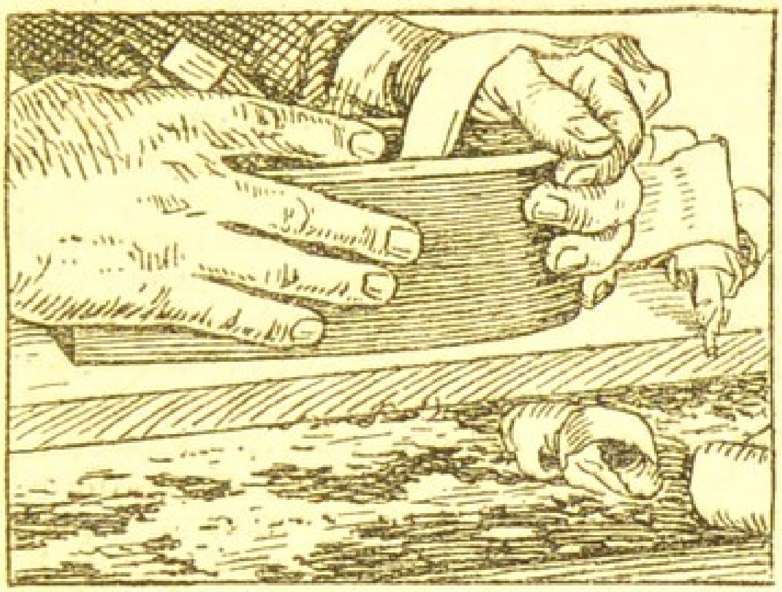
A smoothing plane is adjusted in the same way, except that to loosen the plane iron, the back of the plane is struck with the hammer. In the case of metal planes the various adjusting devices are operated. Fig. 1 shows a metal trying plane with the location and purpose of the various adjustments indicated.

Manipulation of the Tool. Most planes are held and used with both hands; in general, the right hand grasps the handle of the plane, such as a jack plane, or the back part of a smaller plane, such as a smoothing plane. Some very small planes may be held in the right hand only; they are used for chamfering the edge or cleaning up any little roughness on the end of a piece of wood, or for work on curved surfaces, but are seldom of use in making a really flat surface. The correct method of using a smoothing plane is illustrated in Fig. 2, which shows the disposition of the hands and the style of shaving that should be produced. Rebate planes and similar planes used for making mouldings are held in the manner indicated in Fig. 3, which shows a filister plane employed in making a rebate.

Figs. 4 and 5, Plate 35, show the beginning and end of a planing movement with a jack plane. The top front of the plane is grasped between the fingers and thumb of the left hand, and the handle held in the right. The object should be to thrust the plane forward in a straight line, keeping it level. A tendency to roll the plane may be detected by the tool inclining to lift at one corner, and this may be checked by control with the hands and arms.

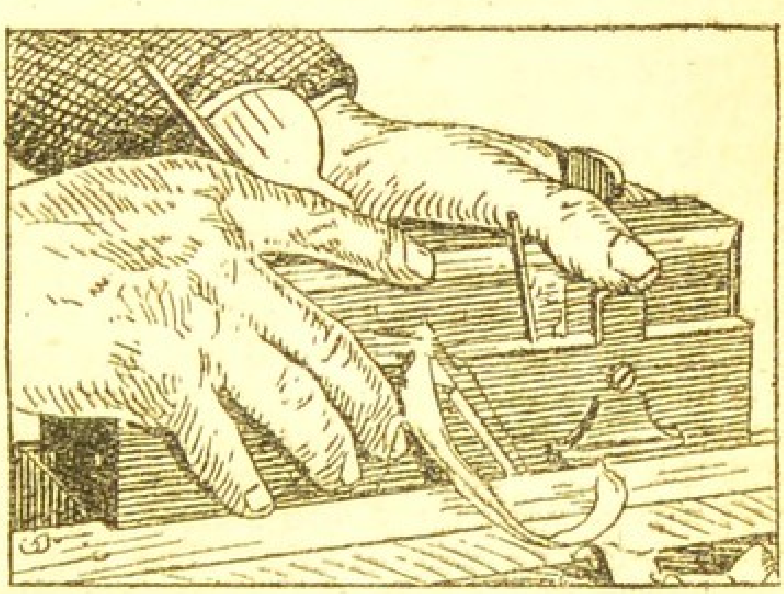
If the edge of a board is to be planed, the tool is grasped in a different manner. It may be held as in Fig. 6, Plate 35, the first finger of the right hand being extended, and the left hand resting on the top of the plane. With this grip it is possible to judge whether the plane is being held level or not.

Planing to thicknesses and widths is simply a question of gauging. The principle is to establish a flat surface, or face side, then one edge. These are marked off and gauged to the desired thickness, for which purpose special hardwood gauges can be prepared, or, as in gauging the thickness of a panel, grooves can be ploughed into a small piece of wood, and this is applied to the edge of the panel to correct the planing. Another point is that when planing curved surfaces, always work downhill; never attempt to plane uphill against the grain of the wood. When planing end grain, do not plane straight across the grain, but work from each side across the end grain to the middle; or slightly bevel one corner of the board, and plane across the end grain to this level; or clamp it to an odd piece of wood on the far side of the board, and plane right across. If these precautions are not observed, the wood will split. Another aid is to hold the plane diagonally, or slanting, across the board, but to push the plane bodily in a straight line.



Before attempting to plane wood it is essential that the plane iron is very sharp, and it must be rubbed up on an oilstone when this becomes necessary. For rough work the plane iron should project considerably; for smoothing, a less amount, and for a fine finish, the least amount it is possible to set it at. When the plane is cutting properly, the shaving should come away with a clear decided sound.

PLANE. Above. Using a smoothing plane. Right. Using a fillister plane to make a rebate



PLANK. This is the name given to sawn timber 11 in. or more wide, and from $2\frac{1}{2}$ in. to 6 in. thick, but the word is commonly applied to all sorts of boards. Examples are seen in planks of a platform, in planks used in scaffolding and in boat building.

For cabinet making it is very often cheaper to purchase a plank and have it sawn into boards, the charge for the saw cuts being a few pence. An objection, however, is that the boards may wind or twist after sawing from the plank, so that a period of seasoning is desirable before using the stuff for anything important. Care should be taken in selecting a plank for conversion, and an end grain showing the heart should be avoided unless several thin boards of narrow width are required.

PLASTER AND PLASTERING

Treatment of Walls and Ceilings

Plastering is not usually performed by the amateur, but often a little knowledge of the craft will enable the home decorator vastly to improve the appearance of his house

Plaster is the name given to calcareous compounds with a base of calcium sulphate. In the general use of the word, as applied to building operations, it refers to a mixture of lime, sand, and water, generally with the addition of plaster of Paris, or some other material to accelerate its setting. The general use for plaster, as far as the amateur is concerned, will be in the plastering and repair of wall surfaces, construction of economical outbuildings, and in the making of moulds and patterns for ceiling and wall decoration.

It is easily worked, especially in small quantities, and is particularly adapted for any purposes where an intricate form is to be reproduced or modelled, and where no great strength is required.

The plaster for a wall is applied in 2 or 3 separate coats. The first, or pricking up coat, is applied with coarse stuff composed of a good chalk lime, coarse, clean, sharp sand, and clean ox hair. For the mix-up the sand is arranged in the form of a hollow basin, preferably rested on boards; but if the ground is impervious, such as a concreted floor, it can be set direct upon it. The lime should previously have been thoroughly slaked, and is used in the form of a putty with a consistency not unlike that of thick cream.

This is sifted through a sieve, which may be rested upon a couple of poles or boards upon the surface, and water is run through it, if necessary, to ensure that no lumps of the lime are prevented from being mixed with the sand, which should previously have been sifted for a similar reason. The hair, when purchased, is in a clotted state and all lumpy. It is separated by placing some of it on a board and beating it with two sticks, one held in each hand, so as to separate the hairs without breaking them. The hair when beaten is disposed over the slaked lime, and the whole of the sand and lime turned over and thoroughly well mixed with larry and shovel. The mixture should be just wet enough to mix evenly. The larry is a broad-bladed tool resembling a hoe. In the blade is a large hole, which aids the mixing of the plaster.

The mass that is thus prepared should be heaped up and left to temper for as long as possible before using. Coarse stuff made in this way can be used at once, but the longer it is left to temper, the more satisfactory the plaster. The usual proportions are 1 of lime, 3 of sand, and 1 lb. of hair for every cubic foot of coarse stuff. The object of mixing the hair is to bind the plaster together and make it more tenacious.

The plasterer's putty or lime-putty referred to here is prepared from pure chalk lime broken up and placed in a tub with water, and left to slake. The slaked lime is sifted through a very fine sieve into another tub, covered with water, and usually left to mellow for some weeks. The longer it is left, the better it becomes. Fine stuff is composed of lime-putty and fine, washed sand in the proportion of 1 of putty to 2 of sand. The expression gauged stuff is applied to compounds composed of either coarse or fine grain stuff, mixed with plaster of Paris or some similar material which hastens the setting.

The plaster may be applied to rough brick walls or to a stud partition, built up in timber and lathed over with wooden laths or metal lathing, or even on a backing of coarse canvas strips, cut and nailed to a framework of wood for temporary structures.

Tools for the Amateur. The chief tools used in plastering are the hawk, trowel, hand float, and scratch. The hawk consists of a square piece of board measuring about 14 in. across, with a small round handle underneath. Stuff that is being applied to the wall or ceiling is conveyed from the mortar board to the hawk and laid on with a trowel. The latter is an oblong tool made of steel, having a handle attached, and is used for applying the first coat of material, known as the coarse stuff. The hand float, similar in shape, but made of wood, is employed for applying the final or setting coats. The scratch consists of 3 or 4 laths nailed together in the form of a fan, the ends being pointed. It is used for scratching over the surface of the second coat, so as to form a key for the succeeding coat.

The gauging trowel resembles the ordinary trowel used by bricklayers, except that it is tapered, and does not terminate with a sharp point, but is slightly rounded off. Its use is for mixing small quantities of material, such as putty and plaster. The margin trowel is for work where it would not be possible to use a float. In shape it resembles a small shovel with the sides turned up about ½ in., and is made of steel. The stock brush is for sprinkling small quantities of water on to the work to keep it to working consistency.

There are other tools used by the plasterer which require professional skill and much practice to handle; they are used principally in the formation of mouldings and cornices. For example, the running horse is a tool cut to a particular shape to form a certain section moulding. These tools are generally specially made for the particular job, in conjunction with small moulding tools of different shapes. Another tool is the joint rule for working in the angles on cornice work. All these implements may be obtained from any good tool store.

Plastering a Brick Wall. Supposing that a rough brick wall is to be plastered, then the work will be carried out in the following manner: First, with a garden syringe or a bucket and brush, thoroughly wet the bricks. Having placed several buckets full of the coarse stuff on a mortar board in a convenient position, as, for example, on a box adjacent to the wall to be plastered, take a hawk in the left hand and the laying-on trowel in the right hand, and, with a swinging, circular movement apply the plaster to the brickwork, pressing it firmly into contact and making it about $\frac{1}{2}$ in. thick. Only sufficient of the wall should be covered at a time to permit of convenient working.

The next stage is to take a derby float, and work over the whole surface to flatten and even it. If, however, the wall surface is to be got up in any style, a screed will be necessary. This, in the case of a room having a picture rail and skirting board, may be wooden strips about 2 in. wide and $\frac{1}{2}$ in. thick, securely nailed to the wall, and backed up when necessary with rough grounds, so that their surfaces are in line and represent a level surface. A traversing rule or long batten is worked up and down, levelling off the plaster and making its surface uniform with the level of the grounds.

When the plaster begins to set, a wide, flat, rough wood float, having a nail driven through it, the point of which projects through the face, is applied to the surface of the plaster, producing a series of scratches; this provides a key or hold for the second coat. For all ordinary partitions a second coat may be applied the next day; it may be composed of fine stuff, gauged with a proportion of Keene's cement, or some similar hard, quick-setting material. It is applied with a wooden float, this coat not being so thick as the former.

The second coat is brought to a true and flat surface by the aid of a traversing rule, with a metal float and a liberal application of water. The great point is to prevent the plaster from setting too quickly, and this can generally be accomplished by moistening the work, and keeping it damp as the job proceeds, both with the first and second coats. All small blemishes are carefully worked out with a laying-on trowel, or hand float, and the corners finished off. They may be finished square with the aid of a special trowel virtually having two faces, which work simultaneously at the juncture. A different treatment, and one that is very effective and hygienic, is to cover the corners, that is, round them off, using a wooden float, more or less triangular in section, with one angle rounded off to the desired curvature.

Great care must be taken in reducing the finishing coats to a smooth and level surface in every part. It is important in this connexion to work the first layer as evenly as possible. Equal care should be taken in finishing the arrises, or edges, of projecting corners, particularly the edges of chimney breasts.

Ceilings. Similar methods are employed in the case of ceilings. These are often decorated with applied fibrous plaster ornamentations, which take the form in general of cast plaster enrichments, the plaster of which they are composed being reinforced with fibrous material, such as hair, coconut fibre, and the like. In many cases canvas is used as a backing, and thin strips of wood are employed as a reinforcement. These are simply cemented in place with plaster of Paris.

If the cornice is large and consequently too heavy to be made solid, it is usually cast in pieces and then fixed into position. An alternative method is to fix blocks of wood, either triangular in form or of a shape approaching more nearly to the outline of the cornice, so that strips of wood or laths may be nailed on and thus provide a strong foundation for the first layer of coarse work. Full instructions for repairing a damaged ceiling are given in the article on Ceilings (q.v.). Plaster work on walls is liable to sustain damage, in which case any dents or bruises can be filled in with neat plaster, or a mixture of lime-putty and plaster of Paris. The general procedure is to hack out the plaster over the damaged area, thoroughly wet it and work in the new plaster with a small trowel, trowelling it flat, true and level with the surface. To ensure a good joint the edges of the old work must be kept saturated with water. On all angles or corners liable to sustain extra wear, the first coating of plaster should be composed of Portland cement and sand in equal proportions. Sometimes in a lath and plaster partition the laths are broken, in which case all the affected laths should be cut out and replaced by new.

PLASTER OF PARIS. Calcium sulphate, known as plaster of Paris, is used for the production of casts of many varieties of small statues and ornaments, for mouldings and interior decorations. It is employed in making casts of parts of the human body, and has numerous applications in surgery. It is finely ground and is obtainable in several grades, and should invariably be kept in a dry place.

Plaster of Paris has the property of setting into a hard white substance when it is mixed with water. The best proportion to use is water 1 pint to plaster 2 lb. When the plaster sets, it expands slightly.

Plaster figures are made by pouring mixed plaster into moulds. The figures are generally hollow, the residue of plaster from the centre being poured out before it has had time to set. If a small proportion of Portland cement is added to the plaster the time of setting is delayed. The hardness of the plaster is increased by using alum solution instead of water in the mixing process. Plaster of Paris is useful in the household for mending broken tiles and for filling up crevices in walls.

If only a small quantity is wanted, a good plan is to fill a bowl about $\frac{2}{3}$ with cold water and pour in the plaster with a circular motion, distributing it evenly over the water and at the same time stirring with a circular motion, using a wooden spoon or smooth stick. The surface of the water will exhibit air bubbles, and the plaster should be stirred until these bubbles no longer appear. The stirring should be steady, and the water should on no account be violently disturbed, as the air bubbles will be imprisoned and the work will be imperfect. The mixture speedily gets thicker, and if required to be poured into a mould to make a cast, this should be done just as the plaster is in the thickening stage, approaching the consistency of thick cream. If required for moulded work, pour the plaster in steadily so that the air in the mould can escape.

PLASTIC WOOD. This is the name given to a preparation of wood in paste form. It is used as a filler in woodwork and for a variety of other purposes. It can be moulded by hand or modelled, dries and hardens in a short time, and takes stain or polish readily. When using plastic wood to fill nail holes, knot holes, or shakes, the stopping should be left a little above the surface level and the surplus chiselled off when dry. Any moisture or grease on the surface to be treated will prevent the filler from adhering properly, and if a considerable area is to be dealt with it is as well first to apply a little of a special softening preparation, which can be had from the maker of the plastic wood.

PLATE GLASS. In the processes of its manufacture plate glass is finished with a flat and true surface, and, being transparent and free from irregularities or surface markings, it is used for good-class windows and plate glass is also used as a protective covering for washstands and the tops of tables and shelves. The surface is easily kept clean, and decorative matter can be placed beneath the glass to add colour to the room. In the same way a well-polished piece of furniture or tray can be protected, and the grain and colour of the wood revealed. Plate glass is also used for table mats.

Another application of plate glass in the home is as shelves in the bathroom, or for pastry making in the kitchen. Shelves should have rounded and polished edges and they are generally supported by electro-plated wall brackets.

Plate glass can be purchased from builders' merchants, or first-class ironmongers and has to be cut to size by the manufacturer. In ordering it is well to give the exact dimensions, or a full-size pattern of the piece required. The thinnest plate glass measures $\frac{3}{16}$ in. thick. A useful thickness is $\frac{1}{4}$ in., and this will generally be supplied if no thickness is mentioned at the time of ordering. *See* Glass.

PLATINUM. This metal is generally to be found in the native state, although it may be alloyed with other platinum minerals. It is used extensively for the manufacture of jewelry and objects of art, for various dental and medical appliances, and for several forms of chemical crucibles. Owing to the fact that platinum has nearly the same expansion rate as glass, it is employed in making many forms of electrical contact points and connexions for lamps and other fittings, especially where the conductor has to pass through the glass.

Platinum needles, or points, as they are called, form part of a pokerwork outfit.

PLEATING. One or more folds of material pressed flat and held in usually at the upper end only, allowing the lower one to open and give extra fullness when required, is called pleating. The arrangement of folds to form pleating is used extensively in dressmaking. Different kinds of pleating are suited to heavy or light materials. Kilting and box-pleating are generally employed for the former, while a finely woven material should be chosen for accordion pleating.

Box-pleating is most usual for curtains, frills of loose covers, etc. The material to be pleated is folded alternately towards the left and ought to give flat pleats, which must all be accurately measured to be the same size. If the pleating is to be all round, the material required is twice or three times the length needed for a plain piece. The folds should be pinned into position and then firmly tacked.

Pressing the Pleats. When pleats become creased or lose their shape, the pleated article should be spread on a table, the folds adjusted, tacked into place, and the whole covered with a clean, damp cloth. Press this heavily and evenly with a hot iron until it is dry and the steam ceases to rise, and the pleats will then be found neatly pressed. If the pleats are many, two or three should be pressed at a time.

PLIERS. Of the many patterns of this tool, there are 3 that should be found in every amateur's tool kit, and these are: side cutting, gas and round-nosed pliers. The first, generally made with flat jaws and with cutting edges at the sides, are used for snipping off wire. Gas pliers, made with serrated, circular, internal jaws, are for gripping pipes and rods. Round-nosed pliers with tapered jaws are indispensable for forming eyes at the end of wire and for other purposes.

PLOUGH PLANE. A plough is a woodworking plane designed to make a groove on the face of a board parallel to an edge. The hardwood body of the plane is furnished with a steel sheet, or blade, projecting downward, which is divided so that the cutter, or iron, can pass through; the blade is thinner than the width of the narrowest iron to be used. Two bars pass transversely through the body of the plane, and carry a hardwood block, or fence, adapted to bear against the edge of the board.

In use the bars are pushed through the plane body and locked by wedges, so that the distance from the centre of the iron to the face of the fence is equal to the required distance from the centre of the groove to the edge of the board. The width of groove depends on the size of the iron chosen. The amount cut at each stroke is regulated by the amount that the edge of the cutter projects below the bottom of the blade; the iron is locked by a wedge after being adjusted as required. The total depth to which the groove is ploughed out is regulated by an adjustable stop below the plane body.

The tool is pushed along the work repeatedly till it reaches the required depth, when it ceases to cut owing to the operation of the stop. While cutting is in progress the fence is kept up against the edge of the work so that the groove comes in the right place. The tool must be so held during the cutting process that it is kept level laterally.

PLUG. Before any fitment can be attached to a brick, breeze block, or plaster wall, holes must be made to take the plugs in which the nails or screws can be driven home. For many of the jobs about the home the patent fibrous plugs offer the most convenient means of doing this. The plug consists of a short piece of specially prepared fibrous material, through the centre of which is a small hole. In the material in which the screw is to be inserted a suitably sized hole is made with a drill or jumper, the plug pushed into it, and the screw driven into the plug. This causes the fibre to open and expand, giving a firm grip, etc.

In making the hole a jumper for the plug should be employed. Do not attempt to drive the tool straight into the wall, but strike it with light taps, slightly turning it in the hole after each blow.

Having prepared the hole to a depth suited to the screw, a plug of the required length is inserted in the hole, so that the end is flush with the wall surface. The length of the hole, and consequently the plug, will vary with the article to be fixed. Suppose, for instance, the fitting is $\frac{1}{4}$ in. thick. If the article were not very heavy, a $1\frac{1}{4}$ in. screw would probably be sufficient, leaving 1 in, of the screw to fit into the hole in the wall. In this case a plug 1 in. long, fitted into a hole about the same depth, or slightly more, would be needed. The next step is to insert the screw through a suitable hole drilled through the article, and into the hollow centre of the plug fitted into the hole in the wall. The screw should then be screwed up tightly.

The holes for a rail or other like article should be bored in the wood and the positions of the holes carefully marked on the wall. The plug holes must coincide exactly with these, and the screws must enter the plugs accurately, centre to centre, or the plug may split. The screw must be of such a length that it can be driven home, and thus hold the fitment tightly to the wall, without the unthreaded portion reaching the plug. If the screw is too long for the plug, so that the unthreaded portion reaches the latter, further attempts to screw it home will result in the plug being loosened.

For such hard materials as marble, concrete, slate, and the like, it is better to use a plug slightly shorter in length than the screw, and to drive the plug in so that it is below the surface of the wall. This prevents the unthreaded portion of the screw from entering the hollow of the plug, and thus facilitates the screwing-up operation. An alternative is to use screws which are threaded right up to the head, when the plug can be fitted flush to the surface of the wall, as usual. This type of screw is required in fixing thin metal fittings, such as brackets, mirror-plates, and hangers.

It is often necessary to plug a brick wall to provide a fixing for rough grounds, heavy shelves, etc. Where the joints between the bricks are visible it is generally possible to cut out the mortar.

Prepare a hardword plug equal in width to that of the hole and about 3 in. long, and drive it into the joint along the way of the grain, so that the end grain is facing out of the hole. The wood should be tapered, and is driven in tightly with a hammer. The joint may then be made with neat cement.

If it is necessary to place the plug in the brick itself, or in a plastered brick wall when the joints of the bricks are not visible, the hole must first be chipped out with a cold chisel, or brick borer. The rough hole thus formed is drilled out smooth, and a softwood plug driven into the brickwork. If the plug is made to proper length, which is slightly less than the depth of the hole, it will only have to be driven in flush with the wall, otherwise the protruding end may be sawn off with a hand saw, interposing a piece of zinc between the side of the saw and the wall to prevent scratching the latter.

In plugging a concrete wall it is necessary to chip out a hole in the concrete, making the hole wider at the bottom than at the mouth. The plug should be split at the top and provided with a wooden wedge, which is first placed in the hole; the plug is then introduced so that the wedge goes into the slit, and the whole is driven into place. The wedge will expand the wood plug at the back and cause it to grip the concrete. As an extra precaution, load the hole with plaster, or cement, before driving the plug in.

PLUMBAGO. This is another name for graphite, a form of carbon. It has many applications as a lubricant. Plumbago is a conductor of electricity, and in electro-plating work it is used as a preliminary coating on non-conducting materials, such as india-rubber, which have subsequently to be electro-plated. Crucibles are made of plumbago, as they stand the heat of the furnace, and are extensively used for the melting of metals.

PLUMBING FOR THE AMATEUR

Practical Hints that will Save Time and Money

Other articles that bear upon the subject of Plumbing are those on the tools used, e.g. Blow Lamp; Hammer; Pliers. Others deal with Glass; Lead and other materials. See also Bath; Gas; Gutter; Pipe; Soldering; Tap; etc.

So far as the amateur is concerned, plumbing consists chiefly in making joints in lead pipes and sheets, generally in connexion with the water supply to the house, or the guttering and roof coverings. There are many difficulties that must be overcome for successful plumbing, which is a craft that is neither easily nor quickly acquired; but some of the repair work of a house however, can be carried out by the skilful and careful amateur with no small degree of success.

The principal tools required are a hammer, saw, screwdriver, snips, pliers, and blow lamp.

A bossing stick and a dresser, made from hardwood, are used for working the sheet lead into various forms. A drift and chase wedge are employed for working the lead into corners and angles. A bossing mallet is for driving the other tools, and a tan pin is for opening the end of the lead pipes. A rough chipping knife is used in conjunction with a hammer for cutting the lead, and a draw knife for cutting the thin sheets of lead by hand. A small hand saw is employed for sawing the pipes asunder. Snips or shears are for cutting the metal. A soldering iron of good size is necessary, as is also some flux. A ladle and plumber's stove are other requirements. A shave hook and other hooks are intended for shaving the edges to a level surface before soldering.

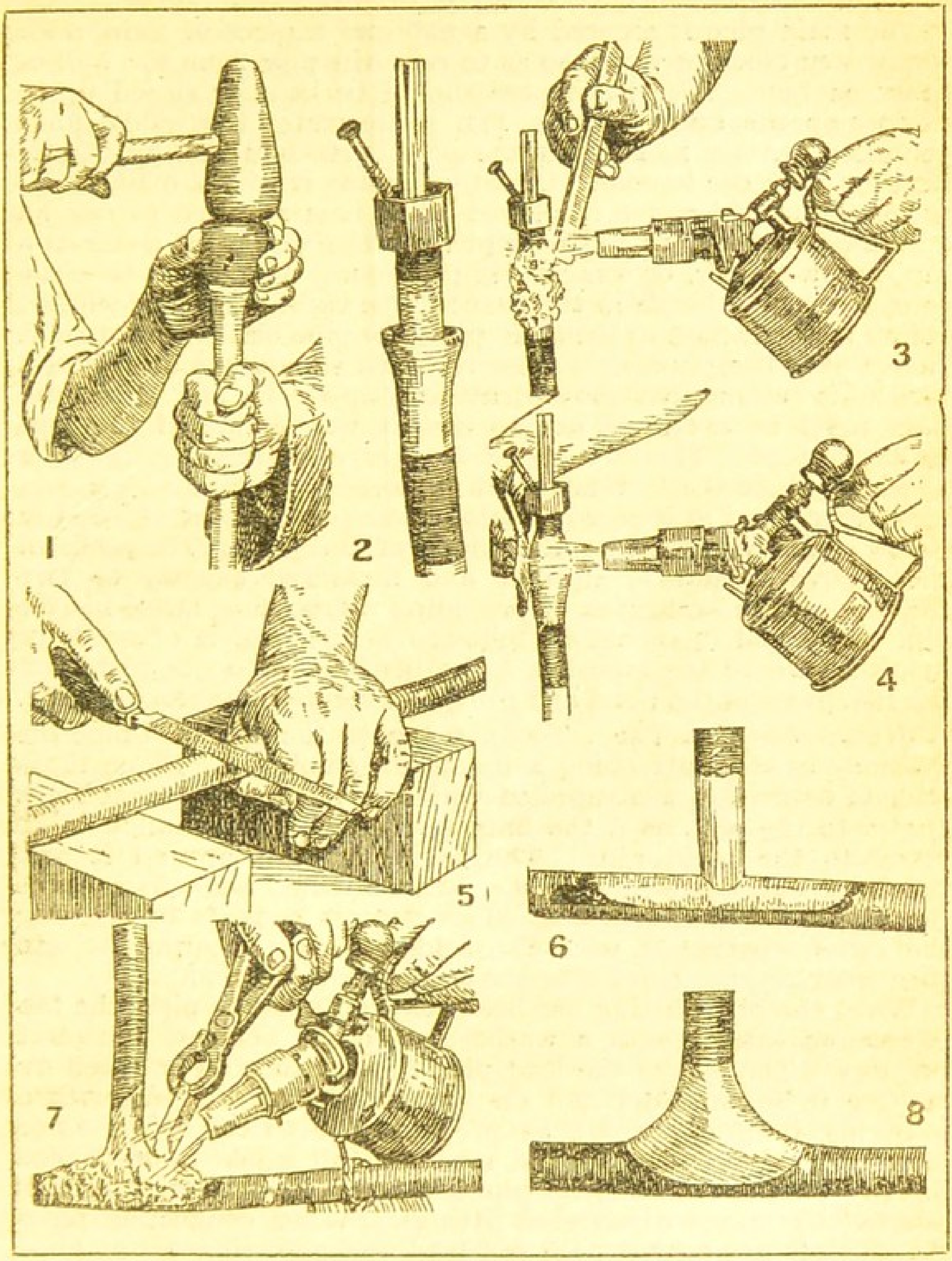
Rasps are used for preparing the ends of the pipes before they are jointed. Fixing points or blunt-edged punches are driven into the joints of brickwork or into other surfaces to obtain a temporary fixing by wiring or tying the pipes to them while the joints are being made. A rule, compasses, bevel, and chalk line are used for measuring and setting out the work. A wrench, hammer and gas pliers are required for dealing with nuts and collars.

TYPICAL JOBS. Probably the repairs most commonly needed are those to water pipes and gutters. First of all, a suitable length of pipe is cut off with a saw or by means of a rasp, and the end of the pipe is opened out with the aid of a tan pin, as in Fig. 1. An assistant holds the pipe while the plumber drives the tan pin home with the mallet, thus belling out the mouth of the pipe. The pipe is then held lightly in the vice.

Should it be desired to fit a union to the end of the lead pipe, this can be accomplished by the following method, which also applies to effecting the joint with another piece of pipe. In Fig. 2 the union end, previously bent, is shown in position for soldering. Note the wood screw jammed in the union nut to prevent it falling, and the wood chips inside to ensure alinement of pipe and union. The scraped pipe end may also be seen, as well as the size and lamp-black deposit to prevent the solder adhering where not wanted. This mixture is applied to the pipe moist.

Fig. 3 shows the first step in building up the joint, the lead solder being applied to the pipe and union. The solder is built up in this way by melting it with the blow lamp, after which the joint has to be wiped. In Fig. 4 the joint is seen being wiped. The wiper is made of moleskin from which all the hair has been removed, and is boiled in tallow. The metal blobs running down to the blackened portion of the pipe have not actually adhered to it; they will be found easy to remove with the fingers after the metal has cooled.

FITTING A BRANCH PIPE. To make a T joint, first make a hole in the main pipe (Fig. 5). A half-round rasp is used, filing at right angles to the pipe to form a round hole. After filing, the hole is scraped into a funnel shape. Fig. 6 shows the branch pipe fitted into the main pipe. The meeting and joint faces are scraped clean with the shave hook, and subsequently the solder



PLUMBING. **Fig. 1.** Opening out end of pipe with tan pin. **Fig. 2.** How the union is fitted. **Fig. 3.** Melting solder to joint. **Fig. 4.** Wiping joint. **Fig. 5.** Use of rasp for cutting hole in main pipe. **Fig. 6.** Fitting branch pipe to main pipe. **Fig. 7** Building up solder around joint to shape. **Fig. 8.** Finished wiped joint is melted around them (Fig. 7). About 1 lb. of solder is required, and when it is being applied the final shape of the joint is borne in mind.

The main pipe is secured by a nail and a piece of string to a temporary block of wood, so as to raise the pipe from the wall or other backing. The main pipe should be bent or closed up so as to grip the branch pipe. Fig. 8 illustrates the saddle joint complete. After 20 minutes the pipe is straightened by careful bending with the hands and lightly striking it with a mallet.

This class of joint is employed when it is required to run an additional branch, as for example, for the supply of water to a tap over a copper, or some other position. Where it is necessay to make several bends in the branch pipe these should be worked before it is attached to the main pipe, the pipe being bent at right angles over the plumber's dresser, which should rest on top of a trestle to allow free movement and space in any direction. Care must be exercised not to distort the section of the pipe to any extent. This is avoided by gently hammering the sides wherever there is any tendency to flatten.

A sharp bend in a pipe is made for a square corner of wood in which a groove is cut to the width of the pipe. The walls of the groove should be upright and measured exactly to grip the pipe. The same idea of providing a groove or chase for the pipe to be laid in should be followed in the corners of walls, or in places where the pipe has to be bent round, so as to reduce the sharpness of the bend and provide a secure fixing for the pipe.

Fixing on the Tap. To fix a tap to the end of a pipe the methods used in attaching a union are employed. Short brass sockets or fittings are supplied with the tap and fitted at right angles to the pipe as if the brass socket were the branch to be fitted to the main pipe. The solder is built around it and the joint subsequently wiped. Brass fittings have first to be tinned on the joint surface. This process consists in cleaning the brass, coating it with the soldering flux, heating it, and then working the solder over the surface with an iron.

When the brass fitting has been soldered into the pipe, the tap is screwed into it with a washer interposed between the joint surfaces. The end of the lead pipe beyond the tap is closed by melting in some solder and then smoothing off the end with a soldering iron, or wiping as previously described. The same principles are applied to the repair of all kinds of lead pipe joints. In the case of iron pipes, the joints are almost always effected by means of screwed fittings. When connecting pipes the threads are coated with red lead and gold size, or any good thick paint, a few strands of hemp being twisted into the groove before screwing home.

There are one or two points that the amateur plumber should bear in mind. The water supply companies have stringent regulations governing piping connected to their mains, and local authorities also have regulations which must be complied with.

PLUSH. A longer pile distinguishes plush from velvet. Mohair plush is cheaper than silk plush and is sometimes used for covering large pieces of furniture. Teddy-bear plush is obtainable about 50 in. wide.

Linen plushes can be had for making curtains, but their pile is more easily flattened down than that of silk or hair plushes. Hatter's plush, made with a laid pile instead of an erect pile, and intended for covering silk hats, is a distinct variety. *See* Upholstery.

PLYWOOD. Made of thin layers of wood glued together at right angles or diagonally and then placed under considerable pressure, plywood can be obtained in large sheets or panels, and in thicknesses from $\frac{1}{8}$ in., increasing by $\frac{1}{16}$ in. to $\frac{3}{8}$ in. These thicknesses are generally of 3-ply, but additional layers of wood are commonly used up to 5-ply to a thickness of $\frac{5}{8}$ in.

Various kinds of wood are used. Birch, whitewood, satin walnut, and pine are softwoods and suitable for backing or staining. Of the commonly used hardwoods, oak, mahogany, teak, black walnut, and bird's-eye maple are obtainable in plywood. The more expensive woods are made with a core of cheaper wood.

The main feature of plywood is the strength it affords in a thin board. It is estimated that a piece of plywood is four times stronger than solid wood of similar thickness. The method of manufacture, which places the grain of the layers at right angles to one another, prevents splitting and renders the material comparatively free from risk of warping and shrinkage. The amateur will find many uses for plywood, especially for the backs of cabinets and for linings and bottoms of drawers and small boxes. It may be employed for panelling, and owing to the large size of the sheets it is useful for either temporary or permanent partitions in rooms. A simple plough plane for grooving rails, legs, etc., to take $\frac{3}{16}$ plywood can be purchased quite cheaply (*see* Plough), and such furniture parts are obtainable also with the grooves ready worked on.

For all kinds of small articles plywood is very handy. Owing to its stiffness it is convenient in making small cabinet doors. The stiles and rails can be of thin wood, glued and screwed to the plywood back.

The best way of obtaining a good top surface on plywood is to size it first, rub it down with fine glass paper, give it another coat of size on top, and lightly rub over to remove grit. The material will now take a good polish, or it can be previously stained. If the edges of the plywood are in a prominent position, it is advisable to use a wood filler, and whiting mixed to a paste with glue answers very well. This should be rubbed well into the grain and cleaned off with glass paper before the wood is polished or painted.

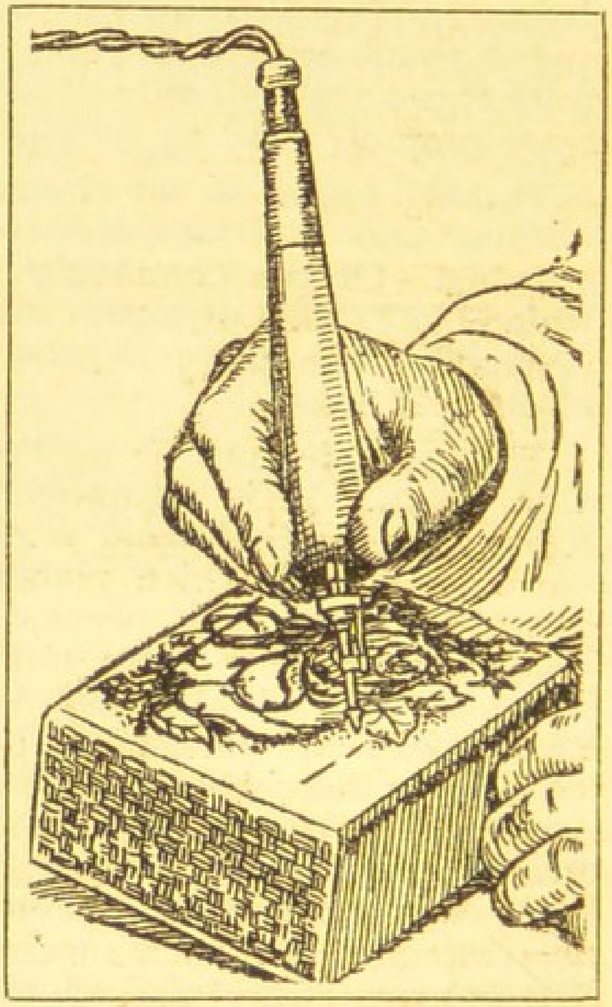
POKERWORK IN VARIOUS FORMS

Appliances, Tools, and Methods for this Decorative Handicraft

This contribution explains the methods for decorating suitable materials by means of Pokerwork. Other artistic crafts treated on similar lines include Enamelling; Gesso; Lacquer Work; Leather; Marquetry; Papier Mâché; Stencilling; Woodcarving

The ornamentation of wood, leather, and velvet by tracing the pattern with a hot needle is known as pokerwork or pyrography. There are various appliances for this purpose. One of these is an electrical apparatus contained in a box. A small plate screwed on to the front panel merely needs reversing to change the voltage. The machine can be fitted with either an adapter or plug-piece, and used on any ordinary fitting.

A simple appliance has a pyro top fitted into the neck of a bottle which is charged to two-thirds of its capacity with benzoline. It is advisable to leave the benzoline in the bottle for half an hour if possible before putting in the top. There is a small tap on the pyro top. When first heating the point, this should be vertical. Press the bellows slightly and light the little jet at the top of the union. Hold the platinum point in this until red hot. Then turn the tap horizontally and continue pumping to force the gas generated from the benzoline through the tube on to the point. Care must be taken never to touch any metal with the point when hot, as this will greatly damage it.



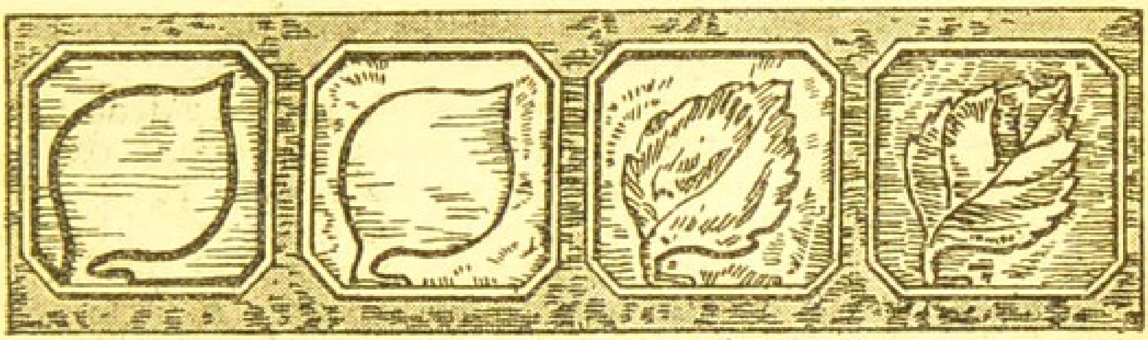
POKERWORK. Electrically heated point in use on a wooden box

All kinds of wooden articles and certain fabrics such as heavy cloth and fine quality velvet may be decorated with pokerwork. In the case of velvet the work is usually painted over afterwards, but if this is not to be done a special shading point must be used. Pokerwork transfers are obtainable in a great variety of designs, but velvet with the transfer already applied can be purchased.

When burning wood, the point should be kept hot, so that as it burns along the outline it produces a tiny flame which will consume the smoke. There is a small attachment sold which can be fitted to the cork handle. This is called a smoke diffuser. When working on leather or velvet, the point must only be a dull red, as the method is to scorch a line and not actually to burn it.

In velvet the pile only should be touched, and it is advisable to use a small, light point. For general use where only one point is available, an ordinary flat point is best, as the outlining can be done by holding the point almost upright and sideways. For the broader work, the point may be used as a modelling tool. A horn point is useful for outlining, and burns a good clear line, cutting deeper than the flat point. Shading is done by a shading-point, or the flat point held over the wood to scorch it.

POKERWORK ON WOOD. The surface of the wood should be carefully prepared by rubbing over with a piece of sandpaper, and then the design is traced on it or transferred by placing the pencil side of the tracing next to the wood and going over the back with a hard pencil. Pokerwork transfers are obtainable in variety, but an original design is to be preferred where possible or one that is adapted to the shape of the particular piece to be decorated. The worker next pokers the outlines. He must use the point as a pencil and draw with it, avoiding any uneven



POKERWORK. Panel in relief burning, giving the effect of carving. Left to right, traced design outlined ; background sunk by using a gouge ; modelling of leaf begun ; finished leaf before colouring

pressure, which means a bad line. As soon as the point touches the surface, the work must be continued or a hole will be burnt. It is wise to practise on a piece of wood, making lines, curves, etc., and in this way to determine the correct heat for the point. When the end of a line is reached, take up the point. Avoid pressing too heavily on the wood, as a line can always be deepened if necessary. The point of the needle must not be too hot if the wood is soft. If to be coloured, the outline and main shading only should be pokered.

For the fine lines in surface pokerwork a small horn point is used. The work is then lightly rubbed over with an old piece of sandpaper to remove any charred wood or grease, and if the work is to be coloured, stained with water stains. Liquid enamels may also be used, and bronze colours give a rich effect for portions of a design.

VELVET AND LEATHER. Silvel pokerwork on velvet produces a good effect. The silver sheen is obtained by means of a sheath which is fixed over the point. Heat the point in the ordinary way and then try the sheath on a piece of the velvet. Most velvet pokers best going with the pile ; but there are exceptions. The whole of the outline should first be silveled and the design then coloured in with spirit stains or pastels. Spray with silvel fixative to make the work brighter.

Pokerwork may be used on heavy cloth to outline stencilling, and forms a decoration for the tops of floor cushions. The stencilling should be done with a strong brush to ensure a clear outline.

To use pokerwork on leather the worker should select a suitable design, and when working, the point should be kept a dull heat, as only surface burning is required. The whole of the design should be pokered and the necessary colouring then done. To make important parts of the design stand out use lacquer and bronze colours. The rest of the leather should be stained a dark colour to tone, and the whole should be wax polished.

Relief Pokerwork. Relief-burning, which is an advanced form of pyrography, has the appearance of carving when finished and can be used to decorate furniture. The design when finished has a much softer appearance than ordinary carving, owing to the shading given by the hot point. A different point is needed, called a bent-knife, and it is advisable to use foot bellows so as to leave both hands free. The work should be cramped to a table.

The point must be made very hot, and after the design has been traced outline it as shown in the first design of a leaf on the previous page. Burn the line to $\frac{1}{8}$ in. deep, holding the bent-knife almost parallel to the surface of the wood. It should not be allowed to lean to either side, and is held more upright in going round a curve. It is essential to have a clean-cut outline, and it is best to cut the outline outside the design. A little methylated spirit rubbed lightly over the surface to be burnt will prevent the wood from charring too much. Should there be an angle in the design, begin each line from the corner.

The next thing is to sink the background. This can be burnt out with the point, but it uses the points a great deal and causes excessive smoking. It is much quicker and easier to use a small gouge. For large spaces a larger gouge can be employed. Carve out the wood across the grain as far as possible to prevent tearing it, and do not cut too deeply at first. Be careful not to damage the design. It is most important to keep the tool well sharpened. The second design on the previous page shows the background carved out.

Before attempting the modelling study a similar subject, and determine which portions of the design require to be sunk. The edges are left and the portions of a leaf on either side of the centre vein. It is a good plan to start from the centre of the leaf, using the flat side of the bent-knife, and gradually to work almost to the edge, pressing a little heavier to make a depression. This is often done by means of the gouge in order to save the point (as shown in the third illustration on the preceding page).

A fluter, another carving tool, is used to make a groove for the centre vein. The point is used to smooth away any irregularities and put in the finishing touches. The veins must be put in, using the edge of the point, and the background burnt even. It is necessary from time to time to brush over the work with a wire brush to remove the charred wood; and if the work is not sharp enough after this operation, touch it up again with the point. The finished leaf before colouring is shown in the illustration on the extreme right.

The colouring should be as soft as possible, to enhance the value of the carving, not to supersede it. The background should be stained to harmonize with the other furniture in the room. Marquetry stains are the best to use for this purpose.

When polishing a large surface or an elaborate piece of work, coat it all over with liquid wax polish, using a soft brush. Allow this to become dry. Then smear a little wax polish on a piece of wood. Take a soft brush and brush this over the wood, up and down, until the polish is spread evenly over the surface of the brush. Then brush over the work, following the direction of the grain of the wood. Do this several times, leaving the work a few hours between each rubbing.

POLISHING OF VARIOUS SURFACES

The Finishing of Wooden, Metal, and other Articles

This contribution describes the polishing of various articles made or required for the home. It will also be found useful to consult the entries on other methods of polishing, e.g. French Polishing; Glasspaper; Lacquer, etc.

In all kinds of polishing, the first and often the most important operation is the preparation of the surface. The wood should be perfectly dry, the surface must be smooth, free from finger-marks, which always leave a thin layer of grease, and the wood should contain as few knots as possible. The surface should be thoroughly glasspapered, and if the work to be polished has been completely made up, brasswork, such as handles, escutcheons, hinges, etc. should be first removed to allow of a clean surface. Also, all holes should be stopped, either with wax or a prepared stopping, and all cracks filled.

As a substitute for french polishing the process known as glazing will be found useful. Glaze can be purchased ready made, but is easily prepared by dissolving 3 oz. of gum benzoin in ½ pint of methylated spirit. The mixture should be allowed to stand for several days before use. The surface of the wood should first be filled and rendered perfectly smooth with fine glass paper. A body of ordinary polish is then applied, completely coating the surface, as described in the article on french polishing.

The glaze can be applied with a rubber and painted on, applying it in the direction of the grain. The method is to dip the rubber in the glaze, which should be placed in a saucer, and wipe it over the work quickly, lightly, and evenly, taking care not to go over the surface twice until the first application is dry. With wide surfaces care is necessary, or it will be left in ridges. This may be avoided by using a wide camel-hair brush, but practice will enable the largest surfaces to be treated with the rubber.

Eggshell finish can be obtained with a glaze finish by adding about one-third of sandarac to the mixture of benzoin and spirits ; the finest finish is obtained by rubbing down the finished polished surface with pumice powder, applied with a piece of felt slightly lubricated with raw linseed oil. Dip the felt into the oil, place on it some pumice powder, and rub well over the work with an even, circular motion. The pressure applied, although not light, must not be heavy ; the rubber must be kept supplied with powder and enough, but not too much, oil. When the surface has been dulled evenly all over it should be rubbed down with a clean rag and wiped with benzoin. Use a brush for mouldings or carvings.

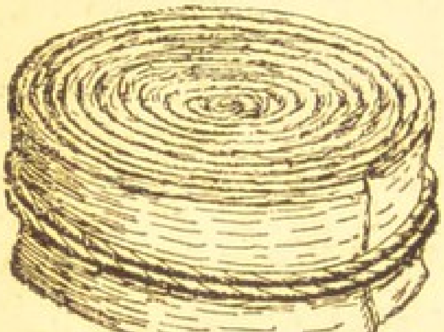


Fig. 1

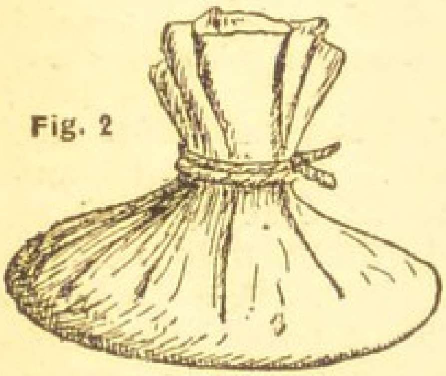
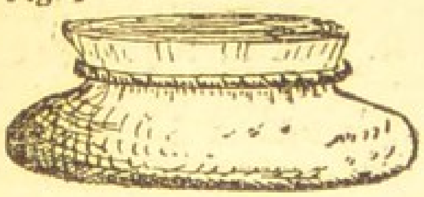


Fig. 2

Fig. 3



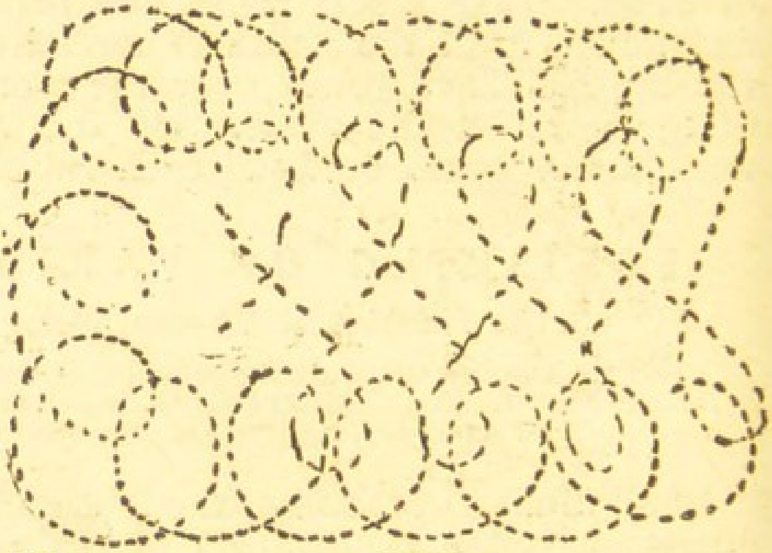


Fig. 4

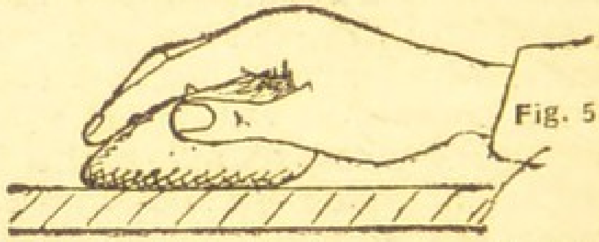
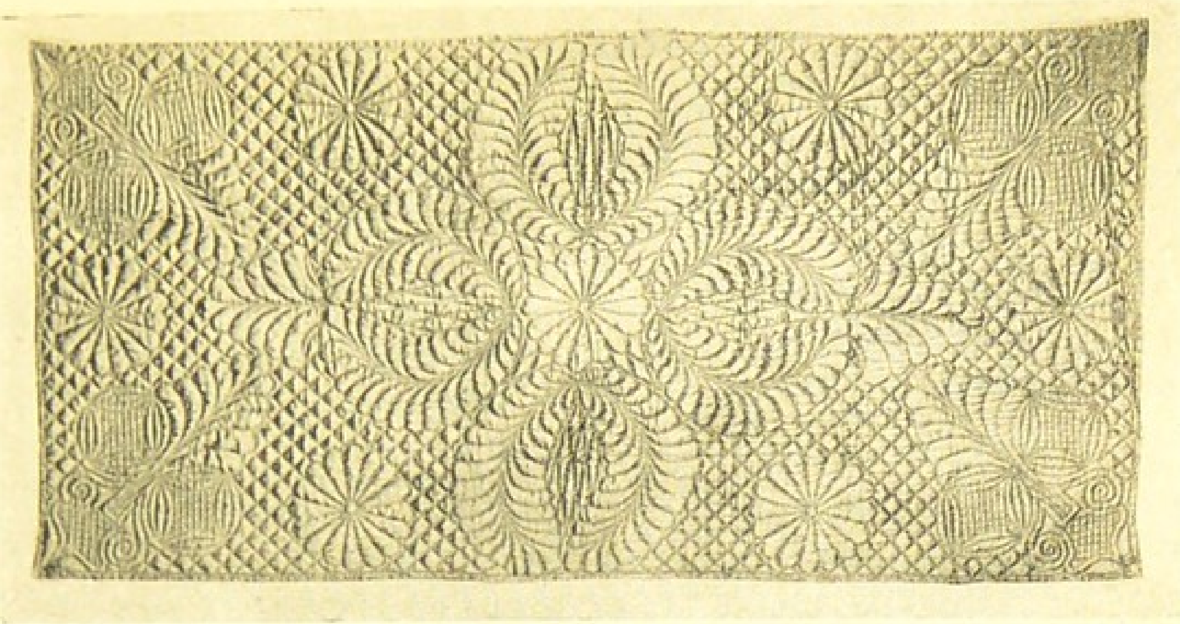


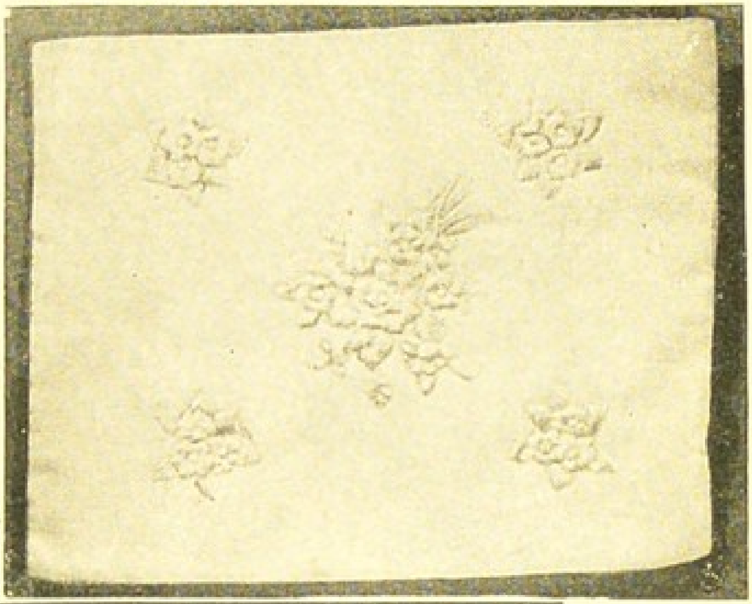
Fig. 5

POLISHING. Fig. 1. Rubber for wax or oil polishing. **Fig. 2.** Pounce bag of muslin for holding pumice. **Fig. 3.** Rubber made of rag for use in surface filling. **Fig. 4.** Method of using rubber by making continuous strokes with circular movement. **Fig. 5.** How the polishing rubber is held

Oil Polish. Oil polishing has several advantages over other forms of surface finishing, and is particularly effective on oak. Prepare linseed oil by placing a quantity into a vessel, surround it with water, and allow it to simmer on a gas stove for about ¼ hour. Pour it into a bottle, and add one-eighth the quantity of turpentine. Apply the oil with a felt or flannel rubber and rub it thoroughly into the wood. It is possible to apply too much oil, but the amount of rubbing cannot be overdone. The work should be carried on over a period of 2 or 3 weeks at least ; a little oil and plenty of rubbing every day or every other day. When a suitable polish has been obtained and the work shows signs of sweating, a little methylated spirit can be rubbed over the surface, as this will dry it without spoiling the polish. Further

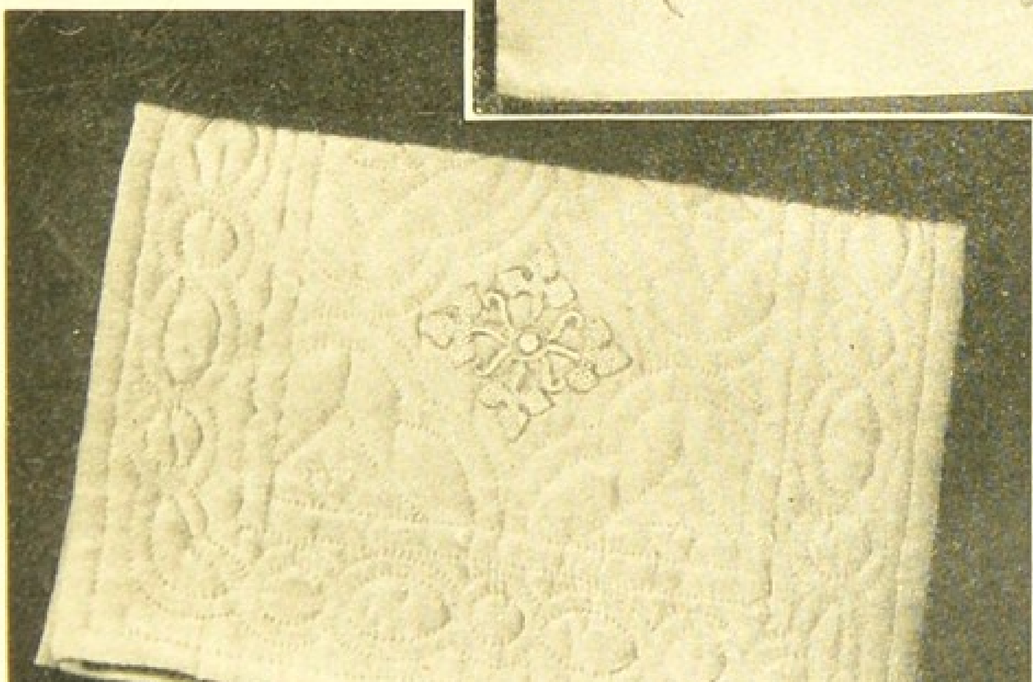


Above. Hand quilting in traditional Welsh design

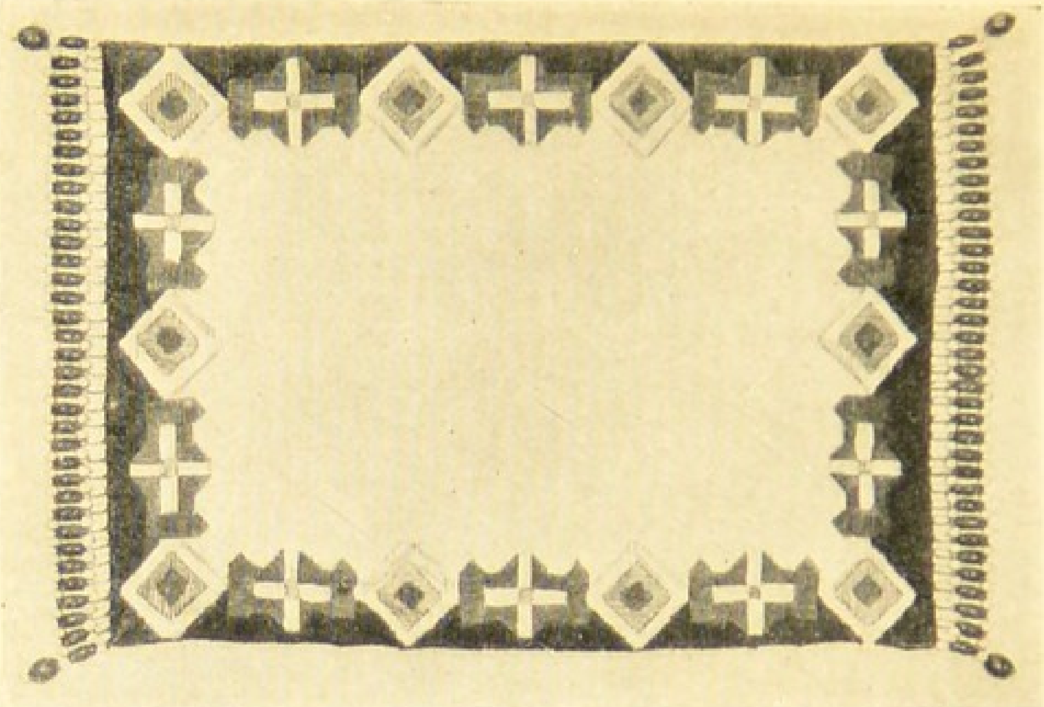


Right. Modern English hand quilting

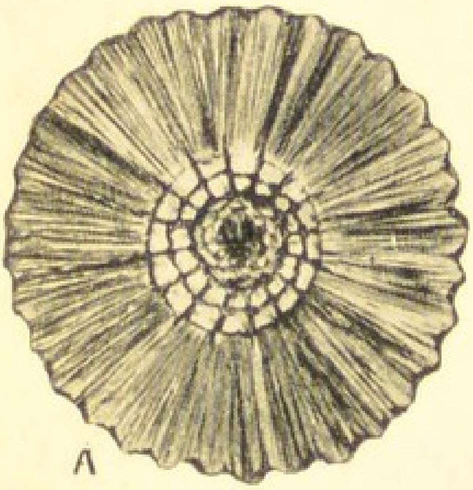
Below. Specimen of Italian quilting



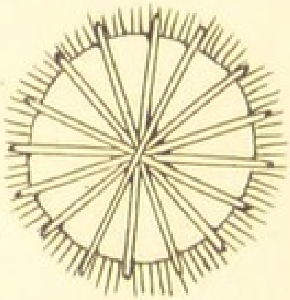
QUILTING OF THREE DIFFERENT TYPES



Mat for a tea trolly made of green American cloth with an applied geometrical design worked in coloured raffia on canvas

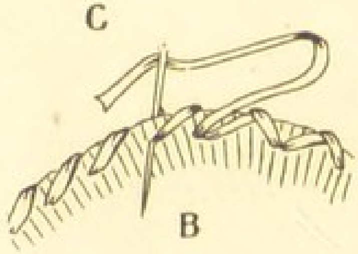


A

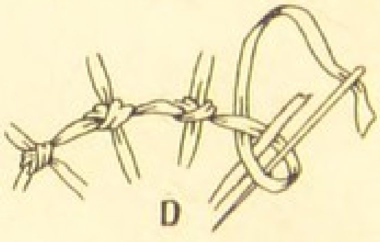


C

A. Mat made of coloured raffia strands over a cardboard foundation. B. Edge worked with running stitch. C. Method of pleating strands for central weaving. D. Details of Knotting



B



D

Left. Work basket in plaited raffia embroidered with raffia flowers. Right. Raffia flowers suitable for an applied trimming

RAFFIA AS A DECORATIVE MEDIUM

applications of oil can be applied if required, and the spirit finishing will not affect it.

WAX POLISH. Wax polishing may be used on any kind of wood and gives an eggshell gloss which is most effective on oak, mahogany, and walnut. Either white or yellow wax should be shredded, placed in turpentine, and left to dissolve. The consistency of the mixture should be that of cream. It is applied with brush or rubber, and must be evenly distributed and thoroughly well rubbed in. A dry rag should be used for finishing, but a good body of polish must be applied if the eggshell gloss is to last.

CARVED AND PIERCED WORK. The treatment of carved work depends mainly on its surroundings, and generally a high polish is not desirable. The most suitable method is to cover the work with raw linseed oil, allow it to stand for a few hours, and wipe it off with a soft rag. After 2 or 3 applications, followed by vigorous rubbing, the groundwork will remain dull, but a soft polish will appear on the raised parts. Although a body of french polish can be applied to carved work, and some portions brought to a high polish, the better medium for woods like oak, walnut, and mahogany is a creamy mixture of beeswax, turpentine, and boiled linseed oil applied with a rag, or brushed and rubbed down.

Fretwork and pierced woodwork are more difficult to polish owing to the broken surface. With wax or oil, it is mainly a matter of working into the crevices, but with french polish, a particularly light touch is required. The edges of large pierced surfaces, especially the end grain, should be filled with size or a prepared filler, and well smoothed down. The polish can then be applied on a small pad made by wrapping a little cotton wool round a thin stick and covering it with very soft rag.

TREATMENT OF STAINS AND CRACKS. The re-polishing of surfaces which have become stained usually means the removal of the old polish, and special preparations for this can be obtained. An alternative method is to soak the surface with methylated spirit to soften the shellac, and rub it with a coarse rag. Glass paper will then be sufficient to take the top surface off. Unless the work is dented or cracked, or the stains go too far down, it is better to leave the original body so that a fresh surface of polish can be applied. With veneered surfaces, the greatest care must be taken. If the veneer is damaged, repairs can often be effected by the application of a hard filler, or by the use of wax.

The commonest defect in french polishing is known as sweating, and is caused by the excessive use of oil, which breaks through the hardened surface. It is difficult to treat, as any further hardening of the surface will be affected in the same way. Continual application of furniture cream will keep the surface bright, but until the surplus oil embodied in the polish has worked out further french polishing will do no good. Cracks which may have occurred on a french-polished surface can only be removed by rubbing the whole of the surface down with pumice powder, and then repolishing in the ordinary way.

White marks on a french-polished surface may be caused by defective materials, or by water or spirit stains on a glazed or poorly finished surface. The best way to remove them is to take off the top surface and repolish; to put a new coat of polish on the old one, without removing the stains, is not advisable. Light stains can be taken out by wiping the surface with linseed oil and then rubbing it lightly with a rag dipped in methylated spirit. If the stains are caused by hot plates, the only thing to do is to rub the surface down and repolish.

POLISHING METAL. The polishing of metal surfaces can be done in many cases by purely mechanical means or alternatively by hand. Polishing wheels of various kinds can be fitted to the lathe or arranged separately on a special bench fitted with a polishing head and a fly-wheel. A useful polishing head with a drill chuck, etc., can be bought for a few shillings. Hand polishing essential for some work, is done with rifflers, emery cloth and buffing sticks.

In machine-polishing, turned work is first rubbed down with emery cloth, finishing with the finest grade. The surface should be left free from scratches, for all subsequent work depends on the quality of the emery finish. As a rule, the emery cloth is used in conjunction with a piece of wood.

The next process is to apply pumice powder by means of a buffing stick, made by glueing strips of basil leather to wood strips of convenient size. For iron and steel it will generally be sufficient to complete the polishing with pumice powder, but a high finish can be obtained by using flour of emery and oil. To obtain a good surface on turned brass in the lathe, first use emery cloth, then pumice powder, and finish with powdered rotten-stone and oil.

By the use of a polishing head, with wire scratch brushes and polishing mops—and these can also be attached to a lathe—much more rapid results are obtained. The scratch brush is made of hard brass wire and used with vinegar and water or stale beer to produce a lather so that a scouring effect results.

For further finishing, brushes made of bristles, leather, calico and swansdown are suitable for applying pumice, rotten-stone and other polishing powders. As a rule the brush is revolved towards the article and the worker, and the highest speed is used for the final polish. The highest possible finish for brass and copper articles is obtained by the use of crocus powder applied with a calico mop. Silver can be scoured with a scratch brush, then treated with rotten-stone and oil and finished with rouge and water, the highest gloss being obtained by burnishing.

POPLAR. Poplar, although not a wood of much commercial value, nor always obtainable from timber dealers, is useful for quite a number of purposes. It is used for sugar and herring barrels, packing cases, matches, clothes pegs, churns, pails, clogs, and wood wool or shavings for packing; also for brake blocks, the bottoms and sides of carts, wagons and barrows, and sometimes for field hurdles. It is soft, light and porous, easily dented, but does not splinter so easily as most woods and does not burn readily. It shrinks a great deal and is not very strong or durable, but is easy to work and seldom split by nails, though it holds nails well. In colour it is light grey or pale yellowish brown.

POPLIN. Irish poplin is a combination of silk and wool, slightly ribbed, firm and warm without being stiff and heavy. Cotton poplins, plain-coloured or striped, are the chief poplins in use for curtains and light upholstery fabrics. They are obtainable in a wide range of colours and guaranteed fadeless.

POTTERY: MAKING SIMPLE PIECES

An Outline of a Pleasing and Useful Handicraft

This contribution explains how simple articles can be modelled, fired, and glazed at home, and concludes with a brief description of methods for decorating pottery.

The forming of the shapes in pottery can be done by hand on a potter's wheel, or by casting and pressing. Apart from the potter's wheel and a muffle furnace, the tools are simple and inexpensive. The clay used for making bricks or flower pots can be used if properly sieved and evaporated down, but for good work it is advisable to employ common C.C., or cane-coloured earthenware. China clay forms the main body of porcelain; blue clay is very strong and plastic. Felspar, flint which has been calcined and ground, and bone ash are mixed with clay to bind the material together and render it translucent.

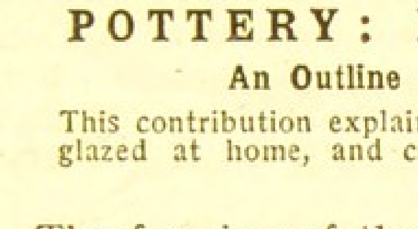


Fig. 1

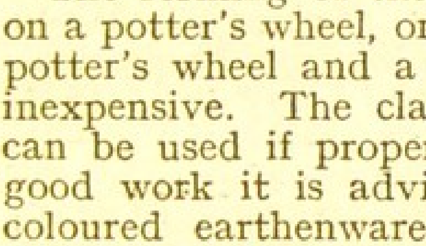


Fig. 2

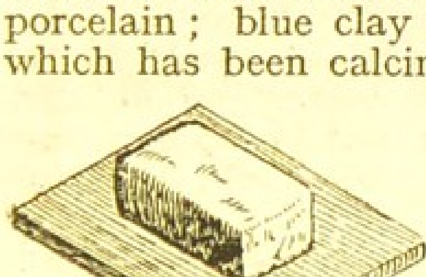
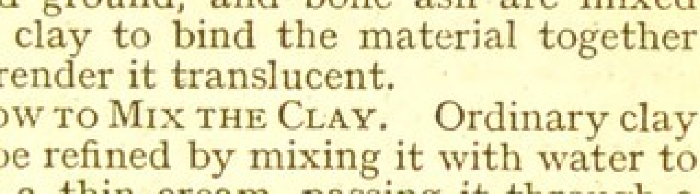


Fig. 3

HOW TO MIX THE CLAY. Ordinary clay can be refined by mixing it with water to form a thin cream, passing it through a No. 10 sieve. The mixture is placed in a shallow pan and slowly evaporated. The dried clay is mixed with fine sand and powdered flint—8 parts of clay, 2 of flint, and 1 of sand. This body is quite suitable for such objects as candlesticks, small trays, or thick bowls for bulbs, but it would not do for circular forms on the wheel, or for casting.

Fig. 4



POTTERY MAKING. Fig. 1. Preliminary working of clay into a brick shape. **Fig. 2.** Wedge cut from corner with a piece of string. **Fig. 3.** Wedge placed in centre of block of clay and driven in. **Fig. 4.** Easily made tray

The clay being hard at first is moistened with water; the lumps should be reduced to powder by pounding, water being then added until the clay is soft enough. It is of the right consistency when the fingers easily make an impression in it without picking any of it up. It can be kept in this condition for a long time if placed in a tin or zinc-lined box; small quantities will remain plastic if kept in a tin box and covered with a damp cloth. Before being used, the clay must be worked so as to exclude all air bubbles and render it perfectly smooth and even in texture. For simple work it can be placed on a board, kneaded with the hands, and rolled out flat 2 or 3 times with a rolling-pin. An oblong piece is worked to a brick shape (Fig. 1) by banging it down on the table several times until the sides are smooth.

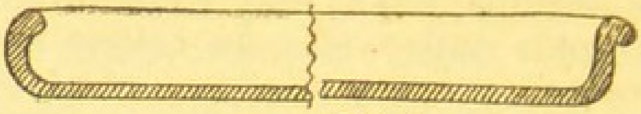


Fig. 5

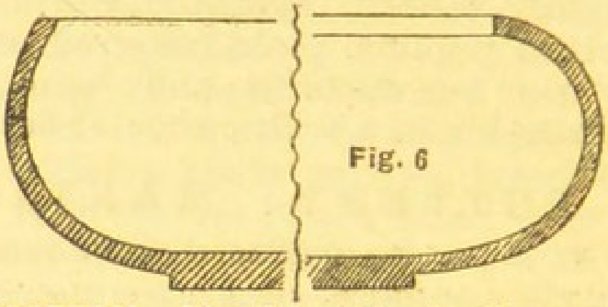


Fig. 6

POTTERY. **Figs. 5** and **6.** Small curved trays and bowls in section

A wedge is then cut from the corner (Fig. 2) with a piece of string and placed in the centre of the block of clay and driven in with a mallet (Fig. 3). The result is seen in the cut edge, small holes being formed by the air previously imprisoned in the clay. It will be necessary to repeat this operation at least a dozen times before the clay is ready for use. It is important that every trace of air should be removed.

Simple Modelling. The first stages in modelling are illustrated in making a simple tray as in Fig. 4. A lump of clay should be taken and placed on a board and worked into a brick shape. Next roll it out

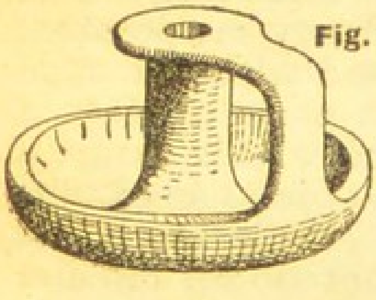


Fig. 7

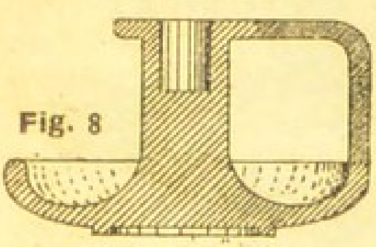


Fig. 8

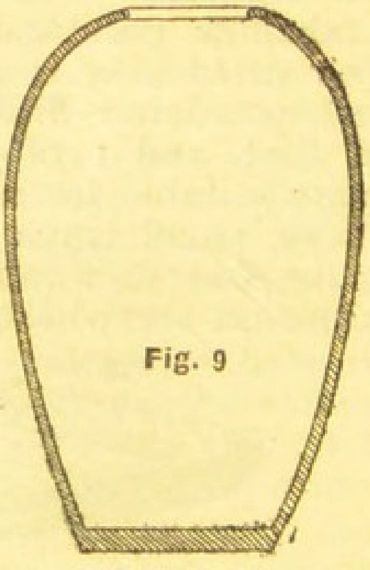


Fig. 9

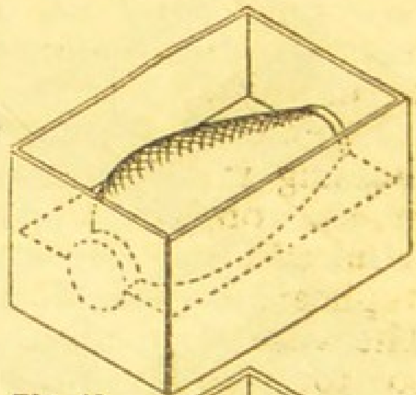


Fig. 10

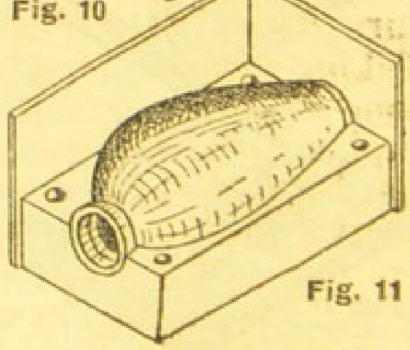


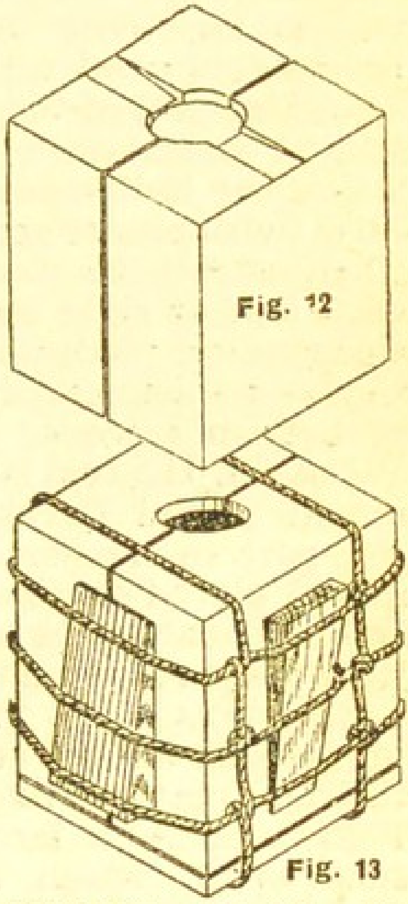
Fig. 11

POTTERY. **Fig. 7.** Candlestick suitable for a piece of wheel-made pottery. **Fig. 8.** Section showing proportion of parts. **Fig. 9.** Form for a vase which can be cast in a 3-piece mould. **Figs. 10** and **11.** How to cast the vase.

flat with a rolling-pin to a thickness of about $\frac{1}{4}$ in. Break the piece up and work it into a brick shape again, then roll it to about $\frac{1}{8}$ in. thick. Repeat the process, finally leaving a flat piece about $\frac{3}{16}$ thick. Then cut the edges off to form a square of 4 in. or so.

Now mark off lines $\frac{3}{4}$ in. from the edges with a modelling tool and bend them. The surface should be finished smooth, and the work placed on one side to dry.

Good practice for the wheel will be found in shaping small circular trays or bowls as shown in section in Figs. 5 and 6. The method of working, called throwing, is to place a ball of clay on the centre of the wheel, which should then be revolved from right to left. Finger and thumb are used to press the clay down to the revolving board, and when sufficiently flattened out the edge should be raised. To form a bowl shape, as in Fig. 6, start with a well-worked ball of clay, wet the thumbs and work the lump of clay into a mound. The clay is worked into a cone shape to indicate the centre, and then the thumbs, pressing downward, will throw out the material sideways. By pressure here and there any required shape can be formed, but considerable practice is necessary before a shape of even form and thickness is produced. The candlestick shown in Fig. 7 is a suitable shape for a piece of wheel-made pottery; the section in Fig. 8 indicates the proportions of the various parts.

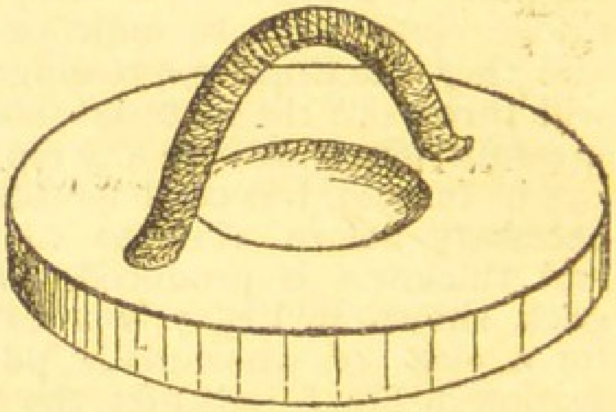


POTTERY. Fig. 12. Recesses cut in each mould at right angles to the join. **Fig. 13.** Mould tied together with string tightened with wedges

Duplication of Pieces. Casting and pressing is the method to be followed if several objects of the same shape are required, or if it is desired to make a duplicate of an existing piece of pottery. The vase form in Fig. 9 is suitable for the wheel and equally so for casting in a 3-piece mould; if the top were not curved inward, the shape could be cast in a 1-piece mould. Taking a small bowl as a pattern for a 1-piece mould, prepare some plaster by sprinkling plaster of Paris from the hands rapidly into a basin half full of water until the surface is reached. Pour off the surplus water, and stir very carefully to avoid bubbles, and then use. The bowl should be lengthened with clay and placed upside down in a circular cardboard box or a clay-made receptacle. Pour the plaster over the bowl, and when set remove the bowl with a twisting motion. If it sticks wet the plaster and try again. A 1-piece mould can only be used for forms that can be removed in this way.

A large number of shapes can be cast in a 3-piece mould, but they must not have sharp contrasts in form. To make one, first set out on the pattern a line that will divide it into 2 equal parts. Place it on the board and build up a bed of clay to the halfway line, extending ½ in. at the top and ¼ in. at the bottom. Shape the sides of the clay and attach a border of cardboard, as in Fig. 10; then fill up the space with plaster, allowing at least 1½ in. of plaster above the pattern. When set, carefully remove the walls and the clay, and work out semi-circular depressions at each corner of the half mould, as shown in Fig. 11. These recesses, which should be quite smooth, are necessary in order that the two halves of the mould may be accurately keyed together.

Coat the surface of the plaster with olive oil, replace the walls, the half mould being at the bottom, as in Fig. 11, and fill up with plaster again. When set, the walls should be removed. Then smooth the bottom of the mould and cut the recesses in each half at right angles to the join, as shown in Fig. 12. Oil this surface, place walls round the mould and fill up with plaster to give a thickness of about 1½ in., thus casting the third member or bottom piece of the mould. When set, the two halves of the mould should be prised apart, the pattern removed and the mould placed together again to dry, the final drying taking place with the parts again separated.



POTTERY. Fig. 14. Disk of plaster with handle attached, used for flattening a lump of clay

CASTING A VASE. The method of casting allows considerably thinner pottery to be made. First prepare a large bowl or small pail, which should be perfectly clean. Place a few lumps of clay in it, and pour water in to more than cover the clay. Next squeeze the clay between the fingers, and thoroughly mix the clay with the water until it forms a creamy liquid. The liquid, termed "slip," is passed through a No. 40 phosphor-bronze sieve, a stiff bristle brush being used to assist it. The mould is sponged lightly with water and tied together with string, one or two wooden wedges being used to tighten up the parts, as in Fig. 13.

The mould is now tilted, and the slip should be very carefully poured into it so that no bubbles are formed, as these mean holes on the surface of the finished casting. The liquid or slip should be watched, and it will be seen that the level gradually falls. Keep refilling it, and give the mould a revolving movement from time to time to prevent the clay settling at the bottom. As the sides absorb the water from the slip, the clay becomes deposited on the mould; and when sufficiently thick, the slip should be poured out and the mould left in a warm place for about ½ hour. The mould should now be taken apart, using every possible care; there should be no difficulty in removing the vase, as the clay shrinks on drying. The lines and the waste at the top should be trimmed off with a sharp knife: then leave the shape to become quite hard.

To complete the work, rub the base on glasspaper to level it, rub the sides down with fine glasspaper, round off the edges at the top, and finish by wiping over the whole of the shape with a damp sponge. Throughout these finishing operations the clay shape must be handled very carefully, as it is very fragile, and will continue to be until it is fired. The 1-piece mould is done in the same way, but as only those objects that can slide out of the mould after the casting has set are suitable, all that is necessary to take the casting from the mould is to place it upside down. The same methods of cleaning up apply.

PRESSED SHAPES. These are easier, but it is not so easy to make the ware thin. Proceed by flattening a lump of clay, using if desired a batter as in Fig. 14, this being a thick disk of plaster with a stout handle. The clay is placed on a piece of linen or calico and pressed out flat with a rolling-pin to a thickness of ¼ in. or so. Sponge the surface of the mould, place the thin slab of clay on it, and press carefully to the shape.

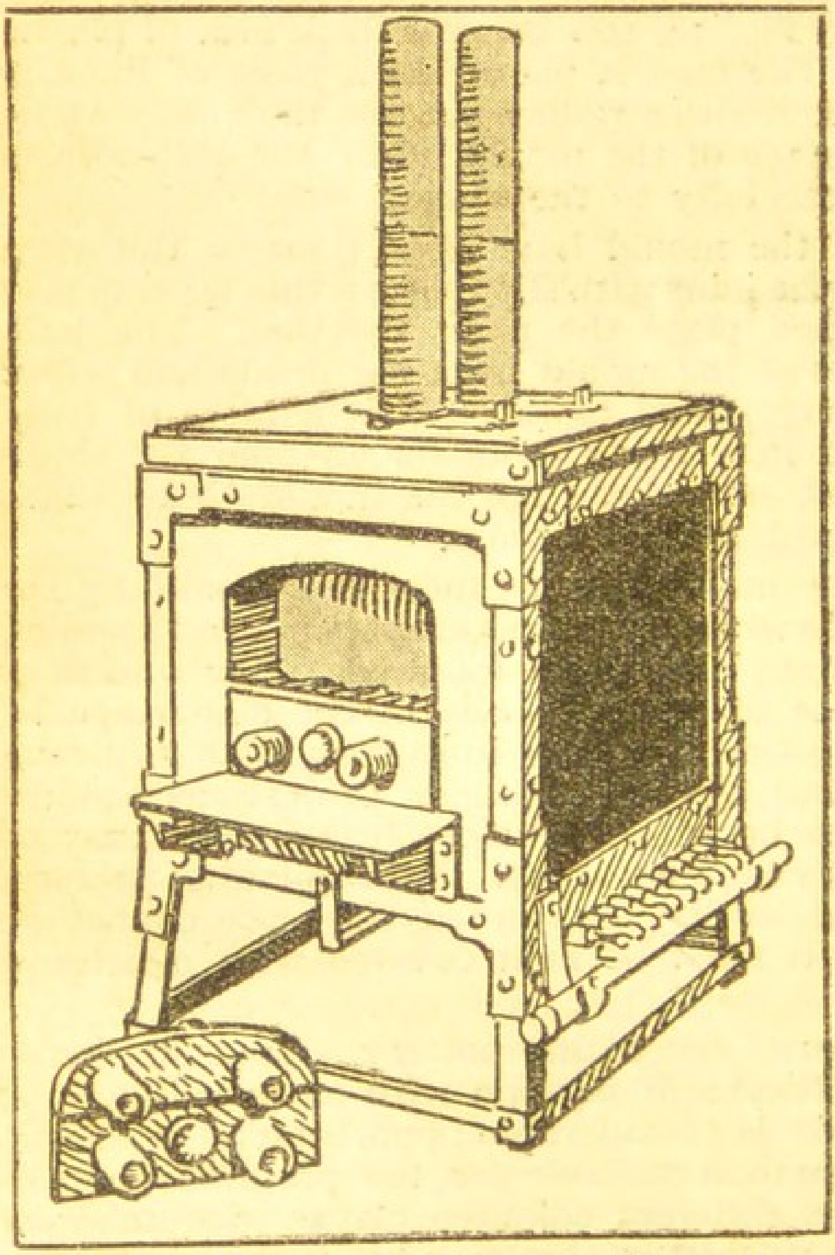
When both sides of the mould have been done in this way, smooth the edges, coat the joins with slip, place a thin layer of clay along the join, and then place the parts together. The joins are pressed to the sides of the mould from the inside and wiped over with a damp sponge fitted to the end of a piece of stick. If the mould is placed in a warm room for an hour the shape inside will have shrunk sufficiently for the mould to be taken apart, when it can be treated like a casting.

Much pottery can be made without moulds by building the shape or throwing on the wheel, but in making spouts and handles, either pressing or casting should be followed. Any additions can be made to a piece of pottery while in the clay stage by scratching the parts to be joined, coating them with slip, and holding in position until set. Handles or projections applied in this way should not be touched before firing, and must be carefully fixed, or they will come apart. When making pottery, it must not be allowed to dry out, and if the piece cannot be finished at one sitting it must be kept covered with moistened cloths.

There are many ways of decorating pottery. Line incision is the earliest and the easiest; it is done with a modelling tool, and for small work there is considerable opportunity for artistic treatment. Another method suitable for the pre-fired stage is to use slip formed from different coloured clays: a number of pleasing effects can be worked in this way by applying the slip with suitable brushes.

FIRING THE CLAY. Before pottery can be glazed or painted it is necessary to subject it to great heat and to transform it into what is known as biscuit. This is the most critical part of the work. If a small furnace is used, the work must be placed in a muffle, supported on slabs of fireclay or sand. The shapes are conveniently arranged, the air inlet almost closed, and the dampers one quarter open. Light up gradually if using a gas muffle furnace, close the lower door, and after the muffle has got sufficiently hot—in about half hour—the lower door should be pushed in close and the interstices covered over with clay.

When the work has finished steaming turn on more gas, leave for about an hour, plaster up the top door, and give full heat until the interior, judged from the spy hole, is white hot; this will take about an hour. The work can now be allowed to cool. To make quite sure, the placing of suitable trial pieces so that they can be removed during firing will help; if the trial piece can be scratched on the surface it is a proof that the firing is not complete. Small pieces of clay, known as Seger cones, can be placed inside; these will bend over when the correct temperature is reached. Common C.C. requires a temperature of 1,100° C. and about four hours in the furnace. We illustrate a special gas muffle furnace for pottery. It is made in a number of sizes, but the amateur potter will need a muffle size of at least 14 in. wide, 8 in. high, and 18 in. deep, if vases and similar objects are to be fired. A still larger muffle has a height of 14 in., the other dimensions being as last mentioned. The makers, Fletcher, Russell and Co., Ltd., of

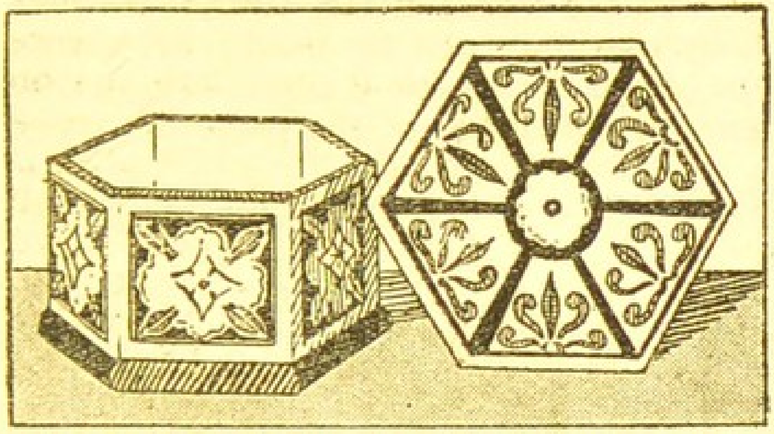


POTTERY. Fig. 15. Muffle furnace for firing pottery
Fletcher, Russell & Co., Ltd., Warrington

Warrington, issue a booklet containing much useful information about these gas-fired muffles.

COLOURING AND GLAZING. The biscuit ware is now ready for glazing or underglaze painting. The glaze is obtainable in various colours, and may be applied with a diffuser or a brush. A glaze firing at about 800° C. will be found most convenient, and if the article is to hold water it will be necessary to glaze the interior as well. Colours can be added to a plain glaze by mixing them with boiling water, passing through a 200 sieve, and mixing with the glaze; only a small amount of colour is required. Before the underglaze paint is applied, the surface of the pot must be stopped by coating it with a solution composed of gum arabic and water.

Shapes that are not quite perfect needed not generally be thrown away, for small defects on the biscuit pottery can be removed with glass-paper, and small holes, cracks or chips in the article can be filled up with a cement made of 3 parts fired clay, 1 part damp clay, and ¼ part of No. 8 flux, ground to a powder, sieved, and mixed with gum. Biscuit pottery can be coloured without firing by applying colour diluted with gum arabic, dextrine, and water to the moist surface of the clay. A fine surface can be applied to unglazed pottery by using ordinary wax polish.



POTTERY. Fig. 16. Jar with lid in decorated colours

CLOISONNÉ DECORATION. Another method is to apply cloisonné enamels. A simple outfit of these contains 6 enamels, gold and silver powder, medium, varnish, 1 flat brush, and 4 camel hair brushes. The design is incised on the plastic surface of the pottery with a modelling tool before the clay is fired. Fig. 16 shows the pleasing and simple type of design which lends itself admirably to this kind of decoration, which is particularly suited to pottery book-ends of simple or geometrical shapes and the like.

For those who are unable to make their own pieces, a variety of articles can be obtained with designs already incised. The procedure is very simple. First coat the whole of the article with the special varnish, which dries in about half an hour. Then a coat of gold or silver enamel is applied, taking care that this flows into the incised lines of the design; this, again, is allowed to dry for about an hour and the decoration in colours is proceeded with. The design is picked out in various tints, using a separate fine brush for each tint employed on the piece.

Care should be taken not to let the colours run into the incised lines, or the effect will be spoilt. There is no need for the subsequent varnishing, as the enamels are durable and have a brilliant finish. They can be thinned if desired with a thinning medium. The larger brush used for the varnish should be cleaned with methylated spirit, while the brushes for the gold, silver and coloured enamels should be cleaned with turpentine.

POUFFE, Making a. A solid pouffe, suitable for use in a small room, is simple to make. It can either be circular or square in shape, and is made by stuffing a calico cover with some suitable filling. Decide approximately the size required, then cut out a pattern in strong paper. This can be pinned up, and gives a good idea of what the size will be when the floor cushion is completed: 16 in. diameter each for top and bottom, as in Fig. 1, makes a medium-sized circular one with a band of 16 in. deep between, as in Fig. 2. It is important to get a true circle, or the finished shape will not be good. A circular tray can be used; or if this is not available, take a piece of fine string, tie a small loop in one end, and fasten the other end to the centre of the piece of paper

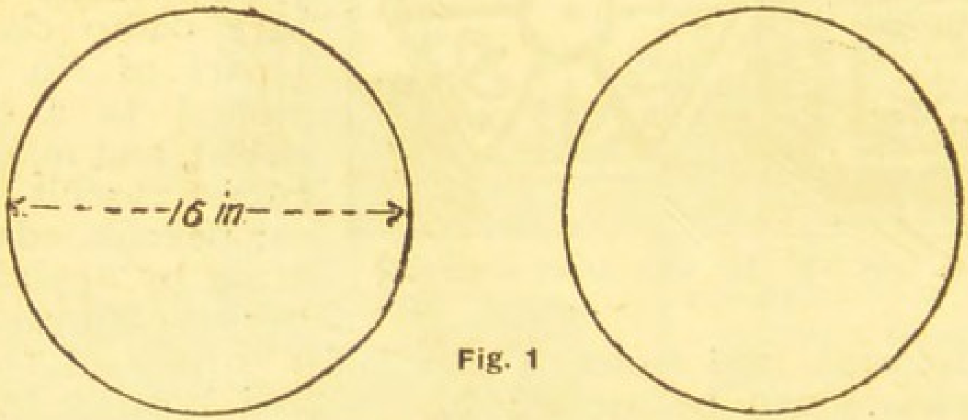


Fig. 1

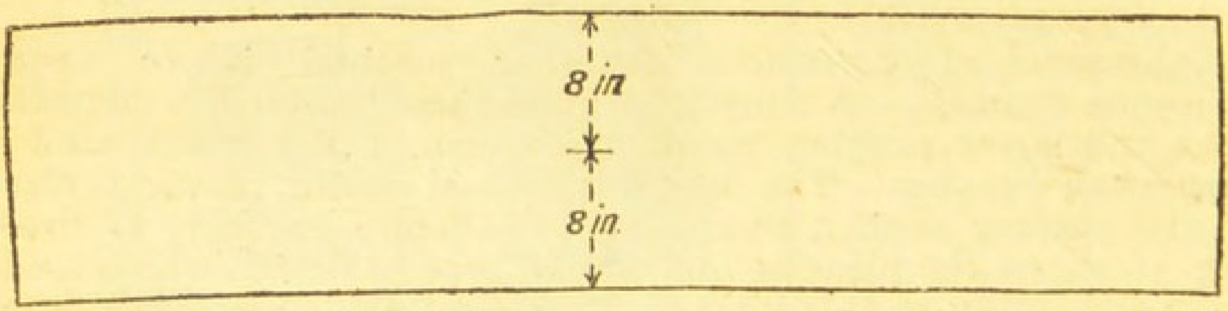


Fig. 2

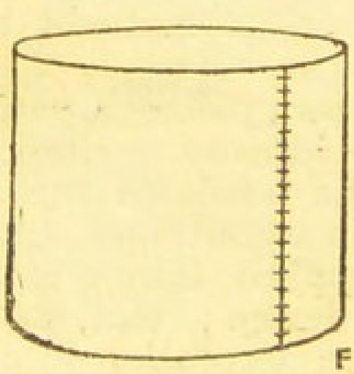
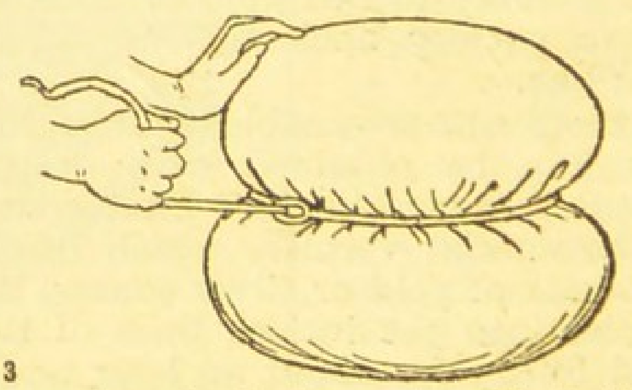


Fig. 3



POUFFE. Fig. 1. Top and bottom pieces for circular pouffe. **Fig. 2.** Band to go between circular pieces. **Fig. 3.** Band sewn together and joined to top and bottom pieces. **Fig. 4.** Cording the waist of the stuffed pouffe with a drawing-pin. Place a pencil in the loop, stretch it tautly, moving it in a circle ; the length of the string gives the radius, or half the diameter.

To make the case, cut a strip of unbleached calico, preferably selvedge way, equal in length to the circumference of the circle, and allowing $1\frac{1}{2}$ in. for turnings. Tack the top of the band to one circle and the bottom of the band to the other circle ; the case then resembles a short bolster, as in Fig. 3. Machine on the wrong side, leaving about 6 in. open on one side.

As a quantity of filling material is required when making large floor cushions, the centre can be filled with cuttings of woollen or cotton materials. For the new filling necessary, imitation hair, fibre, flocks or brown rugging wool, with wood wool right in the

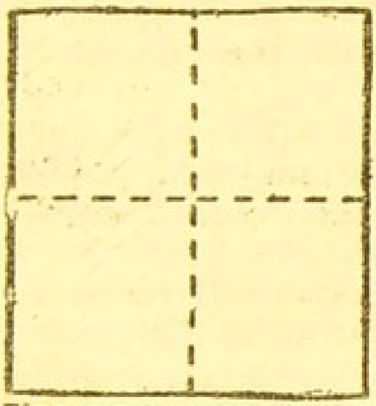


Fig. 5

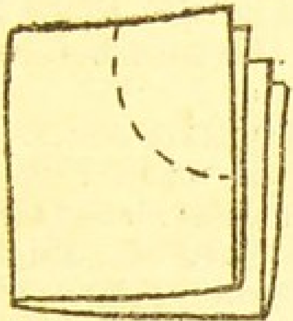


Fig. 6

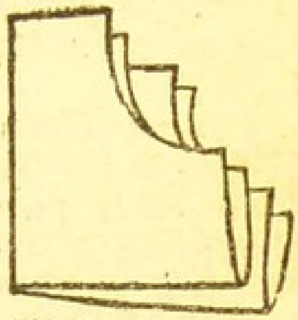


Fig. 7

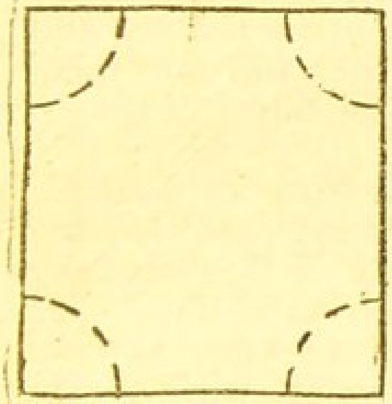


Fig. 8

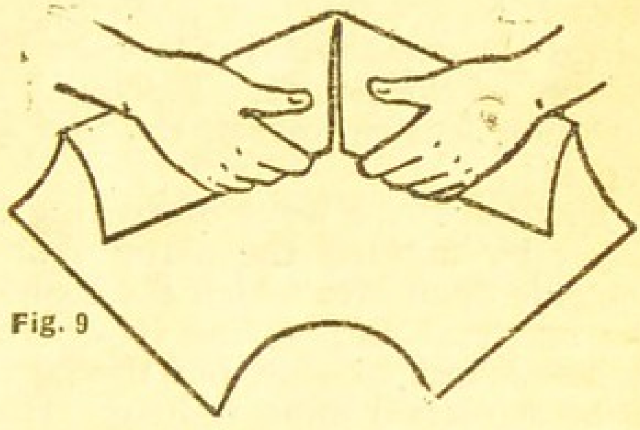


Fig. 9

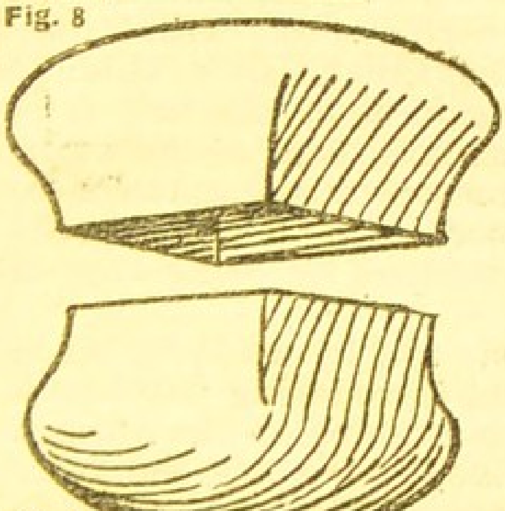


Fig. 10

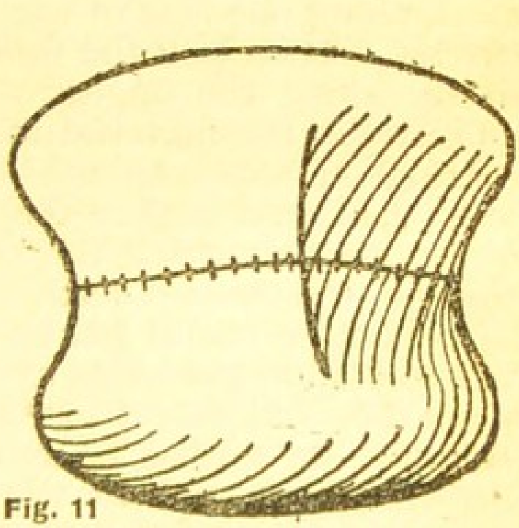


Fig. 11

POUFFE. Fig. 5. Pattern for square-shaped pouffe. **Figs. 6-9.** How to fold pattern and to cut shape. **Fig. 10.** Shaped corners sewn together. **Fig. 11.** Top and bottom joined, leaving 6 in. through which pouffe will be filled centre, is the most suitable. For a medium size pouffe about 10 lb. of wool is necessary.

INSERTING THE FILLING. As the filling is a dusty process, it should be done in a room with little furniture, and preferably in one with a linoleum floor covering. Each handful of filling should be fluffed out before it is put into the case. Use a wooden spoon or stick for forcing the wool into the edges. When as much as possible has been forced into the case, take a piece of flat wood and beat it evenly all over.

Unless the cushion is well stuffed, after it has been in use a short time it becomes flat and loses its shape. When it is impossible to add any more wool, the seam can be sewn up securely. Take some strong string and, using a slipknot, cord the waist as tightly as possible, Fig. 4. Place a piece of flat wadding cut to size over the top of the case before covering with the upholstery fabric.

For a pattern of a square-shape pouffe cut two pieces of paper about 30 in. by 30 in., as in Fig. 5, for a medium-sized pouffe. Fold each piece in half lengthways, and then widthways—this gives a small square of 4 thicknesses, as in Fig. 6; curve off the top left-hand corner (Fig. 7) and the shape will resemble Fig. 8. These two pieces form the top and bottom of the pouffe.

Having cut out the unbleached calico for the case, sew the curves at each corner together as in Fig. 9, and when all the curves are joined the cap-shaped pieces are formed which make the top and bottom of the pouffe. Place one above the other and join them together, leaving one of the four seams open for filling (Figs. 10 and 11).

There are two ways of making the outer covering for pouffes: either by making the material into a bag-shaped case, leaving one side open into which the cushion is dropped, or by stretching the material and sewing it securely along each waist-line. The former is less trouble, but the latter allows the covering material to be stretched more tightly. Place the weft edge, with a 1 in. turn, along one side of the waist, and stitch securely with strong thread. Then pull the fabric tightly round the cushion, stitch it firmly along the opposite waist-line, again along the first side, and attach the material to the two remaining sides of the waist, cutting off any surplus. Gather the corners of the material to form ears, and neaten the waist with cord to match the cover; if the cord is thick the ears can be secured by being slipped through the twisted cord.

Attractive round pouffe floor cushions can be made by using velveteen for the sides and bottom and introducing patchwork of leather and velvet for the top. Such a pouffe can be finished without the corded waist if made 20 in. in diameter, the outer covering being cut in the shapes shown in Figs. 1-3, and the top and bottom finished with a piping or fancy cord. The side strip (Fig. 2) may be cut 10 in. deep (less turnings). Fancy striped material may be used for the top and bottom of such pouffes with a plain fabric for the sides; or terry cloth with an appliqué design in a contrasting colour will make a good cover for a nursery floor cushion.

A two-colour scheme may be devised for a square floor cushion by mounting a square piece of brocade or damask cornerwise on upholstery satin which matches the groundwork of the figured material, and finishing off the edges with narrow gold braid or coloured gimp.

Pouffe Ottoman. A pouffe ottoman of the type hereafter described makes an attractive piece of furniture, as well as a convenient receptacle for music, needlework, or newspapers. A strong wooden box should be procured, if possible with dove-tailed sides. No lid is necessary. A box 18 in. long, 12 in. wide, and 12 in. deep is a convenient size; one of smaller dimensions, when upholstered, would not have a very roomy interior. Divide the box in two pieces, cutting off a section 4 in. deep; but if the box is too shallow to allow of this, a narrow box having the same length and width can be utilised by knocking out the bottom, or a wooden frame can be made by using four 4 in. battens; this should be strengthened at the corners. The bottom part of the box will form the container or ottoman, and the 4 in. frame, when fitted with springs, will make the lid and seat of the pouffe.

The two parts must be upholstered separately, the fixing of the hinges being the last step. First upholster the bottom part; if necessary, scrub and dry the box, preferably out of doors. When dry, rub the inside first with coarse and then fine glass paper. Cover the sides with any suitable fabric, such as casement cloth or hessian. Measure the distance round the box and the depth; allow 2 in. for turnings. Tack the hessian firmly along the top edge and the bottom, keeping it as taut as possible. The reason for covering the wooden sides is that it is impossible to fix hair or wool filling on to wood.

Stitch 3 or 4 rows of strong twine loops into the hessian, using a sacking needle and leaving about 2 in. between each row. Each loop should measure about 2½ in., and a back stitch is necessary between the loops, otherwise the filling, when forced under, causes them to slip.

Wood wool is a very cheap first stuffing, and rugging wool, fibre or imitation hair are all suitable for the top layer. Arrange the stuffing as evenly as possible under the string loops, giving the corners extra padding, so that when finished they will be well rounded. Cut off a length of unbleached calico, allowing for the padding and for mitred corners, and tack it in position along the bottom of the box; standing over it, pull the cover up tightly over the padded sides, rearranging and adding more stuffing if needed. Tack the cover just inside the box. Line the inside first with layers of cotton wool and then with casement cloth. A straight piece of material about 2 in. deeper than the sides of the box and long enough to go round it is necessary. Use small brass tacks to fix the lining along the inside of the top edge. Cut a piece of stiff cardboard to fit the bottom of the inside tightly; cover it with the same material, and place it in position. A piece of plain American cloth to match the upholstery fabric in colours should be tacked over the bottom of the box that comes next to the floor, to prevent the edges of the material fraying and to neaten. The bottom of the pouffe should be fitted with castors or glides. If the latter are used, 4 small stained blocks of wood should be screwed in position at each corner, in which the prongs of the glides should be fixed; this raises the pouffe off the ground and improves its general appearance.

To upholster the lid, first stretch the frame with good quality webbing bands lengthways, and then interlace them at right angles in basket fashion. A webbing strainer or small piece of wood used as a lever enables the bands to be stretched tightly. Procure five or six 8 in. copper springs, arrange them in position on the webbing, and stitch them firmly, using twine and a packing needle. When all the springs are fixed at the bottom, tack the outside ones tightly to the frame, and tie each one to the adjacent springs. When all are lashed down, cover the springs and sides of the frame with hessian, make twine loops and pad in exactly the same way as the lower part. Extra padding must be piled on to the top of the springs or the seat will become flat after being in use a short time. Keep the stuffing in position with a cover of unbleached calico, tacked to the lower edge of the frame.

Tapestry, rep, velveteen or plush may be used to cover the pouffe; with a patterned material a more professional appearance is given if an oblong panel 10 in. by 14 in. is piped on to a length of fabric. The panel must be arranged so that it comes in the centre of the lid, and the piping should be of one of the colours incorporated in the pattern. Mitre the corners neatly, making any surplus material into small rosettes. Make a small tab of covering material about 2 in. long, and tack it to the middle of the front edge of lid to facilitate opening. Line the inside of the lid with casement cloth over cotton wool, tacking it on to the wooden rim. Attach the bottom of the pouffe to the lid by two small brass hinges. Two chains screwed inside to the sides of the box and to the rim of the lid may be added to prevent the lid from falling back.

POUNCING. Patterns may be pounced on to metal, glass, or pottery by means of a linen bag containing blue chalk. By pouncing is meant that the bag will be dabbed all over the surface of a stencil and will thereby transfer to the surface of the article itself the outline of the design cut in the stencil.

POWDER. A powder may be described as any substance reduced to fine particles. Powders used in the home may be divided into those used for the toilet, e.g. face and tooth powders, those used for various cleansing purposes, and those taken as medicines. For the complexion, powders can be had in white, cream, pink, and flesh tints, variously perfumed, and either in solid or loose form. They should be carefully selected both for texture and colour. Many women blend their own by mixing two or three shades until the desired tint is obtained. Other kinds of toilet powders include rice, pearl, violet, and talcum powders.

Cleansing powders include those for cleaning silverware and cutlery; there are also sanitary powders and vermin destroying powders. Powdered soaps are used in washing clothes, while another powder used in the household is baking powder.

The powders used in medicine are reduced to very small particles by a mill, or with pestle and mortar. To give bulk where a small quantity of the drug is to be taken, sugar of milk is frequently included. Powders may be taken by sprinkling on the tongue or in jam or syrup.

POWDER PUFF. Puffs for applying powder to the skin are made chiefly of swansdown, lambs' wool, and beaver fur; for hygienic reasons no puff should be used too long.

To make a powder puff, cut out a circular piece of swansdown or fur, turn in the edges to the wrong side, and then cover the back with a circular piece of white or coloured silk. If a bone button and ring, or some other type of handle, are attached to the centre back, the puff will be found easier to use. Large puffs intended for powdering the neck, shoulders, and back are fitted with long handles of wood, bone, or tortoiseshell, and are backed with ruched satin narrow ribbon, or floral trimming.

A usual kind of powder puff is a handkerchief puff. Small pieces of coloured swansdown can be purchased and neatly sewn on to the middle of a crêpe-de-Chine or georgette handkerchief. This may be decorated by painting or pattern printing. On large powder puffs the usual bone button and ring may be substituted by a handle made from a bow of satin ribbon or a small bunch of padded silk-covered flowers and fruit.

PRINT. Many kinds of cloth are printed with designs, but the name print is most often given to simple cottons, useful for aprons, working overalls and dresses, or for dust sheets. Print can be pasted down as a lining to wooden boxes or cupboards, and it can be employed as a backing to curtains made of washing material. Old print dresses can be cut up to make capital dusters, and when those are worn out they are still useful for wiping grease from machinery or for polishers for floors, furniture, or boots.

PUNCH. In the domestic sense a punch may be considered as any small wood or metal bar used for intervention between the hammer and the object to be smitten. The nail punch is a piece of mild steel bar, either hollow or flat at the small end, and slightly rounded at the upper end. This is applied to the head of the nail, and the upper end is struck with the hammer to drive the head of the nail below the surface of the wood, or in order to prevent the wood being bruised.

Punches of various kinds are used for the perforation of leather. The wad or saddler's punch has a hollow, tube-like cutting end, with the hollow carried upwards and increased in diameter at its mouth. A smart blow with a hammer drives the punch through the material, leaving a clean, round hole. The part cut out is driven up into the hollow portion of the punch, succeeding cuts gradually forcing the disks out at the mouth. Other small, hollow punches are used for making round holes in leather. A hand-tool can be had with several punches of various sizes, and is used like a pair of pliers. Matting punches are made of steel, and are used by wood and metal workers for working up a diaper pattern. One end is shaped to produce the pattern, the other slightly rounded off. Soft punches are used by metal workers for many purposes.

A centre punch is for making an indentation on a metal surface (e.g. when starting to drill a hole). A similarly shaped punch with a sharp point is used for piercing holes in corrugated iron. A bell centre punch has a conical shroud surrounding the point and is used for centreing the ends of cylindrical rods. Spring actuated punches are made which need only a gentle pressure to operate the marking point. A spacing punch has an additional or guide point which can be set at varying distances from the marking point.

Name or letter punches are employed for punching names or monograms. Buttonhole punches are used by dressmakers and tailors for cutting cloth. Eyelet punches are used for closing eyelets on sails and the like. Pinking punches are about 1 in. in diameter and are employed for cutting soft material with a serrated edge. Automatic, mechanically actuated punches are made for cutting cardboard and paper for filing purposes.

PURSE. Leather is the material principally employed in purse-making, pigskin in particular being favoured for men's purses, because of its hard-wearing qualities. Suède purses, though attractive in appearance, are less durable. Venetian leather purses, ornamented with medieval designs in colours, are sometimes carried by women inside large purse bags. Velvet, silk, and satin, elaborately beaded and embroidered, are also favourite materials for small purses to be used with various evening dresses.

To make a brocade purse, cut out a circle of brocade 7 in. in diameter, and a circle of silk or other lining of the same size. Sew the two together neatly around the edge with a running stitch, then gather them up and attach them to a bone or ivory purse-top. Trim the inside, where the material meets the frame, with a little rose-trimming or ribbon-ruching. Bone, metal, and tortoiseshell purse-tops can be bought at drapery stores.

A small inner pocket suitable for holding small change, a key, or other trifle can be made from the silk, and sewn to the lining before joining brocade and lining together.

QUILTS AND QUILTING

Modern Coverlets Worked in Simple and Traditional Designs

This article includes instructions for making a down quilt, patchwork quilts, and some details for hand-quilting work. In conjunction with this, readers should also consult the entries on Down; Embroidery; Patchwork; Woolwork

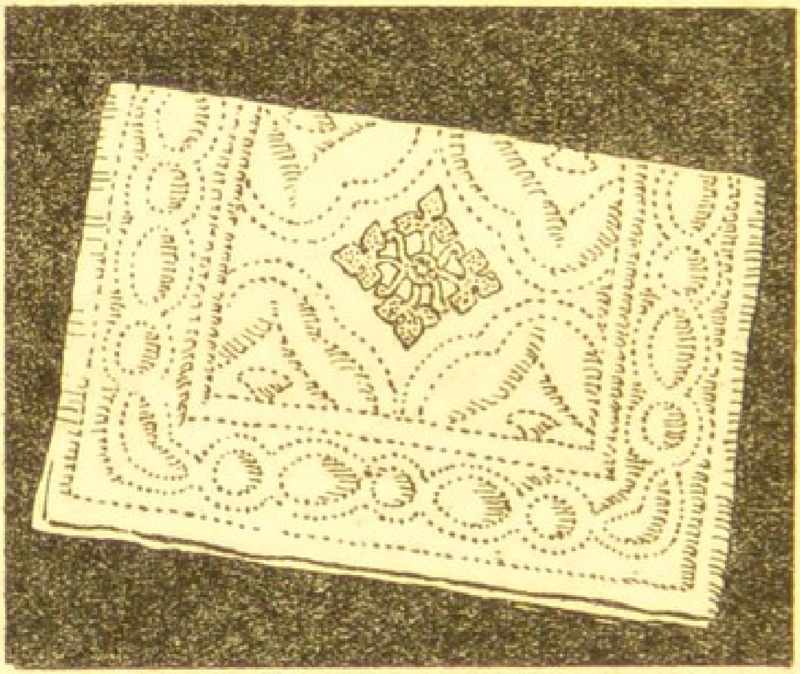
While down quilts are sold in double or single bed sizes and in many qualities, it is sometimes more satisfactory to make them at home. They can be covered with self-coloured material, or with panels, borders, or centre-pieces of plain material, used in conjunction with a patterned fabric. When both plain and fancy materials are to be used, the panels and borders must be cut out and machined together. If the quilt is to be made entirely of one kind of fabric, the quilting design can be first marked out in chalk and then with a tacking thread on to the silk. Artificial silk is quite suitable for this purpose and cotton backed satin is also used. Some people prefer sateen for the underside of the quilt as it is less likely to slip off the bed than the other fabrics. For a quilt to be used on a double bed the silk will need joining, but this will probably not be necessary for a single bed or cot quilt.

Sometimes an inner case of down proof sateen is made, but this adds to the weight of the quilt. The case is formed by joining together the two pieces of silk or other fabric cut or made up to the required size. The wrong side of the material should be soaped or waxed before making up in order to retard the passage of the down. A piping of the same or contrasting material along the seam gives a professional appearance when the quilt is finished. One end must be left open for filling.

In filling, the down has to be carefully put into the case by hand, and the end which was left open must be sewn securely. It should then be placed quite flat on to a large table or bed, and the down arranged as evenly as possible by careful shaking and tapping with the outstretched hands. Without moving or disturbing the down, tack along the lines marked out for the quilting, ascertaining that all the tacking stitches go right through to the underside of the case. This process is most important, as otherwise, when quilting, the depth of the down padding will become uneven, and the whole appearance of the quilt will be spoilt. It is best to use a tacking thread of a contrasting colour.

Quilting can be done by hand by stitching along the lines of the pattern and taking the needle through to the underside at each stitch, but this would make the work rather laborious. It is therefore more often done by machining. Test the machine on a piece of material similar to the cover; the stitch should be long, and neither top nor bottom tension should be tight. No trace of any puckers should be seen in the stitching. When the machine is satisfactorily adjusted, raise the pressure foot to its greatest height, pass the quilt under it, commence stitching, and do not hurry the process. With the left hand carefully smooth out any creases in both the top and underside of the eiderdown cover.

If a hand sewing-machine is being used, a second person to guide and arrange the eiderdown is a great help. The quilting completed, the tacking cottons should be removed carefully so that no down is drawn through in doing so, and five or six eyelet holes should be buttonholed at convenient distances from the centre of the quilt to provide ventilation. In another form of quilted bedspreads, the designs of the patterned silk, satin, sateen or chintz used for the covers are outlined with running stitches taken through the interlining of wadding. These spreads are finished with brightly coloured plain shantung or cotton linings and are most effective.


QUILTING. Example of modern English hand quilting

PATCHWORK QUILTS. For cottage bedrooms and for use with four-poster beds patchwork quilts are always suitable. They may be made of cambrics, gingham, sateen and other similar materials, or of silks. Sometimes they are composed of blocks of linen 6 or 8 in. square embroidered in woolwork and joined by alternate plain squares of a contrasting colour. Edges may be finished with plain banding or with a binding. Transfers can be obtained for such blocks. Another idea is to use alternate squares of a small patterned chintz and plain sateen. Designs for quilts which more strictly deserve the name are made with patchwork and hand quilting and are interlined and lined, the quilting being worked on the plain border and plain squares.

Patchwork quilts are also made so that the patchwork forms a panel in the middle of the quilt and a border of 18 in. is added of plain material. Such patchwork requires a foundation. Haphazard, crazy patchwork is a way of using up odd scraps, but is only suitable for a cottage quilt. Fancy stitches such as feather-stitch, chain-stitch or blanket-stitch are used to attach the patches to the foundation. Whatever the design decided upon, begin by tacking the first patch to the centre of the foundation and arrange the others round it.

A foundation for a quilt should be cut and made to allow $\frac{1}{2}$ yd. drop at either side of the bed and also at the end. When the top is completed turn in ½ in. hem all round. If only the centre panel (large enough to cover the actual top of the bed) is of patchwork, a cotton foundation is cut of just the same size as the panel and the lining may be chosen of a suitable colour and cut the full size required so that it also forms the border.

Otherwise cut the lining material exactly the same size as the quilt, tack it in position, turn in the raw edges, and fell to the patchwork. The most suitable material for lining depends on the kind of fabric used for the patches. Sateen, woolback satin, jap, or Shantung silk is preferable for backing more elaborate silk or brocade patchwork. For cotton quilts use only cotton or linen for lining ; a small patterned old English print, casement cloth, crash or coloured lawn are the materials which are generally employed.

A more formal type of quilt is not made upon a foundation, but the patches are cut out in geometrical shapes, such as triangles, squares, hexagons, and octagons, each piece being mounted on fairly stiff paper. Black and white triangles placed so as to form a box-shaped pattern is a familiar design that imitates tiling, but the best effect is gained with octagonal shapes. Cut out a template the exact size of patch required and cut the pieces of mounting paper from this so that all the patches correspond. Place a paper hexagon on the table and see how the edges may best be joined to the surrounding patches without overlapping.

Cut out all pieces of material allowing ¼ in. turnings, place them on to the paper shapes, turn the raw edges, and tack to the paper. Prepare a number of pieces in this way before commencing to join them together. Place them edge to edge, right sides outside, and sew them with very small stitches, taking only a few threads of the material, or the patches will not lie flat.

When all the shapes have been joined together, a plain or quilted border can be stitched by hand or machined on to the patchwork, and the lining made in the way already described. It is particularly necessary when making such a patterned quilt to cut each shape with accuracy, or the effect is spoilt, inaccuracies showing much more readily on a large surface than on small ones. The paper used for mounting the patches must be torn away before the quilt is lined.

Rosette Quilt. Most attractive for a country bedroom is a form of quilt dating from the 18th century, or earlier, made of rosettes. Some originals seen came from the West Indies, the materials used for the rosettes being soft, patterned cottons as worn by the plantation negroes. Any prints, patterned lawns or sateens may be used, provided that the scheme is harmonious and the effect light and dainty.

The method of making is simple. Cut out a cardboard template the size of a small saucer (about 5 in. in diameter), the paper shapes to correspond, and the pieces of material allowing for turnings. Having tacked these to the paper, whip round the edges of the material, and before drawing up tear away the paper.

Each patch or rosette is like a little flattened circular bag with the gathered top uppermost and is joined by a few stitches to the adjacent patches, but made up in such a way that the quilt has an openwork effect through which the separate lining of some pretty plain coloured sateen shows.

FANCY QUILTING. Plain quilting usually consists of lines of back-stitching arranged to cross diagonally about 1 or 2 in. apart. This is used sometimes with an interlining of wadding to make comforters, or small quilted spreads, and cot coverlets of silk or satin, and may be done by machine or hand. Fancy quilting in which the stitchery forms a pattern is also employed on materials for such coverlets. A form of quilt design which is often found in use dates from the Tudor period and is still made in Wales by the villagers. These quilts are interlined with sheep's wool or cotton wool, covered with sateen or silk or other washable material and stitched all over by hand, as shown in the illustration.

Small decorative pillows and night wear sachets to match the bed quilt are dainty accessories. They may be made of satin, taffeta, or crêpe, the quilting, lined with muslin and padded with cotton wool. The pillow foundations may be made of sateen and stuffed with down or kapok.

QUIRK. This is the name given to a narrow channel or groove separating one portion of a moulding from another. The name is also applied to the bead or fillet of a beading plane, and a tool, similar to a metal spokeshave, known as a quirk router, is obtainable for use in forming quirks.

RABBIT WOOL. The soft, fluffy wool manufactured from the skin of the Angora rabbit is popularly known as rabbit wool. Because of its silky texture it is employed in white or a pale colour to make babies' knitted and crocheted caps, and it is used extensively as an edging for knitted coats and frocks.

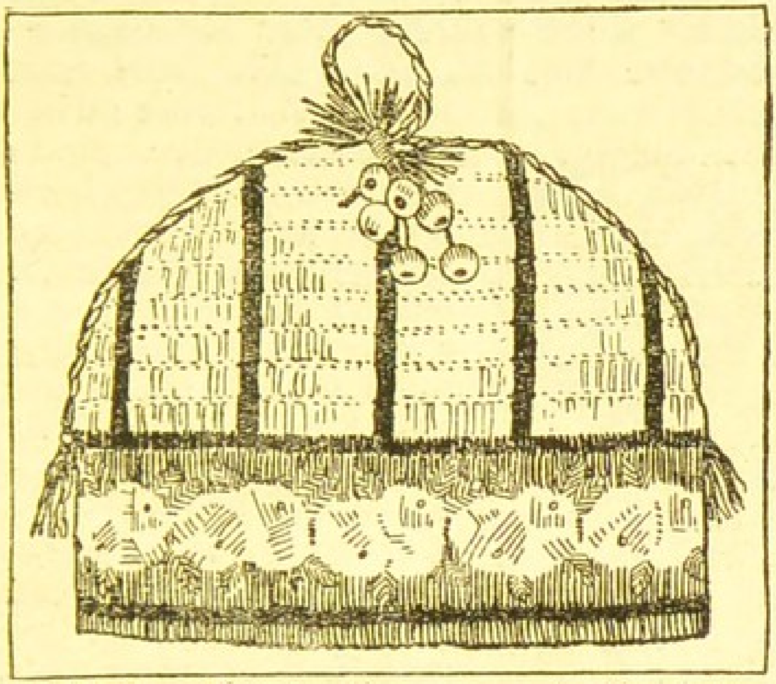
When the garment is finished, the rabbit wool should be brushed with a wire brush such as is used for cleaning suède.

RAFFIA WORK: EMBROIDERY AND WEAVING

Methods of Decorating Useful Articles with this Fibre

Some ideas are here given of the wide possibilities of this work, which may easily be varied. The reader should also consult the articles appearing under the headings Artificial Flowers; Embroidery; Rush Work

Strands of raffia are woven into mats, baskets, hats, and other articles. They are also used for embroidery purposes and for making motifs which may be applied as trimmings. In its natural colour, which is similar to that of straw, raffia can be bought from the florist, and then dyed to the desired shade; but it is sold ready dyed in a wide range of colours at handicraft stores and in most art work departments in big shops, together with varnish, canvas, needles and raffia cloth. In the event of the dyeing being done at home, the raffia should be soaked in warm water for an hour. This process makes it more pliable and enables it to take the dye more easily than would otherwise be possible. Almost any kind of dye used for household purposes is suitable, hat dye, applied with the brush with which it is usually sold, giving particularly good results. When a brush is used, the dye is best applied to the finished article, not to the unwoven strands of raffia, for the latter would be a tedious process and an even effect difficult to obtain.



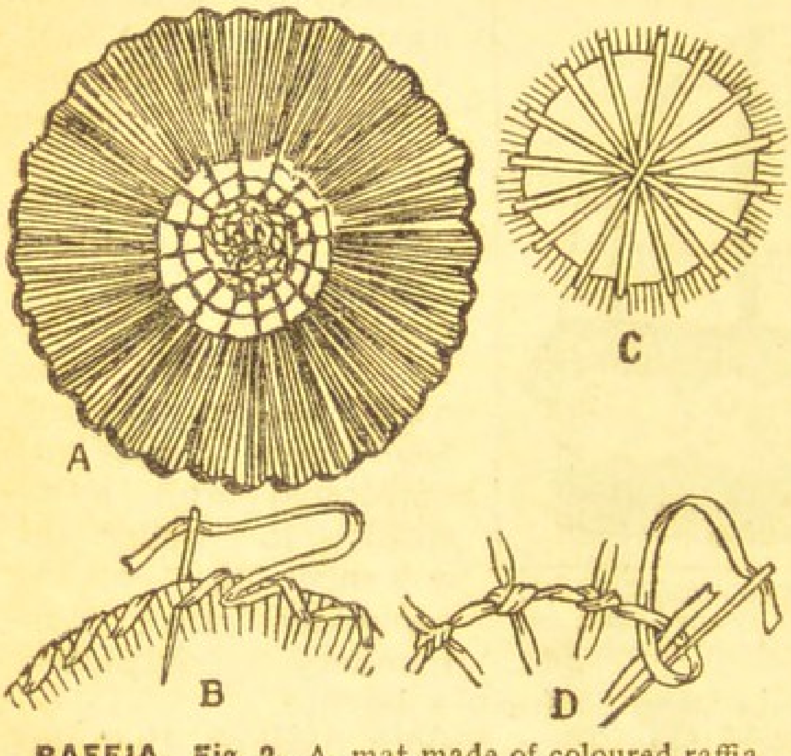
RAFFIA. Fig. 1. Tea cosy embroidered in natural, black, yellow, blue and orange raffia on coarse canvas and lined with deep blue sateen

RAFFIA EMBROIDERY. The most suitable trimming for rush baskets, mats, hats or garden cushions is embroidery in raffia. It is equally useful for table mats in American cloth, raffia cloth or for tea cosies with canvas foundations. Sometimes beads are employed and also wools in order to enhance the effect; sometimes the embroidery completely covers the surface, or is only used to form a border.

When embroidering with this fibre, select designs that are suitable. Conventional or geometrical patterns are best. Natural raffia should be soaked in warm water and allowed to dry for a few hours before working. Dyed raffia having been already soaked does not require damping unless it feels brittle to the touch. Designs can be traced on canvas or raffia cloth over carbon paper. When the embroidery is meant to be flat, a warm iron may be pressed over a damp cloth on the back of the work when finished. Satin, blanket, lazy-daisy and stem stitch are the stitches most suitable for working the fibre, and special needles are sold for use with raffia, or crewel needles may be used for finer work. Raffia strands are split into narrower threads when the embroidery demands it.

A stiff canvas is preferable to a soft one, and the mesh must be large enough to take the raffia strands. Rug canvas is suitable for large pieces of work. Special raffia canvas has only a single thread mesh. Broad strands of raffia cover backgrounds best. Raffia cloth is a pleasant fabric for garden cushions and cosies and is also very useful for covering such things as blotters and bookends to be embroidered with designs in raffia. It is always advisable to strengthen the back of this cloth with thin muslin or canvas before embroidering. The edges of a large piece of work such as a cushion cover should be tacked between strips of muslin to prevent fraying whilst embroidering. The raffia cloth is obtainable both natural and dyed and in three qualities, fine, medium, and coarse.

Book-ends of white wood, raffia cloth to cover, raffia strands in various colours for embroidering the design for which a chart is provided, leather for the base of the book-ends to prevent it scraping a polished table, and gold galon for finishing the edges of the work are obtainable for a few shillings from the Francis-Lewis Studio, 18, Soho Square, London, W.1. The book-ends make a charming gift or add a decorative note to a table. A pretty blotter or writing pad can easily be made to match, using raffia cloth over a cardboard foundation lined with shot taffeta and finished with gold galon. Raffia cloth covers for bridge markers are also decorative, and pochettes can be made from this material, or of canvas embroidered with designs in coloured raffia. The latter fabric makes a more durable article.



RAFFIA. Fig. 2. A, mat made of coloured raffia strands wound over a cardboard foundation and woven in the centre. B, edge worked with running stitch. C, method of placing strands for central weaving. D, details of knotting

For the tea cosy (Fig. 1) a piece of canvas 16 in. by 22 in. is required. The width of the cosy at the bottom should be 13 in. across and the depth should be 9½ in. Make the outline 1 in. larger than the finished article to allow for shrinkage in working.

The simple design of apples and leaves may be copied freehand on to paper and transferred by means of carbon paper. Alternatively, any fruit border transfer of suitable size (about 3 in. wide) may be used. Begin by working a straight edge of bright blue raffia over two holes and then a row of black. Fill in the background round the fruit with the blue. The apples are worked in yellow and two shades of orange. The leaves are filled in with green, working from centre to edge in satin stitch. Above the border a row of black is worked.

The rest of the design is filled in as follows: Work a vertical line in black exactly in the centre of the cosy. Work over 2 holes. Then work a similar line on either side 2 in. from the centre, and another at a similar distance. Fill in the spaces between, using a series of vertical stitches over 4 holes, then over 5 holes. Continue in this manner until the whole of the cosy is filled in. Then work the other side in the same way.

When finished place the two sides face to face and machine together, turn right side out, make a plait of black and white raffia and stitch this round the join, making a loop at the top for a handle. The ends of the plait should be knotted, leaving the raffia loose to form a tassel. Split this up very finely to simulate silk.

Wrap some large wooden beads with orange raffia by passing the needle through the hole and over the bead. Thread a needle with a strand of green raffia, pass it through the wooden bead, thread a small back bead on to it, pass back to make the stalk, leaving the black bead as a finish to the base of the large bead. Make 6 berries in this way, tie them securely together with some green raffia, and stitch this at the base of the handle. Pad the cosy with layers of cotton wool wadding and line it with blue sateen to match the blue raffia used for the border. Raffia cloth may be used instead of covering the canvas with raffia embroidery. The border and finishing would be worked in the same way and ½ yd. of the raffia fabric would be required.

Luncheon mats for garden or loggia table use and tray cloths for service trolleys are most practical when made of almond green American cloth with an applied canvas border embroidered in raffia and with coloured beads at the ends. A tray cloth should measure 18 in. by 12 in. Cut the American cloth to this size, place a piece of canvas under it and cut ½ in. larger all round. Trace or draw the geometrical design on the canvas and embroider in brightly coloured raffias, using black for the outer edge. Leave half inch of canvas for turning. A large-eyed needle should be used.

When the border has been worked, cut out the inside of the canvas and catch down the embroidered border to the American cloth with a fine needle and silk. Turn the edge of the canvas over that of the American cloth and buttonhole round both with black raffia. Buy or make a fringe of wooden beads to match the colours of the embroidery. Attach this to the raffia buttonholing at each end and finish off the two sides of fringe by using a large black bead and a small coloured one.

WEAVING AND PLAITING. Other effective uses for raffia consist of weaving and plaiting the strands to make baskets, mats, hats, and other articles. Table mats are extremely simple to make in this manner. Oval and round cardboard foundations may be purchased or a set may be cut from a strong sheet of cardboard (imperial size). Six round mats 7 in. in diameter, 2 oval dish mats 9 in. by 6 in., and one large oval 11 in. by 8 in. make a set. For a 7 in. mat (*see* Fig. 2) a centre should be cut out in the cardboard of 2½ in.; for the ovals cut out an opening in proportion. The raffia is simply bound over the cardboard through the centre opening, taking care to overlap the strands each time so that the cardboard does not show through. Near the end of each strand, thread it with a sharp pointed crewel needle and take it through the cardboard and make firm by pushing the end beneath the already wound raffia strands. Continue winding till the cardboard shape is covered. Two or three strands may be used together to cover the cardboard more quickly. The edge (*see* diagram B) is worked by threading the needle with a contrasting shade of raffia and using a running stitch. Bring the needle up through the cardboard each time, then reverse the mat and bring the needle up through the same holes so that the stitches cross.

The centre weaving is begun by taking a strand of the same coloured raffia as used for the edge straight across the opening, threading through the cardboard on the other side, and bringing the strand back to the other side of the opening to give a double thickness. Fasten off and repeat round the opening; eight strands should be sufficient for a small mat (*see* Fig. 2, C).

Now weave in and out of these strands from the centre for about 1 in. in diameter. Make a row of knots all round close up to this weaving, one on each strand, and then a second row of knots, leaving a small space between them and the weaving. Detail for the knots is shown in Fig. 2, D. More elaborate borders can be made to such mats introducing several colours with fancy stitches.

Applied Raffia Trimming. Flowers or fruit may be worked separately. These are effective for ornamenting fruit, bread or wastepaper baskets. A piece of canvas larger than the spray required is used to work on. Sketch the design and fill in with the coloured raffia strands, using long buttonhole stitches from centre to edge. Use green for stalks and leaves. The centres of the flowers are of beads. Cut away the superfluous canvas from the spray when the embroidery is finished.

RAINPROOF CLOTH. Oilskin or mackintosh cloth is needed to resist really heavy wettings, but the treatment which makes it waterproof closes up the pores of the fabric. Rainproof cloth, while fairly resistant to ordinary showers, is just as well ventilated as unwaterproofed fabrics. Cottons, woollens, and silks can all be rainproofed.

The processes used affect only in an imperceptible degree the appearance, touch, and colour of the article. These processes cannot, however, be attempted at home without inviting disappointment and courting risks. The goods need first to be prepared and to have all grease removed, and the most efficacious results are obtained from a combination of chemical and mechanical methods. The cloth is best impregnated with a chemical (acetate of alumina), and this, unless properly done, may spoil the colour.

The goods are then dried and given an infinitesimally fine film of wax, and it is important to have the right mixture of waxes. The wax may be rubbed on dry, when it is almost impossible to avoid the production of shiny streaks ; or be applied in a melted state, for which purpose a trace of wax is laid on by means of a metal roller ; or the wax may be dissolved, e.g. in petrol, into which the cloth is dipped.

RASP. A rasp is a kind of rough file used for shaping wood and other comparatively soft material. Amongst many varieties the ordinary pattern is that known as the half-round, one side being flat and the other semicircular in cross section. Rasps are also obtainable flat, circular and square in cross section.

A cabinet rasp is a half-round rasp with rather finer teeth than the ordinary kind. The rougher types are employed for primary shaping and the cabinet rasps for further finishing the wood.

RATTAN. For domestic purposes rattan cane forms a convenient material for cleaning drains, but it is also extensively used in basket making. The whole cane is utilized to a large extent for making chairs and many kinds of strong baskets ; the outer skin is peeled off and used for caning chairs, one side of it being quite smooth and bright.

The inner portion, known as pulp or pith, is treated by machinery and drawn through holes in a metal plate, the resulting material being available in lengths of several diameters, ranging from the finest, 00, to the thickest, No. 15. The appearance of the prepared pith cane when made up in the form of a basket can be improved by singeing the minute fibres which are left on the outside. Generally the material is used quite plain, but it can be dyed or stained.

The main advantage of rattan for basket work is its length, and for this reason it is largely used, and forms a most convenient material for beginners in basket weaving. Owing to its lightness the rattan is particularly adapted for making light and fancy baskets. Used in combination with raffia, it forms an excellent material for making table mats.

RAZOR : How to Sharpen. The routine sharpening of a razor consists of 20 or 30 double passes on the leather side of the strop every time the razor is used, and is preferably done after shaving, so that the edge has a few days' rest between stropping and use. The strop is hung up on a strong hook at the height of the chin from the floor, the handle is grasped in the left hand and pulled hard to keep the strop quite flat. The tension is important, as a weak pull will result in the strop curling minutely round the blade so that the edge gets rounded instead of properly keen. With the other hand the razor is then swept boldly up and down the strop with the blade lying flat, the back pressing only lightly, but the edge firmly. The reversal at the end of the stroke is effected by a turn of the right wrist, which lifts the edge and lays the other face of the razor on the strop as the return stroke is commenced.

During stropping a faint drag should be felt and a swishing sound heard, not a scraping noise, and the blade may emit a ringing note, but this is almost inaudible. If a strop gets accidentally gashed, it is best discarded and replaced. The only dressing required on the leather is a mere touch of oil or grease, and the application should be postponed as long as the leather retains its soft pliability and its velvety appearance.

After a period of regular use and stropping a razor loses its keenness of edge; it should then be given 10 or 12 light double passes on the canvas side, keeping a very heavy tension on the strop, followed by the ordinary work on the leather. A blade that is not restored by this treatment, or that is found to require it at frequent intervals, needs a touch of the oil stone; if the owner has enough confidence to attempt this operation himself he should use a fine carborundum stone moistened with paraffin, using light pressure and much care and patience. A magnifying glass may be employed to examine the progress of the work from time to time.

The blade must be held with the edge on the stone, but the back overhanging so that the two planes ground on the steel meet on the edge at a very fine angle. This is facilitated by the faces of the blade being ground hollow. Before resorting to such a drastic remedy as stoning it is well to try if a dull razor can be restored by a month's rest out of use or by 10 min. immersion in water kept boiling all the while. A keen edge must be maintained on a razor both for the sake of getting a clean and comfortable shave, and to avoid cutting the face, an accident generally due to a dull blade.

REBATE. This is a kind of groove that is made on the edge of a piece of wood in the form of a step. An example is that found on the back of almost all picture frames. The purpose of the rebate is to provide a space in which some object, such as a panel, can be used so that its surface or one of its surfaces may finish flush with the top surface of the framework.

Generally speaking, the rebate should be used in places where one piece is to fit into, and be supported by, another. For example, boards may be rebated to a half of their thickness so that, when the two prepared boards are brought together, the rebates in each will enable both faces of the boards to finish flush and form a level surface. This arrangement is known as a rebated joint.

REBATE PLANE. This is a tool specially made for cutting rebates. The simplest form is a narrow, hardwood plane with an iron that is the full width of the body of the plane. Useful sizes are those of $\frac{1}{2}$ in., 1 in., and $1\frac{1}{4}$ in. wide.

The plane may be made with either a skew or square mouth; the skew generally is preferred, because the shavings escape more freely, so that there is less liability of the plane choking. Such a tool, however, is not very satisfactory for the actual work of making the rebate; it is generally used for cleaning it out, after it has first been prepared with the cutting gauge or by chiselling.

To be effective, a rebate plane requires some means to prevent it from slipping sideways on the wood. The tool known as a fillister is a development of the simple rebate plane with the addition of a fence or guard to prevent the plane wandering over the surface of the wood. The fence is a movable piece of hardwood clamped to the sole of the plane by set screws. These may be adjusted so that the width of the rebate can be regulated. A small brass shoe-piece controls the depth of the rebate, and a separate cutter is provided for cutting the inner edge of the rebate. The sash fillister is somewhat similar to the moving one, but the fence is supported on two rods which slide through the body of the plane. It is used by first adjusting the fence and the stop to the requisite width and depth of the rebate. The cutter is similarly adjusted, and the plane is worked along the edge of the timber, taking care to keep the face of the fence against the edge of the job, and planing until the rebate is completed.

Another type of rebate plane, as used for cleaning up the rebate, is that known as the bull-nosed plane, generally made in metal. It is virtually a small metal plane in which the plane iron terminates on the front of the tool, so that it is possible to clean out rebates, or any other hollows, right up to the end of the slot.

RED LEAD. Red lead is a crystalline powder known in chemistry as triplumbic tetroxide, or lead orthoplumbate, according to its purity. It has many commercial usages, of which one is the manufacture of flint glass. Its use as a pigment is common, and it forms the base of the priming coats in painting.

The mixture of red lead and gold size is a useful drier for painting; the same mixture is applied to the screwed joints of gas or hot water piping to ensure a leak-proof joint. A length of tow or hemp is smeared with the paste and twisted into the threads of the pipe, which is then screwed home.

REPOUSSÉ WORK IN BRASS AND COPPER

Particulars of a Process that Gives Charming Results

This contribution should be read in conjunction with the articles Metal Work; Napkin Ring; Piercing; Silver Work

In its strict application, repoussé work means the formation in relief in thin metal of a pattern beaten up from the reverse side, but it now generally includes the shaping as well as the decoration of the article. Brass and copper are commonly employed, the most useful thicknesses of metal being from 26 to 22 imperial standard wire gauge.

In selecting the metal its ductility is of importance. Silver, although expensive, will bear considerable expansion and is pleasant to work on. Of the inexpensive metals copper is extremely ductile; it can be finished with an agreeable surface and is not liable to crack. Brass is harder, and not so suitable for high relief, but for many small articles it is very useful. Pewter is extremely soft and easily worked, but it is liable to split, and only in the thinnest sheets can it be used for high relief with any success. Iron and steel, particularly if thin, are capable of considerable expansion, but the repoussé ornament should be restrained.

Repoussé work may be begun with a few tools, these being shown overleaf. The first is the hammer, the head of which should be steel, or at least steel-faced; the handle of special form is about 10 in. long, quite slender for two-thirds of its length, and terminating in a knob of a flattened oval form. A boxwood mallet with a similar handle is a necessary tool, and a selection of small punches is also required; these for a beginning should comprise a tracer, a number of raising tools, pearls, punches, and matting tools. A steel scribing point is necessary, and this can be made from a knitting-needle; a pair of shears, compasses, try-square, and steel rule complete the worker's equipment.

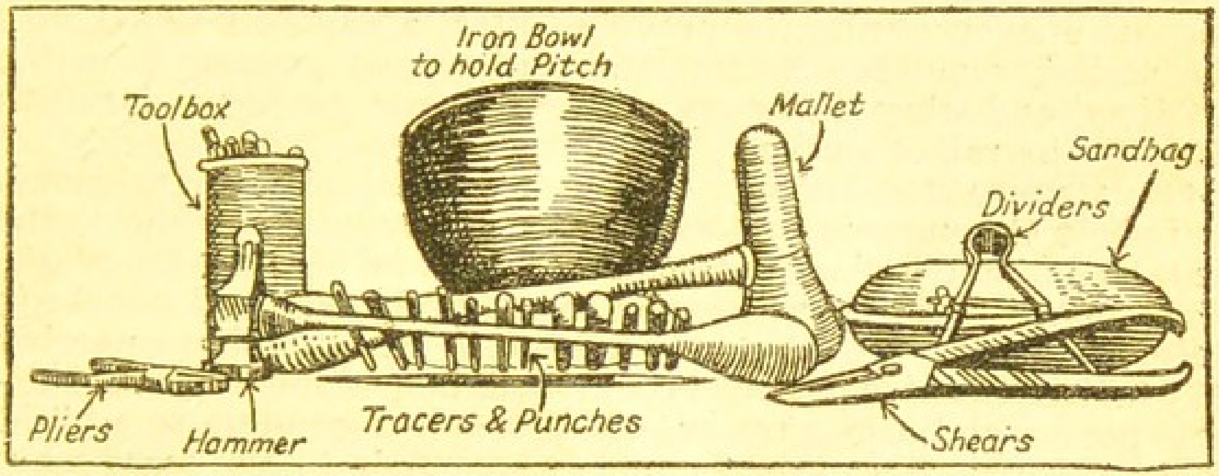
Although a number of small articles can be made without it, a pitch block is essential for good work. This is a block of wood covered with a thick layer of cement made by melting 4 lb. of best black pitch in an iron pot and stirring in $\frac{1}{4}$ lb. powdered resin and $\frac{1}{2}$ lb. Russian tallow. When thoroughly mixed, add 4 to 5 lb. of plaster of Paris. Another cement is made by substituting powdered bath brick for the plaster. These mixtures are highly inflammable, and if overheated a vapour may be given off which will easily take fire. Wherever possible the melting should be done out of doors. A wood fire can be used and the vessel supported on a couple of bricks. For small work it is convenient to pour the cement into a tin bowl, but generally it is better to use a block of wood about 12 in. by 10 in. by 2 in., and form a border on top of this to a height of 4 in. with strips of stout cardboard, so that the molten cement will not run off the board.

The tallow renders the cement soft, and it is advisable to have two blocks, one with a little less tallow than the amount stated above, and another with a little more. The block should be rested on a pad of stout canvas or leather filled with silver sand. If made with leather the pad can be used for working high relief without any risk of perforating the cover.

A simple piece of work for an amateur's first attempt is an ash tray made from a piece of sheet copper or brass of about 24 S.W.G. and 6 in. square. In the first place the metal must be flattened on a hard, flat and true surface, such as that of an old flat-iron mounted on a wooden stand. Only the lightest possible blows are needed, otherwise the metal will become buckled.

The metal is cleaned with emery cloth and a little oil, circular scouring marks being made all over the surfaces. The oil is wiped off, and the surface is ready for work. The design is now transferred with carbon paper on to the best surface, or, if preferred by the worker and he has some artistic ability, the pattern can be drawn direct on the metal. To prevent the lines getting rubbed off they are scratched over with a scribing point, which must be kept sharp for this purpose.

The next step is to indent the lines with the tracer, and probably some little difficulty will be experienced with this tool at first. It is necessary to make an even indentation which will show as an even line on the other side of the metal, and the best way is to mount the metal on the cement block. The surface of the pitch is melted by placing it in front of a fire, in an oven, under the grill of a gas stove, or by using a blow-lamp. It is not necessary to melt more than ½ in. down, and then the metal is pressed on the cement so that it is just below the level of the surrounding surface, and the cement pressed out is allowed to run over the edge sufficiently to hold it in place.



REPOUSSÉ WORK. Good outfit for the amateur, by means of which most of the work described can be done
Courtesy of C. J. Plucknett & Co., Ltd.

The tracer is held in the left hand with the thumb and first two fingers and with the edge on the line, but tilted slightly away from it. The third and little finger should be behind the tracer and resting on the metal. The hammer is poised directly over the tool, and then a series of light, even, and continuous taps are directed on to the tool. There should be no need to assist the tool forward, as the action of the hammer should have a propelling effect. The blows must be light, but the exact weight of the blow can only be gauged by experience. A fairly accurate estimate can be obtained by making a few tracer indentations on a piece of spare metal rested on a block of soft wood.

Raising the Design. When all the lines have been traced, the cement can be chipped off the edge of the metal, which is then prized off the block. If the metal is warmed and wiped with an oily rag, any adhering pitch can be removed. The pattern should be plainly visible on the other side of the metal, and that side is now placed uppermost and fixed in the cement. A brass punch is placed between the raised marks and the hammer used to drive it into the metal.

It is better to work along gradually, making a slight hollow, and to repeat the process several times, rather than attempt to reach the required depth at one blow. It will be seen that much depends on the shape of the punch. If some hard brass rod and bar is obtained, it will be possible to form suitable shapes with a file. The shaped end of the punch must be quite smooth and polished, as any uneven marks will show on the other side of the punched surface. Having sufficiently deepened the pattern, the metal is removed from the cement, warmed, cleaned, and then replaced with the raised surface uppermost.

The shape of the pattern is now adjusted with the tracer, but this time it is placed on its side, so that hammer blows properly directed will work the raised pattern to its correct shape. This is a simple operation, but care must be taken that only the lightest hammer blows are given, otherwise there is risk of driving the tool through the metal. If the metal has become uneven during the previous work, it can be levelled with the mallet, removing it from the cement and placing it on the sandbag, and when necessary on the flat iron, taking care not to damage the raised surface.

ORNAMENTATION OF THE GROUND. If it is desired to punch or indent the surface of the ground, or give a matt effect, the metal must first be thoroughly cleaned. Useful tools are the pearls, made of round steel rod ground to a round point and polished; these are usually provided in 3 or 4 sizes. By obtaining a number of 5 in. lengths of $\frac{3}{16}$ in. steel rod, it will be possible to make suitable pearls, and also a tracer, which requires grinding to a blunt edge on both sides. Steel punches are made in the same way, by using rod of suitable thickness and grinding the ends to shape. All steel punches must be hardened, tempered, and the ends highly polished.

The methods described are suitable for all raised work, but with high relief it is necessary to remove the metal frequently for the purpose of annealing. Continual hammering either direct or through a punch has the sure effect of hardening the metal, and it is only when it is soft and ductile that the material can be thinned out. As a rule, the harder the metal is the more frequently must it be annealed.

MORE ELABORATE WORK. When the repoussé worker has had experience in raising simple forms, and desires to attempt more elaborate work, it will be necessary to do some of the preliminary sinking on the sandbag. Owing to the skill required in the successful manipulation of the mallet and the prevention of undue straining of the material, it is not advisable to attempt this stage of the work until a fair knowledge of the properties of thin metal has been gained.

When the sandbag is used, the surface of the flat iron or a suitable hard surface, should be used in conjunction with it; after every few blows with the mallet the work must be straightened on the flat surface, and frequent annealing must not be forgotten. The deeper the sinking is carried, the thinner the metal becomes.

If it is desired to tool the raised surfaces to any extent, it will be necessary to fill up the hollows before the metal is placed on the cement block. The surface modelling is done in the same way as ordinary raising, but using greater care. Punches suitable for working the particular shapes are used. The tracer, employed as described above, is a useful tool to define shapes.

Repoussé decoration of bowl shapes is not so simple as in flat work, and different methods must be employed. For a small bowl where it is impossible to use a punch, the method is to use a snarl held in the vice and a hammer. Several shapes of snarl must be provided, and it is hardly possible for the amateur to attempt much of this work without a large equipment. The raising is carried as far as possible with the snarl, and then the bowl is filled with cement, so that the main portion of the work can be done from the front.

The selection of suitable designs is not difficult. It is important that the shaping should be done as far as practicable before the ornament is worked. It is often possible to do the shaping and the decoration at the same time; but it is only with a few shapes that it is possible to shape the work after raising a portion of it. Simple forms for trays and dishes can be done on the sandbag, and with the aid of one or two metal worker's stakes of varying shape all but the most elaborate forms can be worked by the amateur.

The method of procedure in advanced work is very little different from ordinary raising, the main consideration being that of modelling. It is not always easy to gauge correctly the amount of sinking necessary to produce a pleasing surface effect; only experience enables the worker to obtain the approximate depth so that removal of the metal from the block can be reduced to a minimum.

With large bowls it is always advisable to complete the shape as far as possible before the decoration is applied, and also to use the sandbag and mallet to beat out prominent portions of the design. This method assists the raising, because the metal is spread more evenly than is possible on a large surface when only raising tools are employed.

Final surface finishing should not be attempted unless the hollows have been filled completely with pitch; if there is much work to do, it is advisable to use a harder pitch than is generally employed. Matting tools should be used always with discretion, and in large work must be avoided for purposes of background effect. The main object in employing them should be to give texture to leaves and drapery.

Cleaning and Finishing. The metal when worked is warmed and cleaned and then dipped into an acid bath; it is washed and dried and then polished with a hard brush and powdered pumice. If a highly polished surface is desired the prominent portions should be burnished and finally coated with lacquer, but it is usual for a plain surface to be left and then lacquered. A common finish for copper is oxidization ; this is effected by dipping the metal in a solution of ammonium sulphide and thoroughly washing when the desired colour is reached. Owing to the offensive odour of this liquid, the work should be done out of doors.

REPP. The name rep or repp of this furnishing and dress fabric comes from the fact that the surface is ribbed.

The best furniture repps are made with threads of two different thicknesses running in both directions of the cloth. The structure is firm, and in good colours repp is a suitable material for covering chairs, settees, etc.

RESIN. The best-known resin, or rosin, is obtained by the distillation of crude turpentine, which exudes from pine-trees. It varies in colour from a pale amber to dark brown, according to its purity or method of preparation.

The solid resin is used for giving violin bows a grip on the strings, and in powder form is employed by golfers and tennis players to increase the grip of the hands. Dissolved in turpentine or benzine a simple form of varnish is obtained.

Resin is used in soap making, and resin soap is supplied in the form of a coarse powder for household cleaning purposes, but owing to its colour it is not suitable for washing linen.

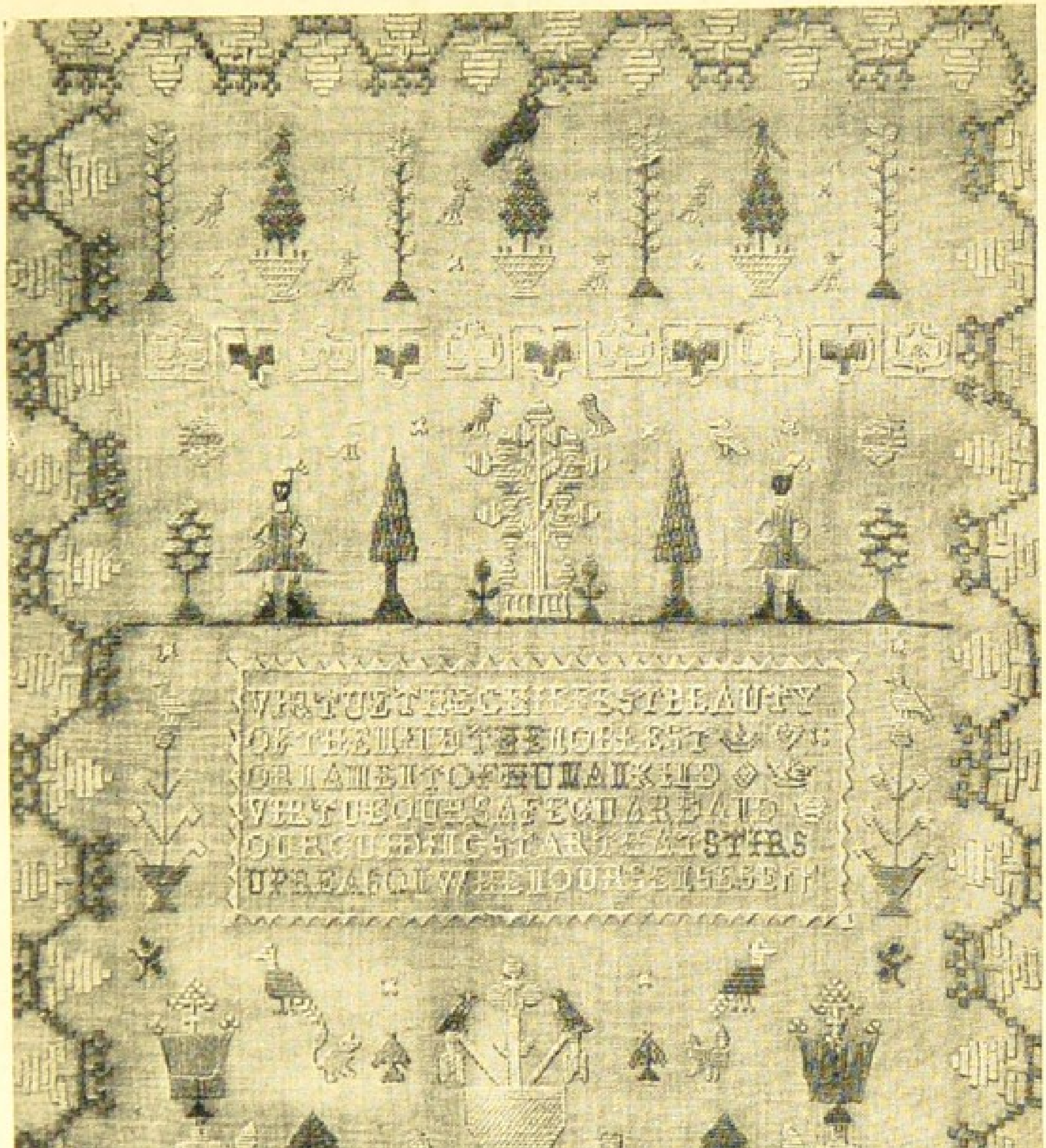
RIBBON WORK AND TRIMMING

Effective Uses and Methods for Making Applied Decorations

Directions for making accessories which can be charmingly trimmed with ribbon work may be found under such headings as Bag ; Curtains ; Cushions ; Night-wear Case. See also Appliqué Work ; Artificial Flowers ; Embroidery ; Laid Work ; Raffia ; Transfer

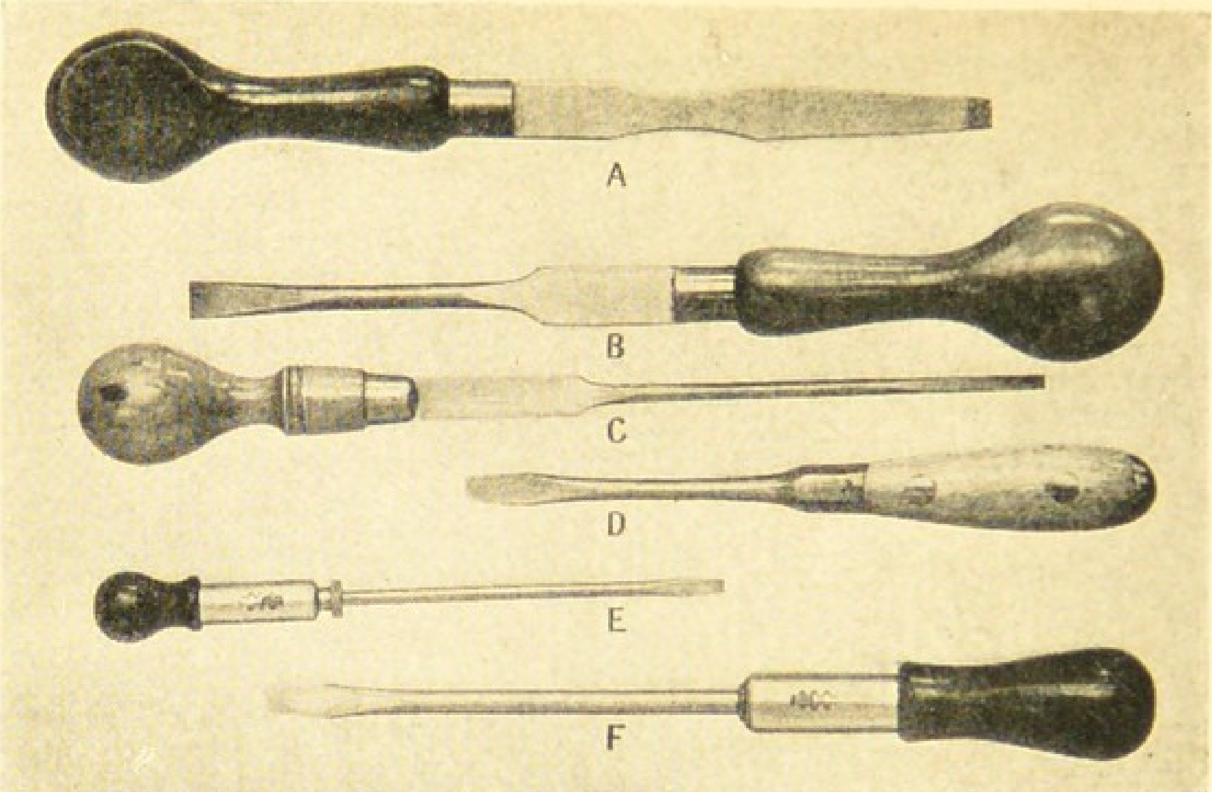
The simplest form of ribbon work consists of making bows, rosettes, and gathered ruchings ; the most elaborate is combined with embroidery or appliqué work, and used to decorate furnishing accessories. Although seen on cushions it is perhaps most suitable for pieces of needlework such as bedspreads, pelmet and curtain borders, handkerchief and nightwear sachets. The raised or looped formations of ribbon, often used in the work, make it less practical for hard wear than ordinary embroidery unless narrow ribbon is actually employed like a coarse thread.

Bows and Rosettes. Even a bow for trimming requires to be properly made, especially if the ribbon is wide. Leave an end and form a loop with small pleats, twist it round with cotton. Repeat the making of loops measuring their length carefully until the required number is made. Arrange the loops to lie in even numbers each way and leave an end to match the one at the beginning. Make a tie over with a separate piece of ribbon, sewing it tightly or loosely according to taste. Flat

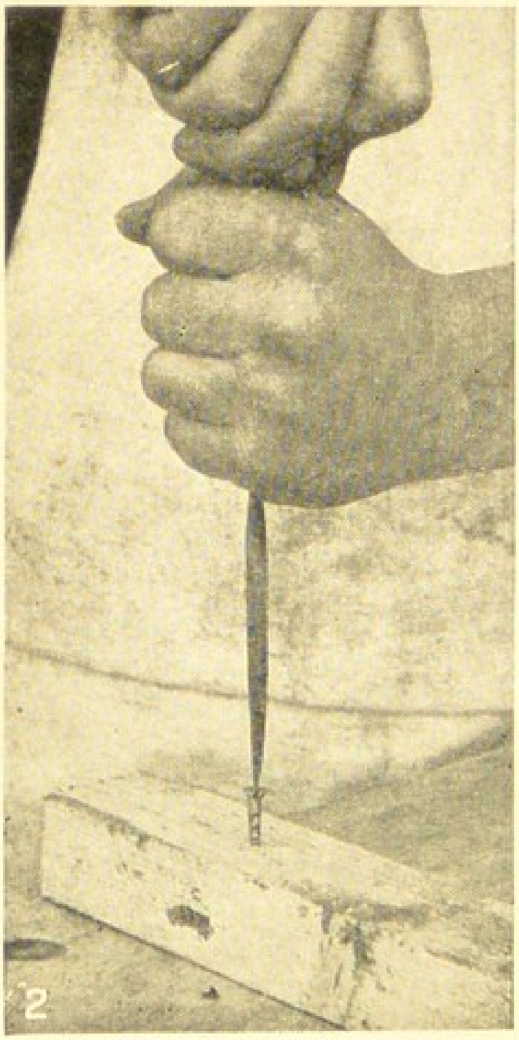


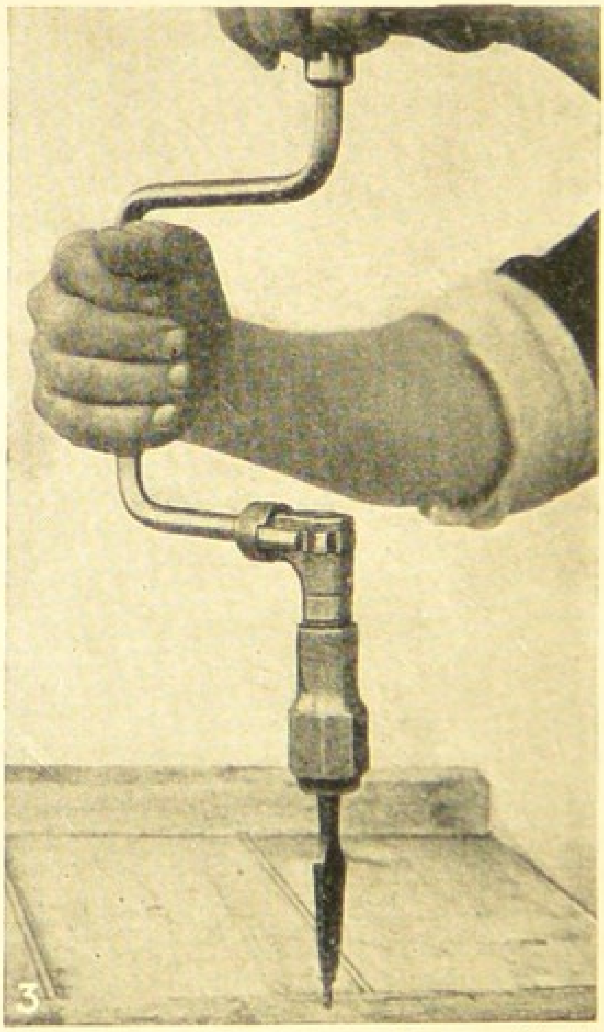
Sampler dating from 1800, with small figures, birds and trees, embroidered in coloured silks upon canvas. In the centre is the following moral verse: "Virtue the chiefest beauty of the mind, the noblest ornament of human kind. Virtue our safeguard and our guiding star, that stirs up reason when our senses err"

THE PATIENT WORK OF A PAST GENERATION



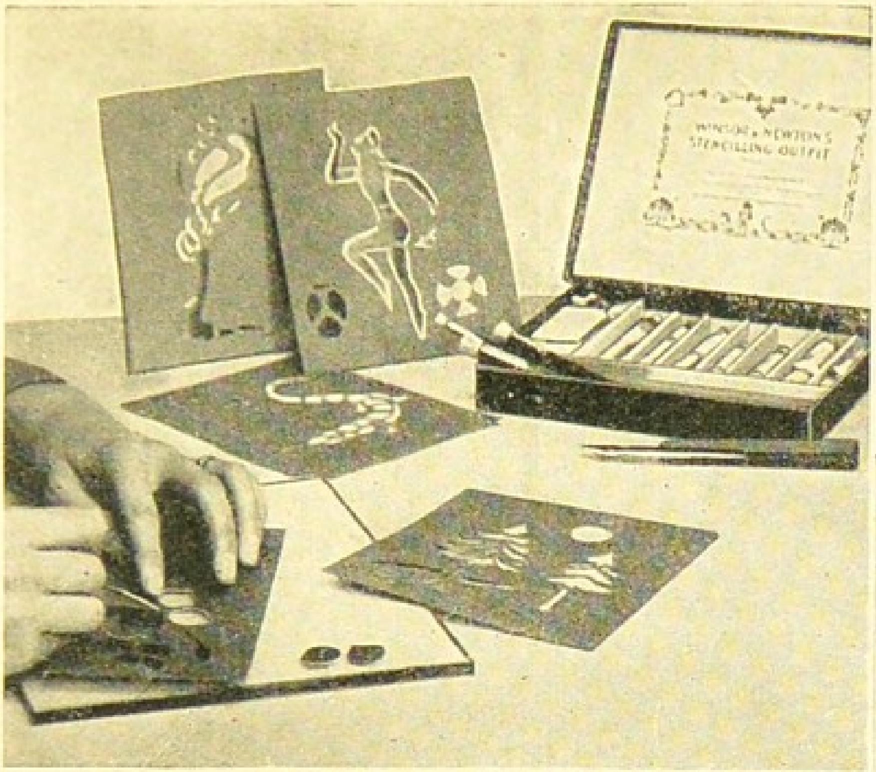
A. London pattern screwdriver, which has a flat blade. B. Cabinet screwdriver. C. Long-shanked driver for electricians. D. Screwdriver with blade and handle forged from one piece of steel. E and F. Ratchet screwdrivers



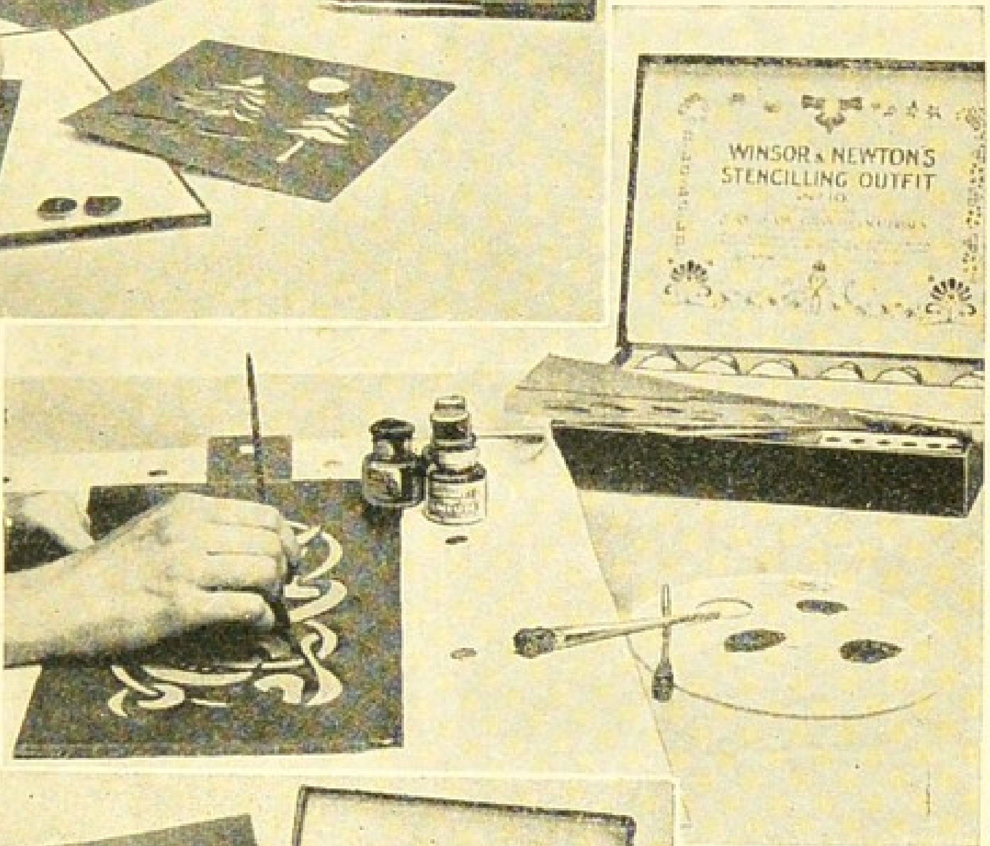


Left. Showing double-handed grip necessary for a large screwdriver. Right. Using screwdriver bit in brace

SCREWDRIVERS OF SEVERAL DESIGNS



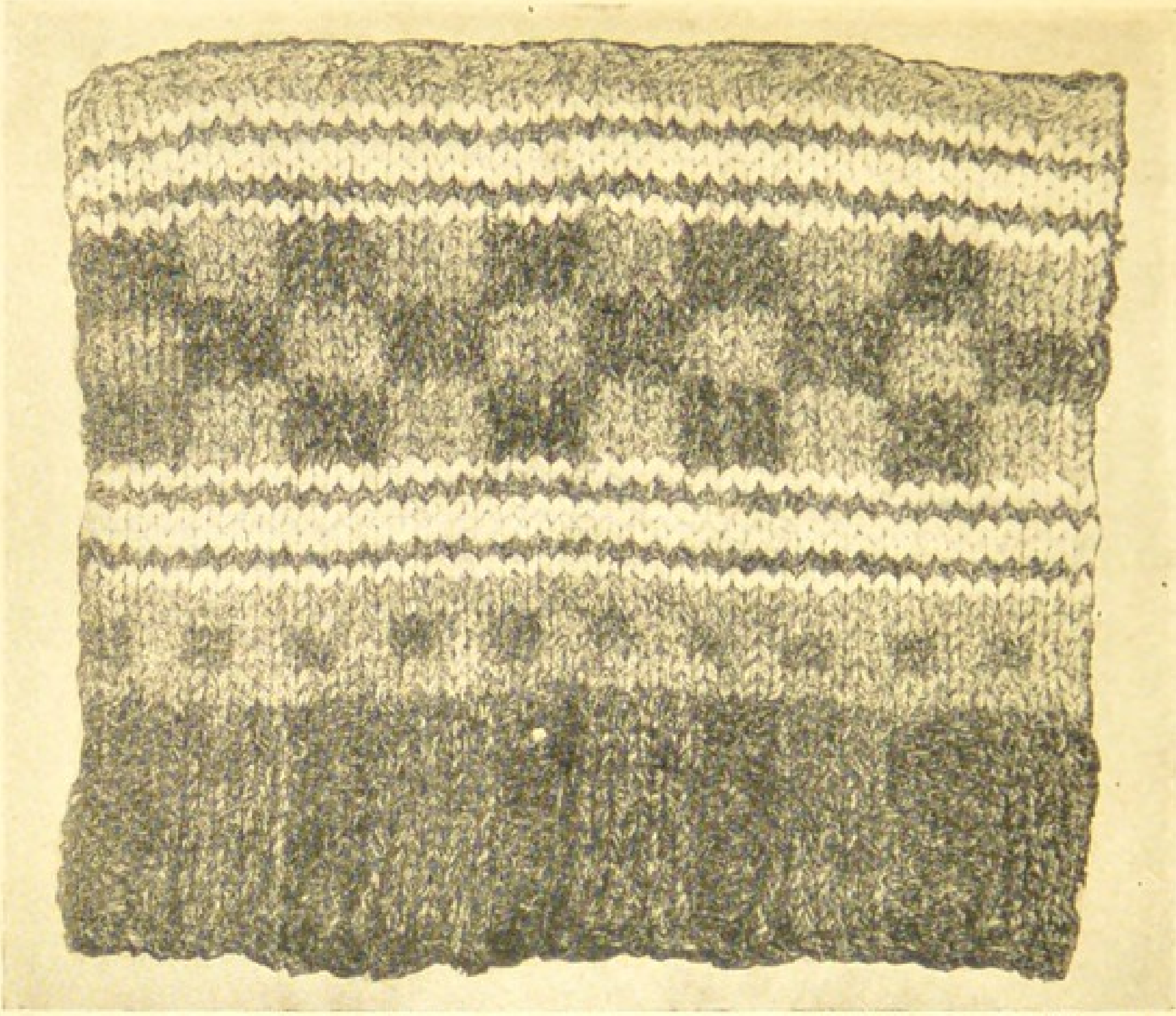
Left. When cutting a stencil, hold the plate firmly with the left hand



Right. Showing the correct way to hold the brush for stencilling with oil colour on thick material

Left. When stencilling on thin materials use a Japanese stencil brush and stipple the colour

STENCILLING: SOME PRACTICAL HINTS



Turn-over top for a boy's stocking, which can be knitted in three different colours by following the directions in the text

Pattern for a boy of 14 years. The turn-over top can also be knitted in three different colours if desired

HAND-KNITTED STOCKING—WITH COLOURED TOP

bows are made by folding ends of ribbon over without pleating to form the desired size, and tacking them down. A shorter piece of ribbon is then folded in the same way, so that the shorter bows lie flatly above the longer ones and stitched down. A flat tie-over strip is placed across the ribbon and finished off neatly at the back. Ribbon rosettes are made on a circle of buckram. To this are tacked ribbon loops, any length desired, beginning at the edge and working towards the centre, longer loops being used towards the centre to make a rounded rosette. For another kind of rosette a wide ribbon can be used and folded over and the edges gathered strongly together. These are drawn up and sewn to the muslin or buckram foundation, beginning at the centre and working to the edge. If a narrow ribbon is used it is not folded, and one with a picot edging gives an attractive finish.

Wheel-like ribbon decorations which form corner trimmings for cushions or sachets are easy to make on a muslin foundation. The centre is of puffed or ruched ribbon, and the edges are finished with loops and ends cut diagonally, the effect being very like a large daisy.

Covering Small Articles. Ordinary wooden coat hangers can be made attractive when covered with satin or chiné ribbon. They need first to be padded with cotton wool, sprinkled with sweet-smelling essence, or some perfumed powder, and then covered with ribbon gathered to fit the arms. One yard of 3-in. wide ribbon is enough to cover the wooden portion, and narrow ribbon to match is used to cover the metallic hook. At the base of this a bow, rosette or ribbon flower may be stitched if the hangers are being made for a gift or sale of work.

Ribbon-covered perfume sachets are easily made by sprinkling little pads of cotton wool with perfume or with sachet powder, covering them first with fine muslin, and then with ribbon. An attractive effect is obtained when two narrow ribbons are interlaced to form a lattice work, the ends being mitred and left free. Long sachet pads to line the bottom of a chest of drawers or wardrobe are made of perfumed wadding covered with coloured muslin, which is bound by ribbon in a contrasting colour.

Inexpensive shoe trees are made daintier if the wooden portion is painted or gilded and the metal bar is covered with about 1 yd. of 1-in. wide ribbon. The ribbon is doubled and gathered over the metal, the gauging being drawn up entirely to cover it. A looped bow in the centre of the metal bar may be added if liked.

Plaited ribbon and jap silk to tone make a pretty sachet set. Two different-coloured double satin ribbons, ⅜ in. wide, should be obtained, the quantity needed depending upon the size of the sachets. Having cut out the silk for the cover and for the linings, the ribbon must be cut in lengths, each piece being in duplicate, one of each colour. The longest strip should go diagonally across the cover from corner to corner; the others follow in order of length.

The plaiting may now begin. Assuming the colours chosen are pink and deep rose, a pink strip is started from the left top corner and is carried across to the opposite one. This is stitched down to the edge of the cover. Across it lay a piece of rose ribbon, the shortest length used, and stitch the two ends of this down, one on the left side and one on the right. For the next two rows, one on either side of the first row, two lengths of pink ribbon are needed and over them a piece of rose-coloured ribbon is placed, this passing under the first strip. Two more pieces are laid across, over and under which a piece of ribbon of the other colour is plaited.

The work proceeds in this way until the whole is covered. It will be easy to see whether the alternating colours are in the right order, but other points need watching. The edges of the ribbon lengths should just touch one another, and the ends should not be cut until they are stitched down. The stitches must be small and neat and the lengths must be cut off slantwise. The corners need especial care, for here the ribbon is liable to bulge and refuse to lie flat. Care must be taken, too, that no uncovered spaces appear in the plaiting. When the plaiting is finished a cording of silk should be made to match the rose or pink, or the sachets may be finished off with a silk or tinsel bought cord or with a narrow gimp.

RIBBON EMBROIDERY. For certain kinds of embroidery ribbon makes an excellent medium. Choose a conventional floral design that is not overcrowded, transfer it to the material, and then stretch the latter on a frame. First embroider the stalks and leaves in thick silk, using stem stitch for the stalks and satin stitch for the leaves.

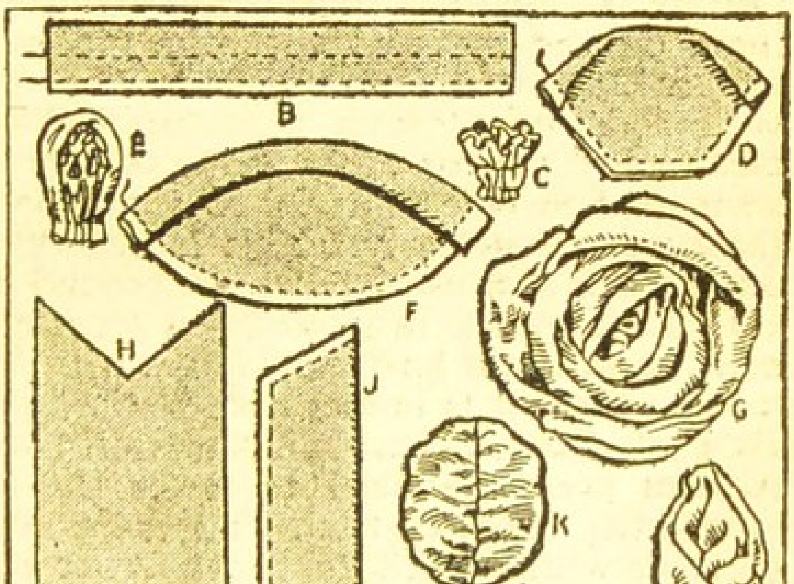
The large flowers should be rather paler than the small ones, and, if a rose or chrysanthemum design is chosen, make the undersides of the flowers a darker shade than the tops. For a chrysanthemum take a piece of thin embroidery ribbon about 9 in. long, thread one end through a needle with a very large eye, and pull up from the centre of the flower. Hold the ribbon flat with the left hand and put the needle down through the material at the tip of the petal. Use 2 or 3 shades of ribbon, making any petals that are underneath darker than the rest. Do not pull the ribbon too tight. Embroidery ribbons can be successfully used to work designs on tea-cosies, blotters and sachets. Beads may form centres to ribbon flowers, or French knots in silk may be worked for this purpose. Many designs for raffia work can be adapted for ribbon work.

RAISED RIBBON WORK. Sprays of flowers which can be made separately and then applied to trim cosies or sachets are not difficult to make with a little practice. Roses are effective flowers for this type of ribbon work, and details of making are illustrated. For the centre of a rose cut a strip of pink taffeta ribbon $1\frac{1}{2}$ in. by 7 in. Fold it in half lengthways and gather twice as shown in B. Draw up the two threads tightly and finish off. Roll up and stitch firmly (C). Next take an oblong $2\frac{1}{2}$ in. by 2 in. to make a petal. Fold it in half lengthways and slope off the edges to the fold, as shown in D, and gather round the raw edges, folding over each edge at the fold. Draw up the thread and fold this finished petal over the centre (E). The other petals should be each a little longer and wider (F). When all the petals are separately made, stitch them round the central ones and the rose is finished, as shown in G.

RIBBON WORK. Above. Spray of roses made of ribbon. Below. Diagrams for cutting out and sewing

The leaves are from green ribbon cut $1\frac{1}{2}$ in. wide by 2 in. Fold it in half lengthways and slope off the top (H). Gather down the point and the fold (J), then draw up, turn the ribbon right side out, and open up the leaf; flatten out, pleat the base into proper shape and stitch it down firmly (K).

The various pieces of the spray can be first sewn to a piece of muslin if liked or applied directly on to the article to be decorated. No stalk is visible in the completed spray illustrated, but one is easily made by taking a short length of string, twisting a narrow green ribbon round it, inserting a leaf and continuing to twist for the desired length. For a bud have an oblong (on the cross if the pink ribbon used is wide enough) $2\frac{1}{4}$ in. by 2 in. Fold it in half length ways and the corners to the centre (L). Pleat it twice each side so that the pleats meet in



the centre (M). Cut a piece of ribbon the same shape, slightly larger and fold round the first piece (N). Make a cup from the green ribbon 1 in. wide, cut as for the leaf (H), fold in turnings down the V-shaped end, fasten one point to one side of the bud and the other point to the other side. Wrap the cup over and twist ribbon below to make the stalk (O).

RICHELIEU WORK

Hints Regarding a Fascinating Form of Decoration

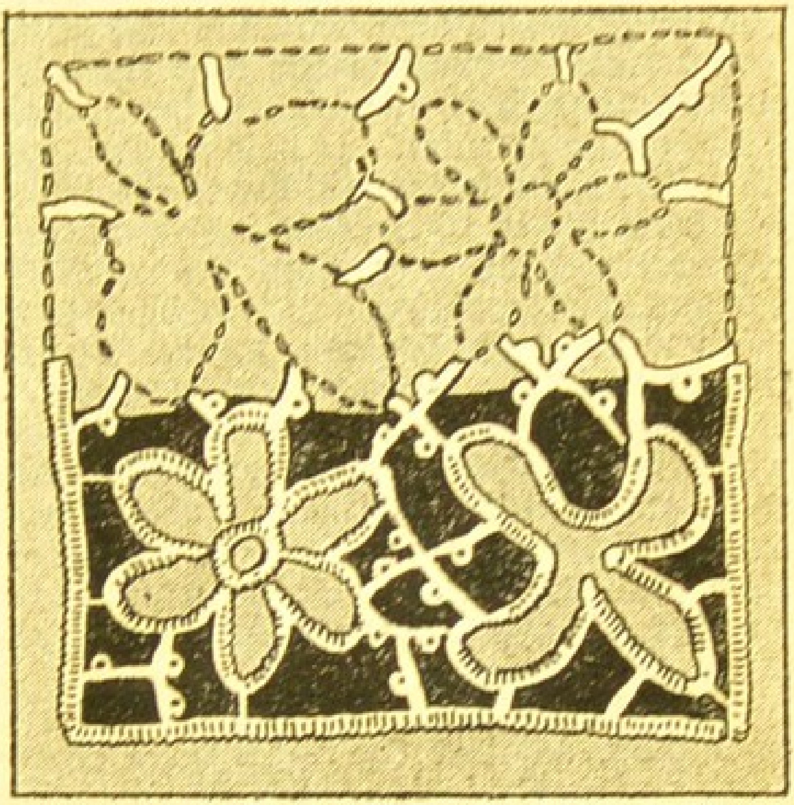
Useful information related to this work will be found under the headings Embroidery for Household Fabrics; Picot; Transfer; and the entries on the various types of stitch

This form of work is very effective when well carried out, and it is popular for use on house linen and also for dress and women's and children's underwear. It may be worked equally well on crêpe de Chine, silk or linen. Floral, geometrical and figure designs are employed as motifs.

The materials required are the ground material such as those mentioned above, embroidery cotton of loose twist, linen lace thread, or embroidery silk, according to the ground material. All these working threads are made in many sizes, and that which is used should correspond with the texture of the ground material. A firm thread is used for the outlining, while a softer twist may be employed for the bars and filling stitches. Ordinary long sewing needles are required and a pair of small embroidery scissors, very sharp, and with fine points, as the material has to be cut away right under the pearl edge. A transfer design is needed, suitable for this work. It should have bold patterns for the motifs, which are held together with worked bars. Those who can do freehand drawings can make their own designs and trace them on the material with the aid of carbon paper. In the design illustrated four small motifs are placed together and an outline drawn to form a square; this can be varied with a diamond, circle, or other shape to suit the purpose. Black has been used for the material so that the white stitchery should show up more clearly. This in reality would be ugly and the needlework always matches the ground material in colour.

Richelieu work in its original form consisted only of buttonholed motifs and buttonhole bars with bullion picots; but in its modern form it is mixed with Reticella work, hence the appearance of twisted bars and woven bars. Filling and veining stitches are introduced to make the motifs more interesting. Stem stitch, back stitch and satin stitch are the most used together with French knots for flower centres. After the design is transferred to the material work over all the outlines of motifs and the outside edge of the design with small running stitches, then proceed to work the bars. By the old method the outlines were buttonholed first and the bars laid as they were reached; but experience has proved that stronger work is the result of working all the bars first and passing a buttonhole-stitch through the end of each bar as the outline progresses.

WORKING THE PICOT BARS. The lower part of the illustration shows the outlined motifs and the connecting bars worked in various ways. To work a bar with bullion picot, secure the thread on the wrong side of the material and bring it up on the main outline of design; pass the needle under one of the stitches on a small motif, picking up a tiny piece of the material. Pass the needle back again under the stitch on outside of design, then back again under the stitch on the motif; there should now be three threads laid. Now buttonhole from right to left half way across this bar, placing the stitches close together.



RICHELIEU WORK. Linen embroidery consisting of motifs of conventional or original design joined by worked bars

When the centre of the bar is reached make a picot thus: Pass the needle up through the last buttonhole-stitch made, to about two-thirds of its length, holding the needle in place with the right thumb, and with the left hand twist the thread ten times over and round the needle, from right to left, pushing the twists towards the eye of the needle, but still keeping the right thumb on them. Draw the needle through with the left hand until the thread can be felt pulling under the thumb; then remove the latter and draw the needle through. Pass the needle up from below through the last buttonhole-stitch, draw through and continue buttonholing to the end of the bar.

A bullion picot often comes on the outside edge of a piece of work, when a Richelieu border forms the edge of a teacloth, for instance, and in this case the picot is worked on the outline of the design. When the needle is inserted in the last stitch the thread is passed under and round the needle from right to left; push the needle through the twists, pull up the thread so that the spiral forms a semicircle then continue to buttonhole the outline until the next picot occurs.

Where the space to be spanned is wide, cross-bars are used as seen in the centre of the illustration between the two motifs on the upper half of the design, and where a space is long, branched bars are worked as seen at the lower left-hand corner of the design. In order to work the cross-bars lay three threads obliquely across the space, fill one half with buttonhole-stitches and a picot in the centre; now lay three threads from the last buttonhole-stitch to the opposite corner of the space to make the third arm of the cross. Fill with buttonhole-stitches and a picot, and bring the needle up through the last stitch at the centre. Lay three more threads right opposite to form the fourth arm of the cross. Bring up the needle again through the centre of the bars and fill the remaining fourth arm, which is half of the first long one laid.

A branched bar has the first threads laid between one motif and another, half of which is buttonholed with a picot halfway if the space permits. If it is a short space, the picot is omitted. Then the threads are laid for the branch bar either to the outline of the design or to another motif, as the case may be; work this bar in the usual way, then the needle is passed under the first bar and the remaining half is worked to match.

TWISTED AND WOVEN BARS. Twisted bars have only one thread laid, the second is twisted two or more times round it according to the length of the bar. This should only be employed where strong linen thread is used for working or where the space to be spanned is quite short, as between points of petals and the outside line in the illustration. Woven bars have three threads laid, and the needle taken under and over each thread as in darning, always taking the working thread round the outside edge of the laid threads.

To work the main outlines buttonhole from left to right as in scalloping, so that the pearl edge comes on the outside of the motif and on the inside of the square outline seen in the illustration. When all the buttonholing is done the material has to be cut away under the pearl edge, taking care not to cut the bars. In the illustration the top half of the material is cut away and shows how the bars connect the motifs.

LADDER WORK BORDERS. On a linen of loose texture effective borders to Richelieu designs can be worked with buttonholed edges and bars under which the material is cut away.

Draw two threads about ½ in. apart. These will form two lines for the buttonholing, the pearl edge coming on the drawn thread line. Begin at the bottom left-hand corner and work upward, buttonholing the whole side, then turn the work so that the opposite edge or line will be at the left, and proceed to work upward as on the opposite side. When about ½ in. is done begin to lay a bar, the distance between the bars depending on the fineness of the material, and according to how much work it is desired to put into it. Pass the needle upward through the pearl edge of the buttonhole-stitch exactly opposite, now cross the ladder and pass the needle up through the pearl edge of the last buttonhole-stitch made on the second side of the ladder. Cross the ladder again and pass the needle up through the same stitch, on the opposite side. There are now three threads laid, and these should be buttonholed as shown, working under the threads only, not through the material, as this will be cut away afterwards. Continue buttonholing on the second side of the ladder for ½ in., or according to the space to be left, then work another rung. When all the work is finished cut away the material right under the pearl edge, taking care not to cut the stitch, and buttonhole the cut ends at the top and bottom of the ladder.

RIFFLER FILE. A riffler file is a double-ended file of peculiar formation, comprising a plain metal part, or bar, curved at either end, these ends being cut to form the teeth of the file. They are made in a wide variety of shapes and coarseness of cuts, and are invaluable when working hollow and rounded shapes in metal, fibre, or other material.

This type of file is used largely for cleaning up the corners and angles in chasings and engravings. It can be manipulated in odd corners in a manner that would be impossible with any other tool.

RIP SAW. This is a hand saw particularly adapted for cutting in the direction of the grain of wood. The teeth are specially shaped for that purpose, the front of them being vertical instead of sloping slightly backwards, as in the cross-cut saw. It facilitates the cutting of long lengths of timber, cutting rather faster and more freely than the ordinary saw.

RIVETS AND RIVETING

Practical Information for the Amateur Mechanic

The Metal worker should consult the articles Bent Iron Work; Repoussé Work. See also Punch

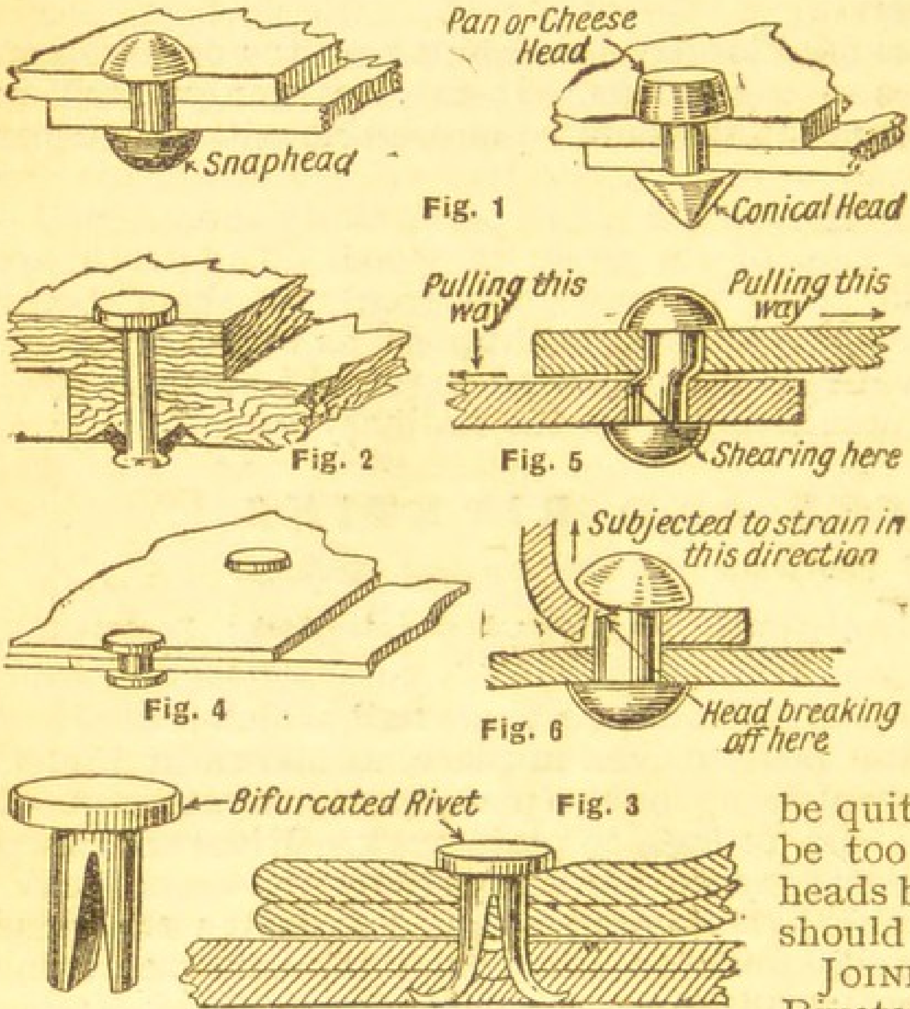
A rivet is a metal peg, resembling a short nail, which is clinched over at the ends after being driven in place, as shown at Fig. 1. It provides a permanent fixing for two plates or for the attachment of objects with thin ears, or lugs, to plate work. Rivets are used in many ways in other spheres than engineering and metal work. For example, soft metal rivets are employed to fasten the parts of leather and textile work together, and also for attaching metal fittings to bags and straps.

For use on wood, as in the planking of small boats, copper rivets or nails are employed with washers or burrs of the same material. The rivet is driven through the two planks, and the washer put on and closed up to the work. The superfluous projection is nipped off and the end riveted over the washer as in Fig. 2. The head of the rivet must be supported by a heavy hammer, or other suitable mass of metal.

When leather or a like material is being joined, it is necessary to provide rivets with heads of a large area and washers of a corresponding size. When a metal fitting is being riveted on to leather, it almost always takes the place of a washer. Bifurcated rivets used in leather work have large, flat heads and a shank divided into two prongs. When driven into leather of suitable thickness, and the job is resting on a metal surface, the prongs turn up, hook fashion, into the lower surface of the leather. The result is a good fixing, as will be seen by reference to Fig. 3.

When using a bifurcated rivet a suitable hole should be made in the parts and the rivet inserted. The work is then laid on a block of wood (end grain is best) with the prongs downward. The rivet is driven home, so that the prongs project, and the work levered up from the block, when the prongs can be prized apart and hammered over into the leather. The head of the rivet should rest on the vice or some other metal surface.

Large flat-headed rivets are used in joining thin metal sheets. They may be made of any material—aluminium, copper, tinned or plain iron—comparable with that for which the rivet is used. The generic term for this style of rivet is tinman's rivet (Fig. 4). Where the rivet is of a metal dissimilar to that of the plates being joined it should be the softer of the two. All rivets should be quite soft. If found to be too hard, so that the heads break off, the rivets should be annealed.

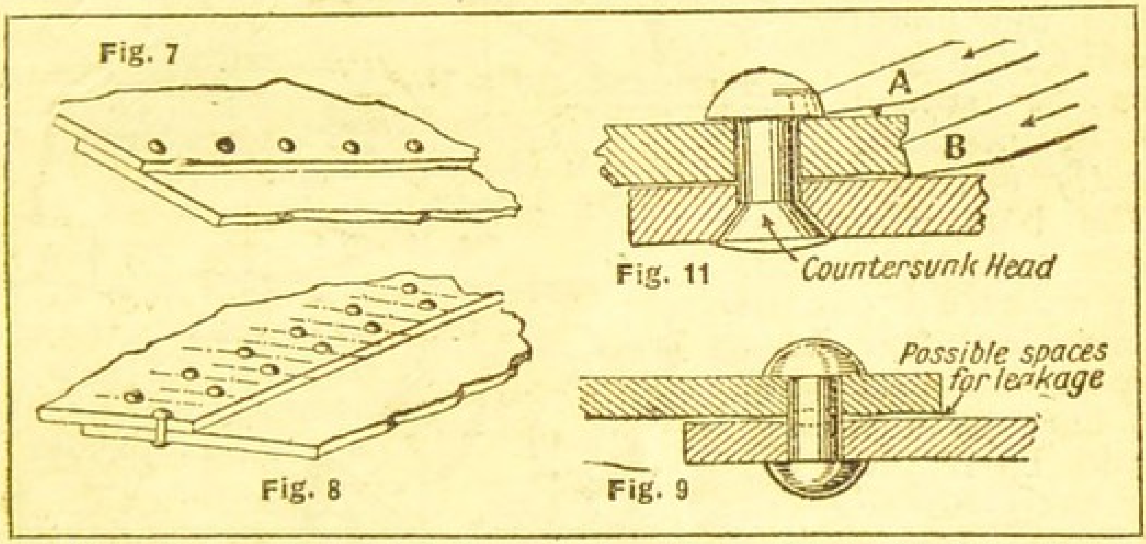


RIVET. Fig. 1. Three types of rivet head. **Fig. 2.** Rivet used with a washer for joining two planks. **Fig. 3.** Bifurcated rivet used in leather work. **Fig. 4.** Tinman's flat-head rivet. **Fig. 5.** Showing the tendency of metal plates to shear the rivet when the latter is not securely fastened. **Fig. 6.** Unusual strain on a rivet resulting in pulling off the head

JOINING METAL PLATES. Riveted joints in metal plates requiring to be secured to each other in the strongest possible manner should be made so that the rivets themselves are subjected only to a shearing stress. This means that the strain should be such that the two plates tend to cut the rivets in the same manner as the blades of a pair of scissors, as seen in Fig. 5. There should be little or no tendency to pull the head off the rivet, as is shown occurring in Fig. 6. For thin sheet metal work, rivets from $\frac{1}{16}$ in. to $\frac{3}{16}$ in. are commonly employed. The spacings may be from $\frac{1}{4}$ in. to 1 in. respectively.

Rivets in tanks and boilers subjected to pressure, and those used in steel structures, usually have a diameter equal to about twice the thickness of the plate. The spacing depends upon the kind of joint and the relative strengths. For a single riveted lap joint, as illustrated in Fig. 7, the spacing would be about five times the single-plate thickness. Rivets under $\frac{3}{8}$ in. in diameter are usually driven cold. A single riveted lap joint of good design has a tensional strength of only about 55 per cent of the solid plate. In a double-riveted joint, as at Fig 8, the proportionate strength may rise to 70 per cent. In no case can a riveted joint be made as strong as the original plate unless the plate is thickened.

CAULKING AND FULLERING. In larger work, that is to say, where plates of over $\frac{3}{16}$ in. are employed, the joints are made pressure tight against liquids and gases by caulking and fullering. Although the plates may be drawn closely together around the rivets, they may not touch each other between them, as indicated in Fig. 9. There may be small open spaces under the heads and



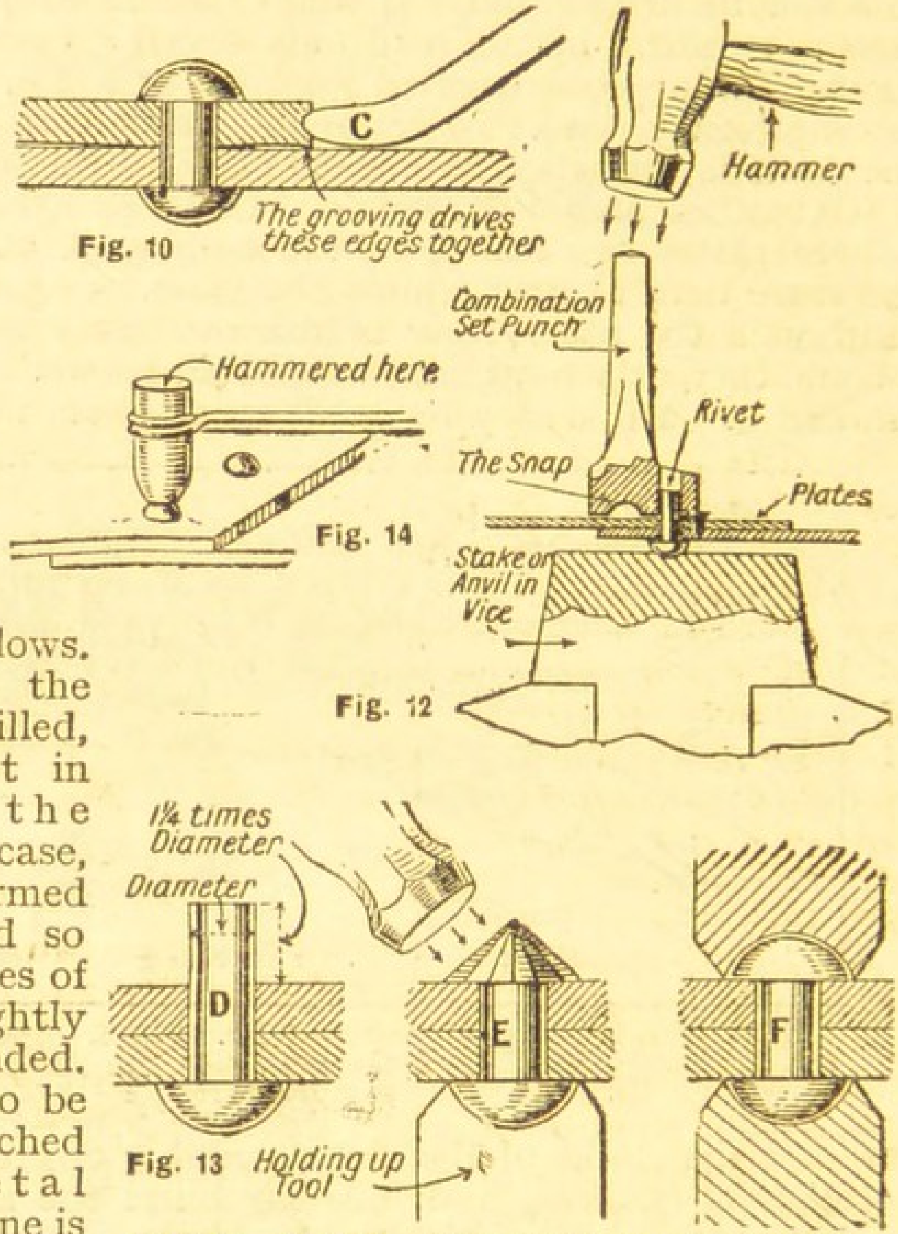
RIVET. Fig. 7. Single riveted lap joint. **Fig. 8.** Double riveted lap joint. **Fig. 9.** Possible space for leakage between two plates. **Fig. 11.** Caulking to prevent leakage

around the stalks of the rivets capable of creating a leak. The process of caulking and fullering burrs the metal over at these places. It is done by blunt chisels of various shapes, and requires skill and experience to be a success. Fig. 11 shows at A the edges of a rivet being caulked over ; at B, the plates of a single riveted lap joint are being similarly operated upon. The use of a fullering tool is shown at C in Fig. 10 (on next page). In a thin sheet metal object such caulking is impossible, and the same result may be accomplished by soldering, brazing, or welding.

FORMING THE SNAP HEAD. In order to pull together the plates of a riveted joint in sheet metal preparatory to hammering the rivet over, a hollow set punch may be used. Fig. 12 shows a combination set punch having in addition a recess or snap for forming cup or snap-headed rivets. The holding-up tool used beneath may also be provided with a sinking to suit the shape of the rivet being driven, and act as a snap in addition.

To form a snap head, the projection of the shank of the rivet before it is hammered over should be about 1¼ times its diameter, as shown at D, Fig. 13. The final neat rounded shape is obtained by the use of the rivet snap, as at F, after the head has been formed roughly into a conical shape, as shown at E. The blows, in the first part of the operation, should be delivered at an angle, following around the rivet with a hammer of suitable weight. It should not be hit directly end on in the centre. The only exception to this method would be in the case of a countersunk rivet, as in Fig. 11, where the metal would for the most part be spread out by means of directly central blows.

The holes in the plates may be drilled, or punched out in a machine for the purpose. In either case, the burr thus formed should be removed so that the sharp edges of the holes are slightly chamfered, or rounded. A drilled hole is to be preferred to a punched one, as the metal around a punched one is weakened in the operation, and the strength of the plates is thus locally impaired.



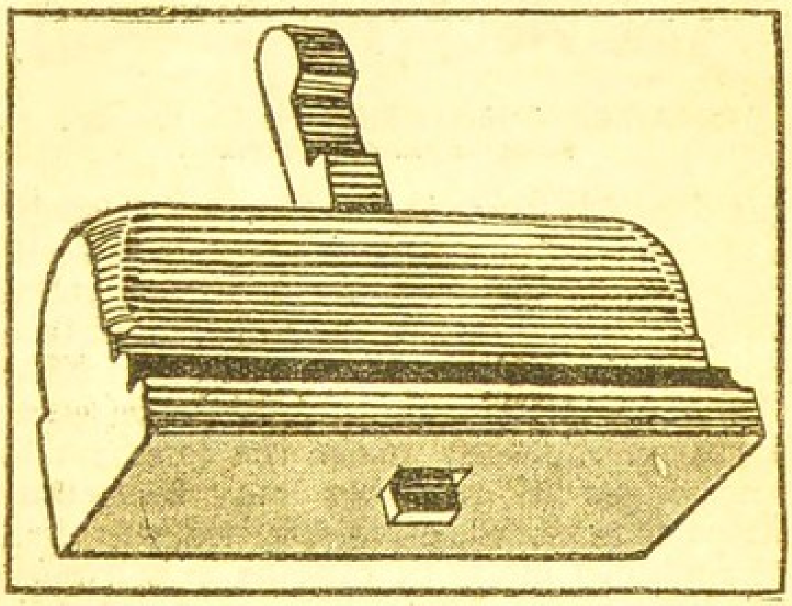
RIVET. Fig. 10. Showing the use of a fullering tool. **Fig. 12.** Driving the plates together by means of a hollow punch. **Fig. 13.** Three stages in forming a snap head. **Fig. 14.** Another type of punch used in riveting

Rivets for cold driving should always be thoroughly annealed before use. Iron rivets are to be preferred for this purpose, as the heads of steel rivets are apt to crystallize when hammered over cold. Copper rivets used in a pressure-tight joint, to be soldered subsequently to riveting, should be tinned before use. This will ensure their taking to the solder. First they should be cleaned by dipping in nitric acid. The use of countersunk or flush rivets should be avoided wherever it is possible, especially in cases where the rivets are subjected to the slightest tensional stress. A pan head or snap (cup) headed rivet is much to be preferred. Rivets should be purchased with one head already formed. Plain wire should only be employed where both heads are of the countersunk form and where the rivet is a long one.

ROPE. Although this name is often given to cord over $\frac{1}{4}$ in. diameter rope is properly cordage over 1 in. diameter. It is made with threads of hemp and other fibre, such as flax, twisted together with the aid of a wheel used by rope-makers. For domestic purposes rope is used for lifts and lifting apparatus, such as blocks and tackle, and for various other purposes. It is liable to deterioration through damp, and for outdoor use it should therefore be protected from rain.

Generally rope wears out through becoming frayed, therefore all rope used for lifting purposes should be examined frequently, and all sharp corners liable to come into contact with the rope should be rounded off or otherwise protected. New hoisting rope should be oiled soon after it is put to work, using the best sweet oil. The process should be repeated each month for the first six months, and to preserve the rope to an almost indefinite period all that is necessary is an occasional rub with an oily rag.

ROSEWOOD. This is a fancy hardwood of a rich dark colour, red or brown, with wavy streaks that are almost black. Formerly it was much used for pianos and cabinets, and as a veneer on plainer woods. To-day it is used to a slight extent for pianos and also for handles to carving tools and to the squares and levels used by woodworkers. It takes a good polish, but, as it is rather oily, glue is unable to get a good hold on it. One reason for its decline in popularity is that it has a tendency, even when well polished, to develop minute cracks in the pores of the wood.



ROUTER PLANE. Wood carver's router, with wooden stock, the cutting iron being secured by a wedge
Courtesy of R. Melhuish, Ltd.

The finest rosewood is the Brazilian variety. In character this is of a heavy, dense nature, rather coarse and open in the grain. Indian rosewood, known also as blackwood, has the same general characteristics as the Brazilian.

ROUTER PLANE. The router is used for inlay work or for finishing the bottoms of recesses. A typical pattern is made of malleable iron, not unlike a spokeshave in appearance. It comprises a working face through which a cutter projects, the amount of projection governing the depth of the recess. The carver's router has a hardwood block through which the iron, or cutter, projects, and is fixed in position by means of a hardwood wedge. Various widths of cutter may be used. The tool is a combination of chisel and plane. It is worked forward and backward and in various directions until a flat surface has been obtained on the bottom of the recess.

A modification of the router is used for cutting reeds and mouldings in positions remote from the edge of the timber, or for similar purposes in curved work. Some routers are provided with adjustable fences so that grooves may be cut in the work parallel to the edge. *See* Plane.

RUCHING. The trimming, known as ruching, consists of a strip of material, with a gathering thread run down the middle, from end to end, and sewn along the gathering to the article it is to trim. Ruchings may also be pleated or boxpleated.

The strips of material for gathered ruchings are nearly always cut on the cross of the grain, so that their edges can be pulled out with the fingers into flutes, to emphasize the frill. Strips for pleated or boxpleated ruches are cut on the straight.

RUCHING. Gathered taffeta ruche, the edge being frayed with a pin

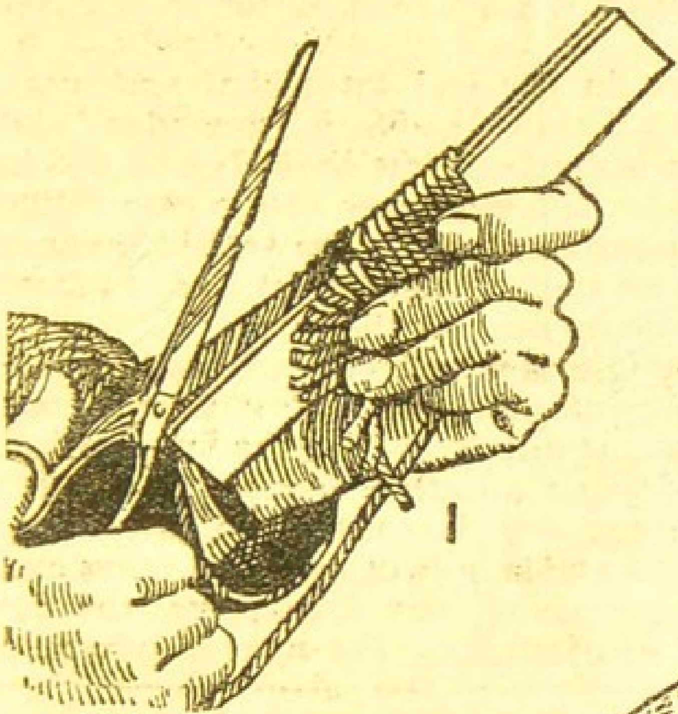
Ruchings may be of any width, ranging from very narrow to very wide. The length the strips should be cut depends upon the nature of the ruche. For a gathered ruche a strip measuring half as long again as it is when finished should be allowed. That is, if a strip of gathered ruching about 20 in. long is wanted, a strip of 30 in. must be allowed. For pleated or boxpleated designs, strips three times the length are required.

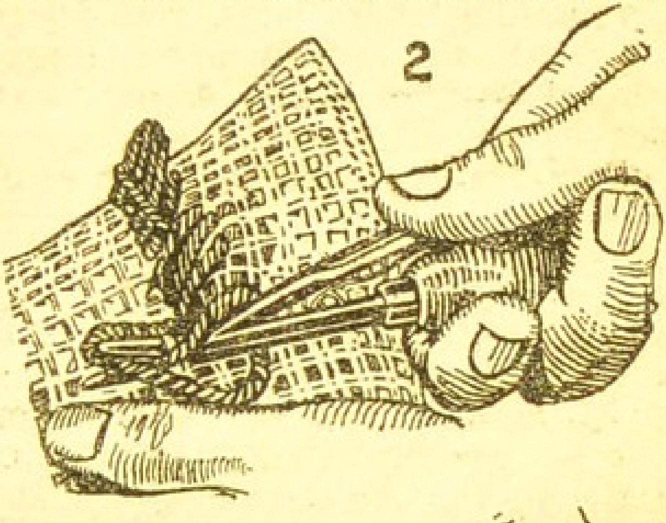
When joining crossway strips to gain the length required for gathered ruchings, make the joins on the straight of the grain. The edges of ruchings may be hemmed, bound with narrow strips of material, picot-stitched, or rolled. A finish for the edges of ruchings made of taffetas is a fringe, this being achieved by fraying out the edges with a pin. Another finish is pinking, as it is called.

To make a gathered ruche, cut and join the strips wanted, and neaten the edges; then fold it up into halves, quarters, and further subdivisions, if possible, and mark each fold with a pin or chalk line. Fold the article it is to trim into an exactly similar number of sections and mark to match. Next run a gathering down the middle of the strip, draw it up slightly, and pin it to the article so that the marks correspond, thus making certain of the fullness being distributed evenly; then run the ruche to the article along the middle. If desired, a line of fancy stitchery can be used to secure the ruche.

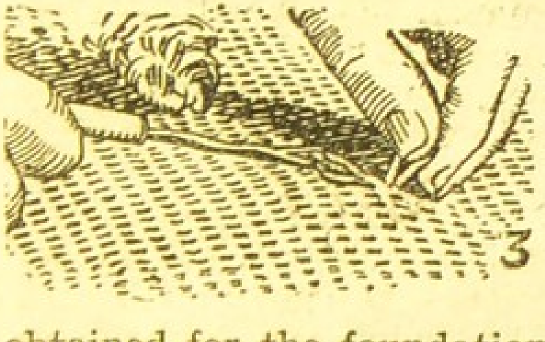
To make pleated or boxpleated ruchings, cut, join, and neaten the strips; then set them in pleats, running a tacking along top and bottom edges as they are formed, and well press them afterwards. Run a cotton through the middle, to keep the pleats permanently in position, and sew them to the pelmet, cushion cover, garment, etc., along the central line.

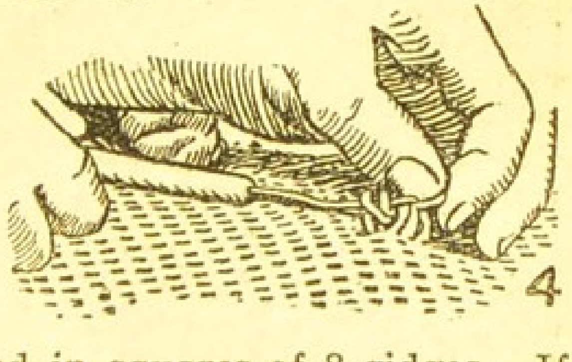
RUG, Making a. With the increase in number not only of smaller rooms but also of parquet and wood block floors, rugs are in greater demand than ever. There are also the hygienic and labour saving merits of rugs to be considered, which make them suitable in place of the all over carpet, which cannot be removed easily. There are various methods of making wool rugs, but the general one is to hook the wool through the canvas or hessian to give a series of little tufts so closely worked together that they form a pile like that of a carpet. The canvas takes the place of the warp and weft threads of the Oriental rug. There is special canvas to be





RUG. Fig 1. The wool is cut in short uniform lengths by means of a grooved gauge. **Fig. 2.** Knot-making tool in use. **Fig. 3.** Using regulation hook; to knot the wool on the canvas it is first doubed and drawn through under a ridge. **Fig. 4.** The hook is pushed through the loop, so that the wool lies behind the latch, and the two loose ends are hooked





obtained for the foundation marked in squares of 8 ridges. If the wool is of fine quality like the 6-ply Turkey rug wool, it is worked into every ridge, but if of the coarser 2-ply cable wool it is only knotted into every alternate one.

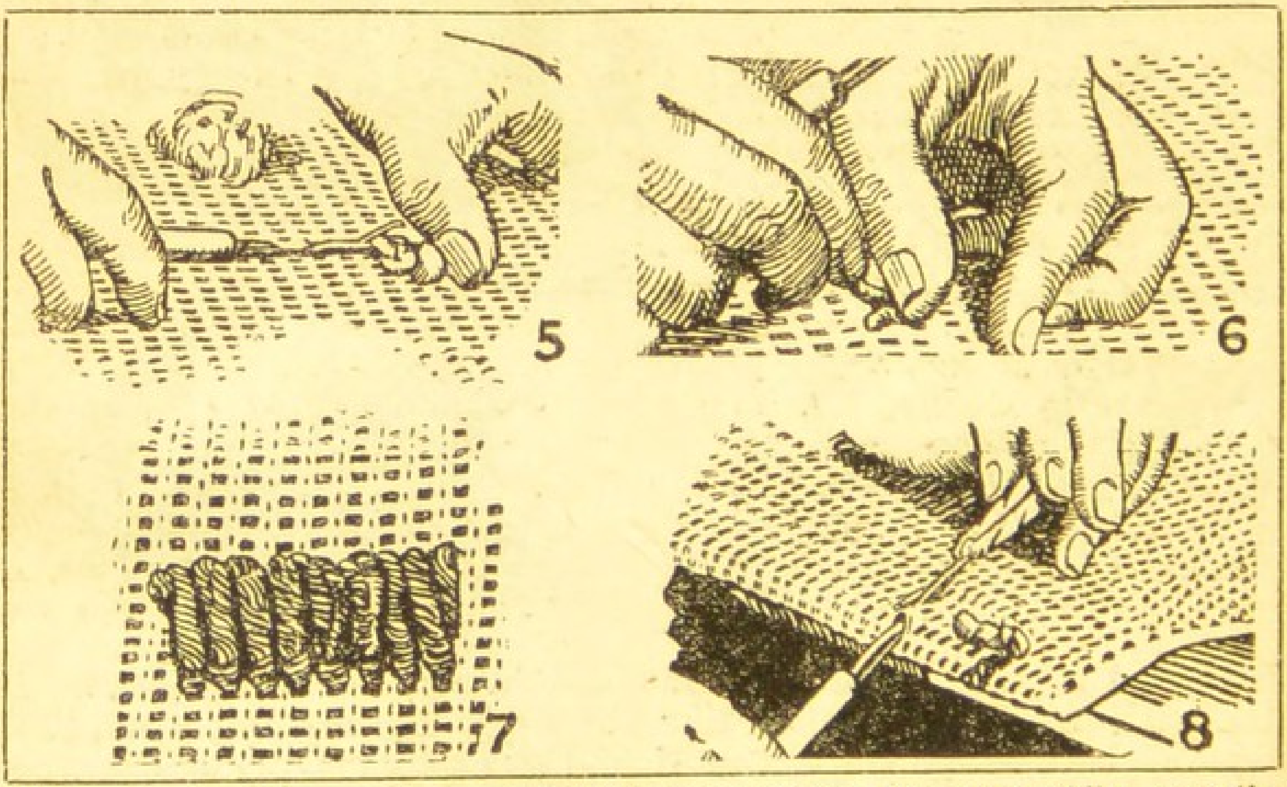
By means of a gauge, the wool is cut into little equal pieces, each about 2 in. long (Fig. 1) ready to be hooked into the canvas.

To make the actual knot, a coarse crochet hook will do, though there are several patent instruments on the market. One is like an ordinary crochet hook with a movable latch, which prevents the hook from catching when drawn back through the canvas. Another is like a pair of pliers which by a simple device knots the wool on the canvas in one operation.

Chart designs are available from the various wool shops marked in squares to correspond exactly with the squares on the canvas. This makes the working out of an intricate design very simple indeed. But simpler still for the plainer designs is the canvas which has been stencilled with a pattern. Line the rug when finished with black hessian which will make it softer to the feet and more durable in wear.

When beginning a rug, turn in the end for $1\frac{1}{2}$ in. and work through the two thicknesses. This will give a firm edge, and when the other end of the rug is reached that should be turned in in the same way. (*See* Fig. 8.) The selvedges at the side of the canvas are strong enough without turnings. The easiest manner to work is to place the canvas on the table and knot in rows from left to right, the finished part being nearest the worker.

Patterns may be inspired by Oriental motives such as the pine cone design in Plate 58, or they may be simply geometrical and worked in dark brown, havana brown, and three shades of beige, In making these rugs, the designs adopted should always be conventional even where figures are introduced into nursery rugs. Squares, circles, triangles, and simple designs of flowers and leaves are all suitable for rug making, but the art of the designer lies in combining them successfully. By careful planning



RUG. Fig. 5. These ends are pulled through the loop, the latter sliding over the latch. **Fig. 6.** The knot is then pulled tight and a similar tuft made in the next ridge, and so on. **Fig. 7.** A row of eight tufts. **Fig. 8.** To make a neat selvedge an inch of canvas should be turned up on to the face of the work in the general layout, artistic and highly pleasing results are possible.

The particular kind of wool used is a matter for individual taste. What is known as cable wool is a curly 2-ply yarn. It is more lustrous than Turkey rug wool, and produces a rug of a softer and longer pile. The pile of Turkey wool, however, is wonderfully firm.

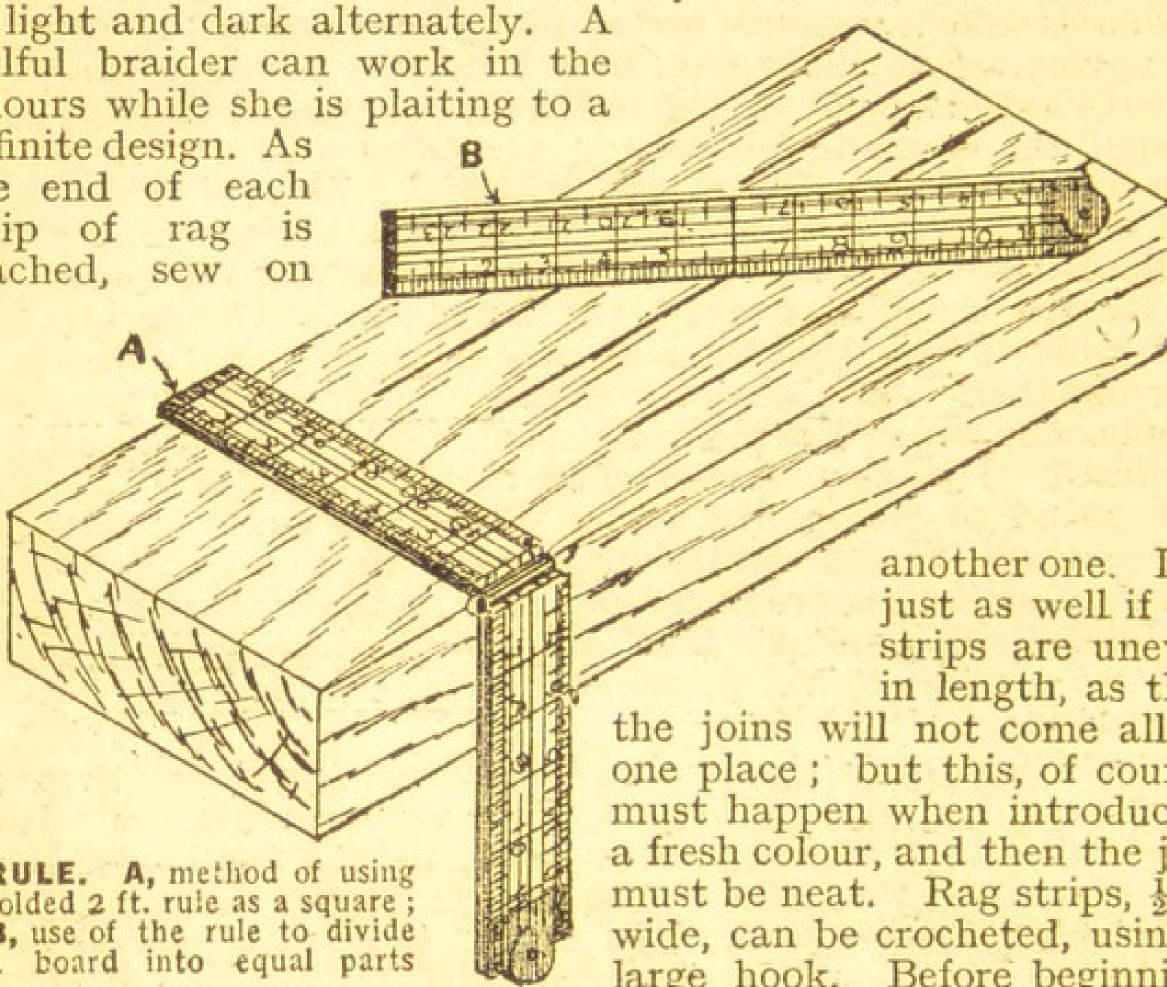
A most ingenious way of making a pile rug on hessian is by the Kwikumak method. The instrument, which is fitted into a wooden handle, is a simple hollow metal tube pointed at the end and having a hole about 1 in. from the end. Through this hole the wool is threaded. As the instrument is pushed through and through the hessian, following a stencilled pattern, it leaves loops on the other side of the material. These loops, when they are cut evenly with the scissors, form a close pile.

RAG RUGS. There are two methods of making rag rugs. In one the rag is pulled through the canvas with a large crochet hook, while in the other the rags may be braided or twisted and sewn together. All kinds of rags are suitable for this purpose. For a hooked rug a piece of strong open-meshed hessian or sacking is required. Having measured off the required size, hem or crochet it all round to give a firm edge. Stencil or draw in chalk a pattern upon it; an old-fashioned posy or wreath of flowers worked in bright colours in the centre suits these old world rugs. Various grotesque animals and birds can be also worked in the brighter rags, leaving the more nondescript coloured ones for the background.

For a hooked rug, the rags need to be about ½ in. in width more or less, according to the thickness of the various materials. It is not essential to sew the strips together, though the longer they are the quicker they can be hooked through. Use a coarse crochet hook for the work; the canvas is often stretched in a frame, but it is easy to work without. Place the pile of strips under the canvas either in the lap or under the table. Hook the strip of rag through the canvas to form a loop about ½ in. in length. Then make another loop close by, and continue until the canvas is covered. The loops are then clipped to give an even, mossy surface. A hooked rug should be lined with hessian to give it greater strength. To braid a rug it is necessary to cut the rags about 3 in. wide. If they are made narrower than this it is rather difficult to turn in the edges as neatly as is necessary for tidy work. The edge should be turned in about ½ in., and the strip folded over in half lengthways, so that the raw frayable edges are inside. This may be done while braiding, but if the material is stiff and wiry it is better to press it into its proper folds. Strips may be joined together to give lengths of about 1½ yards each, and are best folded and pressed beforehand, and wound on to pieces of cardboard to keep them in good shape.

Plait the strips closely and evenly, just as hair is plaited, with 3 strands. The ends must be sewn together and pinned on to something firm. As soon as 1 ft. or more of the plaiting is finished the sewing together is begun. This is done with strong, waxed thread. When making a circular rug, the braid is then wound round and round flatly, edge to edge, and the needle passed through and through in close, invisible stitches. A little practice is required to make the braid flat. If too tightly wound it will buckle, but it must not be too loosely done, or will look rough.

To make an oval rug, begin with a long-shaped centre, and wind round it. A dark centre usually looks well with outer rings of light and dark alternately. A skilful braider can work in the colours while she is plaiting to a definite design. As the end of each strip of rag is reached, sew on another one. It is just as well if the strips are uneven in length, as then the joins will not come all in one place; but this, of course, must happen when introducing a fresh colour, and then the join must be neat. Rag strips, $\frac{1}{2}$ in. wide, can be crocheted, using a large hook. Before beginning, join the strips together and wind into a ball. Begin by making 5 chain, join into a circle and then crochet round, increasing in order to make work lie flat.



RULE. **A,** method of using folded 2 ft. rule as a square; **B,** use of the rule to divide a board into equal parts

RULE, for Measuring. Of the varieties of rule in ordinary use some are of wood and others are made of steel and other materials. Those made of wood range in size from the 6 in. rule supplied with small sets of drawing instruments to the 6 ft. lath used by the glazier. For amateur use the most convenient is the 4-fold 2 ft. rule. This is marked on both sides in opposite directions, and is usually divided into $\frac{1}{8}$ths and $\frac{1}{16}$ths.

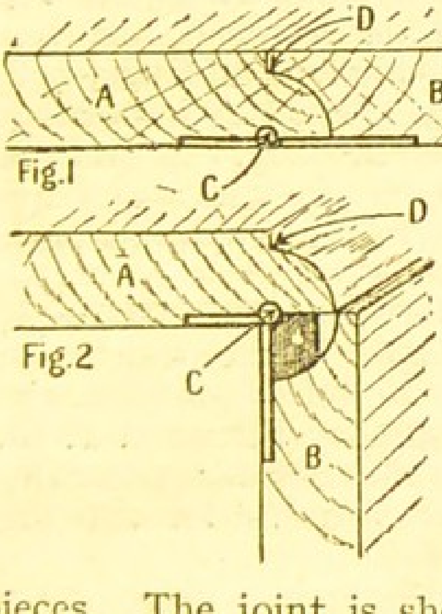
In making accurate measurements with a wooden rule, the edge should be used so that the marks can be transferred direct, and when several measurements are required on the surface of a board, they should be added together. For example, if distances of 2 in., then $\frac{5}{8}$ in., then 1 in. and $\frac{5}{8}$ in. are required, the method is to mark off 2 in. first from the edge next $2\frac{5}{8}$ in., then $3\frac{5}{8}$ in., and finally $4\frac{1}{4}$ in. Some rules are fitted with a brass slide.

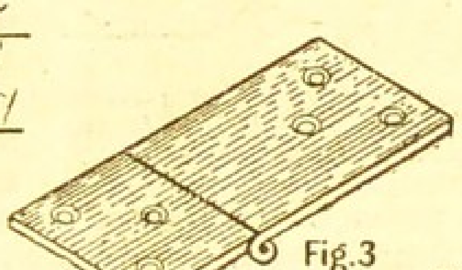
The 4-fold rule can be employed as a square by folding it in the centre and the two halves together at the knuckle joint between 5 in. and 7 in. as illustrated. In dividing wide boards into equal parts, the quickest method is to lay the rule diagonally across the wood so that opposite corners are touching. For example, supposing the board to be 10$\frac{3}{4}$ in., and it is required to divide it into 4 equal parts, the pencil should be placed at 3 in., 6 in., and 9 in., and lines drawn through these points parallel with one edge, *see* illustration. The rule is useful in the latter operation, as it can be held between the fingers of the left hand, the pencil placed on the point, the brass tip of the ruler placed against it, and, with the fingers of the left hand acting as a guide, both ruler and pencil can be drawn down the wood. This is called lining with rule and pencil.

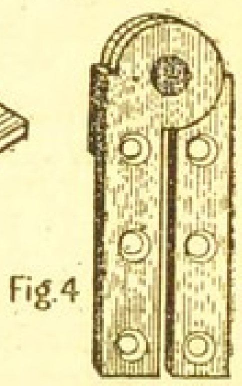
The engineer's steel rule is obtainable without a joint and engine divided into 12 in., with the usual sub-divisions; the rule is also made as a 2-fold 2 ft., a 1 ft. 2-fold, and a 1 ft. 4-fold. The steel rule is essential for accurate metal workings, the first-mentioned size being the most suitable.

Steel rules should be rubbed occasionally with an oily rag, as perspiration from the hands and dampness will soon make them rusty.

RULE JOINT. Used for tables and drop leaves, the rule joint is a method of hingeing two pieces of wood together so that a neat, closed joint is shown when the leaf is down. It is better than the square joint, which shows a space between the two hinged





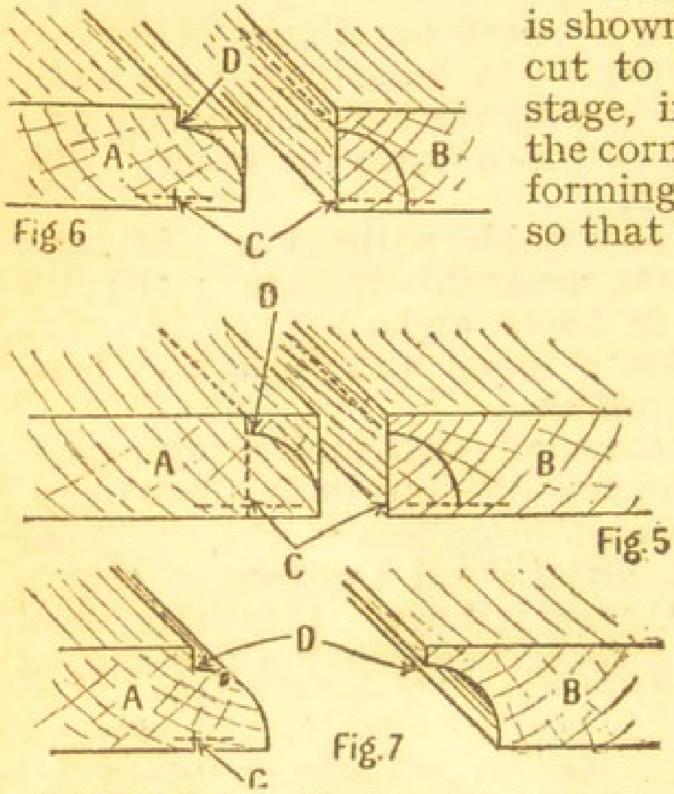


RULE JOINT for the drop-leaf of a table. **Fig. 1.** Sectional view of rule joint with leaf up. **Fig. 2.** Same with leaf down. **Fig. 3.** Detail of the table hinge. **Fig. 4.** Rule joint hinge for use with a flap folding flat over itself

pieces. The joint is shown in Fig. 1 with the leaf up and in Fig. 2 with it down; A is the fixed top, B the leaf, C the centre pin of hinge, and D the commencing point of the curve of the joint. It will be seen in Fig. 2 that a semi-circle is formed when the leaf is down, the centre being at C, and that this necessitates the hinge being let into the wood. The hinge (Fig. 3) is specially made for rule joints, and is known as the table hinge; it is similar to a back flap, but as it is attached with the knuckle in the wood, the screw holes are countersunk on the opposite side. Hinges are made in sizes from 1 in. to 1$\frac{1}{2}$ in., 1$\frac{3}{8}$ in. and 2 in.

The table hinge should not be confused with the rule joint hinge shown in Fig. 4, which is used for another purpose. The method of marking out is shown in Fig. 5; the two pieces of wood should be the same thickness, and the gauge line at C should be the depth of the hinge. The distance of the centre C from the end of the wood should be about $\frac{3}{4}$ of the thickness of the wood. Special planes are made to form the joints, but the latter can be easily cut with ordinary rounds and hollows.

The first stage in working the round is shown in Fig. 6, a rebate being cleanly cut to the level of D. The second stage, in Fig. 7, consists of rounding the corner to a true quadrant, and then forming the hollow in the opposite piece so that the edge at the top equals that at D and the curve is the exact opposite to the round. The two parts are placed together and the slots for the hinges marked out and cut. The short part of the hinge is on the side with the round and the pin of the knuckle is exactly under the top at D. The work can be polished in the ordinary way before the hinges are attached, but they should have been fitted previously. The rule joint hinge shown in Fig. 4 can be employed for narrow flaps, the edges of wood being shaped as above, but it is more suitable for hingeing flaps which are to fold over flat.



RULE JOINT for the drop leaf of a table. **Figs. 5-7.** Details of construction of the rule joint shown in Fig. 1

RULER. The two words rule and ruler are often confused; the former relates to measuring and the latter to the drawing of lines. Although the rule can be used for the latter purpose, the jointed rules are not convenient. The ordinary boxwood 12 in. rule serves the double purpose; but the round ruler, generally made of ebony and about 1 in. in diameter, is useful for drawing parallel lines as well.

RUNNER, in Woodwork. In chests of drawers or most pieces of cabinet construction, runners are fitted to rest the drawers upon. Usually they are tenoned into the framework.

RUNNING, in Needlework. This is the simplest stitch, and the first to be taught in needlework. The needle is passed in and out of the material at regular intervals, taking up 3 or 4 threads at a time in a horizontal line. If the fabric is sufficiently soft and thin, several stitches are taken on the needle at once before the thread is drawn out. This stitch is used for plain seams and for making gathers.

RUSH WORK: A USEFUL HANDICRAFT

With Directions for Seating and Repairing Chairs and Stools, and for Weaving a Basket

For information on related subjects the reader is referred to the entries Basket Making; Cane; Osier; Raffia; Wicker Work, etc.

When dried the rush is used as a chair seating, for making baskets and mats, and more rarely as a floor covering. It provides a strong, soft, comfortable, and inexpensive seat, and has the advantage of being easily worked.

Two varieties are commonly used, ordinary rush, known as green, but more of a brownish-green in colour, and salt rush, known as golden rush, and of a yellow colour; the latter is considered to be the better quality for general work. The rushes should be gathered in the late summer and carefully dried; they require no other preparation, as the drying leaves them in the form of fibre. They are obtainable in large bundles in lengths up to 6 ft., and after dipping them in water and leaving them for a few hours they are ready for use.

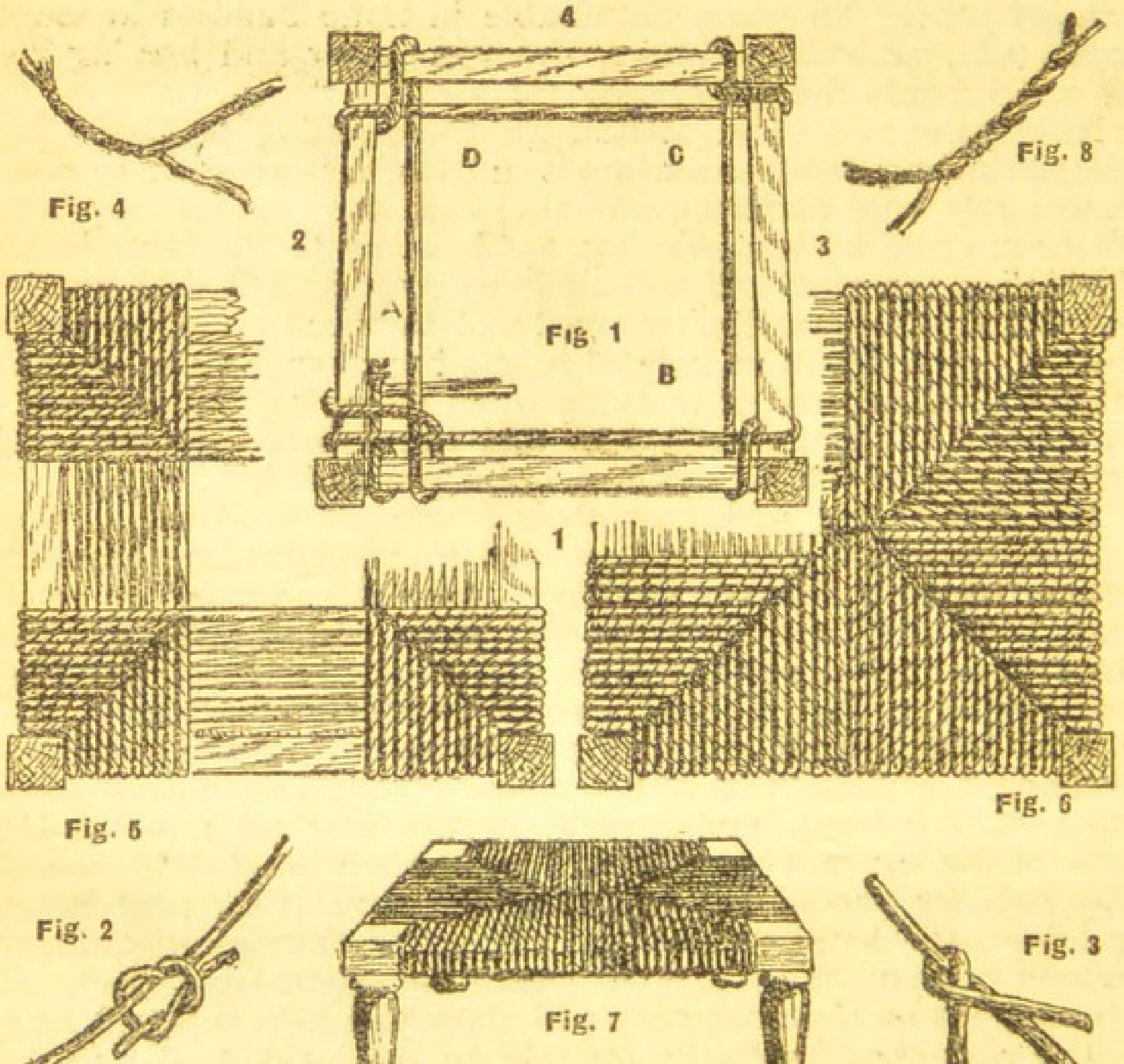
Reseating a Chair. Although the framing of chairs is of special design when the seating is of rush, it is possible to re-seat almost any kind of frame provided that the corners, which will not be covered by the weaving, are built up to the same level as the rest of the seat. If a chair is to be re-seated with rush, all the old material must be removed and the framework thoroughly cleaned; but it will be helpful to the beginner if he or she notes carefully the method of weaving when removing the old rush, to see where the rushes are twisted and where they are used singly, and also where and how extra lengths are added.

The rails of the rush seat chair frame are mortised in about ¼ in. below the top of the legs, and a corresponding amount is left on the outsides, but the inner sides of the rails are usually flush with the inner faces of the legs. Begin with one long, stout fibre and secure the thick end to the inside of the framework as in A, Fig. 1, using a stout tack or a clout nail. Bring it over to the front rail, quite close to the raised corner, and commence to twist from left to right. Carry the twisted portion down on the front, underneath the rail marked 1, around the back of the leg, and bring it up over the left-hand rail marked 2. The twisting should be continued for about 1 in. past the rail and then the length should be carried to the opposite side and twisted again to carry it over the right-hand rail. The illustrations on the next page will show you how this is done.

The rush should now be brought to the inside under the rail, over the first twisted strand on to the front rail, and carried underneath it, as at B. Next carry it untwisted to the opposite corner at C, alongside the right-hand rail marked 3, then take it over the back of the rail marked 4. Bring it up inside, carry it over rail 3 and under it right across to rail 2 at the corner at D.

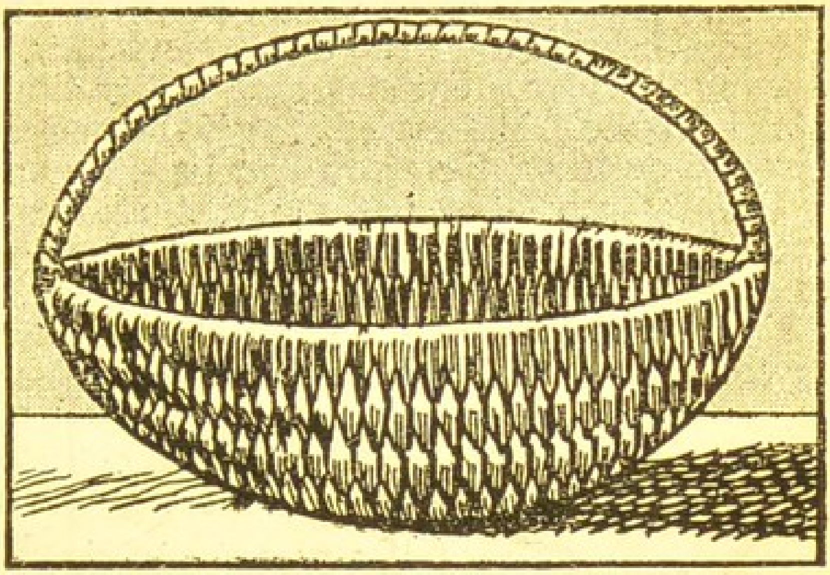
The length is next carried under rail 2 over the twisted strand and rail 4, and underneath again to the front rail. As the lengths of rush are taken round the frame it is necessary to add new lengths continually. The strongest method of joining two lengths of rush is shown in Fig. 2, and is usually known as the reef knot.

The method generally employed by the professional, as in Fig. 3, is quick and simple. After a little practice the twisting will be easily done with the right hand alone, but the direction of the twist from left to right should not be overlooked, and the twist should not be allowed to get slack. When the single rush is twisted, it gives a fine strand, and it is usual to twist two lengths of rush together at the same time, to produce a thicker strand, as at Fig. 4. This will not be found difficult after a start has been made, but care should be taken to keep the twisted strand an even thickness.



RUSH WORK. Fig. 1. How weaving is begun. **Fig. 2.** Reef knot for joining lengths of rush. **Fig. 3.** Professional knot. **Fig. 4.** Two lengths twisted to form a strand. **Figs. 5** and **6.** Stages in weaving. **Fig. 7.** Small rush-seated stool. **Fig. 8.** Two-colour twist

When the weaving has been continued for a few complete rounds (Fig. 5), it will be seen that a pocket is formed between the upper and lower strands. This must be kept well stuffed with waste or broken rushes; it helps to keep the strands together and give a fullness to the seat. Continue with the same order as indicated in Fig. 1 until the centre of the chair is reached (Fig. 6), keeping the pockets between the rushes neatly packed so as to give a sweep to each of the sections. Usually a chair is narrower at the back than in front, and the way to bring the sections to an even centre is to have a finer twist at back to make up difference in lengths of the two rails.


RUSH WORK. Fig. 9. Combined with cane, rushes can be woven into a basket with twisted handle

When the corners of the sections do not come to a point in the centre of the seat, the remainder of the work can be done by carrying the strands over one rail and under the next alternately in the form of a figure 8. This method fills up the space effectively and is particularly useful when dealing with rectangular frames. The twisting of the rush as the work proceeds has the effect of bringing the points of the twist to the inner side of each corner; this effect should be continued when filling up straight portions.

A Rush Stool. The easiest piece of work the beginner can have to practise on is a small stool (Fig. 7). This can be moved round as the work progresses more easily than a chair, and the frame is usually rectangular. An effective method of seating is to use two colours, the ordinary brownish-green and the golden salt rush, twisted together. The alternation of colour (Fig. 8), is very effective.

Cleaning Rush Chairs. To renovate rush-seated chairs that have become dirty with age or use, but are otherwise in good condition, the whole of the framework and seating should be scrubbed with warm soapsuds to which a little washing soda has been added. When as clean as possible, the work should be thoroughly rinsed and allowed to dry slowly. The woodwork should be rubbed with an oily rag. It will not be possible to restore the rush to its original freshness of colour, but the seating can be stained with an aniline dye. The method is to dissolve $\frac{1}{4}$ oz. green aniline dye in 1 pint hot water, then add $\frac{1}{4}$ gill strong vinegar. Apply the stain with a brush, giving the work two or three coats, according to the depth of the colour required. When the stain is quite dry, make a size by dissolving ½ oz. glue in 1 pint hot water and apply this while still hot to the whole of the stained surface.

Rush seats that have a few broken strands need not be re-seated if the rest of the work is in good condition. The method of repairing is to pull the broken strands through to the underneath, and to join on a new length to the corresponding straight length. The new piece should be twisted and pulled through to the top, carried over the frame, and then tied with a loop after passing it under a few strands. There is a limit to which repairs of this kind can be carried, but if the material is not very old and has not perished the work can be done with success.

Usually the front edges of the seating wear away quickest, and if many of the strands have given way it will be better to re-seat the whole.

RUSH FOR BASKETS. Rush is used in making baskets, bags, and in other small ways. It is often combined with cane to produce such useful articles as the basket illustrated in Fig. 9. It is worked in its natural form and also twisted and plaited. Examples of plaiting are shown in Figs. 10-14.

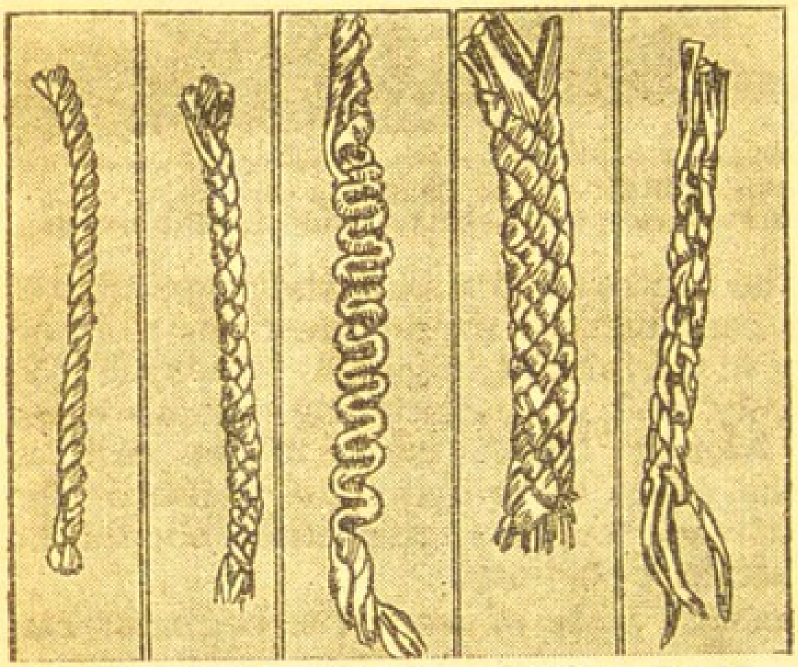


Fig. 10 Fig. 11 Fig. 12 Fig. 13 Fig. 14

RUSH WORK. **Fig. 10.** Simple twist. **Fig. 11.** Three-way plait. **Fig. 12.** Plaited braid. **Fig. 13.** Five-way plait. **Fig. 14.** Rattle twist

The simple twist at Fig. 10 is done with two rushes, as follows: Tie the thick ends together and secure them to a hook in the wall or over a convenient nail. Hold one rush in each hand and twist outward, then take the right-hand rush over the left one, at the same time bringing the latter under the right one. The rushes are transferred to the opposite hands and the movements repeated, inserting a new rush when required.

A double twist is accomplished by first making 2 simple twists as above, and tying them together and treating them as single rushes, but the twisting should be in the opposite direction, from left to right; this prevents the twist curling.

The 3-way plait at Fig. 11 is commenced with 3 rushes tied together and held in the left hand, using the thumb and fingers to keep the plait even. The right hand is used to do the plaiting, each length of rush being brought from the back over towards the centre. New lengths are placed on the inside of a right-hand length, and the 2 lengths plaited together, leaving the end of the old one underneath when finished with.

The plaited braid at Fig. 12 is particularly effective; it is formed by first plaiting 3 rushes as at Fig. 11 for 6 in., then one of the lengths is held firmly in the left hand while the right hand is used to push up the plait to reduce its length to about 2 in. Note the length which was held tight, so that when another 6 in. of plait is done, the same length can be held while the other two are pushed up close to the first.

The 5-way plait at Fig. 13 is made with 5 rushes by interweaving each rush diagonally under one and over one, the outside rushes being so arranged that they start from the back and come forward over the next rush and towards the centre. Wider plaits can be made in the same way by using 7, 9 or 11 rushes.

The rattle twist at Fig. 14 is made with 5 rushes of even size tied together and held vertically by the tied portion in the left hand. Take one of the rushes and bend it behind the two next to it on the right; do the same with the others in order until they are laid down. Continue by laying each rush in its turn across the centre and over the last one turned down and the one next to the latter on its right. The same movements of the thumb and finger should be used in every stroke for the building up of the twist. As the thin portion of the rushes is reached add a new length.

Rush and Cane Combined. The melon-shaped basket in Fig. 9 is a very effective way of using rush, the framework being made of split cane. The first stage is to make an oval band with a length of stout split cane, the joint being made by making 2 tapering cuts so that the ends of the cane can be joined up evenly and bound together. A useful size is 12 in. by 9 in. A second band is now made in the same way, but a trifle larger; this is fitted over the first oval so that the two are crossing each other.

The ends are bound together with raffia over and under until a small pocket is formed underneath on each side of the vertical oval. Two lengths of split cane equal in length to half the horizontal oval are bent and slipped into the pockets and then the binding is continued, but the extra lengths are included in the over and under binding. These two pieces should be equally spaced, and when the pocket formed by the raffia is large enough, similar lengths of split cane should be fitted in. The 9 lengths are bound together, weaving the raffia over and under alternately until they are firmly secured. Both ends are worked alternately, and can be finished off with raffia of a different colour.

The remainder of the basket is filled in with flat rushes by commencing at one end and running a length out in plain weaving over and under alternately, repeating the operation from the other end. This is continued to the centre of the basket, the work being kept as close as possible, because the damp material used in the first place will shrink when it dries.

The handle can be given a decorative finish by twisting the rush spirally round it and carrying a wide length of coloured raffia with it, so that the raffia is covered in one turn and exposed in the next, and so on throughout the length. A stronger basket can be made by using tapered ash splints.

Plaited rush forms a most convenient and cheap method of filling up the sides of many kinds of basket woven either in cane or osier and suitable for wastepaper or work baskets.

RUSH MATS. Rush mats can easily be made at home with a packing needle, some string and the necessary rushes. These are sold in bundles and before use they should be soaked in water for 8 or 10 hours.

The rushes should be plaited in strands each strand consisting of three or more rushes. A useful type of mat can be worked by stitching the plaits together round and round until they form an oval.

To work the centre of the mat, take three small plaits, one coloured green, one natural, and one brown. Stitch them to form a zigzag pattern and bind the edges with a plait of rush. The rest of the mat, save the border, is of plain rushes, with the plait sewn edgeways. To join the rushes, put the butt end of the new rush to the thin end of the other one, and plait it in about 4 in. from the end of the last rush.

USEFUL HINTS. To prevent mats from curling up at the corners, as they are apt to do after a few weeks' wear, turn them occasionally and use them upside down. In the case of plain rope or hemp mats this can be done without any obvious change of effect, for the two sides are usually alike ; but if they are decorative mats with coloured patterns some other method must be adopted. Weighting the corners is usually effective, but if this is done with coloured mats an oddment of material which harmonizes with the predominant shade is necessary. Cut the material into four small squares, turn them in neatly all round, then fold them into triangles and sew them on to the four corners of the mat, first inserting a tailor's lead weight in each corner. Take stitches right through the mat with a long darning needle, and sew firmly so that the weight will not strain the stitches.

Coloured mats which have faded may be restored to brightness by washing them with warm, salted water, or with water to which a little vinegar has been added. If made of Indian matting they may also be scrubbed, rinsed well, and left in the open air or in a draughty place to dry. Stains which will not yield to ordinary treatment should be rubbed with benzine or washed with a solution of water and ammonia. *See* Raffia Work.

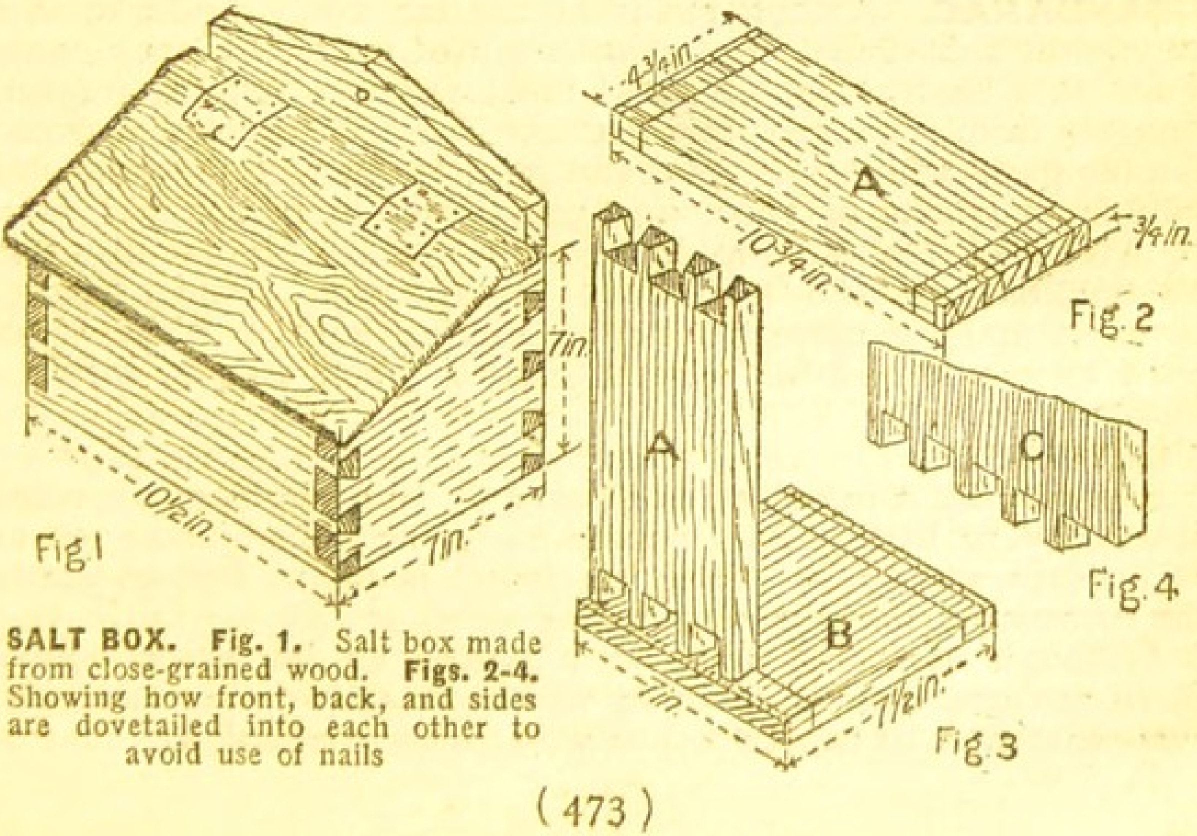
SALT BOX, Making a. Owing to the corrosive effect of salt, the use of nails and metal fastenings is avoided as far as possible in making a salt box, which is usually of wood ; because of the damp nature of the material the wood should be fairly thick and close grained. Beech is well suited for the work, but ash is often used, and American whitewood can be utilized. A convenient shape, illustrated in Fig. 1, measures 10½ in. by 7 in.

at the base, $4\frac{1}{2}$ in. in front, and 7 in. at the back up to the lid. The wood is $\frac{3}{4}$ in. thick, the corners dovetailed.

Commence by planing up the front, A to $4\frac{3}{4}$ in. by $\frac{3}{4}$ in., and cut to $10\frac{3}{4}$ in. The sides, B, are the same thickness, and 7 in. wide, with a length of $7\frac{1}{2}$ in. The back, C, is $10\frac{3}{4}$ in. by $9\frac{1}{2}$ in. by $\frac{3}{4}$ in. and the bottom, D, is $9\frac{1}{2}$ in. by 6 in. by $\frac{3}{4}$ in. The pieces are set out as in Figs. 2, 3, and 4; the dovetail pins are cut on the ends of the front piece, A, the distance between the shoulders being 9 in., and then placed on the sides in turn to mark out the exact shape of the sockets, as in Fig. 3.

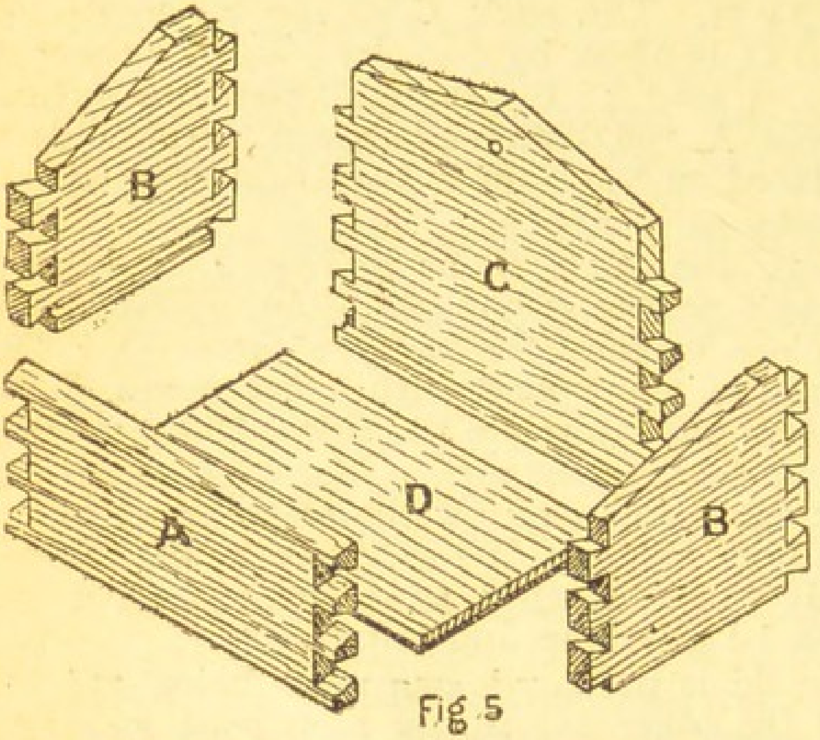
The same is done with the back, C, as in Fig. 4, and then a $\frac{1}{8}$ in. wide and $\frac{1}{4}$ in. deep groove is ploughed $\frac{3}{8}$ in. up from the bottom edge of each piece to take the bottom piece, D. On the latter plane a rebate to correspond with the grooves, $\frac{3}{8}$ in. up the edge and $\frac{1}{4}$ in. deep, and complete the sides, B, by sawing off the front corner and planing smooth. Mark $1\frac{1}{2}$ in. down at the top of the back each side, saw off the waste, and plane down smooth, and then bore a $\frac{1}{4}$ in. hole 1 in. down in the centre. The parts are now ready to fit together, as in Fig. 5, and if the joints are true, they can be glued up and left to dry.

In the meantime, the lid is prepared, one piece being $11\frac{1}{4}$ in. by $6\frac{1}{2}$ in. by $\frac{3}{4}$ in., and the other $11\frac{1}{4}$ in. by 1 in. by $\frac{3}{4}$ in. The front edge of the large piece and both ends of both pieces should be rounded and finished smooth with glass paper. The glued box can now be trimmed at the ends and cleaned up with a sharp smoothing plane, the top edge of the front being planed to the slope of the sides, and the narrow portion of the lid screwed on from the back. Its lower edge in front must be planed down $\frac{1}{8}$ in., so that the sloping lid can be fitted. The top edge of the latter is now bevelled sufficiently to fit, and then attached with



SALT BOX. Fig. 1. Salt box made from close-grained wood. **Figs. 2-4.** Showing how front, back, and sides are dovetailed into each other to avoid use of nails stout leather hinges, 2 in. long and $1\frac{5}{8}$ in. wide. A neater job is made by cutting recesses $1\frac{1}{2}$ in. from the ends to take the leather, securing it with $\frac{1}{2}$ in. round-head screws.

The outside of the box should be sized and varnished; the inside is left plain, so that it can be washed out when necessary. On account of the action of salt on metal, it is not advisable to use plain butt joints or to nail or screw the box together. The work can be simplified by screwing on a plain base, which can be fitted on the outside and screwed from the bottom or fitted between the sides.



SALT BOX. Fig. 5. The parts ready for glueing together

SANDALWOOD. This is a hard, close-grained, yellowish-brown wood. It has a fragrant smell which increases with age, and when it is burning there is an aromatic odour. Ground into powder, it is used in cosmetics, and an aromatic oil is distilled from it, and used in medicine as an internal disinfectant. As a wood it is used chiefly for small fancy ware, carved articles, finger plates for doors, etc.

SANDARAC. Among resins of the lac kind, sandarac is an important substance. It is hard resin of yellowish tinge, which melts at a heat of 300° F., and breaks with a lustrous fracture, exuding from pine trees in North Africa. It is known variously as pine gum, white pine resin and gum juniper. It is completely soluble in spirits of wine, and practically in petrol and turps. It makes good photographic negative varnish, and is also used by bookbinders and for school blackboards. Being hard, it requires making more elastic by mixing with a West Indian resin known as elemi. This material is much used to soften or toughen varnishes.

SAPWOOD. The wood of very young trees, known as sapwood, is generally light in colour and porous. In some trees the colour changes very little indeed as the tree grows older and such are called sapwood trees. They are found in Great Britain among the sycamores, beeches, and hollies.

Although sapwood may be regarded as imperfect timber, there are one or two cases in which its value is considerable, exceeding that of heartwood or wood that is completely mature.

For instance, the sapwood of the hickory has a greater value for handles and the like than the heartwood. Many of the American woods are noted for their abundant sapwood, notably the satin walnut, the loblolly pine and the basswood.

SARSENET. The name has to a large extent dropped out of use, because old-fashioned sarsenet has been superseded by Jap silk, white, black, or coloured. The material is a plain, thin, and rather shiny silk. Sarsenet ribbon is suitable for making soft binding for the edges of dress seams, perambulator rugs, cot blankets, and so on.

SASH CRAMP. This is a tool used by woodworkers for cramping up a framework of considerable size. All patterns comprise a stiff metal bar having one adjustable jaw, which can be moved along the length of the bar and secured by a tapered peg or wedge. The fixed head comprises a clamp screw, which forces a movable head along the bar.

The work to be cramped is placed between the jaws and the movable jaw secured by the pin on the side of the framework. The screw is rotated and pressure brought to bear upon the frame by means of the sliding head. Generally, two of these cramps are needed for a frame, so that equal pressure may be exerted on each end.

SASH WINDOWS: RENEWING THE CORDS

Practical Instructions for Carrying out Necessary Repairs

With the aid of the illustrations and directions here given, the amateur mechanic will be able to keep his sashes and cords together. See also Glass; Leaded Lights

A sash window is a type of opening and closing window in which the upper and lower windows are weighted to facilitate their movement in an upward or downward direction. The window is balanced by means of heavy iron or lead weights, arranged to move up or down in a well in the framework. Two such weights are used to each moving window, being arranged one on either side of it. The weights are connected to the window with sash cords, which pass over grooved pulleys sunk flush with the framework. The pulleys are placed at the extreme top of the framework.

The sashes are arranged in the frame so that they pass each other as they are raised or lowered. They slide in grooves formed by the casings of the frame, and are suspended on sash cord. Although between the sashes there is a parting slip, the centre rails of the sashes are arranged so that they meet, and they are splayed so as to form a good fit in order to prevent their rattling, and to make them wind and water tight. It is on the centre rail that the fastening is fixed in order to keep the window closed.

The sash cord is attached to the window by means of 1 in. wire nails hammered through the cord. An alternative method

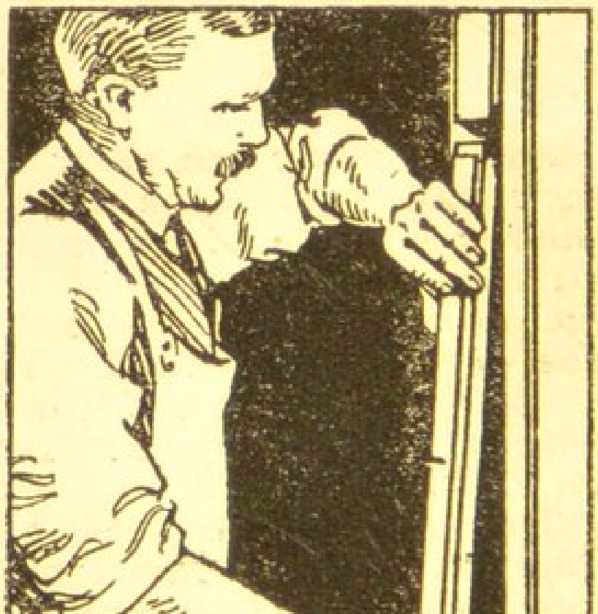
SASH. Fig. 1. Removing parting slip, after which top sash may be swung out of frame

to this employs a screw and washer which is turned home at the end of the cord. A circular recess is usually made in the side of the window in which this screw is placed. Two common methods are used for the attachment of the cord to the weight. One has a loop threaded through an eye in the top of the weight, the free end of which is bound to the length of the cord with fine string. The other method simply has a knot tied at the end of the cord after it has been passed through the eye in the weight. Where this second method of construction is employed care must be taken to prevent any free end of cord from fouling the movement of the weight. The weights used for window sashes are extremely long and thin, in order that they may slide in the small space in the frame allotted to them.

Repairing the Sash Cord. It sometimes happens that a sash cord breaks after the windows have been in use for some time; consequently the balance weight will fall, and the sashes will be hard to move. It is not a difficult matter, however, to replace a broken sash cord. The lower window should be raised some distance, and if it shows any tendency to drop down, it should be kept up with a stick of wood.

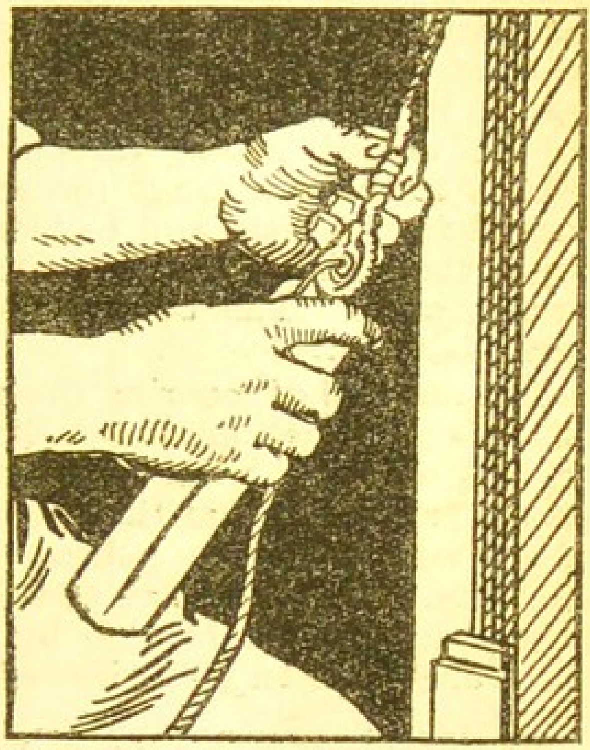
The bead at the bottom of the window frame is removed with a chisel. The tool should be placed as nearly as possible under the nails holding the bead down. To prevent damage to the paintwork the point of a knife should be used to break the joint between bead and sill before prizing up the bead.

One of the side beads is next removed, when the lower sash may be swung clear, and the broken cord removed from the



SASH. Fig. 2. Removing fillet in frame to give access to weight pocket frame. The fitting of the new sash cord is carried out as detailed below for the top sash, and illustrated in Fig. 4.

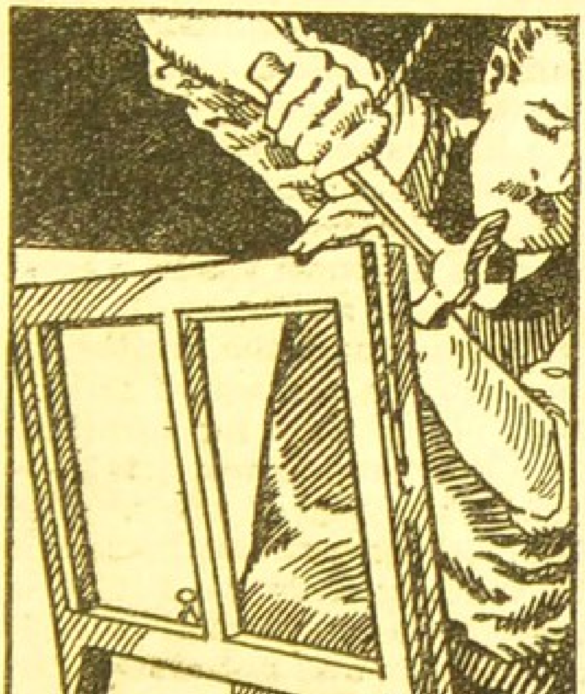
In cases where it is only necessary to repair the top sash, the bottom sash must also be removed, this being done first. When detaching the cord, take care that it does not come away suddenly, as if that should happen the weight would drop, pull the cord right through the pulley, and be lost inside. When the cord is nearly off it should be finally removed by hand, and a knot tied in it to prevent any risk of losing the end.



SASH. Fig. 3. Method of attaching new cord to weight

REMOVING THE TOP SASH. The top sash may now be removed (Fig. 1) by prising away the parting slip. An opening at the bottom of the frame is normally covered by a fillet, which has to be removed, but is frequently difficult to find owing to its being covered with paint. A few taps with the hammer will crack the joints, when it may be removed, as in Fig. 2. The weight is disclosed behind this partition, and is then removed.

In order to fit the new cord a length of a more flexible material is first run over the pulley and down the space inside. A piece of chain or a "mouse" is used with a length of string, to one end of which the cord is attached. The mouse is a long, thin leaden weight, small enough to pass over the groove in the pulley, and having a loop at one end for the attachment of the string. The other end of the string is securely fastened to the new cord. The mouse is pushed over the pulley and drops down into the weight box, carrying with it the string.



SASH. Fig. 4. Fixing new cord to sash with nails

Having pulled the cord through to the hole from which the weight was withdrawn, this end of the cord is joined to the weight. In Fig. 3 the method adopted is to bind over the free end of the cord with strong string. The free end of the new cord is left hanging while the old cord is removed from the sash. This latter operation is performed with a small cold chisel and a hammer. The exact length to cut the new cord requires careful consideration. If it is not long enough, the weight will be drawn to the top before the window is closed, in the case of the bottom sash. If the cord is too long the top sash will not close, owing to the weight having already reached the bottom. The best plan is to make a rough measurement of the length of the cord tacked to the sash, and to mark this length downward from the top of the pulley. The new cord is now pulled up until the weight swings clear. The cord is placed against the mark and cut 3 in. above it.

The method of securing the cord to the sash is shown in Fig. 4. It is placed in the groove in the sash designed to take it and then tacked on with 1 in. wire nails. During this operation it is important to see that the end of the cord is carefully tucked out of the way, as it may subsequently cause trouble by jamming if left loose. A nail or two at the very end of the cord will obviate any possibility of trouble in this direction. Where new sash cords are fitted on both sides of the sash they must be of the same length.

The replacement of the sashes will not present any difficulties, as the operations are the reverse to the dismantling processes. In a double window, one sash should be finished before tackling a similar window on the other side, in order to avoid confusing the beads or even the sashes. The depressions made by the nails in the fillets may be filled in with putty, which is brought up level with the woodwork. If the work is carefully done a coat of paint will hide any trace of removal or replacement. While the new cord is out it is a good plan to rub it over with linseed oil.

SATIN WALNUT. This is the name given to the wood of the sweet gum, a common tree in the swampy parts of the lower Mississippi valley, where it grows to a large size ; it is also found in most parts of the United States. The tree is similar in appearance to the maple, but it exudes a liquid known as red gum or liquid-amber. When cut the timber is of a brown shade, varied at times and occasionally marked with black stripes.

On account of its even, straight texture and the widths in which it can be obtained (up to 18 in. with an average of 14 in.), it is a useful wood for the amateur. It is used for furniture making, fretwork, and wood-turning ; it is easy to work, takes a good polish, stains well and forms strong glued joints. The wood is liable to warp and twist, but with proper seasoning this can be reduced to a minimum. In working satin walnut, it is advisable to cut up the material some time before it is planed, but the wood should be kept in a warm room and not allowed to get damp. Satin walnut can be used for carving on account of its soft cutting and even grain. It is also made up in the form of plywood.

SATINWOOD. The varieties of satinwood are named after the part of the world from which they come. Satinwood is used as a veneer, for small cabinets, in fretwork and inlaying, and for the backs of hair brushes and other fancy articles. In colour it is light orange, and has a close, smooth grain, with a lustrous, mottled and satiny surface, and a transparent appearance.

Satinwood works well, but takes glue rather badly, owing to the dense nature of the wood: it polishes well, and a fine finish can be obtained on it. Adam, Hepplewhite and Sheraton used the wood freely but owing probably to its scarcity, in small quantities. It was employed in conjunction with mahogany and fancy woods of all kinds, such as amboyna, tulip wood, and purplewood. Designs were often painted on satinwood pieces. When the satinwood is carefully selected, its beautiful marking or grain requires little or no decoration beyond a banding or border of mahogany.

SAWS: THE VARIOUS TYPES

Their Different Uses and How to Sharpen Them

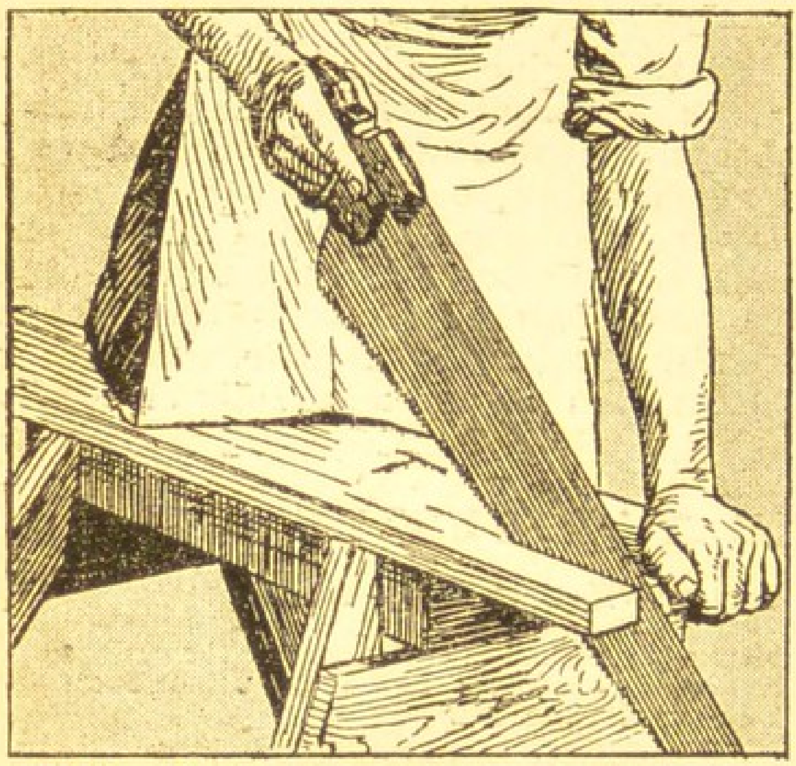
Other information on this subject will be found in the articles on the various kinds of saw. These appear under the headings: Bow Saw; Frame Saw; Hack Saw; Keyhole Saw

The cross-cut saw is used for cutting across the grain of wood, while a rip-saw works along the grain. The average length of the cross-cut hand-saw is about 26 in., and the number of teeth to the inch depends on the work for which it is intended. The tenon or back saw is 12 in. to 18 in. in length, and the number of teeth to the inch about 10. The top edge has a strip or back of grooved steel or brass, fitting the blade, and giving strength and rigidity.

The panel saw is a small hand-saw with fine teeth that may be used for the same purposes as the cross-cut and ripping saws, and also for many other wood-sawing jobs. The dovetail is similar to the tenon, but smaller and with finer teeth; its usual length is 10 in. It is used in making dovetail and other joints that entail very accurate work. For cutting beading and similar small work a light brass-backed saw is often used with a straight handle, like that of a bradawl.

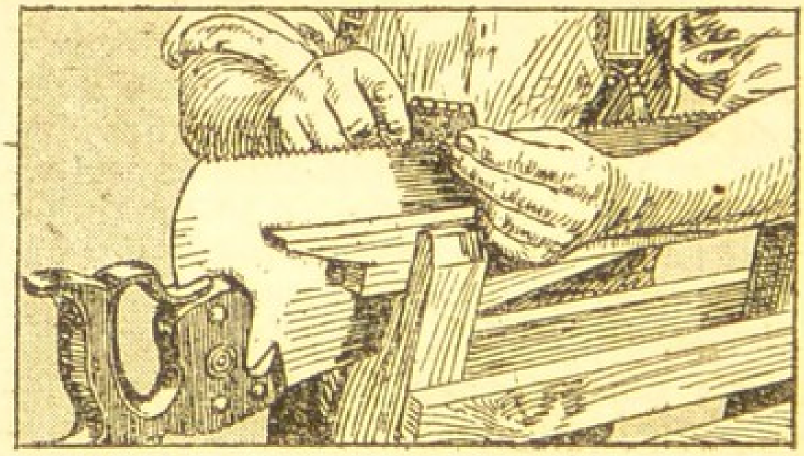
For cutting shaped outlines in wood a bow saw is usually employed. The frame is generally of beech, and the handles and blades can be obtained separately, so that the latter may easily be renewed. The saw blade is tightened for use with a tourniquet arrangement. This tightening is absolutely necessary, otherwise the blade will snap; but when the saw is out of use the blade should be slacked off. In addition to the bow saw, compass and keyhole saws are used for shaped wood, and for starting a cut to be completed by the bow saw.

The first difficulty which the amateur finds in using a saw, especially a cross-cut saw, is to start the cut. There is a tendency for the saw to jump about and make a series of small jagged cuts on the edge of the wood. Fig. 1 shows how the preliminary saw cuts should be made and how the handle of the saw should be held. The left-hand thumb should be placed on the wood against the blade of the saw to guide it. Then take two or three gentle up-strokes before making the first down or forward stroke. The pressure should be as light as possible. The preliminary cut made, the sawing can proceed. The two chief rules for accurate sawing are to use long strokes, and not press too heavily. Draw the saw slowly backward and forward, and the work will be done more quickly and with less labour. About sixty strokes a minute with a 26-in. saw is right.

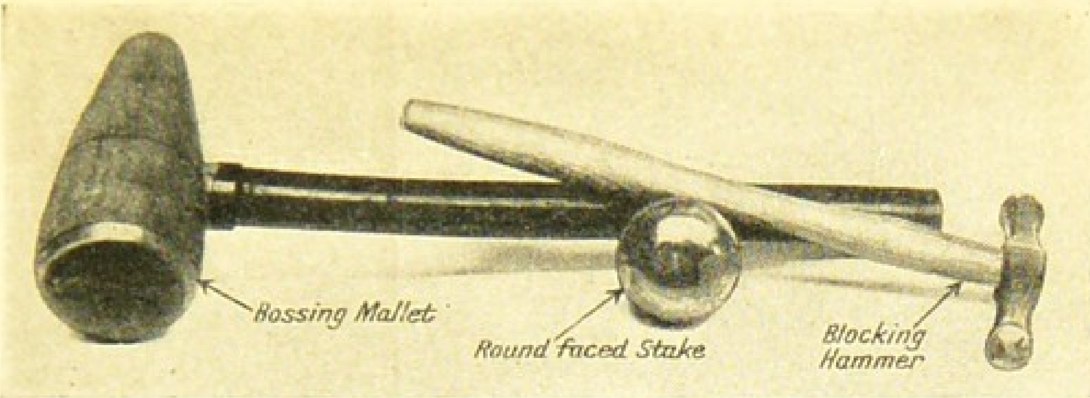


SAW. Fig. 1. Correct position to adopt when cutting a thick plank

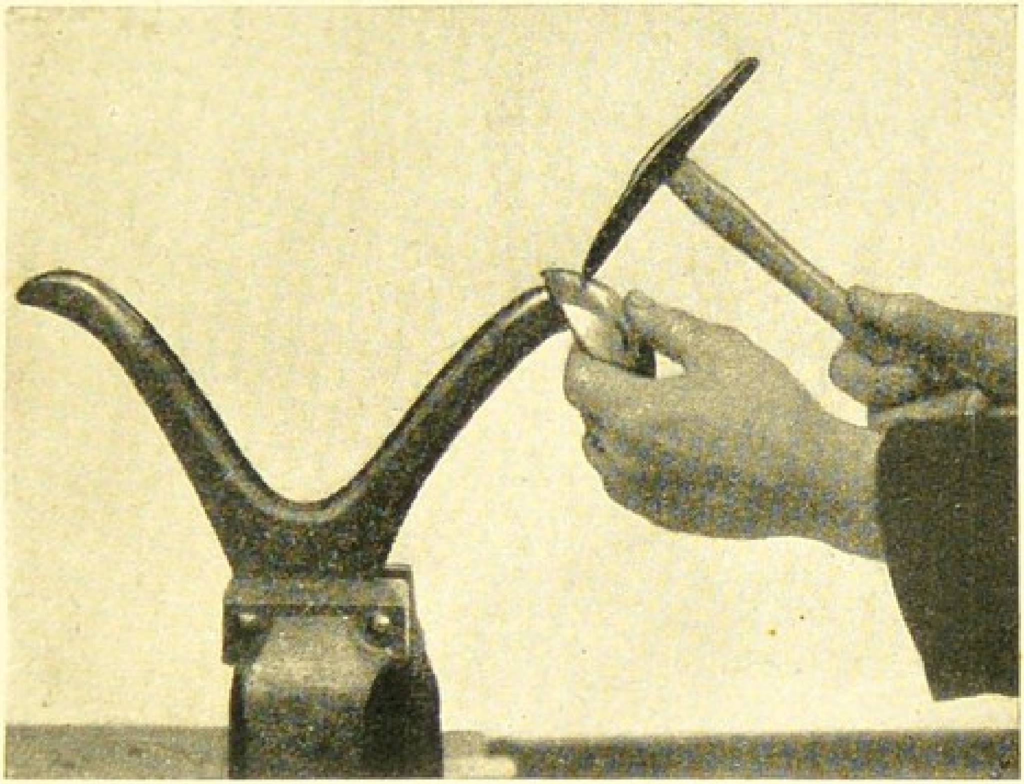
When sawing off a piece from a long board, both ends of the latter should be supported, and the board so kept horizontal. To use only one support and hold the board horizontal by the pressure of one knee is bad, because the board is bound to vibrate, and the sawing will probably be uneven. When a long board has to be sawn across the middle, it is best to have an assistant holding it to prevent the board sagging and so binding the saw blade. During the last few strokes, when cutting a short or long piece, it should be supported, or it will break away and split the end of the board. The last few strokes of the saw should be as lightly made as the first, to prevent the breaking away of the fibres of the wood at the corner. Short pieces of board may be held in the bench vice. With a tenon or similar saw nearly

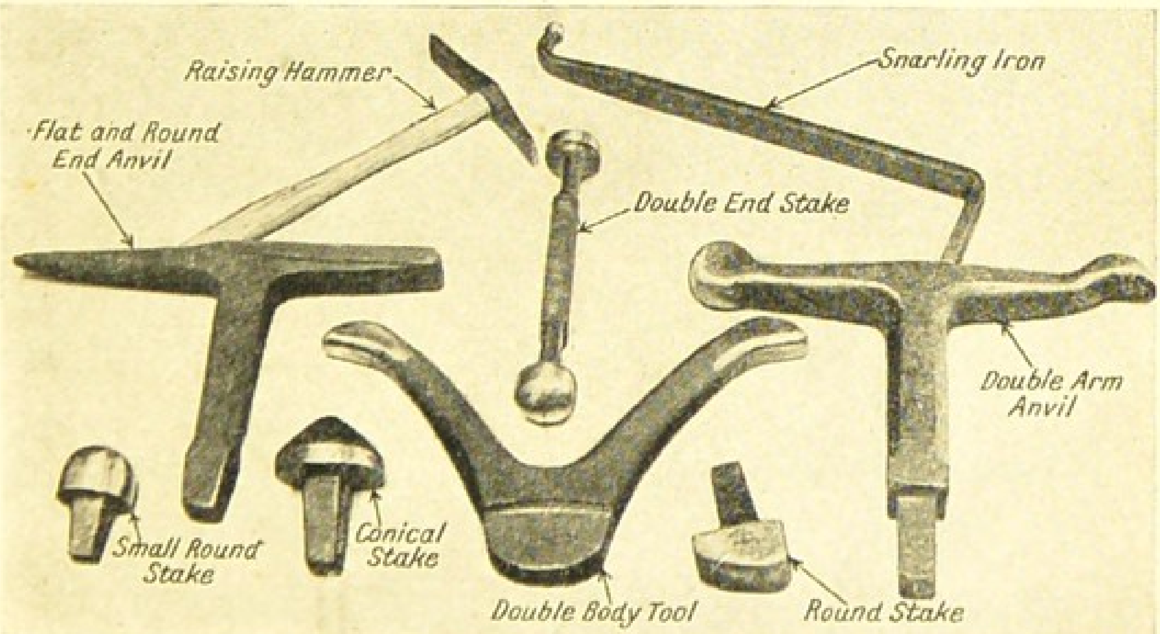


SAW. Fig. 2. Method of setting the teeth of a saw with a hand saw-set



Tools used for making pin bowls and for other hollow work

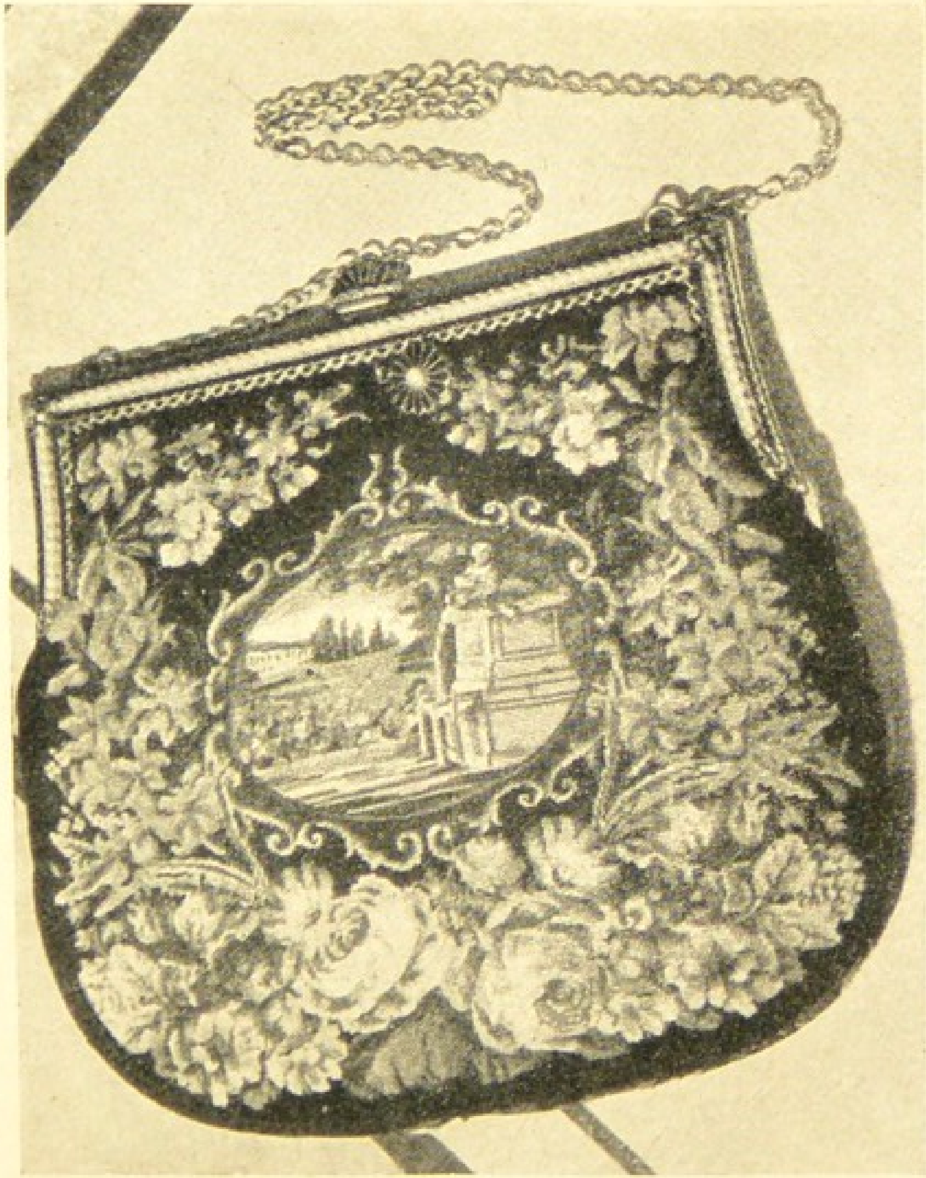

Using the raising hammer in coursing

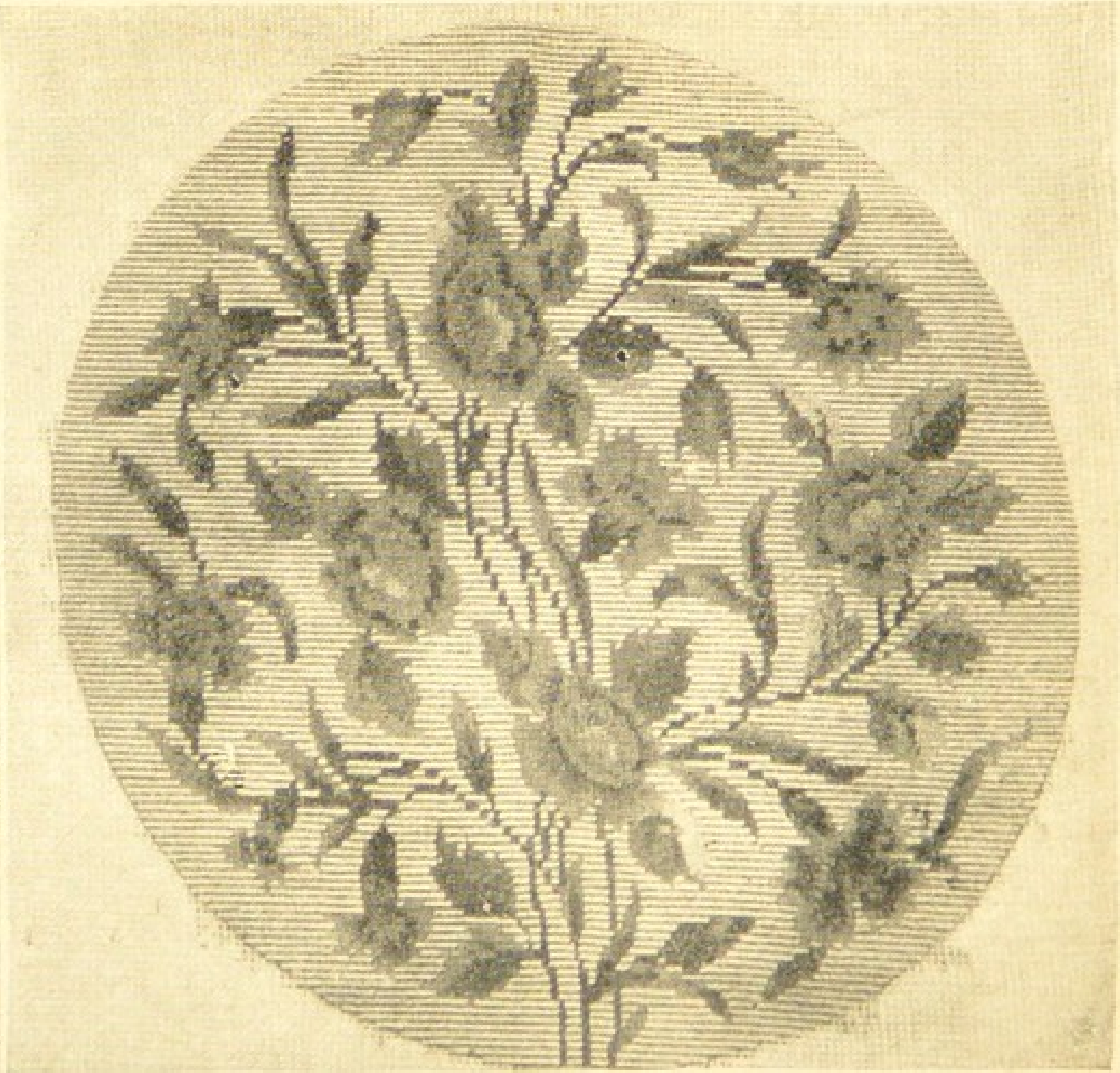


Tools used in the process known as raising

SOME NECESSARY IMPLEMENTS FOR THE SILVER WORKER

Courtesy of C. J. Plucknett & Co., Ltd.

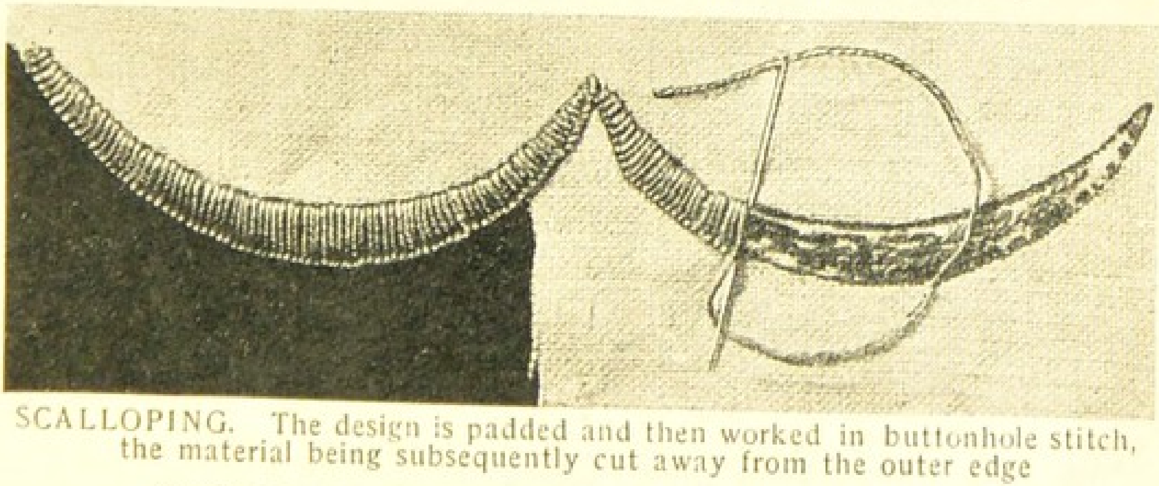




Circular piece of tapestry worked for a stool covering. Left. Bag in which a Louis style design is worked in petit point with silks on fine canvas

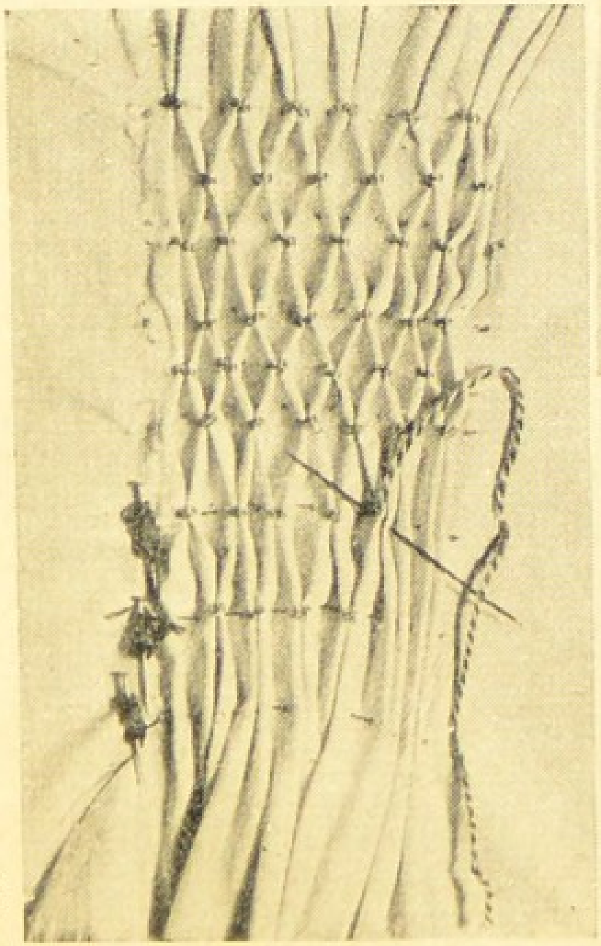
TWO BEAUTIFUL EXAMPLES OF TAPESTRY NEEDLEWORK

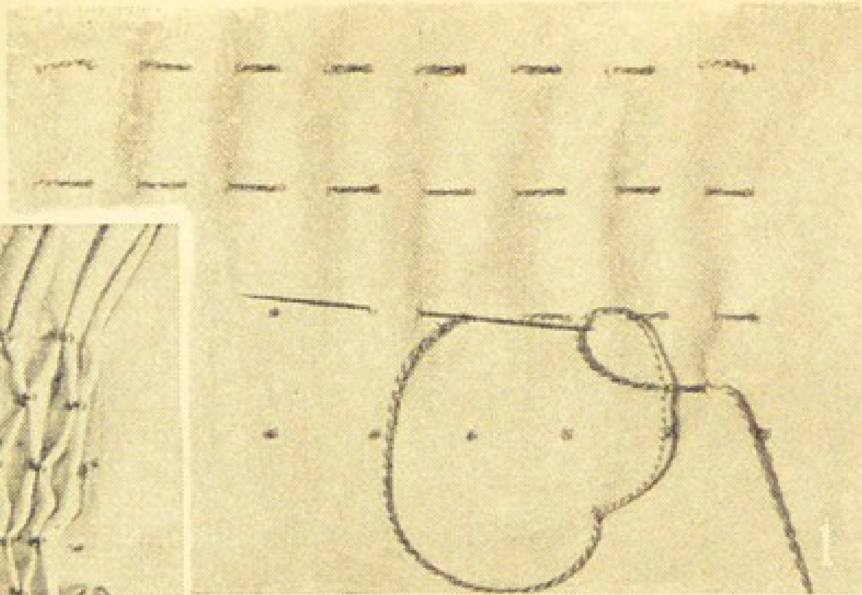
Transfer on material, showing a clever simulation of embroidery

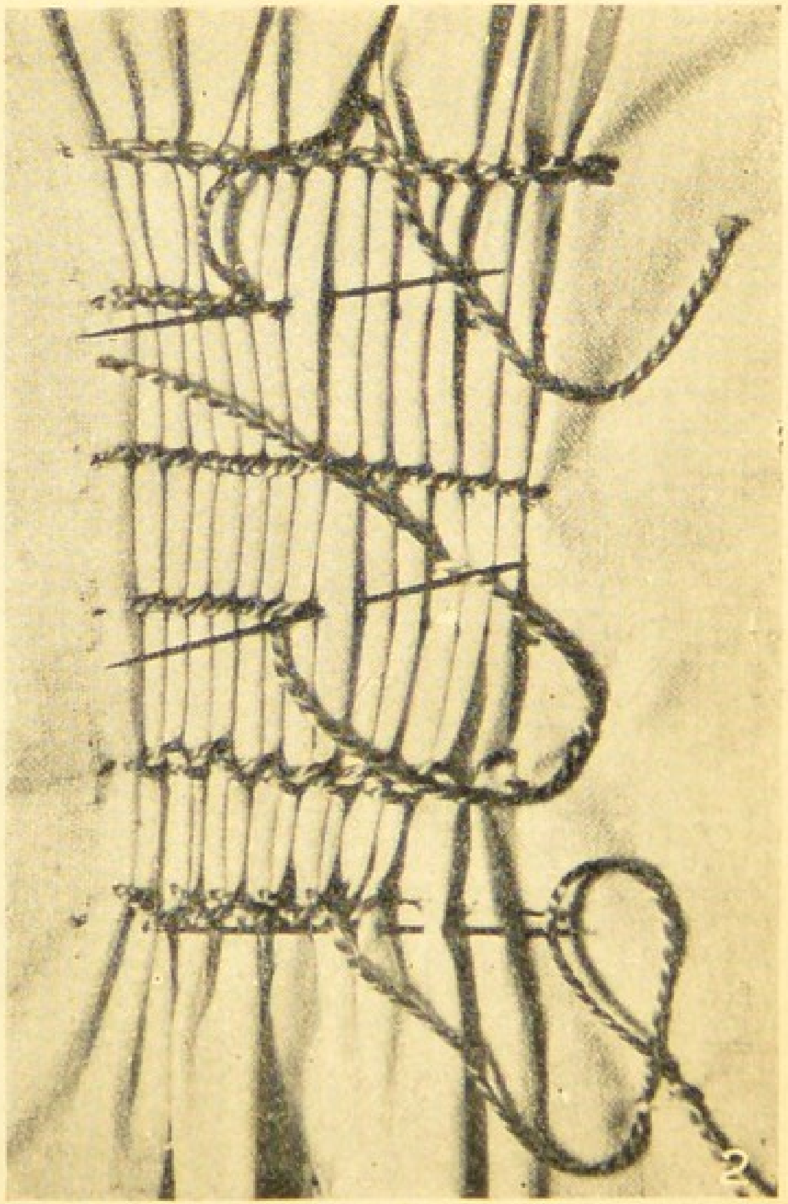


SCALLOPING. The design is padded and then worked in buttonhole stitch, the material being subsequently cut away from the outer edge

CONTRASTING METHODS OF BEAUTIFYING MATERIAL







Left. Honeycomb design shown in two sizes. Above Running the gathering threads along dotted lines. Right. Four different stitches used, all worked from left to right

DESIGN AND STITCHES USED IN THE FANCY NEEDLEWORK CALLED SMOCKING

all the work is done on the bench. The sawing should be done against the bench stop, or by using a bench hook. This is hooked against the front of the bench, and the wood to be sawn is pressed firmly against the top of the hook with the left hand.

Considerable practice is required to saw a straight line and to saw squarely, particularly when using the cross-cut saw on thick stuff. The tendency generally is to incline the handle end of the saw towards the side on which the worker is standing. By giving what appears to be a contrary slope it will generally be found that the wood is being cut squarely; practice will thus keep saw cuts square.

A saw may persistently saw to one side of a line when all the rules of sawing have been observed. This will be due to a defect in the saw itself. Either the blade has twisted or the teeth of the saw have been set more on one side than the other.

A board 1 ft. in length when sawn exactly through the middle, does not produce two pieces each 6 in. long. Each piece is 6 in. less half the width of the saw cut or kerf. When careful work is being done this width becomes important, and must be allowed for when cutting. Saw on the outside of the line, so that the saw kerf is in the waste piece of wood.

Setting and Sharpening. Saws should be set and sharpened at regular intervals, and they should be set before they are sharpened. The set is the amount to which the teeth are bent sideways. This is to make them cut a kerf wider than the thickness of the blade to allow the latter to run freely. Saws should be set to a maximum for cutting wet wood, or cross-cutting soft wood, and to a minimum for ripping hard, dry wood.

The simplest way of setting a saw is by means of a hand-set, Fig. 2, with the saw held in a vice. The hand-set contains a number of slots or notches of various sizes to suit different thickness of saws. A slot is fitted over a tooth, and the latter then bent over to the required angle. Alternate teeth are bent over on one side of the blade, and the remainder on the other. The accuracy of this method depends largely upon the eye of the worker, and a hand-set with a gauge attachment is best for the beginner. When the tooth is bent over sufficiently the gauge just touches the blade of the saw, and this ensures that the teeth are set uniformly. There are other types of saw-set on the market. Saw-sharpeners place the saw on a metal block with bevelled edges, and strike the teeth with a saw-setting hammer.

Saws are sharpened by filing the teeth with a three-cornered file. A proper and suitable saw-file has the same section as the tooth space, and thus files the front of one tooth and the back of the preceding one simultaneously. Such files are made in various sizes, a $4\frac{1}{2}$ in. file being suitable for hand saws and a $3\frac{1}{2}$ in. for tenon saws. The saw should be held, teeth upward, in a long-jawed vice, the teeth projecting only slightly above the jaws. A simple wooden vice can easily be made by the amateur. The jaws should be faced with a thickness of leather. The appliance has legs to stand on the floor against a bench or table, and thus bring the tool to a convenient height for the work. Another way is to clamp the saw between two pieces of wood the length of the saw.

Before beginning, look along the top of the teeth and see that they are in a straight line. With a blunt saw it will be found that they are uneven, and the first thing to do is to straighten them. This is done with a flat file run over the points of the teeth. To ensure accuracy, fit the file in a groove in a piece of wood. The latter held against the saw blade acts as a guide and enables all the ends of the teeth to be filed with a perfect regularity.

The saw should be sharpened from the handle end. The file is held on a slight slope to the horizontal, not more than a few degrees, and its direction should be at an angle across the teeth, not at right angles. Two or three strokes of the file will suffice to sharpen each tooth, and the file should only be used on the forward strokes. The back of the tooth is filed to bring it to a sharp point again, though the front of the next tooth to the right gets filed away to some extent. When one set of teeth has been filed the saw should be turned over and the other set similarly treated. The file should still slope towards the handle when the saw has been turned.

The angle at which the file is pointed across the teeth varies with each type of saw. In the case of a rip saw the file is only just off the square; with a cross-cut, tenon or panel saw it is off about 20° to 30°. The more the filing is done out of the square the finer the point and the keener the cutting. Naturally the teeth are weaker, and saws thus will want more frequent sharpening. In general sharpen finely for soft and squarely for hard woods.

Saws when not in use should be thoroughly greased to protect them from rust. A grooved piece of wood the length of the saw should be prepared, and kept over the teeth when the saw is not in use. To make such a cover, the grooved edge of a piece of stout matching can be ripped off to a width of about 1½ in. A couple of holes are bored to take a cord for tying it to the saw.

SCALLOPING. This is used to form a fancy edge on babies' clothes, underwear, frocks and house-linen. It is worked on white flannel with floss silk, on silk and cotton wear with embroidery cotton or silk, on linen with linen embroidery thread.

In the case of flannel, long-cloth and nainsook it can be worked on the single material, but when working on thin silk or crêpe de Chine it is advisable to sew a narrow strip of tissue paper or fine book muslin under the edge of the material on which the scalloping will be worked. This prevents puckering, and gives a firm, even edge.

The design is put on the material by means of a transfer which is ironed off in the usual way. These transfers are sold by the yard in various shapes. The ordinary scallop pattern is in a semicircle; there are fancy vandykes made up of 3 or 4 semicircles on each side of it. Plate 47 shows a wide one, each scallop measuring $2\frac{1}{2}$ in. It is not necessary to buy a scallop transfer, as a coin and a soft lead pencil will provide various designs. For the average scallop, which is about 1 in. wide when worked, a halfpenny will act as the tracing medium.

To mark the design draw a line across the diameter of the coin, so that the exact half can be used. Pin the material taut on a drawing-board, so that the cut edge is away from the worker, then place the coin on the material about $\frac{1}{2}$ in. from the edge and draw round the coin from one point of the centre line to the other when a half-circle will result on the material, which forms the outside line of the scallop. To make the inside line, draw the coin inward until there is a space of $\frac{3}{16}$ in. from the pencil line to the edge of the coin, at the centre of the scallop. Again draw round half the coin, but beginning this time on a level with the points of the first semicircle drawn, instead of in a line with the centre of the coin.

For successive scallops the coin must be placed against the previous one, taking care that the guiding line is quite straight. As a further guide the starting-point for the first semicircle could be marked on the coin. By the same method a permanent scallop rule can be cut out in stiff cardboard, making about ten scallops, and this can be moved along for any length of material. Tiny scallops for babies' clothes can be made with a sixpence, and the larger ones with a halfpenny and a penny, marking the shapes on the cardboard.

Sometimes the work is padded as shown at the right side of the illustration. The buttonhole work is done from left to right, holding the material with the cut edge towards the palm of the hand. After joining the thread on the wrong side, bring it through to the right side on the lower line. Then, holding the thread down in a loop under the left thumb, put the needle down through the material on the top line, and bring it up again on the lower line, next to the spot where it came up before, as the work must be close and even. Draw the needle through, still keeping the loop down under the left thumb, and only release it as the last bit of thread is drawn through. This will make the pearl edge, and after the whole work is completed the material is cut away under this pearl edge.

For the latter purpose a very sharp pair of embroidery scissors must be employed, so that the material can be cut clean away without cutting the embroidery stitches.

SCANTLING. This is a term used in building and carpentry work for the dimensions of a piece of timber, i.e. its length, breadth, and thickness. The name is often applied to an actual piece of timber, which differs from other timber in not according with some series of standard sizes, in the same way as battens and planks.

SCARF. The primary use of a scarf is to protect the throat and shoulders from cold, but frequently it is worn by women merely for its decorative qualities.

A silk scarf $1\frac{1}{2}$ yd. long and 1 ft. wide can be quickly crocheted in three shades of one colour. Two hanks of crochet silk are required of the palest shades, one of the medium and one of the darkest: also a No. 11 crochet hook. Make 82 chain and work 5 in. in the darkest shade; break off, join medium shade, and work another 5 in. Break off and join the palest shade. Work this 34 in. and then finish off with 5 in. of the medium and 5 in. of darkest shade.

KNITTED SCARVES. Scarves are simple to knit. Any number of stitches may be cast on the needle, according to the width required, and plain or plain and purl knitting, or some other pattern, used. The knitting should be continued until the scarf is of the necessary length, then the stitches should be cast off and fringe added to the two ends. To obtain an even edge, slip the first stitch of each line.

A fringed scarf can be made in Shetland floss; 4 oz. floss, a pair of No. 7 needles, and a medium size bone crochet hook are needed to make it. The scarf measures 48 in. long and $11\frac{1}{2}$ in. wide, and the knitting is worked at a tension that will produce about 18 stitches to 3 in. in width, and 30 rows to 3 in. in depth.

Commence by casting on 60 stitches, and for the first row * knit 12 wool forward knit 2 together 6 times, and repeat from * to the end of the row, finishing with knit 12. Repeat this row 11 times, making 12 rows in all. The 13th row consists of * wool forward, knit 2 together 6 times; knit 12, repeat from * to the end of the row, finishing with wool forward, knit 2 together 6 times. Repeat this row 11 times, making 12 rows in all.

Then repeat from the first row until the work measures 48 in., and cast off. For the fringe, take 6 lengths of the wool, each about 10 in. long, and with the crochet hook pull through the first stitch at one end of the scarf and knot.

Repeat this all along the row in about every third stitch of the knitting, and then fringe the other end to correspond.

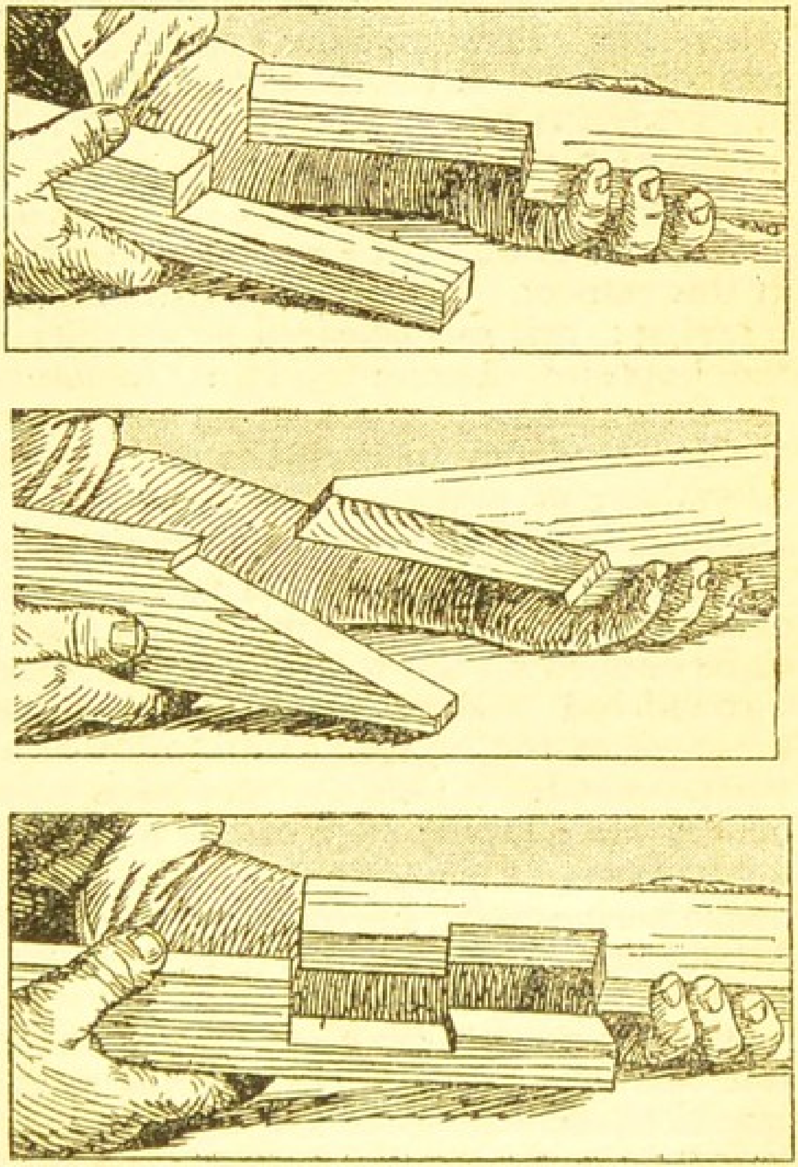
A scarf made from brushed wool might be composed of two different colours arranged in bands. For a scarf 2 yards long and 20 in. wide, 9 oz. of rose-coloured wool and 3 oz. of white wool are needed; but if thicker wool is used, these quantities must be increased accordingly. The white wool is used for the bands and part of the fringe, and the whole is done in plain knitting. Work at a tension of 5 stitches to the inch in width.

Begin by casting on 100 stitches, and knit 54 rows of 6 in. with the rose-coloured wool; then 18 rows or 2 in. with the white, twisting the rose wool over the white before knitting the first stitch, so as to bring it in line. Work another 2 in. with the rose wool, and then make another band of white. This also should be 2 in. wide. Knit $1\frac{1}{2}$ yd. with the rose wool, allowing for a second set of white stripes, and making the latter correspond with those at the other end. The scarf will then be complete.

For the fringe, wind the wools over a card or thin book measuring 5 in. across, and cut them through at one end. Take two strands together, double them, and with a bone crochet hook draw the loop of the threads through one of the casting-on or casting-off stitches. This will depend upon to which end of the scarf the fringe is first applied. Pass the ends of the cut wools through the loop and draw them up closely. Repeat this all along both ends of the scarf, clipping the bottom of the fringe to make it even. Lastly, brush the scarf on one or both sides with the special wire brush that can be bought for the purpose. Any other colours may be chosen instead of rose and white.

SCARFED JOINT. In carpentry, various kinds of scarfed joints are used when it is necessary to join the ends of timbers to increase their length. An ordinary scarfed joint is made by cutting the two ends of the timber to a long angle, and glueing, dowelling, bolting, or otherwise securing the two parts together.

In the case of a lapped scarfed joint, instead of making the joint at an angle half of each end is cut away so that each piece of material can lap on to the other, as shown in Fig. 1. This is a useful, all-round joint, easy to make, and is practically an ordinary lapped halving joint. When used in timber the joint should be square, and secured with nuts and bolts. Such a joint would not be suitable for an upright post which has to support a moving load. For the best proportions the length should be twice the breadth of the pieces that are to be joined.



SCARFED JOINT: Three varieties. **Fig. 1.** (Bottom) Lapped Joint. **Fig. 2.** (Centre) Splayed scarfed joint. **Fig. 3.** (Top) Tabled scarfed joint

SCISSORS, Repairing. If scissors get loose after long service the pivot should be tightened a little by laying the scissors on a heavy piece of iron with the head of the screw down and drawing the rivet tighter by light hammer blows on the screw point, the screw having been first tightened with a screwdriver if possible.

When scissors get blunt the edges must be ground with an oilstone or on a grindstone, cutting at right angles to the plane of the flat of the blade, the scissors being held wide open for the purpose. On no account must any attempt be made to grind the flats of the blades.

SCRAPER. The scraper is a tool employed for giving a better finish to an article already machined or worked. The type for woodworking consists of an oblong strip of sheet steel about 6 in. by 3 in. and in thickness about $\frac{1}{16}$ in. This tool is largely employed in cabinet making. The method of using is to hold it in both hands a few degrees out of the perpendicular away from the operator. The two thumbs are placed in the middle of the scraper on the side nearest the user, while the fingers grip the other side. Pressure now applied by the thumbs will give the scraper a bend in the middle and away from the operator. The lower edge is put upon the work and a strong forward motion imparted by the upper arm.

In the majority of cases the scraper is used in the same direction as the grain of the wood; but experience is the only guide in this respect. Very often the wood will come up woolly after scraping; this can be cured by scraping with the grain but from the opposite direction. It is sometimes useful to approach the scraper to the wood in an oblique direction, this having a decided tendency to keep the grain in place, but it has the disadvantage of making a slower cut.

In sharpening the scraper is set firmly in a vice between two pieces of wood, the top projecting a little. A fine file is then run over the top, and the burr thus created removed with a fine oil stone rubbed on the top and sides. When both edges are sharp a round rod of hard cast steel or similar material is pressed on the edge of the scraper at an angle of about 45° with it. The sharpened edge is thus destroyed and another burr created. This burr is the scraping edge of the tool.

SCREED. A projecting strip known as a screed is employed in plastering and rendering as a guide in the preparation of a flat surface. It may be of wood or metal or of the same material as the surfacing of the wall.

Wooden screeds are fixed to the face of the wall or other surface with the aid of rough grounds or thin packing pieces. The face of the screed is levelled, or brought into line with the desired face for the work. Two screeds are set vertically and two horizontally, then all four are adjusted until their faces truly represent the outer surface of the wall covering. Lines are stretched from one screed to another and any additional screeds added wherever they are requisite.

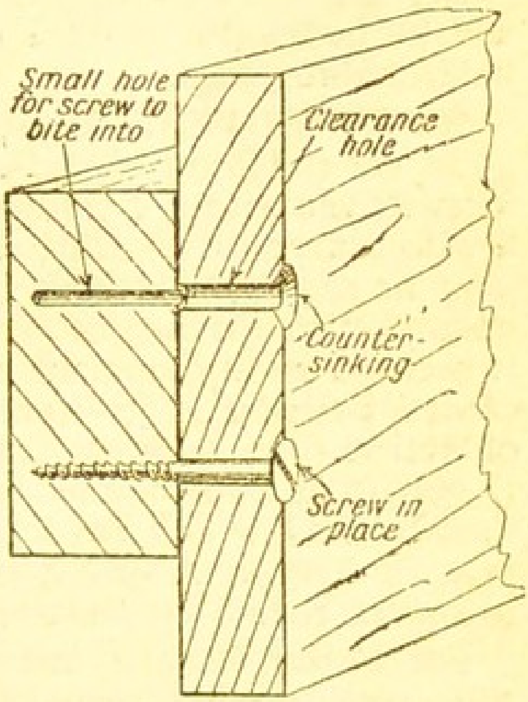
The wall surface is thus divided into a series of cells, the screeds being usually about 2 to 3 ft. apart. When this preliminary work has been done the covering material is then applied, and afterwards levelled with a long batten. When the plaster has set sufficiently the screeds can be removed and the spaces filled in with plaster, etc., or more generally are embedded in the second and finishing coats when these will be of sufficient thickness.

In other cases screeds are made in the form of little walls of cement or plaster and their faces levelled, the spaces between being subsequently filled in with the same material.

SCREW. The screw is a cylindrical piece of metal or sometimes of wood having a spiral groove cut along the whole or a considerable portion of its length. At one end provision is made for imparting a turning motion to it.

The wood screw has a tapered shank, which taper varies according to the nature and the application of the wood with which the screw is used. The thread resulting from the spiral groove cut along the shank is deeper, thinner, and spaced farther apart in the wood screw than in the metal screw. The former terminates at its lower end in a sharp point.

In principle the screw represents an inclined plane moved by a force up or along another inclined plane. These are represented by the screw thread and, in the case of the metal screw the thread of the screwed hole. The wood screw makes its own thread as it advances. The angle of the inclined plane is known as the pitch angle of the screw, and the spacing of the threads is known as the pitch.



SCREW. Diagram illustrating process of screwing in wood

The countersunk wood screw is designed to sink flush with the wood, and is used where an unbroken surface is required, as in a table top. The round-head screw is useful where the material is too thin to permit countersinking, and this type is also used for its more decorative appearance. It is often japanned and used with rim locks, barrel bolts, and thumb latches.

Where a good appearance is desired iron screws may be blued, tinned, or finished to match any particular work with which they will be afterwards associated. Screws for outside work can be had with a galvanized finish. Raised-head screws are a combination of the countersunk and roundhead pattern. These are often employed with a small brass cup, or socket, for use in hardwood, where they may be removed from time to time without the risk of damaging the surrounding wood.

To enable a screw to be introduced into wood, it is necessary to bore a hole somewhat smaller in diameter than the screw. This is most conveniently accomplished with a gimlet. After the hole has been made, the screw can be driven with the aid of a screwdriver, or with a screwdriver bit in a carpenter's brace. If two pieces have to be screwed together, the screw can only bite properly into one of them, which should preferably be the thicker if there is any difference. What is known as a clearing hole is drilled in the first piece, and the termination of the hole on the face of the work should be properly countersunk. The head should draw the one piece towards the thicker or outer piece, ensuring a close, tight joint. If the work is not done in this way, the screw bites into both pieces of wood and will not draw the joint up tight. The plain shank will tend to jam in the hole, unless a proper clearing hole in which the shank can just turn is provided.

Driving screws into plaster is a difficult operation ; either it will be necessary to fix a wooden plug or to employ one of the patent fibre plugs.

SCREWDRIVER. A good screwdriver for general use is that known as the London pattern, which has a flat blade. The cabinet screwdriver with a cylindrical shank and oval or spherical handle is also a favourite. Ratchet screwdrivers permit the blade to be kept in engagement with the slot of the screw during the whole operation ot driving or withdrawal. Right or left-hand motion is secured by moving up or down a slide on the ferrule, and a centre position gives a neutral position, with the ratchet out of action. In another type the shank is spirally grooved like the shaft of an Archimedean drill (which has right and left hand threads and which revolves automatically when the handle is pressed down). A spring in the working sleeve causes the handle to return ready for another stroke.

For heavy work a screwdriver bit may be used in a brace, the ratchet being brought into action. If too much pressure is used, however, the bit is apt to walk off the screw head.

When driving a screw, say, vertically downward, it is started in the hole by taking it in the right hand and screwing it into the hole as far as it will go easily, without risk of cutting the fingers on the sharp edge of the head. The point of the screwdriver is then put in place in the slot in the head of the screw, the screwdriver being vertical, the palm of the right hand resting on the end of the handle, and the thumb and fingers lying along the handle.

The process of driving the screw consists in turning the screwdriver to the right, while keeping a considerable pressure on it to prevent it from jumping off the head of the screw. This pressure is liable to make the screw fall over to one side if it is excessive or directed out of the true line before the screw is half-way home. The fingers of the left hand are, therefore, placed loosely round the blade of the screwdriver a little above the point, so that they can act as a check on obliquity.

When the screw is right home it must not be over-tightened, since this may cause the screw threads to break the timber round them, which destroys the hold of the screw, and is particularly liable to happen with short or thin screws in soft woods. If it is found quite impossible to drive a screw it must be removed and the hole deepened or enlarged before the screw is re-driven. With small screws in hard timber, the screw should be withdrawn and the hole enlarged if the effort of driving becomes too great, or the screw may break.

A screwdriver seldom requires any attention if it has been correctly hardened and tempered in the first place. After a lot of hard service, however, the point may get rather bruised and rounded, when it can be restored in a few minutes by filling with a smooth file on the two long flats and right across the point, being careful to keep the actual flat point square with the length of the tool and as thick as will enter comfortably into the size screw for which the tool is meant.

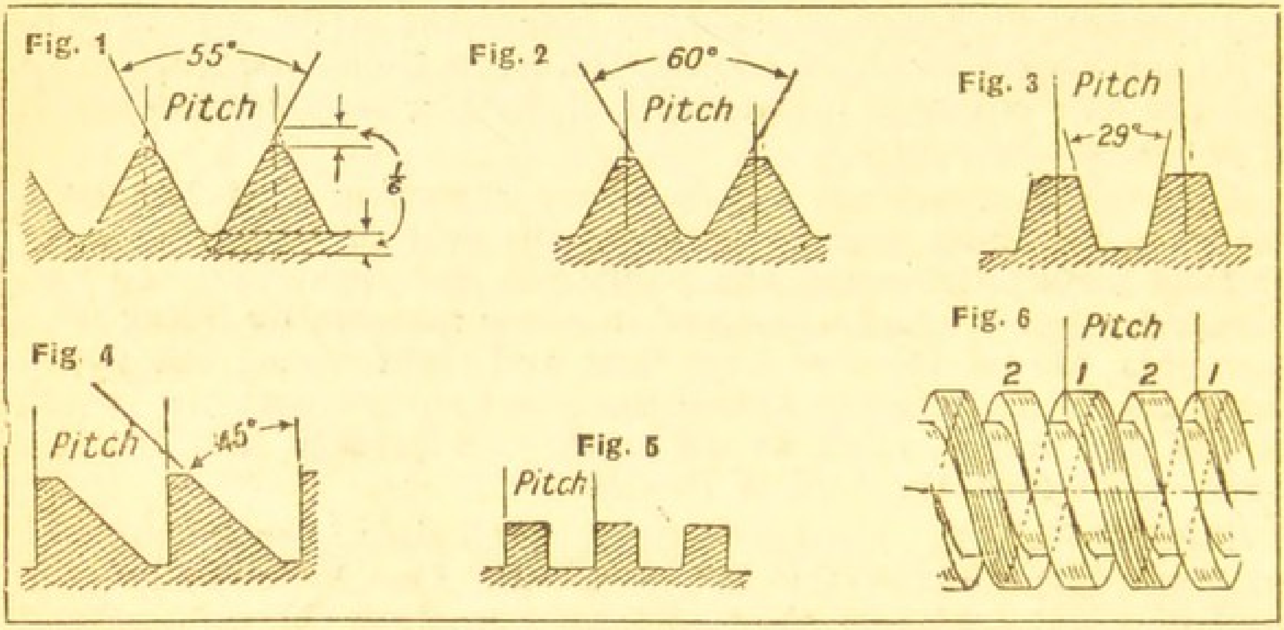
SCREW PLATE. Used for cutting small sizes in screw threads, a screw plate is obtainable in two forms. One to hold dies consists of a flat frame of steel with an adjusting thumb screw at one end ; the other is a flat plate of steel containing a number of graduated holes forming dies. The latter tool is only serviceable for the smaller sizes, since no proper clearance is possible for the chips.

SCREW THREADS. There are two classes of screw thread, the triangular and the square. The former is used where grip and maximum security are required, and the latter where progressive movement is necessary with as little binding or frictional effort as possible. The lead screw that operates the saddle of a lathe is a notable example ; the screws of all high-class machinery that are a part of the various controls are of square thread section.

The most common type of V thread is the Whitworth, which varies in pitch, i.e. in the number of threads to the inch, in relation to the diameter of the bolt. The shape of the thread is shown in Fig. 1. One-sixth of the full depth of the thread is rounded off at the top and bottom to facilitate the cutting of the thread, and to render the exposed thread of the male member, the bolt, less liable to injury. Where threads are formed by the use of stocks and dies, the shape of the thread will obviously be correct, but when the thread is cut in a lathe, such would not be the case unless great care is taken to see that the screw-cutting tool is ground to the angle of 55° on the cutting faces.

Other standard screw threads are B.S.F., British Standard fine ; B.A.S.T., British Association screw threads, the various sizes of which are stated in millimetres ; B.S.P., British Standard pipe, used for all barrel work, such as gas fitting, etc. ; and the I.S.T., International Standard thread (Fig. 2), better known as the metric thread. With this type the angle of the thread is 60°, the top of the thread being flat and the bottom rounded. The American Standard (the Sellers thread) is practically identical with the International in regard to shape of thread, but the pitch corresponds very nearly to the Whitworth table.

Two other types are the Acme and Buttress thread. The



SCREW THREAD. Fig. 1. Standard Whitworth. **Fig. 2.** International standard (metric system). **Fig. 3.** Acme standard. **Fig. 4.** Buttress thread. **Fig. 5.** Common type of square thread. **Fig. 6.** Double thread

former, Fig. 3, is a modification of the square thread, used chiefly in machine tool work where a disengaging nut is required. Owing to the fact that the thread is wider at the bottom for a given pitch than the square thread, it is much stronger.

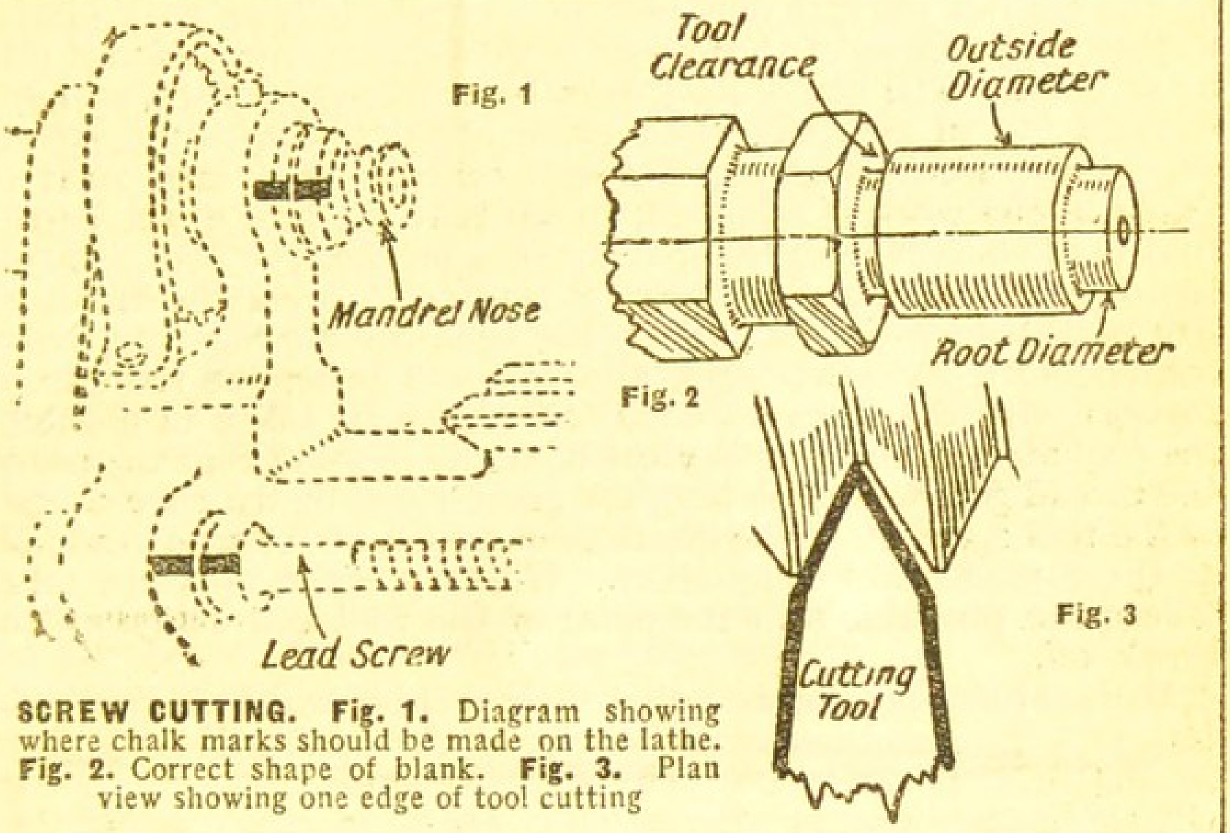
The Buttress thread (Fig. 4) is sometimes used where a screw has to resist a force acting always in one direction. It has one surface normal to the axis of the screw, like the square thread ; the other, as shown, is at an angle of about 45°.

The square thread in Fig. 5 cannot be produced satisfactorily by dies, and has to be cut in a lathe. More than one thread may be cut on the same bar, if desired, i.e. 2, 3, or more separate threads, termed leads, may go to make the complete screw, the pitch remaining the same in each case, as seen in Fig. 6.

Screw Cutting. So far as the amateur is concerned, there are two ways of cutting a screw thread, namely, by the use of stocks, dies, and taps, or in a lathe.

In using the lathe there is far more to be considered than a mere operating of the tool rest and the lead screw control nut of the lathe saddle. Some makes of small lathes are provided with a dog clutch on the lead screw instead of a split nut on the saddle. The first thing to do is to set the change wheels in accordance with the table of changes provided, selecting, if possible, a pitch that has an even multiple of the pitch of the lead screw. In other words, if there are 8 threads to the inch on the lead screw, then 16, 24, 32, and so on are even numbers, and the dog clutch or split nut that governs the travel of the saddle may be engaged at any point without fear of the tool failing to come up in register with the partly cut thread.

If an unequal number of threads per inch must be cut, it will be necessary to stop the lathe at the end of each cut and line up at the chalk marks previously made at two points, the first on



SCREW CUTTING. Fig. 1. Diagram showing where chalk marks should be made on the lathe. **Fig. 2.** Correct shape of blank. **Fig. 3.** Plan view showing one edge of tool cutting

the mandrel and the second on the lead screw, corresponding marks being made on the body of the lathe. As soon as all four marks line up the saddle may engage with the lead screw, on no account before. This is illustrated in Fig. 1.

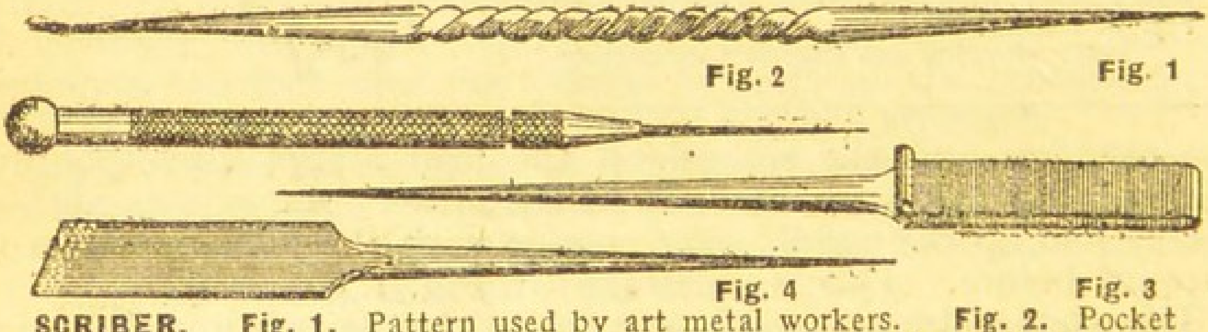
The work to be screwed is first turned to the required diameter, and a small extension, left on the end, turned to the root diameter of the thread, so as to avoid the possibility of cutting the thread too deep (Fig. 2). The work should then be placed in the lathe, either between centres or in a chuck, according to its shape. Next set the tool, ground to the correct angle, in the tool rest on a level with the centre of the work, and at an angle of 90° to the lathe bed.

Now approach the tool close up to the outside diameter of the work, so as to get the first position and reading of the handfeed index. If one is not fitted, chalk a mark on the hand wheel, then withdraw the tool a little way and place it, by means of the tool rest, about ¼ in. from the work towards the tail stock. Then return the tool about one-sixth of a revolution of the hand wheel nearer the work, as indicated by the position of the chalk mark just made.

THE FIRST CUT. Start the lathe, having first engaged the back gear and the lead screw clutch, and make the first cut, withdrawing the tool smartly when the end of the cut is reached, at the same time throwing out the lead screw clutch. Then return the tool towards the tail stock to its original position and set about 5° deeper than the one-sixth just given: throw in the clutch and make the next cut.

This process is repeated until the thread is of the correct depth. In the case of work that is held in a chuck, it is an easy matter to test the progress of the thread with the part into which it is to be screwed. The chuck may even be unscrewed off the mandrel without fear of upsetting the register of the tool with the thread. Where the work is placed between centres great care must be taken, if the work is removed, to see that the arm of the carrier that is in contact with the driving stud on the face plate is again the driving arm when the work is replaced; otherwise the work will be half a revolution out by the time the driving stud makes contact with the other arm, and this will bring the tool out of register with the thread. Great care must be taken in depthing the tool at each cut, and it must be borne in mind that the nearer the thread gets to completion, the greater will be the edge contact of the tool: therefore the depth of cut must be reduced gradually as the thread nears completion. If this precaution is not taken it is quite probable that the point of the tool will wedge up and break off.

If the above points are noted little trouble will be experienced



SCRIBER. **Fig. 1.** Pattern used by art metal workers. **Fig. 2.** Pocket scriber with removable point. **Fig. 3.** Engineer's scriber. **Fig. 4.** Marking tool

when cutting fine threads, but for coarse threads, after the first 3 or 4 cuts, the tool should be very slightly moved by means of the tool rest across the thread, so as to cause it to cut on one face only, reversing the process so that the next cut is on the opposite face (Fig. 3). The depthing of the tool is carried out as previously explained. When cutting a square thread this procedure is absolutely necessary for both fine and coarse threads. Plenty of thin oil or soap and water should be used.

SCRIBER. The scriber is used for marking purposes in every kind of metal work. It is made of steel hardened and sharpened to a fine point. The double end scriber in Fig. 1 is used by art metal workers, and is convenient to hold on account of the twisted centre. The pocket scriber in Fig. 2 is provided with a steel point which is contained in the handle when not required; the handle is knurled so that it can be held firmly. The engineer's scriber in Fig. 3 has a loop handle and one point.

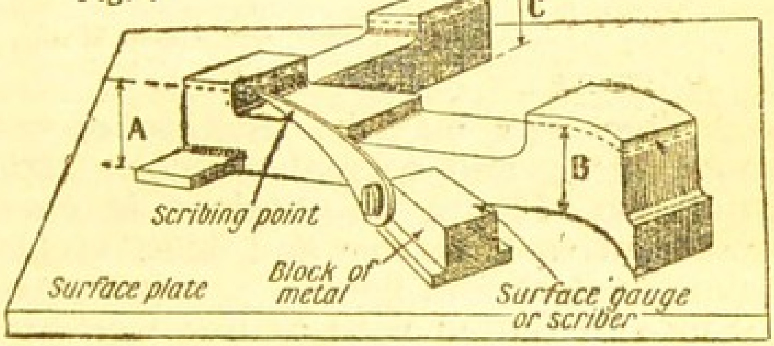
Although a marking knife is generally used for woodwork, a scribing point is sometimes necessary, and both are incorporated in a marking tool, as in Fig. 4.

SCRIBING. This is the term used for the process of scratching a gauge line on wood or metal work. In fixing a dresser against a wall, it is found that the skirting board must be allowed for and the legs of the dresser cut back to permit the fixture to stand in close to the wall. This means that a line must be marked on the dresser leg showing how much stuff ought to be cut out for an accurate fit. Again, when fitting a skirting board on an uneven floor, if the board is to fit close and its top edge be horizontal, the inequalities of floor surface must be compensated by giving a suitably shaped lower edge to the skirting board.

A pair of dividers is set to the distance between wall and dresser leg, and the points locked. Then the dividers are used as a gauge, being drawn along with one leg in contact with skirting and the other, in line, touching the dresser leg, so scratching a line on the latter showing the amount of material to be removed. When scribing the pilasters of a cupboard over the skirting, or to the wall, or when scribing a skirting board to the floor, the dividers are set to the greatest distance between the edge of the board and the wall or floor, as the case may be.

SCRIBING GAUGE. This instrument is used to obtain measurements from any flat surface of predetermined accuracy. In the testing and marking off of engineering components of all kinds, the surface plate or table is the basis of all measurements. The surface is a specially prepared casting, ribbed up at the back so that it forms a rigid base for any work laid on it, and with a top surface finished off to a high degree of accuracy. The smaller plates used on the fitter's bench are surfaced to 1–10000 in. by hand scraping in comparison with another plate, or by a patented grinding process. Work of all kinds can be mounted on the surface table and with the scribing gauge surfaces may be marked out and tested, or machining and centre lines drawn on the job according to the requirements. A sheet of plate glass is sufficiently true for amateur use.

Fig. 1



SCRIBING GAUGE. Fig. 1. Simple form of gauge

The diagram, Fig. 1, indicates how the bench surface plate and scribing gauge may be employed to mark out the levels of various lugs forming part of a casting. These lugs have to be planed off to the level shown by lines A, B, and C, which are all exactly the same height from the underneath side of the casting resting on the surface plate. The drawing at the same time shows the simplest form of surface gauge that can be made. This comprises a block of metal, the under surface of which is machined flat, and a steel arm pivoted to the block with a screw which will make it work so stiffly that it will remain in any position to which it is set. This is best accomplished by fitting a double spring washer under the head of the screw. The end of the arm should be bent over, pointed, and be made of a steel that can be hardened and tempered.

Metal work requires to be locally chalked where the scriber is to make a mark. To preserve the marks, should the chalk be rubbed off, centre-punch dots are lightly hammered along the marked lines.

Figs. 2 and 3 (on next page) illustrate a more elaborate scribing block. A V-slot in one of the vertical faces of the base block is useful for working against shafts and other round objects, while for obtaining scribed lines parallel to the edge of the surface table, or from any other straight edge, two pegs may be fitted in holes in the base. The steel pegs should be a push fit, so that they may be made to stand up or to project below the base and overhang the edge of the table or work being operated on, as illustrated. The scriber is held in a universal joint clamp permitting of movement in horizontal and vertical planes.

SEALING WAX: ITS DECORATIVE USES

Brilliant Effects that Can be Obtained by This Medium

This article belongs to the group of those describing Art Craft, which includes, among many others, Enamelling; Gesso Work; Italian Renaissance Work; Lacquer Work; Repoussé Work; Stencilling

Sealing wax may be used to decorate candlesticks, boxes, vases, etc.; and to make smaller articles, such as beads and pendants. It can be obtained in every colour, from delicate shades of rose, mauve and blue to black, and also in bronze colours, silver and gold.

Surfaces coated with sealing wax are of pure colour, smooth and brilliant. The composition is a fine coloured lacquer, and for this reason oriental designs are particularly good carried out in gold or silver wax on a ground of vermilion or black wax. The drawback to the craft is that the wax, being brittle, is easily chipped. The advantage is that such chips can be repaired by holding the broken surfaces over a spirit flame and allowing the edges of the crack to run together. When working, if not satisfied with the result the wax can be remelted and the process started again.

The materials needed for sealing wax craft are inexpensive, and requisites for the work are stocked by most stationers and at handicraft studios where materials for art crafts are sold. All that is required is a spirit-lamp, a broad-bladed knife, a wax spatula and a moulder, several steel knitting-needles, methylated spirit, and sealing wax of various colours. In addition to these, a piece of soft rag should be handy for wiping the melted wax off the tools and drying the cooled beads

Fig. 2

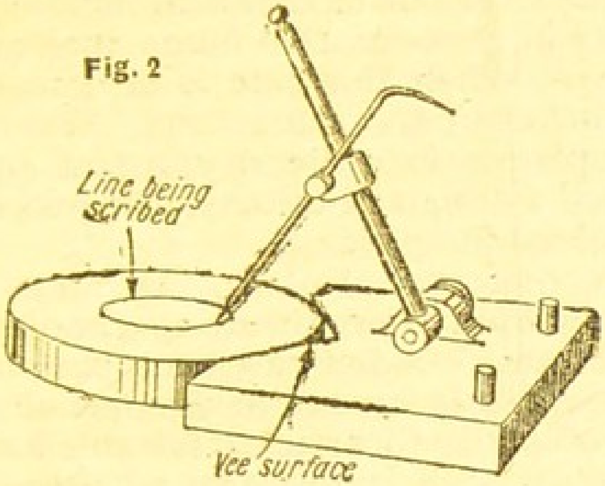
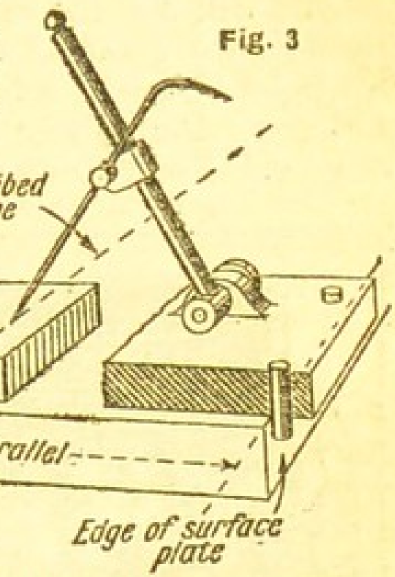


Fig. 3



SCRIBING GAUGE. Figs. 2 and **3.** Better type of gauge with V-slot

and pendants; a tumbler of cold water is needed, in which to cool the beads, etc., and the table-top should be protected by a marble slab or small sheet of plate glass.

Making Beads. Beads can be made with sealing wax in the following manner. Heat a knitting needle in the flame of the spirit-lamp, and press it into a small piece of the wax. After deciding on the colour of the beads, or on the foundation colour if they are to be multicoloured, the wax of this colour should be broken into pieces of an appropriate size.

Having got the bead on the needle, allow it to cool; then return it to the flame and rotate slowly. The bead will gradually become oval in shape, and the shaping may be assisted by the knife. A little nicety of judgment is required at this point to tell exactly the moment at which to take the bead out of the flame. If it becomes too hot, the wax will drop off, and, on the other hand, unless it is sufficiently heated the bead will suffer in shape. Very little experience, however, is needed to judge this point correctly, and the bead may be cooled by dipping it into cold water.

To blend other colours, two methods may be employed. The sticks may be heated one at a time and a little placed on the shaped bead. This is heated carefully and rotated slowly until the colours mingle with the foundation colour. After that it is cooled in water, dried, and passed quickly through the flame again to restore the lustre. As an alternative method sealing wax of the desired colour is dissolved in methylated spirit to the consistency of cream, and the solution is painted on the shaped bead.

This method is used when designs are painted on beads to obtain an effect of Venetian glass.

The bead must now be removed from the needle. Heat the needle just above and below the bead, slide the head backward and forward a few times to ensure a good hole for the threading, and finally let it drop off the needle into a glass of cold water, which will set the shape. Pendants or a central plaque for the necklace are made on a piece of stout cardboard cut to shape, a hole bored at each side, and supported on a strong hairpin, the whole of the plaque covered with wax of any colour. Let the wax spread evenly over one side first by holding the plaque over the flame once or twice. When this side is dry, coat the other in the same way. When the plaque is quite dry, paint or stencil a design in colours, using wax dissolved in spirit.

SEALING WAX. Brown vase decorated with apple blossom

DECORATING SMALL ARTICLES. One method of ornamenting candlesticks and wooden cases for match boxes, comb cases, bridge pencils and other small articles suitable for a bazaar stall is to warm whatever has been chosen to be decorated, and at the same time heat the tip of the stick of sealing wax. Then, beginning at the top, dab the wax on in spots leaving a space between each spot, and every now and again hold the article over the flame, rotating slowly and always in the same direction, until the spots of wax have melted and run smoothly over the surface. Repeat these operations until the entire surface is covered. It must be remembered that this method of decoration must not be applied to any celluloid article.

When a raised motif is required to decorate the corners or centre of a small article, or to make a border, the spatula and moulder may be used. Wreaths, baskets of flowers and tiny designs found on flowered china are specially suitable for this work. It is best to make a few trials with the hot sealing wax on a piece of cardboard and experiment on one or two flower shapes.

Mark a place with a pencil on the article where the raised work is to come. Heat the wax in the flame of the spirit lamp, and let a tiny drop fall for each flower. Use two shades of pink for a cluster of roses and put several drops one over the other. Then, while the wax is still plastic, press with the spatula round the centre and make little separate dents to form petals and a dent in the middle of these for the rose centre. The tiny leaves may be made of green, silver or gold wax and consist of a drop of wax, the spatula being drawn quickly through to make a central vein and shape the leaf, forming a nicely pointed end.

ENAMELLING WITH SEALING WAX. The most artistic effects in sealing wax decoration are obtainable by using solutions of the different coloured waxes in methylated spirit. This inexpensive craft has the appearance of fine enamelwork and can be used on a ground of sealing wax to decorate beads, or on wooden articles covered with the wax, or on pottery and glass in conventional designs.

The first step is to choose the article to be so enamelled, and to decide upon the colouring. Then break up a stick of sealing wax and place it in a small bottle, covering it with methylated spirit. Cork tightly and leave overnight to dissolve. Shake it up well. Use in the same way as liquid enamel ; a small sable brush is the best tool to employ.

Colour the design, attempting no shading, and working quickly and evenly. Practice is required to prevent the work from being patchy. The pressure on the brush must be even, and the sealing wax must be kept stirred. If it is too thick dilute it with methylated spirit. Keep the bottles well corked, and clean the brushes in methylated spirit. The shading is added when the first coat is dry.

One section must be done at once and allowed to dry, as the work is ugly if the enamel is thicker on one side than another. As the work is dry in a very short time, it should appeal to those who have nowhere to put things during the drying process.

A useful flower vase is illustrated. Its colour is dark brown, and it is decorated in gold sealing wax shaded with bronze, the design being a ring of conventional apple blossom. The leaves are in bronze green. Geometrical designs and the Greek key pattern are also suitable for bowls, jars, vases, or boxes, while Chinese motives of bird or dragon are always effective.

SEAMS FOR PLAIN SEWING

Some Helpful Directions for the Needlewoman

This article suggests reference to the one on Sewing Machines and their uses ; and also to various stitching operations, e.g. Overcasting, etc.

The plain seam is the one most commonly used in needlework. To make it, lay together the two pieces of material to be joined, with the right sides facing and the two edges exactly level, and tack along the two thicknesses where the permanent stitching is to be put in. It is a good plan, when a garment is being cut out with the aid of a paper pattern, to mark the material round the pattern edges with chalk, so that, after the pattern is removed, there is a guide to the amount of material that should be taken up in seams, etc. After tacking carefully stitch the seam by machine ; or, if small light articles are being made up, run the seam by hand if preferred, as in Fig. 1.

The stitching of all seams of garments should be commenced at the top, i.e. the waist of a skirt, shoulder of a sleeve, and so on. If one of the two edges is on the cross or bias of the fabric, it should be laid uppermost, as it is apt to stretch out of shape. When stitching a shoulder seam, always ease in the back shoulder-edge and stretch the front, in order to get a better fit over the shoulder blades.

It is the custom, when stitching seams of dresses or coats that take a concave curve at the waist, to stretch this part of each seam, so that it will still more follow the curve of the figure. Seams that take a convex curve are held in, so that they will not stretch, otherwise the shape would be spoiled. In stitching the seams of a 2-piece coat sleeve, commence by stitching the shorter or inner seam, and do the longer or back seam afterwards, easing in the elbow part of the wider or upper portion to the elbow part

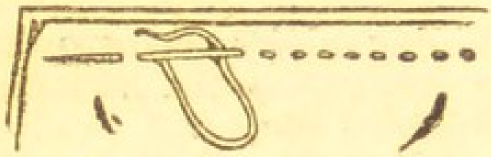


Fig. 1

Fig. 2

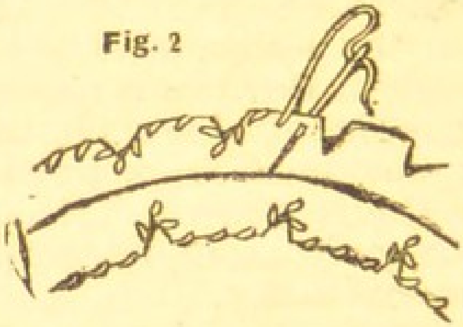


Fig. 3

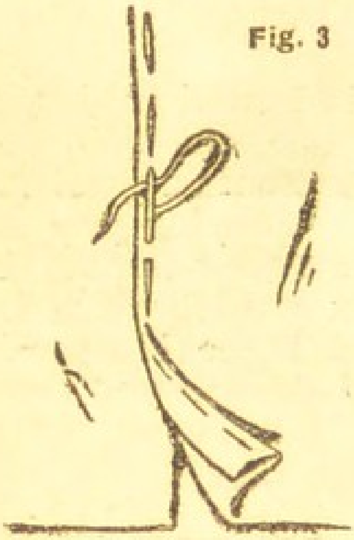
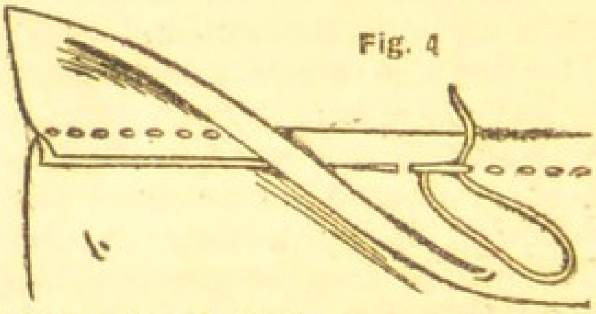


Fig. 4

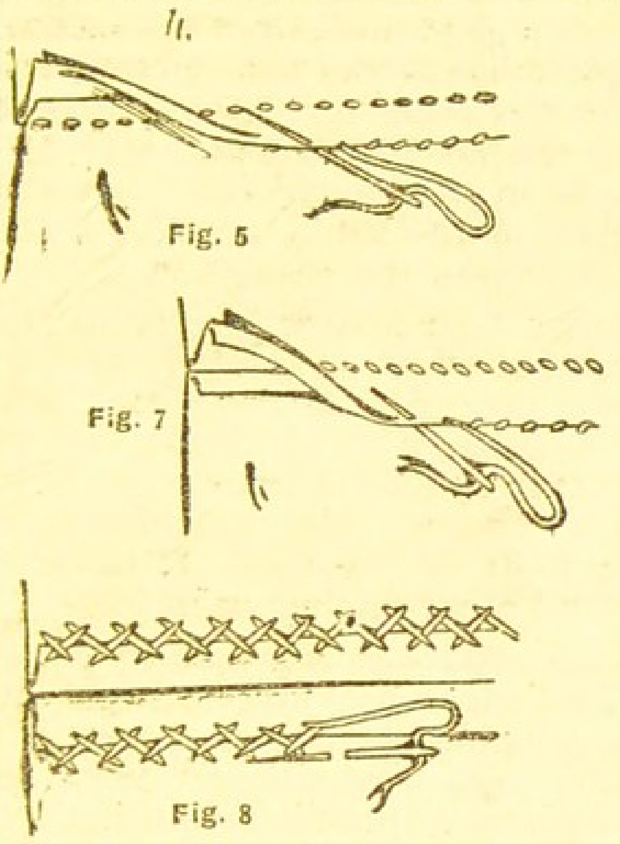


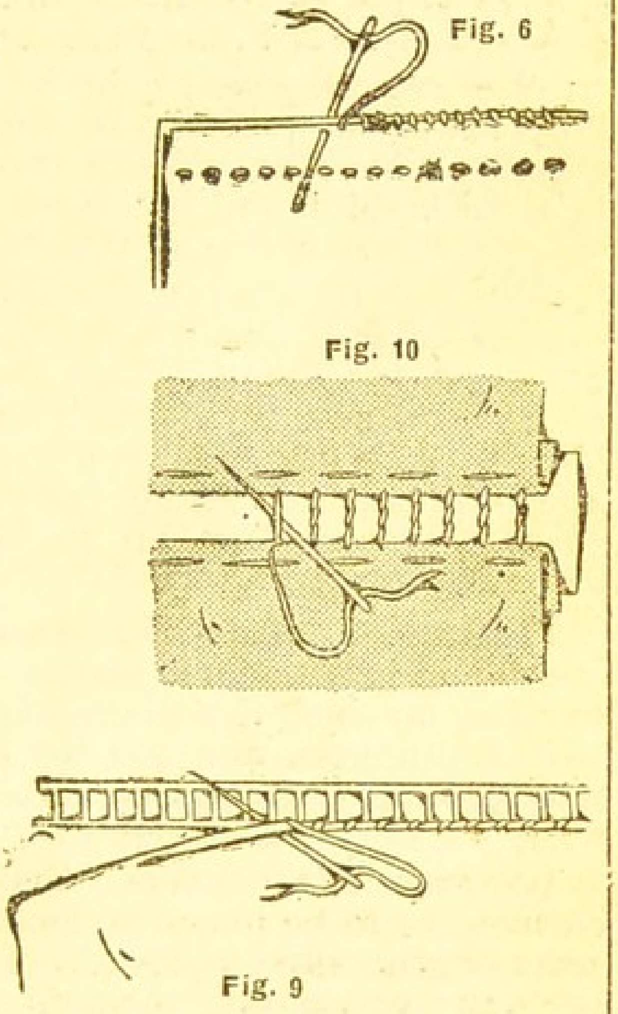
SEAM. Fig. 1. Plain seam run by hand. **Fig. 2.** Notched and overcast edges of a curved seam. **Fig. 3.** Overlapped edge. **Fig. 4.** French seam

of the narrower portion, so as to give it more play at the bend of the arm. After any plain seams are stitched, remove tackings, and iron the seam edges open flat. If the seams are curved, however, be careful to snip the turnings here and there, evenly and regularly, as in Fig. 2, otherwise it will not be possible to iron them flat; the material under the seam edges will become dented or cockled up. Many seams have their edges notched or snipped out in this way, even if they are not curved, merely to give a better effect and to prevent the edges fraying out too rapidly.

Unless the raw edges of these plain seams are to be covered with a lining, they have to be finished off. In dresses it is usual to overcast the edges, as in Fig. 2. In unlined coats or wraps, the edges are bound with lute ribbon or Prussian binding, the binding being folded double, so that the seam edge can be stitched between. In some silken materials that have little tendency to fray, the edges are merely pinked out; in heavier materials of this nature they are often pinked out or herringboned down.

Overlapped Seam. This seam is applied in the making of outer garments, and also on underclothes, pyjamas, etc. It may be used to make skirt seams, to set in yokes, and to attach strappings. It is easily made. Turn in the edge that is to be uppermost, to the amount of turning allowed, and tack along; then lap it on to the remaining edge, and again tack down, as in Fig. 3. Machine as far within the fold as desired, taking care not to go beyond the edge of the turning. The raw edges can be neatened in any of the ways previously mentioned.





SEAM. Fig. 5. Flat seam. **Fig. 6.** Oversewn seam for calico selvedges. **Fig. 7.** Counter hem. **Fig. 8.** Seam in flannel with edges herringboned down. **Fig. 9.** Beading seam for underwear. **Fig. 10.** Openwork seam

French Seam. A seam often employed on delicate materials, such as lawn, muslin, crêpe-de-Chine, net, lace and georgette is the French seam. To make, set the two layers of material together, with the wrong sides facing and raw edges level, and run or machine as close to the raw edges as possible. If it is not easy to stitch as near to these as is desired, cut the turnings away quite narrow afterwards. Now turn the material to bring the wrong side outside, and the seam lying along the top of the fold; then stitch the two layers together again, close up to the raw edges, as in Fig. 4, so that these are enclosed in a little tube.

FLAT SEAM. The stitch and fell seam is employed for flat seams. Lay together the two pieces to be joined, with right sides facing and one edge nearly $\frac{1}{4}$ in. below the other; then tack along an $\frac{1}{8}$ in. below the narrower edge, and afterwards machine, run, or back-stitch along this line. Fold the whole seam flat over on to the material, so that the narrower edge lies underneath, fold the edge of the wider turning under, and neatly hem down, as in Fig. 5.

OVERSEWN SEAM. The top-sewn or oversewn seam is used when it is desired to join the selvedges of longcloth, calico, cambric, and similar cotton materials. Tack together the two selvedges and neatly oversew, working from right to left, as in Fig. 6, and making the stitches of an even slant. No knotted ends of cotton should show. Leave a generous end of the cotton, and push it down on to the edges towards the left, so that the stitches can be made over it, at the same time not letting it drop below the position at which the needle passes through the edges. When the seam is completely oversewn, open out the two thicknesses and lay them flat on the table, and press the stitches down with the thimble to make the seam flat.

COUNTER HEM SEAM. A counter hem figures largely in the making of men's and boys' shirts, in which a specially strong, flat seam is wanted. Turn under one edge to the wrong side about $\frac{1}{8}$ in. and turn the other edge over to the right side to match. Lap one edge over the other so that the raw edges face, and run a line of tacking down the middle; then machine both edges down as close up to the folds as possible. If desired, hemming may be resorted to, instead of machining, as in Fig. 7.

FLANNEL SEAM. On flannel materials, it is usual to use a stitch-and-herringbone seam. The edges are first stitched by hand or machine in a plain seam, which is then pressed open flat with the fingers, and has the raw edges herringboned down, as in Fig. 8, the material being too bulky to permit of turning the edges under, as for hems.

WHIPPED SEAM. When the edges of fine underwear or baby clothes are to be joined to lace, insertion, or beading, a whipped seam is generally employed. Take the material in the left hand, with the wrong side towards you and raw edge upwards, and roll this raw edge over towards you as a very tiny roll, with the thumb and first finger of the left hand, doing about 1 in. Let the roll rest over the first finger, with the beading or lace above, and whip them together as shown in Fig. 9, drawing the two edges together.

If the material is to have fullness, as in the case of a skirt part that is to be joined to a bodice by a band of insertion, the skirt edge must be rolled and whipped separately from the trimming, pulling up the cotton as the work proceeds in order to get the requisite fullness. After the edge is completely rolled and whipped, it is oversewn to the trimming exactly over the first stitches, so retaining the neat effect of the seam. This rolling and whipping can be used to apply a frill to an edge, the frill, if full, being rolled and whipped and drawn up, while the garment edge is afterwards rolled and whipped to the frill as explained for beading.

OPENWORK SEAMS. Many blouses, summer dresses, baby clothes, etc., show open-work seams, which often have the effect of real hem-stitching. It is usually necessary first to hem or roll and whip the two edges that are to be joined, though in some cases a mere turning in of the edges will suffice. After the two edges are neatened, tack them down on to a strip of stiff paper, with the desired space between, and make the openwork stitchery, with embroidery silk or embroidery cotton, according to the nature of the fabric.

One type of hand-worked seam is shown in Fig. 10; but there are many others, simple herringboning being one that is much favoured, while another popular method is faggoting.

In all cases the needle should be slipped along one of the hems to bring it out to the right side in the position needed for making each stitch or group of stitches. After the stitchery is worked, the tackings are snipped and the paper removed. Openwork can also be used to attach lace to the neatened edges of underwear, etc.

SETSCREW. This name is given to a small, usually headless screw used to affix one part to another. Setscrews are employed for fixing a small pulley or gearwheel to a shaft, a knob to a spindle, and for like purposes. As the name suggests, the screw is used to set or fix the position of a movable part on another part.

SET SQUARE. This name is applied to an instrument used for testing or marking out rectangles. Carpenters and engineers use squares when working in wood and metal, but the term set square is more correctly limited to the squares used by draughtsmen. In a simple form it may consist of a thin, flat piece of pear wood triangular in shape. Two of the sides form a right angle, and the third is at an angle of 45° or 60° to one of the other sides.

In almost all cases it is necessary that one of the edges of the instrument should rest upon a T-square or batten, which is set in position parallel with the base line or principal horizontal line. By sliding the set square along the batten or T to the desired spot and drawing a line against the edge of the square, the angle formed between this line and the horizontal or base line will be 90°.

As a test for accuracy of the square portion of the instrument, turn the square over without moving the batten. If the square is correct, a second line drawn from the same point as the first will exactly coincide; but if the square is incorrect, the lines will be tapered, and the amount of taper at the extremity of the square will be the amount of error in the instrument.

Squares should always be kept clean and in a dry place, preferably hung up on the wall. Celluloid or ivorine set squares are best cleaned by washing them in soap and water. Wooden squares may be cleaned with a linen rag moistened with petrol, and then polished.

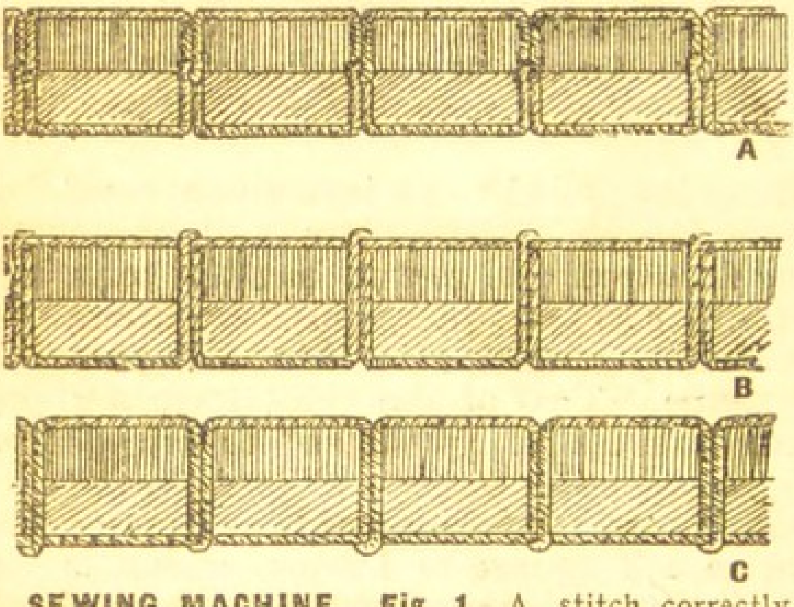
SEWING MACHINES AND THEIR CARE

How the Busy Housewife Can Save Time and Money

In connexion with this article see entries on various needlework processes, e.g. Picot; Seam, etc.

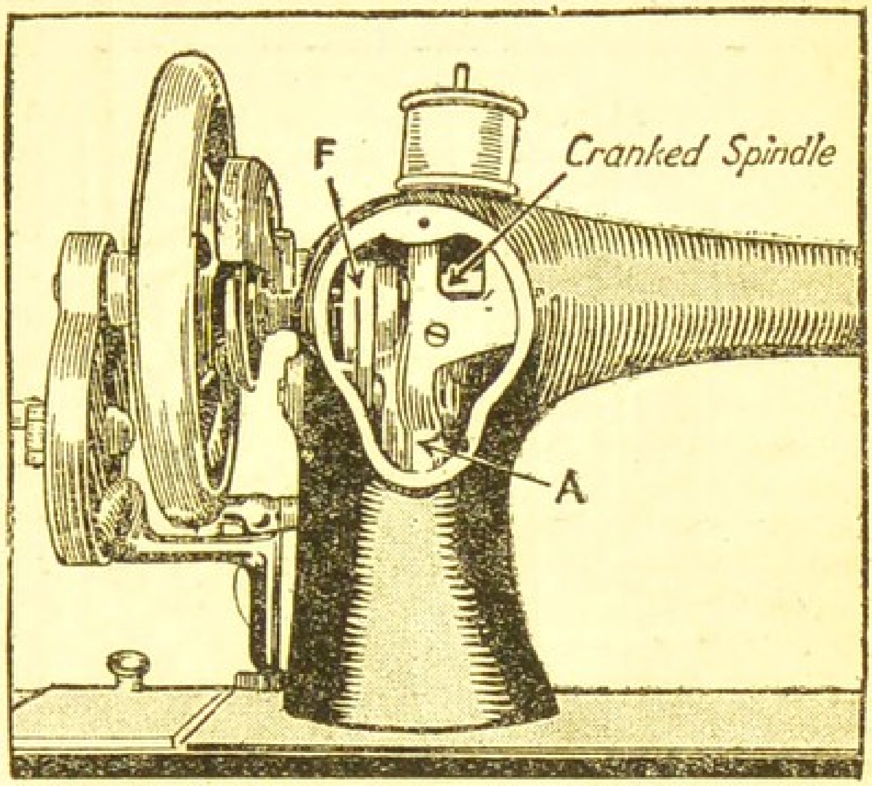
The earliest type of sewing machine, still used for children's machines, is that known as the chain-stitch, which uses only one thread. The machine in general use is the lock-stitch. In this there are two threads, one attached to the needle and the other to a spool enclosed in a shuttle. The needle carries the thread through the material, and in rising causes the thread to form a loop. The shuttle passes through the loop, which, in its passage to the top of the material, carries with it the thread from the shuttle. The tension caused by the thread attached to the needle forming the next stitch pulls up the lower thread tight (Fig. 1, A).

There are two methods of moving the shuttle in general use, one being known as the reciprocating and the other as the oscillating shuttle. The former will be found on some of the older machines and it is therefore briefly described here. In the reciprocating shuttle machine there are two shafts to convert the rotary motion from the wheel. One runs horizontally into the interior of the arm at the top of the machine, carrying at one end the heavy balance wheel, and at the other end the disk and roller for imparting the upward and downward motion to the needle-bar, together with a bevel gear wheel. The other spindle is vertical, with a similar bevel gear wheel at the top and the cam at the bottom for operating the feed lever and a balanced crank, this giving the reciprocating movement to the shuttle carrier, by means of a straight connecting rod.



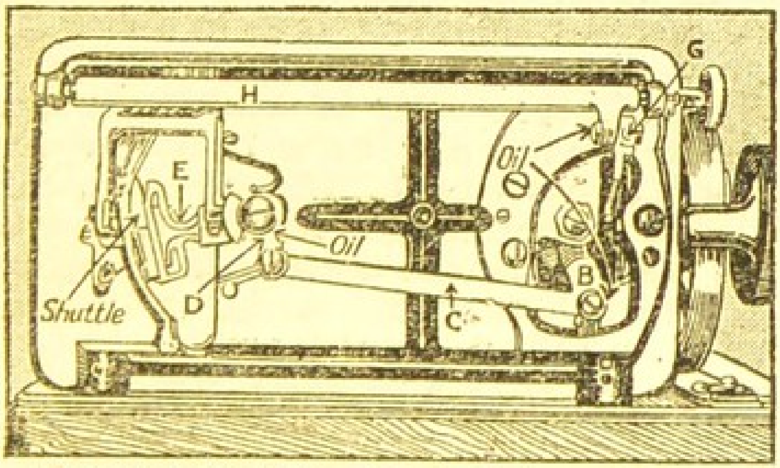
SEWING MACHINE. Fig. 1. A, stitch correctly made. B and C, stitches which result from faulty tension.

The shuttle movement is at right angles to the direction of the sewing, and the shuttle slides in a shallow recess. The whole of the movement is directed towards obtaining an exactly corresponding movement of the needle and the shuttle, and the operation of adjusting these two disconnected parts is called timing. The timing is effected by adjusting the two bevel gear wheels, so that when the needle-bar is at the bottom of its stroke the shuttle must be in such a position that it can pass through the loop formed by the thread directly the needle starts its upward stroke.



SEWING MACHINE. Fig. 2 (above). Interior view of vibrating shuttle machine, showing cranked spindle which produces a swerving movement in the vertical arm

The action of the lock-stitch is assured by this adjustment, but there are other points to be considered in order to obtain a good stitch. It is necessary to have the thread in the shuttle correctly threaded and at a suitable tension, and the thread in the needle adjusted in connexion with the take-up lever, so that when the needle-bar descends it carries the lever with its attached thread and then allows it to spring upward with the ascending stroke to gather the surplus thread used to form the loop and not required for the stitch.

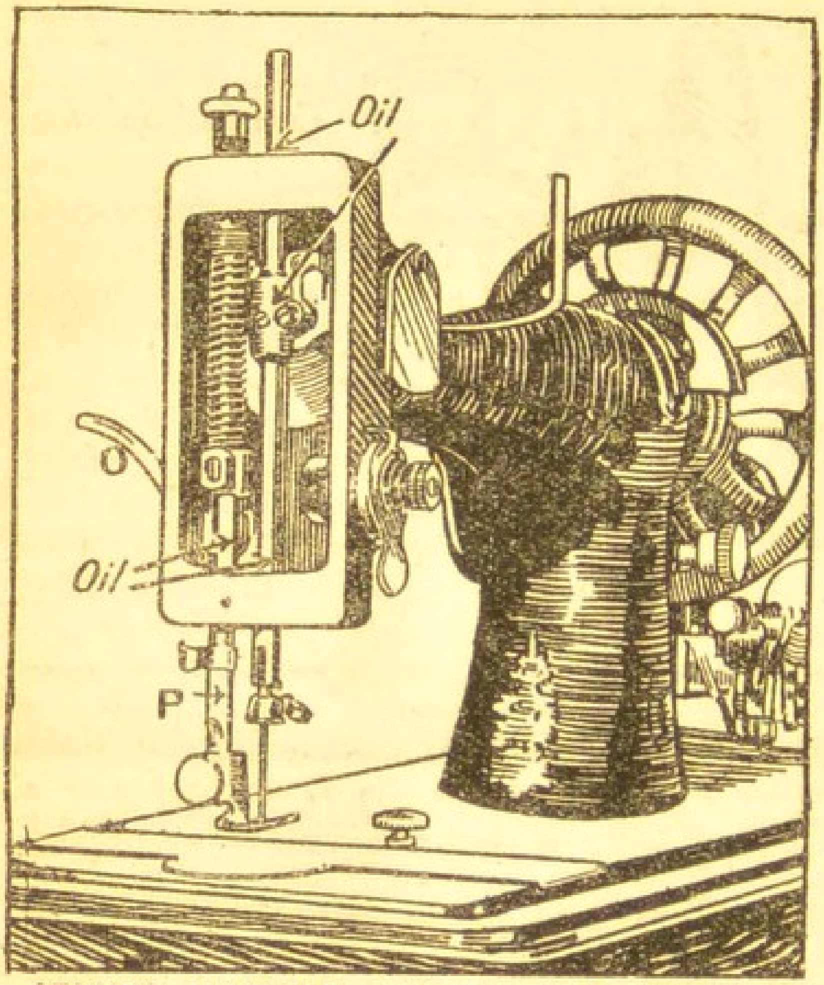


SEWING MACHINE. Fig. 4. Underneath view of vibrating shuttle machine, showing positions of the various parts and oiling points

LEADING TYPES. A vibrating shuttle machine is illustrated in Figs. 2, 3, and 4. In this the top spindle is formed with a crank which produces a swerving movement in the vertical lever A. This lever is connected at B to an arm C attached to the crank D of the shuttle carrier E. The feed movement is obtained through the cam at F (Fig. 2), and crank G (Fig. 4).

The needle-bar movement is shown at Fig. 3. The presser foot, indicated at P, presses the work down on the feed and also prevents the work being pulled up with the ascent of the needle. The pressure produced by the spring can be regulated by a screw at the top of the bar. It is lifted up by a lever at O.

The internal mechanism is the same for both hand and stand machines, the only difference being in the method of turning the balance wheel. In the hand machine a gear case is attached to the framework of the machine, and contains a large-toothed wheel provided with a handle which engages with a small-toothed wheel. The latter is connected with a movable arm, which can be attached to the balance wheel and easily removed to place the handle out of action. The stand machine has a driving wheel of large diameter, turned by a connecting rod attached to a treadle. A belt from the driving wheel transmits the power to the pulley, which forms part of the top balance wheel.



SEWING MACHINE. Fig. 3. End view of a machine, showing the needle and presser foot, and also oiling points

There is a type of machine in extensive use in which an oscillating hook-shaped shuttle carries the lower thread in a circular bobbin. The shuttle may work in a horizontal plane, or in a vertical one. There are several other kinds of sewing machine in use, as, for example, those having a circular container for the lower thread in the form of a rotary hook. Instead of moving backward and forward, the hook continues to revolve, and it is so arranged that when the needle is at the bottom of its stroke the point of the hook is a little behind it and carries the thread with it to form the lock of the stitch.

One of the best methods of operating a sewing machine is by means of an electric motor. This is attached to the back of the table. In some cases the motor is started and the speed regulated by means of a treadle or foot controller ; in others a switch-lever is fitted on the table by the driving-wheel to act as starter, regulator, brake, and stop.

The sewing-machine which is regularly used and frequently oiled will not, as a rule, go wrong ; it is irregular use and improper oiling that usually cause trouble. There are certain oiling points in every machine in which the spout of the oilcan should be placed, but from time to time the underneath mechanism and that portion covered by the frame should be attended to. The main causes of stiffness in running are clogged or gummed up oil and dust, small particles of fibre and grit. A machine that is in regular use is subject to trouble caused by dust and fibre, and it is necessary to examine the unexposed parts and clean them up occasionally. Only the finest mineral oil should be purchased and a very small quantity used at a time, all the oil holes being noted so that the oiling is thorough.

It is in the shuttle race that dust is likely to congregate, and this portion of the mechanism must be kept quite clean ; it can be wiped over with a soft rag soaked in paraffin, the connecting bars and other parts being wiped over at the same time. If the machine has been neglected and the oil has gummed up, it will be necessary to use a stiff brush with plenty of paraffin, which should be wiped off before the new oil is applied.

The regulation of the tension should be carefully attended to, for the success of the stitching mainly depends on it. Referring again to Fig. 1, the correct stitch is shown at A ; but if the tension is not enough, the thread from the needle will not do more than hold the thread from the shuttle loosely. If the tension is too tight, the shuttle may find a difficulty in passing through the loop, which is also liable to break, and, in addition, the shuttle thread, when it is pulled up, will be drawn through the material. The tension plates are fitted with a spring and an adjusting screw, so that different tensions can be given to the thread when sewing different materials. When the machine makes a good stitch with both the upper and lower tensions fairly slack, there is nothing wrong with the other adjustments.

Using the Machine. Faults in sewing are more generally the result of careless use than of defective mechanism. A bent or imperfect needle, which is a frequent cause of missed stitches, may be due to the needle not being set straight in the needle-bar, or the needle-bar being bent. Other reasons may be that the needle is incorrectly set or unsuitable for the size of the cotton. The take-up spring may be set too long, or the hole in the needle-plate too large. All these faults can be adjusted with the exception of the latter, when a new plate should be fitted.

Special care should be given to the choice of the needle ; makers usually give a table showing the size required for various thicknesses of cotton. The correct position is generally marked by a fine cut on the needle-bar, and when the eye of the needle is centred on the needle-plate the mark on the bar should coincide with one on the frame. The easiest way of centring the needle is to place an ordinary needle flat on the needle-plate and run the point of it into the eye of the machine needle, and let it remain until the screw is tightened up on the bar. The alinement of the needle should be frequently noted, as the careless handling of the material before the needle is entirely raised will often cause a a bend, and if this is allowed to remain it may not only cause missed stitches, but also damage the needle hole or the shuttle.

As a rule, the hand machine is easily worked, but the treadle machine is found difficult at first. In order to become well accustomed to the movement of the treadle, the balance or handwheel should be loosened by raising the small catch so that it will turn without moving the other parts of the machine. The presser-foot should be raised, both feet placed on the treadle, and the balance or handwheel revolved towards the machinist, never in the opposite direction. The feet are so placed that the toes and heels can be used with equal power, and have so much control over the treadle that the fly-wheel can be used slowly or quickly.

Practice should next be gained in guiding the material. For this the needle is raised, some material placed under it, and the presser-bar let down. The shuttle should not be used, and there should be no thread in the needle. The handwheel should be turned forward and the material guided as the feed carries it along. The presser-bar should be lifted to turn the material, which on no account must be pulled, as this action will bend and perhaps break the needle ; and on no account should the machine be worked unless there is some material between the foot of the presser-bar and the feed. The action of the stitch regulator should be tested, and in those machines fitted with a reversible feed this should be noted and its action practised.

The method of winding the cotton on the bobbin is more or less automatic, but if the winding is not perfectly even the adjustments should be noted, and, if out of order, put right. The shuttle should be fitted with a bobbin, and correctly threaded, so that the cotton runs out freely. The needle is threaded and the tension tested, and then the actual sewing commences.

In all modern machines there are a number of attachments for use in various kinds of work. These include, amongst others, a straight guide which serves to direct the material in a straight line, and which can be adjusted in various distances from the stitch-hole. The quilter guide is used for quilting padded materials in straight lines and squares. It is attached to the presser-bar and is easily adjusted. An automatic method of hemming can be arranged by the use of the hemmer, an attachment fitted to the presser-bar in place of the ordinary foot. The corder is a similar attachment, having a groove underneath to allow the cord to pass directly under the needle. The gatherer is a useful attachment adjusted by the length of stitch. It allows the lower of two pieces of material to be pleated or frilled, while the upper is straight and firmly stitched.

SHEEPSKIN. Sheepskin is used a great deal for bookbinding, but its wearing qualities are not of the best, and its use is confined to the cheaper class of work. It is more suitable for ladies' handbags or hats, or such goods as are not glued or pasted on to a hard substance. In covering books or other articles with sheepskin, care must be taken to preserve the artificial grain. Glue is generally used in preference to paste for this purpose. This applies more to split skins than to those of full thickness. To prepare the leather for gold tooling or lettering, it should be washed with paste water, which is thin paste about the consistency of milk, and afterwards with two coats of glair (white of egg), or, better still, with glue water and one coat of glair.

SHELF, Fixing a. In fitting up shelves it is generally preferable to use shelving board, which is simply good quality white or yellow deal in a prepared form. One surface is machine planed to a good finish, the edges and sides are clean and square, and the material is uniform in thickness and width.

Shelving board is obtainable in various sizes; those chiefly used by the amateur are known as 6, 7, 9, and 11 in. boards, and range from ½ in. thick up to about 1 in. These sizes are nominal, and the actual diameter will measure somewhat less than those mentioned. When planning shelves, it is well to bear this in mind, and also to make the width of the proposed shelves appropriate to the stock widths of the shelving board, as this obviates the necessity of ripping several lengths of timber and planing the edges up to obtain the requisite width. Generally, it is possible to provide most ordinary shelves by using a single-width board, and the best width for an ordinary shelf fitting is 9 in.

When it is desired to use a width of, say, 12 to 14 in. or thereabouts, 2 ordinary, straight-edged boards can be used and the edges held together with cross battens screwed to the underside of the shelves, or the edges may be properly planed up and glued together. Alternatives are to use tongued and grooved floorboard. When 2 or more pieces of board are placed edge to edge, the tongue of one board fits into the groove of the next and so on. Consequently, as one surface of the floorboard is prepared nicely finished up, it can conveniently be used for the wider varieties of shelves.

All that is necessary is to remove the tongue from one side by chiselling it off and, if necessary, cleaning up the edge with a small plane. If the boards are arranged so that the tongue is on the face or visible side of the shelf, there will be no need to remove the grooved portion of the board which adjoins the wall.

SHELLAC. Shellac is a fine resin, found in Indian trees, and is due to the action of the lac insect. The larva punctures the bark of the tree twigs, feeds on the gummy or resinous sap, and exudes a secretion which embeds the insects. The female secretes a red fluid known as lac dye.

The lac includes the twigs 2 or 3 in. long, on which it is formed in nodules, and is known as stick lac. For export to England it may take the following forms: seed lac, shellac, button lac, or garnet lac. Seed lac consists of the small lumps of natural lac broken off the twigs and washed.

Shellac is melted out of seed lac in rough bags held near a charcoal fire, the bags being wrung to squeeze out the molten resin. It is spread on cylinders, allowed to cool, and scraped off in flakes. The best quality of shellac is of a bright pale orange colour, quite transparent, and free from dirt and grit. Button lac only differs in that it is melted into larger pieces. Garnet lac is moulded into thick, flat pieces.

Shellac is soluble in methylated spirit and spirits of wine, and in this form is used as a French polish. It is also employed to make lacquers, or spirit varnishes, in various degrees of clearness.

SHELL STITCH. The shell stitch forms a solid or all-over pattern in crochet work. The original stitch is a cockleshell shape, but there are many modern variations of it with spaces between the shells, and alternate rows of open stitches and solid shells. It is used where a close pattern is required.

The number of chain stitches on the foundation row should be divisible by 3 with 2 stitches over. To work the first row, put 1 treble in the fifth chain from the hook, then 3 more trebles in the same place; * miss 2 stitches, 1 double crochet in the next stitch, miss 2 stitches, 5 trebles in the next stitch, and repeat from * to the end of the row, finishing with a shell of 5 trebles.

For the second row slip-stitch over the first 2 trebles of first shell, and work 1 double crochet into the centre treble of the same shell, putting the hook into the back loop of the stitch throughout the pattern. * 5 trebles in the next double crochet, 1 double crochet in the centre treble of the next shell and repeat from * to the end of the row, finishing with 1 double crochet in the centre of the last shell, turn with 4 chains.

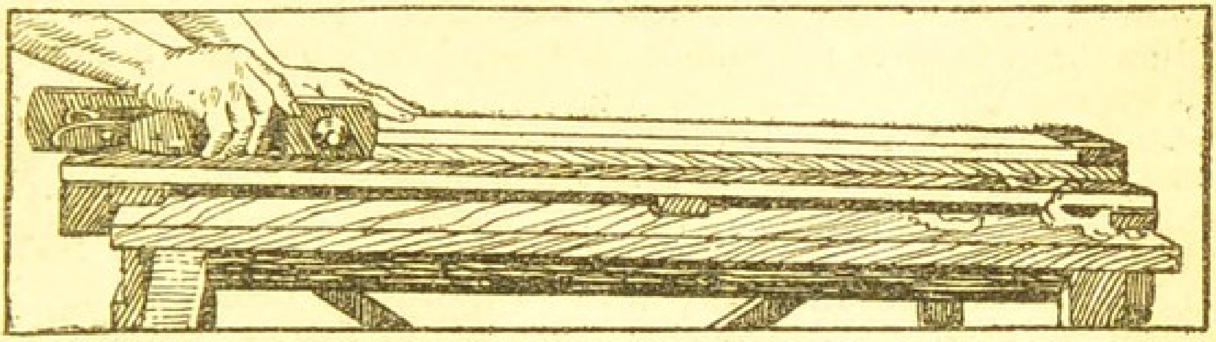
For the third row put 4 trebles in the first double crochet over which the turning chains stand, then 1 double crochet in the centre of the next shell and repeat shells and double crochet alternately all along. Take note that a shell is always worked over a double crochet, and a double crochet in the middle of a shell of the previous row. Repeat the last 2 rows for the amount of pattern required if a straight piece of the same width all the way up is wanted.

Where a sloped edge to narrow the piece is desired, the decreasing is made on the shell by working 3 trebles only in the end shell, and also where the shell begins the row at the opposite side. Then, on the return row, this decreased shell is not worked into. By this method a gradual slope is given to the piece.

SHODDY, the Material. Real shoddy is even better and more expensive than some kinds of new wool, and is made by pulling woven or knitted cloth to shreds and using the fibre for the same purposes as virgin wool. Inferior sorts, however, are also used. Shoddy enters largely into cheap costume cloths, boys' tweeds, etc. Shoddy is very difficult to detect with any certainty, although sometimes its presence can be inferred from the flabby feeling or dingy colour of wool cloths.

SHOOTING BOARD. A shooting board is used by wood workers for preparing the edges of timber. It consists of a guide for the plane and a stop, or support, to rest against the work that is being prepared. An example of a shooting board is illustrated in use. The base consists of an ordinary piece of board 9 in. wide and about an inch thick. To the outer surface of this another board about 6 in. wide and 1 in. or more in thickness is to be glued and screwed. These two boards must be very carefully planed up on all four sides. The two parts may then be glued together and cramped up, and while the glue is setting the battens may be prepared.

If the shooting board is about 4 ft. in length it will be found convenient for most purposes, but it may be increased or decreased as required. Three battens will be needed for the under side, and these should be about 8 in. long, 2 in. wide, and 1 in. thick, glued and screwed to the shooting board, and arranged one at each end and one in the middle.



SHOOTING BOARD. Planing the way of the grain

If the shooting board is used on a kitchen table or an extemporized work bench, it will be found convenient to screw a strong stop block to the under side of the board on the left-hand end. Make this block about 2 in. square and 8 in. long and fasten the ordinary batten at this end next to the block, inside. The purpose is to enable the board to be placed on the top of the table with the block overhanging the left-hand end, so that it will act as a stop and prevent the board moving while the planing operations are in progress.

The next step is to prepare a similar piece of batten; it should be equal in width to the narrower of the two pieces of timber forming the shooting board. This batten should be securely glued and screwed to the right-hand upper side of the board.

To use such a board the piece of timber to be planed on the edge is rested on the upper part of the board, one end against the stop. A jack or similar plane, with parallel sides, is laid on its side on the lower board and pushed up and down with the right hand, as shown in the illustration. The work is held with the left hand, and so positioned that when the plane is pressed against the edge of the upper part of the board it is just able to cut the timber.

Another use to which the shooting board can be put is in planing up the ends of comparatively narrow pieces of timber, such as battens and mouldings. These are simply held up against the stop on the end of the board, while a plane is worked across the end grain. It is necessary to take a small bevel cut on the opposite side of the work to that which is first reached by the plane iron; otherwise the grain will split and the work be spoiled. When not in use, the board should be hung up on the wall.

SILICA. Many materials contain this substance; rock crystal quartz, and flint are practically pure silica. Chemically silica is an oxide of silicium with silicon as its base. Silica is the chief substance of which glass is made; in a pulverized state such as sand, it is an essential ingredient in strong mortar. Plate glass and window glass are silicates of soda, and flint glass is a similar compound with a considerable addition of lead silicate.

SILK. The quality, texture and sheen of silk vary considerably, according to the kind of silkworm that produces it. The strong, natural coloured silks called tussore or shantung are obtained from a so-called wild silkworm. Finer silks, bright yellow and white in colour, are produced by the mulberry silkworm.

Chiffon, crêpe-de-Chine, ninon, velvet, satin, taffeta, georgette, stockinette, and brocade are but a few of the fabrics that are composed chiefly of silk. It is very suitable for clothing, as it is a bad conductor of heat, thus keeping in the heat of the body, and it is very durable and absorbs moisture, although not so readily as wool. Hand-woven materials in silk are particularly beautiful and give good wear. The use of pure silk for furnishing fabrics has been largely superseded by artificial silk mixtures.

As silk is not a cheap fabric, it is more adulterated than any other material, the object being to give weight and generally to improve the appearance of silks of poor quality and uneven texture. Coloured glacé silks are frequently loaded with mineral salts. These weighted silks wear badly, splitting after being in use a short time. Other common fillings are clay, starch, ultramarine, and size.

A simple test to determine the degree of adulteration is to soak a pattern of the silk in warm water for half an hour, and then wash it carefully, using ordinary soap. If the character of the fabric is hardly changed, this proves that the silk has not been adulterated to any extent. A thread of pure silk when heated in a flame shrivels and forms a little bump or knob at the end; silk containing tin salts does not do this, but forms ash similar in length to the thread burnt.

SILVERING, of Mirrors. In the production of mirrors one surface of the glass is coated with a mixture of silver, and this process is known as silvering.

A method that should give satisfactory results is as follows: Prepare a solution of nitrate of silver in the proportions of 90 gr. of the silver to 4 oz. of distilled water. Prepare a solution of pure caustic potash in the proportions of 1 oz. of potash to 25 oz. of distilled water, and a third solution consisting of 1 oz. of milk sugar in powder form to 11 oz. of distilled water.

The half of the first solution is placed in a clean tumbler or other glass vessel, and pure ammonia (sp. g. 0·880) added to it very slowly, drop by drop, until the precipitate is just dissolved. Twice the quantity of the second solution is added, and ammonia again added to the solution until it just becomes clear. It is then further diluted with distilled water, the proportions being $1\frac{1}{2}$ times that of the combined solution. The next step is to add gradually some of the first solution until a slight grey precipitate is formed which does not re-dissolve. It is then allowed to settle, and some of the third solution is added and well stirred.

The plate glass to be silvered has now to be properly cleaned. This can be done by washing in a solution of ammonia water, following this by washing in a solution of hydrochloric acid, in the proportions of 1 part of the acid to 100 parts of distilled water. The glass is then rinsed, dried, and polished with a perfectly clean cloth. The plate must now be placed on a dish and carefully levelled until the surface of the glass is perfectly flat and horizontal, when the solution is poured very gently on to the glass so that it will cover the whole plate.

The operation must be carried out in a warm room, which must be quite free from dust, and the glass allowed to remain for several hours. At the end of that time the solution is poured off the plate, the latter again set level, and a fresh supply of solution poured upon it, and left there until the silver has deposited. The plate is well rinsed in distilled water and set aside to dry. It is then given a coat of varnish, following this by a coat of good paint made up from finely-ground red lead and a little turpentine. Every vessel used for the solutions for the separate steps in the various processes must be chemically clean.

SILVER WORK FOR THE AMATEUR

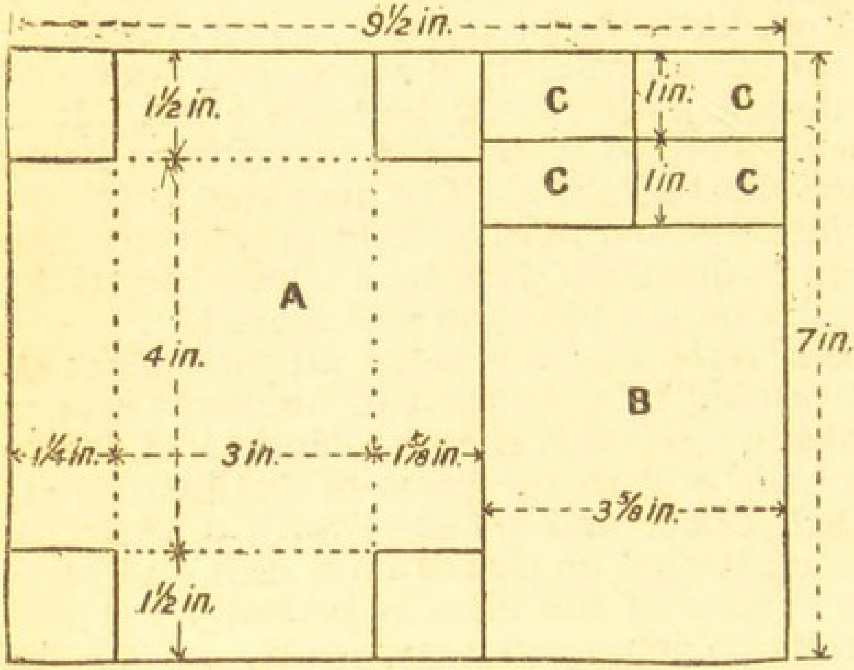
Two Methods of Making Ornaments for the Home

The metal worker may also, with advantage, turn to the articles in this work on Drilling; Riveting; Soldering. Those on kindred crafts are described under Enamelling, Repoussé Work, etc.

The working of silver, as dealt with in this article, falls into three main divisions. The first is confined to the manipulation of the flat metal, and includes riveting, silver soldering, repoussé, and chasing. The second deals with beaten work, such as the shaping of bowls and other round shapes worked from the flat metal. Another form of silver work comprises the use of the metal when it has been drawn out in the form of wire in any section. It can also be cast and used with enamel.

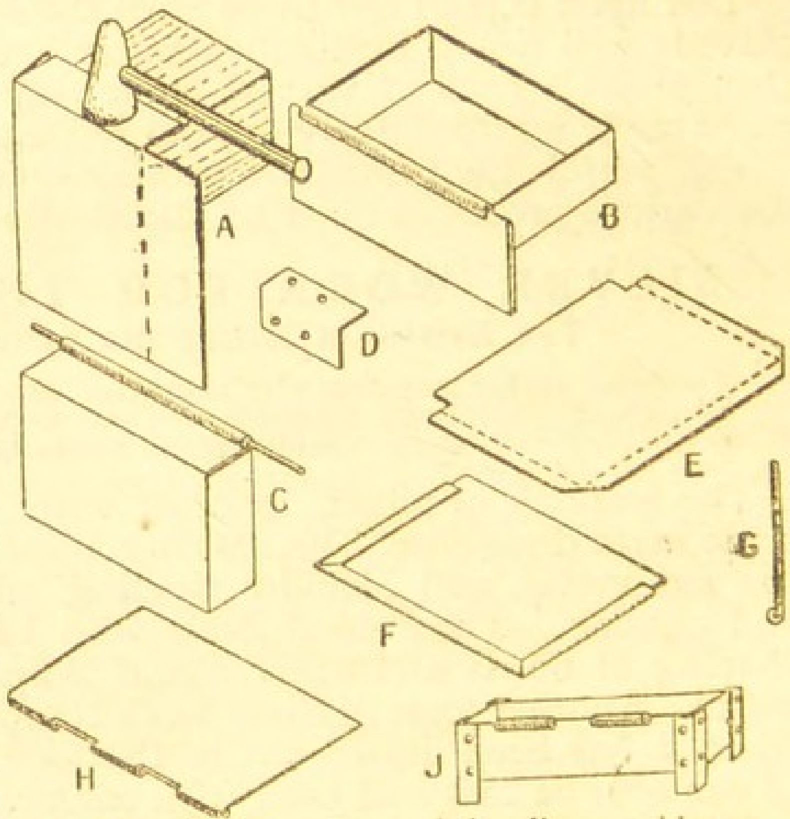
Silver is generally sold by the ounce and measured by the metal gauge, but the thicknesses mentioned will be in S.W.G., and it should be obtained rolled ready for use from a silversmith, or a dealer in art metal working materials. The various tools required for each stage are enumerated as they are required, and the essential ones are illustrated.

A Cigarette Box. A simple piece of work for the beginner might consist of a cigarette box, with corner angle-plates forming feet and a hinged lid. Suitable gauge is 20 S.W.G., and a piece measuring 9½ in. by 7 in. will be sufficient for the whole of the box. Mark out the piece of metal as in Fig. 1. A forms the base and sides, B the top, and C the angle-pieces. The small squares surrounding A are waste, but they will be found useful for making various small articles. The parts are cut apart with a pair of shears and the edges trued up with a file. The next step is to bend up the sides on a hardwood block, as in Fig. 2, A, fitted in the vice or firmly attached to a table, using a mallet and working very lightly so as not to bruise the metal. The back is turned over on a piece of steel measuring ⅛ in. thick, as at B, the top edge being rounded and made perfectly smooth with emery cloth.

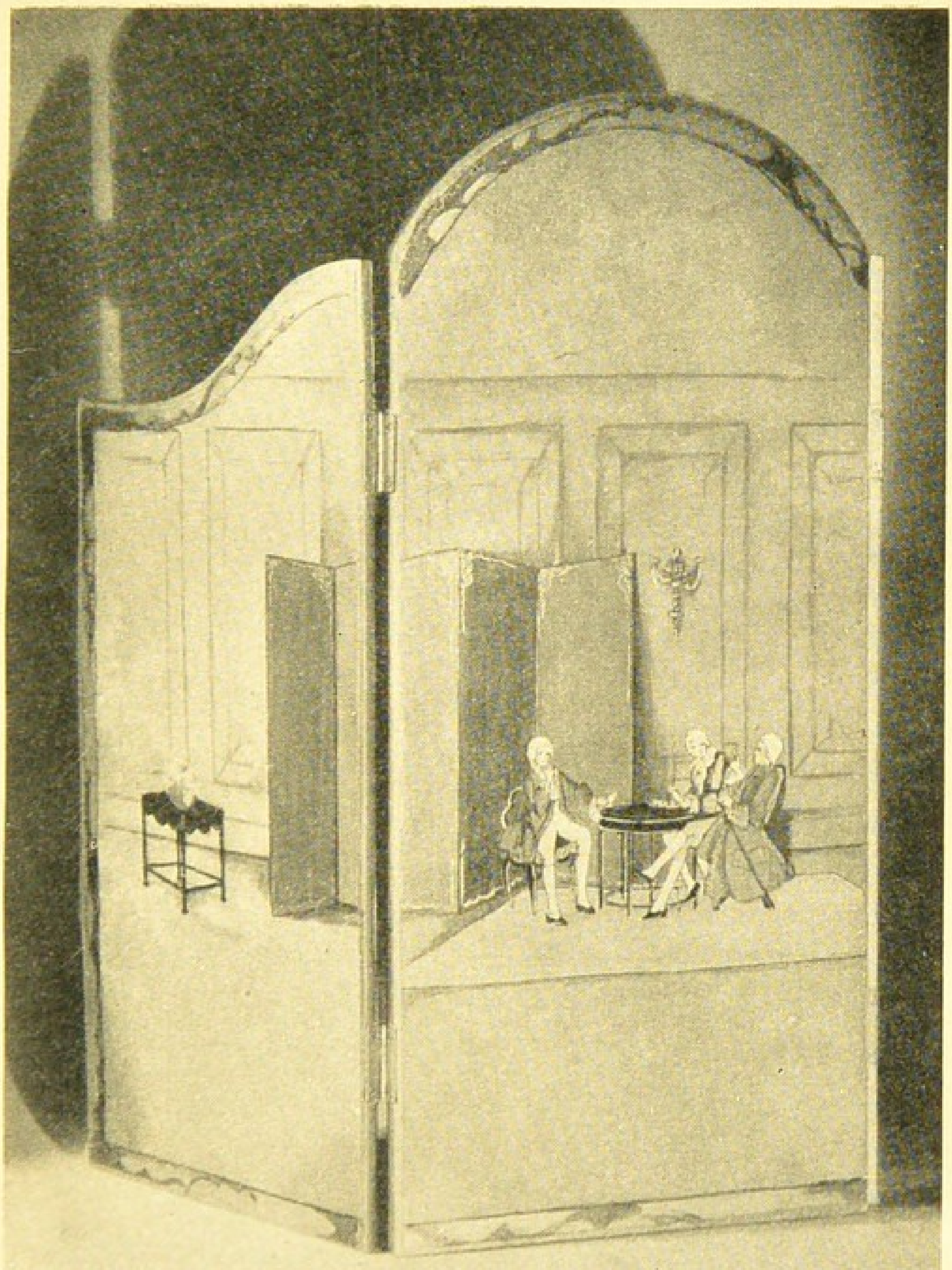


SILVER WORK. Fig. 1. Piece of silver marked out for making a simply designed cigarette box : A, base and sides ; B, top ; C, angle pieces.

Having folded the metal on to the face of the stake, place a length of ⅛ in. steel rod in the hollow and carry the metal around it to close it in, as in C. The corner pieces are bent in the centre at right angles, as at D, and the holes for the rivets drilled.



SILVER WORK. Fig. 2. A, bending up sides on hardwood block ; B, edge of back turned over steel plate ; C, round closed over steel rod ; D, corner piece ; E, lid ; F, edges of lid folded back ; G, sectional view of edge turned over steel rod ; H, cuts made for hinge ; J, box ready for lid



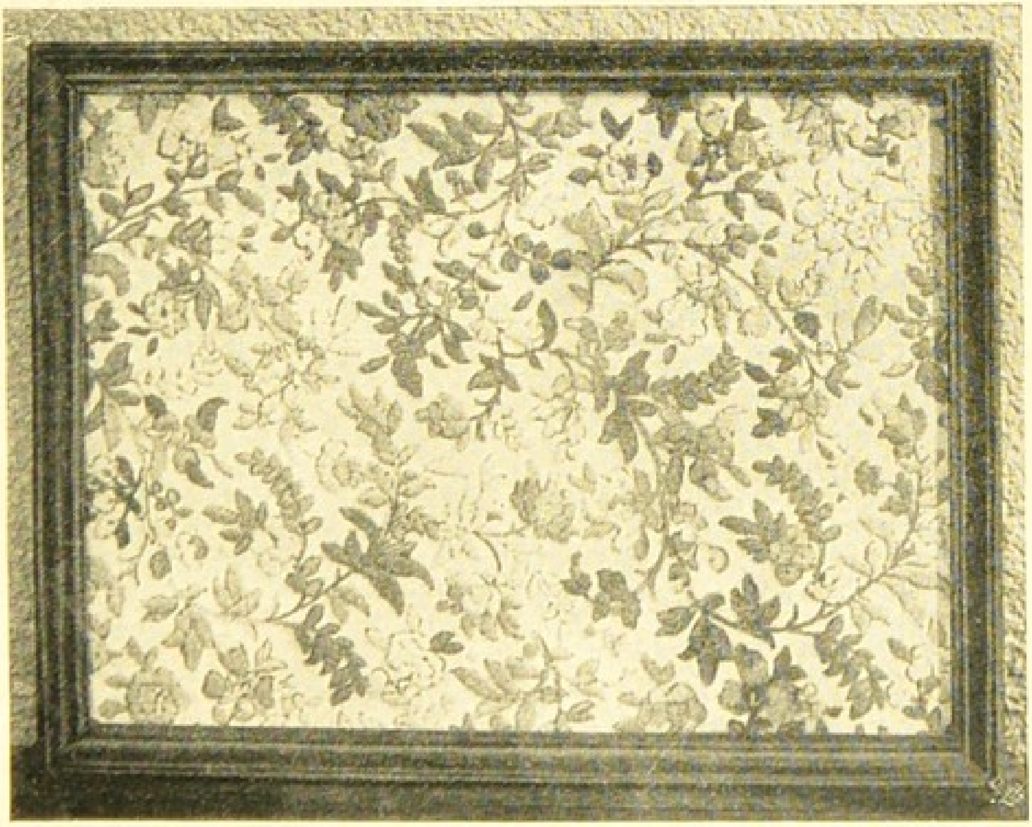
Plywood telephone screen with painted design and border in bright colours.
This screen can be easily made at home for a trifling cost

ATTRACTIVE SCREEN FOR THE TELEPHONE

Above. Period figure telephone cover. A doll's body to the waist is used for the upper portion and the silk skirt billows out over a wire frame. Right. Wooden screen on a revolving base, shown with pad and lamp to match

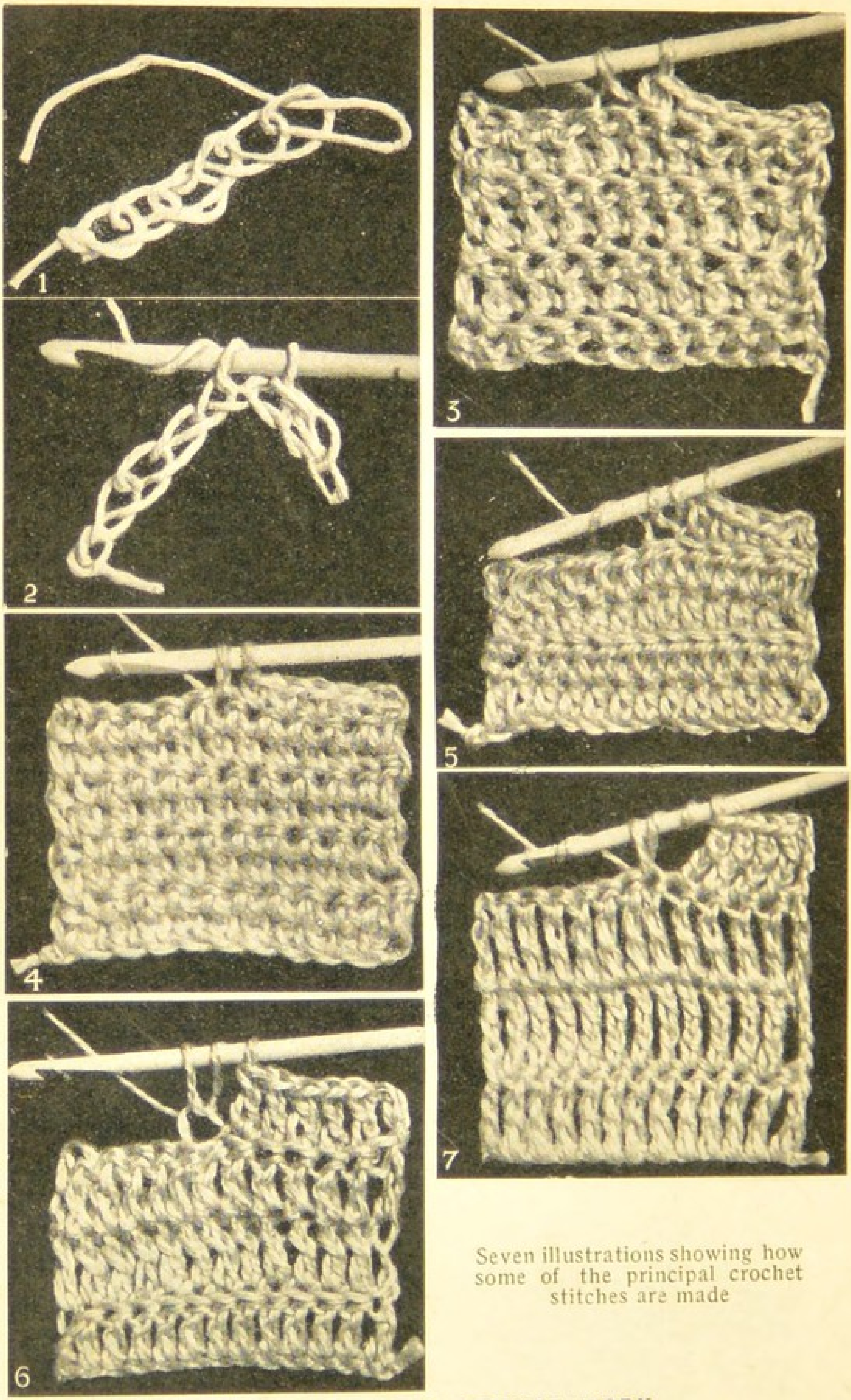
CAMOUFLAGE FOR THE TELEPHONE

TEA COSY. Plush duck cosy for the nursery teapot. Scraps of the plush left over can be made into ducklings to keep eggs warm



TRAYS. Pretty afternoon tea-tray made from a piece of embroidery, backed, framed and glazed

SUGGESTIONS FOR A TEA COSY AND A TRAY



Seven illustrations showing how some of the principal crochet stitches are made

PICTURE LESSON IN CROCHET WORK

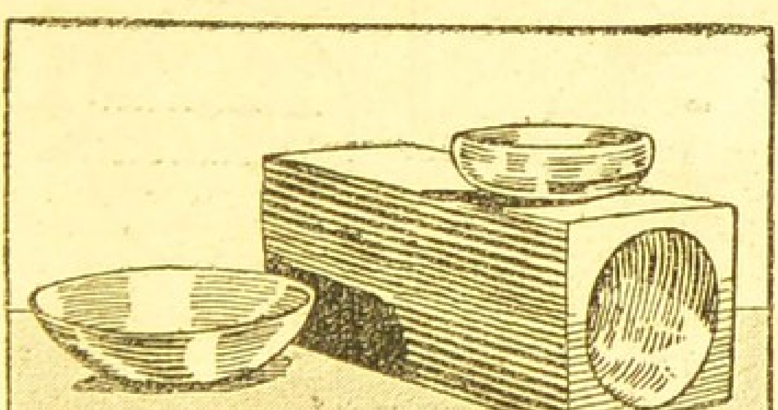
These pieces are placed in position one at a time, the holes marked through and corresponding holes drilled in the sides.

The lid is cut to the shape shown at E, and the edges first turned over at right angles and then folded over quite flat, as at F. The back projection is turned over on the narrow stake and the round completed as at G, in the same way as the bottom. The two rounded portions are placed together to mark out the cuts to form the hinge; these are then made with a piercing saw, as at H and J, and trued up with a file. A length of brass or copper wire is then cut to the length of the side and fitted in.

SILVER WORK. Fig. 4. Blocking hammer used on a hollow block

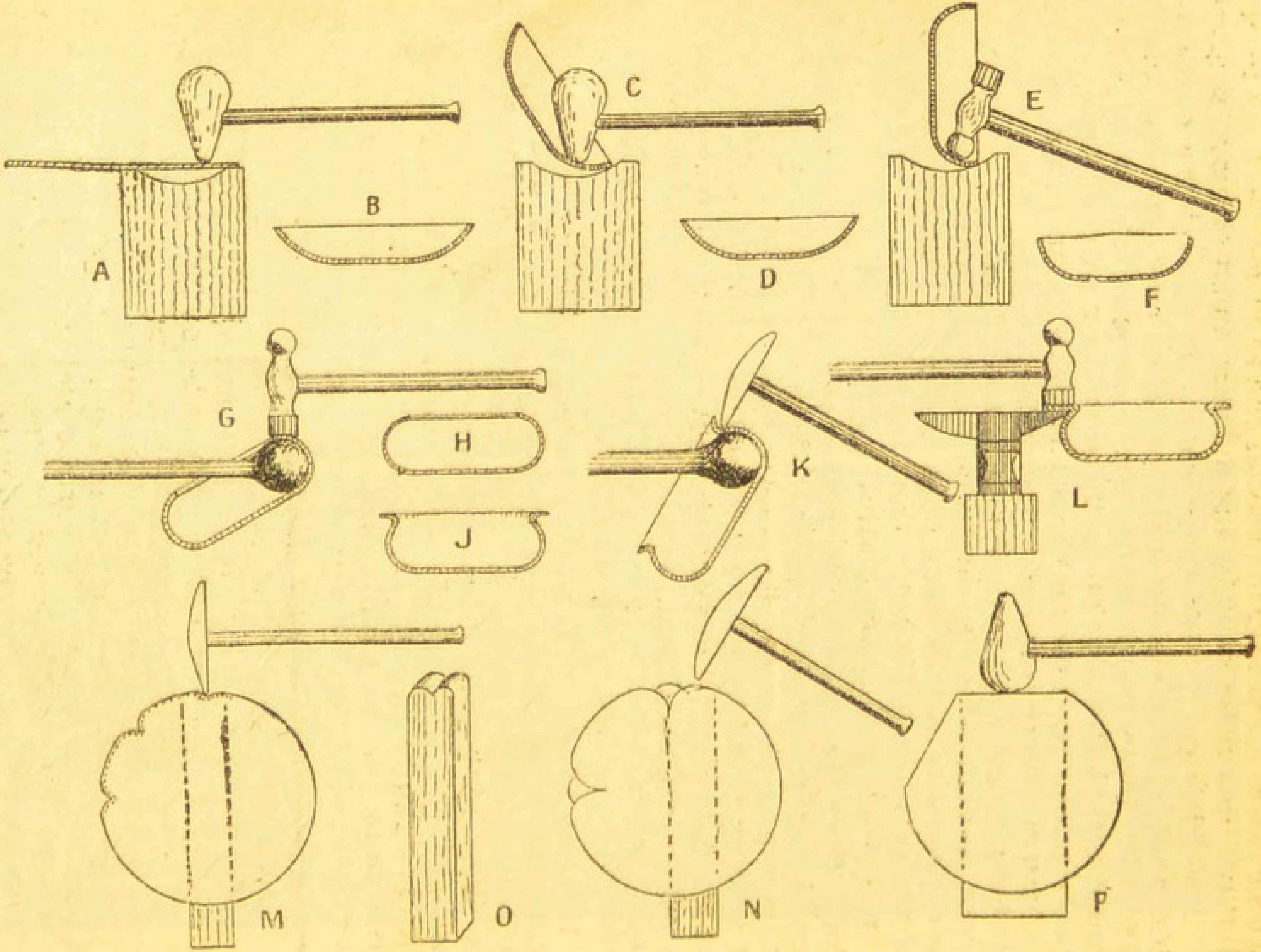
If the hinge work has been neatly done there is no need to solder the round in a small piece of work, but in making a larger casket on similar lines it is safer to solder the joint, especially with a heavy lid. Considerable variety is possible in the design of small boxes, and a pleasing effect is to use hinges (either pierced or in repoussé) soldered or riveted to the lid and back.

Hollow Work. The second division in silver working is that of forming bowl shapes from the flat metal, and this can be done by three distinct methods. The commonest is that of forming the shape by beating it into a depression on a block of wood, or over the edge of a block. The simplest article to commence with is a pin bowl, as in Fig. 3, made from a piece of 18 S.W.G. silver from 3 in. to 4 in. in diameter. With a compass draw the size of the base inside a 4 in. circle; it should be about 2 in. in diameter, leaving 1 in. all round to form the sides. Next provide a stake of the necessary shape (Fig. 3). This is made from a piece of hardwood about 3 in. square and 6 in. long. Place the block upright in the vice, mark a 2 in. diameter circle in the centre, and then with a gouge cut out a concave depression to a depth of $\frac{1}{2}$ in., finishing the hollow as smoothly as possible.



SILVER WORK. Fig. 3. Silver bowls that can be made by following the instructions given

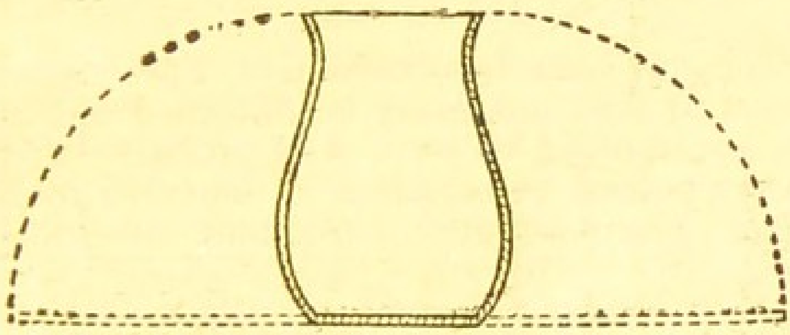
Place the metal over the depression on the block, and, as shown in Fig. 4, beat down the metal into the hollow with the ball end of the hammer, or with a bossing mallet such as is usually employed for this process (A, Fig. 5). A series of blows should be struck all round



SILVER WORK. Fig. 5. Various processes in making bowls: A, beating hollow in metal with bossing mallet; B, result of striking a series of blows round the metal; C, bowl tilted for another round of blows; D, result of second round; E, third round of blows; F, its result, sides nearly upright; G, beating edge round a poker head; H, resulting shape; J, shape with out-turned edge; K, method of turning edge; L. out-turned edge, flattened; M and N, methods of forming a fluted edge; O, notched block for fluted edge; P, panelled shape achieved by flattening rounded sides the metal, and the result will be as shown at B, Fig. 5. The bowl is tilted up a little as at C, and another round of blows is given; this will bring the sides up higher, as at D. The next stage is similar with the bowl still higher, as at E, and when this round is complete the sides should be nearly upright, as at F, and it will be somewhat difficult to proceed further with the hammer.

The final stage calls for the use of a stake, but as this is rather expensive, the beginner will find the round end of a poker quite as good for small work. Before the final shaping is done, the silver must be annealed by placing it on top of a shallow bowl filled with charcoal or small coke, and playing a blow-pipe flame over it until it is red hot. The alternative is to place the bowl over a gas flame, but the greatest care must be taken not to overheat the metal. A good earthenware bowl should be provided to hold the pickle of equal parts of sulphuric acid and water, and the annealed metal is then dipped in it and left until it becomes frosty white, when it is washed and dried in sawdust.

The bowl is now placed on an appropriately shaped stake and the edge beaten over, or the same process followed with the poker-head, as at G, Fig. 5, and this will result in the shape as at H.



SILVER WORK. **Fig. 6.** Shape for a vase, shown in section, which can be made from a circular piece of silver.

PLANISHING. The bowl at this stage should be quite even in shape, but to give it the desired finish, the surface must be planished after being annealed. A stake is almost a necessity if the planishing is to be done in a workmanlike manner, but if a conical-shaped poker-head can be obtained and the end filed off, it will be possible to get close to the inside corner. The regular and even hammer marks on hand-made silver work give it a beauty and charm that is impossible to produce in any other way; but the real effect of the planishing is to true up the surface and stiffen the shape. It is possible to spoil the work with careless planishing; the hammer blows must be evenly spaced and weighted, and if the hammering is heavier in one part than another the bowl will be uneven and difficult to true up.

Another method of forming a bowl requires no other tools than a hammer or mallet and an anvil, or very hard wooden block. It is done by placing the metal on the anvil and, commencing in the centre, hammering in concentric circles to the outside. The success of this method depends on accurate hammer work.

Once having worked out a simple bowl shape by either of the above methods, it will not be difficult to form this into other shapes. It is just as easy to turn the edges out as in. For example, the shape at J, Fig. 5, can be worked on a stake as at K, and the edge flattened out as at L by hammering the edge on a bick iron. Fluted forms can be formed by using a raising hammer as at M and N, on a notched block as at O, and panelled shapes can be worked by flattening the round sides as at P.

COURSING. This process consists of hammering the metal carefully against a stake. The metal should be held in contact with the stake about 1 in. below where the hammer is struck in order that the metal is hammered on to the stake. To make the shape shown in the section at Fig. 6, a piece of 16 S.W.G. silver should be cut in a circle a little larger than the contour of the section, as shown by the dotted lines. Next draw a number of concentric circles commencing 1 in. from the centre, each one increasing in radius to the outside, in order to guide the hammer blows. The metal is now beaten into a rough bowl shape with a mallet by driving it into a hollow stake.

Then fix a stake in the vice, and commence hammering, the blows being carried completely round; a second course follows $\frac{1}{2}$ in. higher up, and each succeeding course is followed out in the same way as before.

The metal has a tendency to work into wrinkles. These must not be allowed to increase in size, but must be flattened out at once; if these wrinkles are allowed to form it is probable that the work will split at that point. A selection of suitable tools for the work is essential. The necessity of frequent annealing must not be forgotten.

SOLDERING. The worker cannot advance very far without silver soldering, which requires the use of a blow-pipe and a spirit lamp.

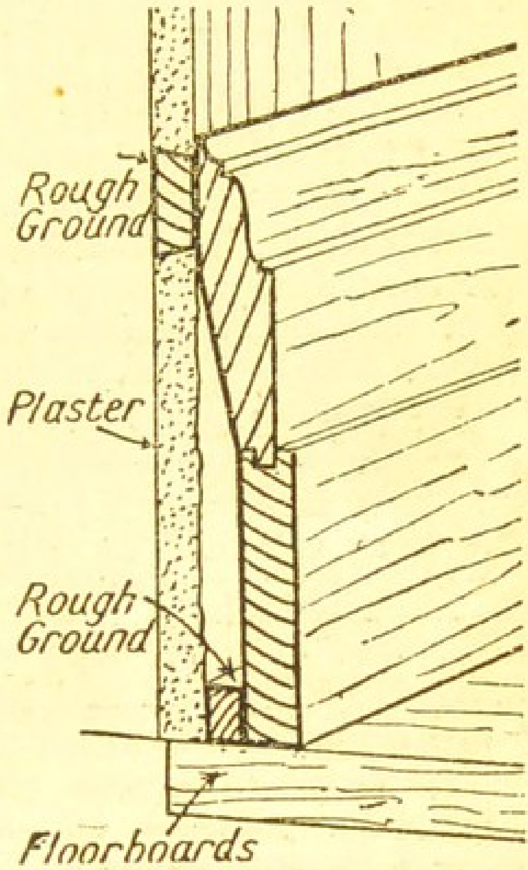
The method of using the mouth blow-pipe is as follows. The portions surrounding the joins are freshly scraped or filed, fixed in place with binding wire, and touched with borax, which is rubbed down with a little water, and applied in the form of a thick cream. Small snippets of silver solder are placed close up to the joint, which is now ready for the application of the flame.

The lamp flame is directed around the work first to warm it, and presently the borax will boil up and then run into a fluid state, carrying with it the solder. The parts to be united must be kept in close contact till the work has cooled.

SIZE. Size is a glutinous substance commonly made from the parings of leather, hoofs, parchment, etc., after prolonged boiling in water and purification by straining. It may also be made from common glue and potatoes. Painters use size in connexion with various kinds of work. Before a wood floor is varnished it should be sized, the size stopping up the pores of the wood and thus allowing an easy and economical application of the varnish.

Size is generally a constituent of good distempers; it has an adhesive effect upon the distemper after it is applied to the walls or ceilings of a building. Size may be purchased from any colour merchant in kegs; it is then in a jelly or viscous state; but it may also be obtained in a concentrated form in small packets. To render it fit for use it is dissolved by boiling water and applied hot with a brush. Wallpapers are sometimes sized so as to obtain a smooth surface for the varnish.

SKIRTING. When fixing skirting boards, the heart side should be used as the face in order that the lateral tendency of the timber to warp will only cause the top edge to be forced more tightly against the face of the plaster. When a single skirting board is used, it should only be nailed along the top edge; the lower edge should be tongued and fitted into a groove cut in the floorboards, so that the skirting board is able to shrink and twist without splitting. The depth of the tongue should be sufficient to allow for shrinkage and expansion without entirely coming away from the joint at the bottom.



SKIRTING BOARD. Section of built-up skirting board, showing also method of fixing it to wall and floorboards

SCRIBING A SKIRTING. Sometimes in older houses, when it is desired to fit a new skirting board, it may be found that the floor has settled and is no longer flat. In such a case, the best procedure is to scribe the skirting board to the floor. To do this, it is placed in position and set with its upper edge horizontal. It will then be found to be resting at one or more places on the floor. A pair of dividers is set so that the distance between their two faces is exactly the same as that between the floor and the lower edge of the skirting board.

The dividers are then used as a scriber by moving them along over the surface of the floor, with the upper leg pressing on the skirting board, and keeping the points vertically above each other. By doing this, a line will be scratched on the surface of the skirting board, and its contour will exactly equal that of the floor. The board is then removed, accurately sawn, and finished, if necessary, with a spokeshave or plane to this scribed line, when, on placing in it position, it should fit the contours of the floor exactly.

In better class construction, the skirting board is built up from several pieces or sections, properly jointed together, as in the diagram, which also shows how the skirting is fixed to the wall and the floor. The skirting in this example is composed of two pieces, the lower one being practically an ordinary board with a groove ploughed in its upper edge.

The upper part of the skirting is moulded at the top, the lower edge being tongued and fitted into grooves in the lower timbers. The skirting is attached to the wall by means of strips of rough wood known as grounds. These are generally about $\frac{3}{4}$ in. thick and 2 or 3 in. wide. The grounds are nailed to breeze bricks, wood blocks, or plugs, or even by driving the nails into the mortar joints between the bricks.

The edges of the grounds which adjoin the plaster work are planed up to an angle, so that when the plaster is applied it acts as a key and assists in holding the grounds and the plaster in position. The grounds are carried right around the room about $\frac{1}{2}$ in. or so below the upper edge of the skirting. To support the lower edge a rectangular or other sectioned strip of wood may be nailed to the floor to provide a stop or abutment for the skirting, which is then nailed to this rough strip.

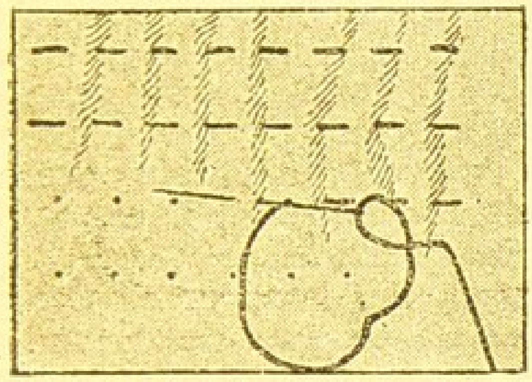
SMOCKING, in Needlework. Smocking is formed by gathers which are drawn into vertical pleats by running gathering threads at certain distances from each other. The latter depend on the design, and are used as guides for spacing when the decorative part is begun. The stitches on the surface of the pleats are the ordinary sewing and embroidery stitches. They all appear on the surface of the work, except in honeycomb smocking, when only the stitches that connect the pleats can be seen on the right side, the rest of the stitch being run inside.

It is particularly useful on the wrists and at the necks of frocks and of small boys' suits, as it is elastic and will stretch easily over the head and hands.

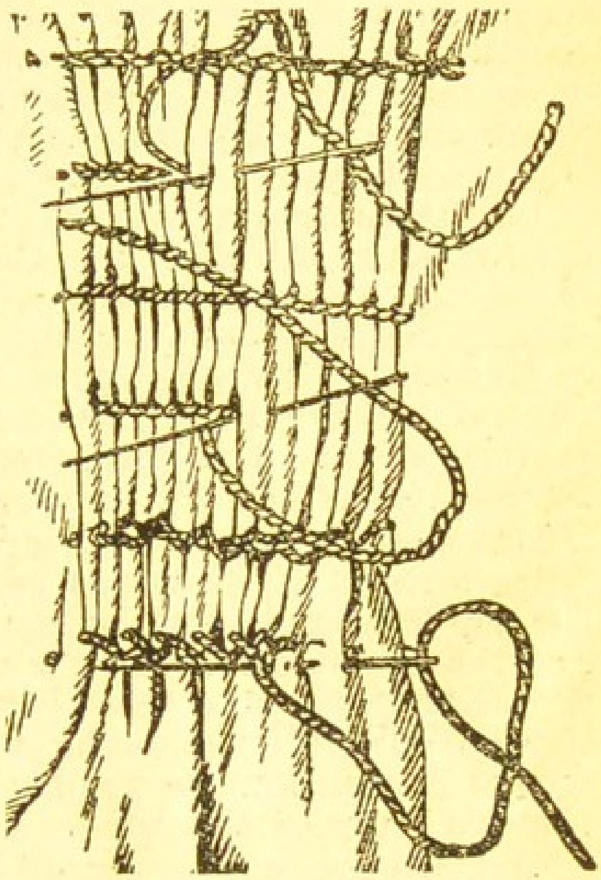
Methods of Working. Mercerized cottons may be employed for smocking casement cloth and similar goods, embroidery cottons for nainsook and other white goods, linen embroidery threads for soft linens and twisted embroidery silk on washing silks.

Smocking transfers consist of sheets of paper with dots marked in transfer ink, which are transferred to the material by means of a hot iron. The dots are spaced evenly, about $\frac{3}{16}$ in. apart, along the row and the rows about $\frac{1}{2}$ in. apart. If a transfer is not at hand, a card with holes at the correct intervals through which the point of the pencil is inserted makes a permanent marker. Before using either the transfer or a marker the material should be stretched on a drawing-board and secured with drawing pins.

To gather, begin at the top right-hand corner, and put a good knot at the end of the cotton ; make a little backstitch here to prevent the knot from going through. These gathering threads are drawn out afterwards, as they only serve to hold the pleats together. Put the needle down through the material again half-way between the first and second dots, and out again at the second dot. This will result in a flat stitch lying over the first half of the space between the first and second dots. Continue this to the end of the row. Fig. 1 shows two gathering threads completed and the third row with the needle in position. Repeat this gathering thread on all the rows of dots. When they are all finished draw up the top thread and secure the latter round the pin at the left side as for ordinary gathering. Fig. 3 shows three of the pins with the cotton twisted round. After drawing up the top row stroke the pleats into position. Draw up, secure and stroke each row, when the work will be ready for the smocking stitches. When the work is begun the threads can be released a little but must still be fastened round the pins while working. It is necessary to draw the pleats up tight at first to set them in an even position. Fig. 2 shows specimens of four different stitches, from which many pretty designs can be formed.

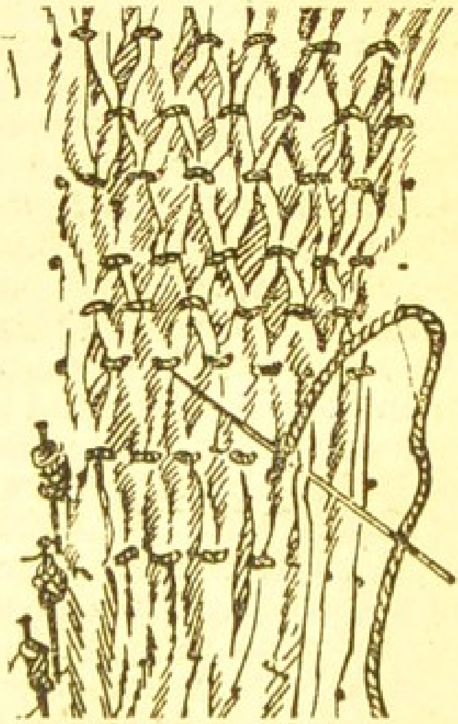


SMOCKING. Fig. 1. Running the gathering threads along dotted lines



SMOCKING. Fig. 2. Four different stitches used, all worked from left to right

The top row shows ordinary stem stitch completed and the second row the same stitch in progress, taking up the stitch on the top of a pleat, and bringing the needle out under the cotton. If the work is held sideways the thread is thrown over to the left of the needle. Note that the work proceeds from left to right. The third row shows crewel outline stitch completed, the fourth row crewel stitch in progress. The only difference is that the loop of thread is thrown over to the right in working and the



SMOCKING. Fig. 3. Honeycomb design shown in two sizes needle comes out above the thread. The fifth row of the same figure shows alternate stitch, that is, outline stitch for the first stitch and stem stitch for the second one, repeating these two movements alternately across the row. The last row on the same figure is herringbone stitch, taking the first and second pleats together for the first top stitch, and the second and third pleats together for the next lower stitch; for the top part of the next cross take the third and fourth pleats together and continue across the row. For each new stitch take the second pleat of the last pair, together with a new pleat.

In the same way all the feather-stitching patterns can be carried out in this work, and the 3 stitches in Fig. 2 can be worked in zig-zags or waves to form new designs. In Fig. 2 the gathering threads are fastened off at the back of the work for the purpose of illustration, but when they are cut out entirely the smocking expands, causing the pleats to stand up evenly and giving a much prettier effect. The gathering threads should not, however, be removed entirely until the work is completed.

HONEYCOMB DESIGN. Fig. 3 shows the honeycomb design. After setting the pleats as described above, join the thread to the top left-hand pleat, as the work proceeds from left to right, and take a stitch through the second and first pleats. Insert the needle in the second pleat just where the last stitch was made, slip the needle down under the pleat and bring it out on the second line of dots for the big honeycomb or half-way between the two lines for the smaller honeycomb.

The two sizes are illustrated in Fig. 3. This long stitch running through the pleat must be entirely hidden. Take a back-stitch through the third and second pleats, slip the needle under the third pleat and bring it out on the first running line again. Take a stitch through the fourth and third pleats, and slip the needle down through the last pleat to the second line once again. Reference to Fig. 3 will show clearly how succeeding rows are formed, always taking the second pleat of the last pair with the new pleat in the middle row, to open the honeycomb. The third row is a repetition of the first row, which closes the honeycomb at the lower end. The needle is shown in position taking a back-stitch through two pleats.

Many pretty designs can be made with honeycomb stitch, such as vandykes, gradually tapering the pattern off to a point, with only one diamond in the last row, and it only requires a little ingenuity for the worker to show individual taste, especially if she has a working knowledge of a number of embroidery stitches.

SMOOTHING PLANE. The most usual type is about 8 in. long, which is enough for ordinary finishing purposes. The method of assembling and adjusting is much the same as for a jack plane, except that to loosen the plane iron, the back of the plane is tapped with a hammer or mallet. No handle is required. The plane is grasped at the back with the right hand; the left hand is placed on the front.

SOCKS FOR ADULTS AND CHILDREN

Home-Knitted Articles Compared With Purchased Ones

This article gives detailed instructions for knitting a pair of woollen and a pair of silk socks for a man and a pair of woollen socks for a child. Kindred articles on knitted wear include Knitting; Needlework; Stockings, etc. See also Silk; Wool

The method of making a pair of men's woollen socks which can be easily knitted at home is here described. They are of average size, and since the leg is not shaped, they can be made either longer or shorter without necessitating a change of pattern. The knitting is done at a tension to produce about 10 stitches to the inch in width: 4 oz. of 4-ply Beehive Soft Knitting wool and 4 No. 13 knitting needles are required to make a pair.

Begin by casting on 84 stitches, 28 on each of 3 needles, and work in rounds, in ribs of knit 2 and purl 2 until 4 in. have been worked.

Continue in plain knitting until the sock measures 11 in., and then commence the heel as follows: Knit the first 21 stitches of the round on to one needle, and slip the last 21 stitches of the round on to the other end of the same needle. These 42 stitches are for the heel, and all the others, which make up the instep, should be divided on to two needles.

On the heel stitches purl and knit a row alternately until 41 more rows are worked. The first stitch of each row should be slipped, and the last row should be a purl one. To turn the heel, knit 26, knit 2 together, then turn, purl 11 and purl 2 together. Turn, knit 12, knit 2 together. Turn, purl 13, purl 2 together. Turn, knit 14, knit 2 together. Turn again, and continue in this way until all the heel stitches are worked on to one row again. Then knit 13 stitches and the heel is completed.

Slip all the instep stitches on to one needle, and on to the first needle knit the remaining stitches of the heel. Knit up 21 stitches at the side of the heel and the first stitch from the instep needle, and with a second needle knit all the instep stitches but the last one. With a third needle knit the last instep stitch; then knit up 21 stitches at the other side of the heel, and the other 13 heel stitches. Knit one round without shaping, and then decrease thus for the instep in the next round. Knit to the last four stitches of the first needle; knit 2 together, knit 2. Knit the stitches on the second needle without shaping, but on the third, knit 2, knit 2 together, and through the back of the loops knit to the end of the needle. Repeat the last 2 rounds until only 20 stitches remain on each of the first and third needles. If a 10 in. foot is required, work without shaping until the sock measures 6½ in. from the side of the heel where the stitches were knitted up; for a 10½ in. foot, work 7 in. from the side of the heel, and 7½ in. for a foot measuring 11 in.

Shape the toe thus: * Knit to the last three stitches on the first needle, then knit 2 together and knit 1. On the second needle, knit 1, knit 2 together, and then knit to the last 3 stitches; then knit 2 together, and knit 1. On the third needle, knit 1, knit 2 together through the back of the loops, and knit to the end of the row. Knit 1 round without shaping, and then repeat from * until only 24 stitches remain on the round. Knit the stitches on the first needle on to the third, and close the toe, by the procedure known as grafting.

To do this, place the two needles together, and having threaded the wool into the bodkin, work in the following way: Place the bodkin in the first stitch of the front row, as for knitting, slip the stitch off the needle, and draw the wool through. Then put the bodkin in the second stitch of the front needle as for purling, and draw the wool through, but do not slip the stitch off the needle. Pass the bodkin under the front needle, put it in the first stitch of the back row, as for purling, draw the wool through and slip the stitch off the needle. Then place the bodkin in the second stitch of the back row, this time as for knitting, and draw the wool through, but do not slip the stitch off the needle. By this it will be seen that the action of the bodkin is reversed on the back needle. Repeat until all the stitches are worked off, and take care not to draw up the wool too tightly. When the last stitch is reached, pass the wool through it and fasten it off securely on the wrong side.

CHILD'S SOCKS. Woollen socks with striped coloured tops, for a child of about 6 years of age, can be made according to the following directions. The socks measure $8\frac{1}{2}$ in. from the top to the ankle and 7 in. from the back of the heel to the point of the toe, and the work is done at a tension to produce about 10 stitches to the inch in width. The materials required are $1\frac{1}{2}$ oz. of Beehive 3-ply Scotch fingering wool in white or grey, and $\frac{1}{2}$ oz. of the same kind of wool in any other colour for the turnover or striped tops, with four No. 14 steel knitting needles.

With the coloured wool cast 24 stitches on each of 3 needles, and working the top in a rib of knit 1 and purl 1, do 4 rounds in the coloured wool and 4 rounds in white, then 1 round in colour, 4 rounds in white, 4 rounds in colour, 4 rounds in white. This completes the top, and as both sides are the same it does not require turning in cases where the socks are to be worn with a turnover top.

Knit the next round in plain knitting and increase one stitch at the beginning of the round by picking up a loop of the previous round and knitting it as an ordinary stitch. Now begin the shaping for the leg in the next round. * Knit 1 stitch, knit 2 together, knit to the last 3 stitches of the round, slip 1, knit 1, pass the slipped stitch over the knitted, knit 1. Knit 4 rounds without any shaping. Repeat from * 3 more times, then do another decrease round, making 5 decrease rounds and 10 stitches decreased away all together. Work 54 more rounds to reach the ankle. Extra rounds are worked here for longer sock.

Now begin the heel. Knit the first 16 stitches of the round on to one needle, slip the last 16 stitches of the same round on the other end of the same needle; these 32 stitches are for the heel flap. Divide the remaining 31 stitches on 2 needles and leave them for the instep. Now work on the heel stitches, always slipping the first stitch, purl 32, turn, knit 31, turn, purl 30, turn, knit 29, turn. Continue in this manner until 9 stitches are left at each side of the heel, the last now being purl 14.

Turn and knit 14, lift up the right-hand side of the loop just before the 15th stitch and knit the 2 stitches together to prevent a hole. Turn, purl 15, lift up the loop just before the 16th stitch and purl the 2 together. Continue in this manner, working one extra stitch on to each row till all the 32 stitches are on the one row. The last row will be a purl row. Knit back 16 stitches and so complete the heel. Slip the instep stitches on to one needle.

Now on the first needle knit the remaining 16 stitches of the heel, knit up 2 stitches at the side of the heel, and knit the first stitch from off the instep needle. With the second needle knit the instep stitches; with the third needle knit up 3 stitches from the side of the heel and the other 16 stitches. Knit one round plain, then decrease for the instep in the next round as follows: Knit to the last 3 stitches of the first needle, then knit 2 together, knit 1, knit the second needle without any shaping, on the third needle knit 1, slip 1, knit 1, pass the slipped stitch over the knitted one, then knit to the end of the needle. Repeat the last 2 rounds 3 times. Now work 56 rounds without any shaping for the length of foot required before shaping the toe, allowing for the latter to add another $1\frac{3}{4}$ in.

Shape the toe as follows: * Knit to the last 3 stitches of the first needle, knit 2 together, knit 1; on the second needle knit 1, slip 1, knit 1, pass the slipped stitch over the knitted, knit to the last 3 stitches of the same needle, then knit 2 together, knit 1; on the third needle knit 1, slip 1, knit 1, pass the slipped stitch over the knitted one, knit to the end of the needle. Knit 2 rounds without shaping. Repeat from * until there are only 28 stitches in the round, then knit the stitches of the first needle on to the third needle.

Place the two needles together, and knit a stitch from each needle at a time, and when 2 stitches are on the right-hand needle slip the first one over the second stitch, and so on until there is only one stitch left, then cut the wool, draw it through the last stitch, thread the end in a darning needle, and fasten off very securely on the wrong side of the sock. Casting off the toe can also be done by grafting, which is a much neater method and more comfortable in wear.

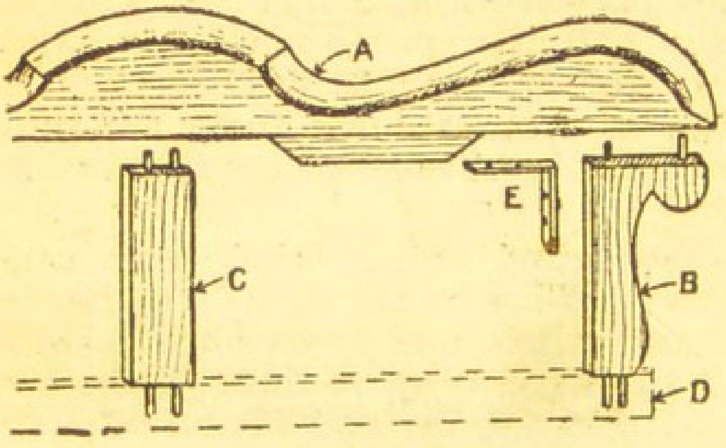
Bed Socks. To make a pair of bed socks of average size for a woman, $2\frac{1}{2}$ oz. of some such soft wool as Baldwin & Walker's 3-ply Ladyship Flossella Wool will be required and also $1\frac{1}{2}$ yards of ribbon, and three No. 7 needles. Commence at the top by casting on 53 stitches, and work the first 24 rows in ribs of 2 plain and 2 purl, always knitting the first two stitches at the commencement of every row and purling the last three stitches of every row.

Now change and work in moss-stitch (1 stitch plain and the next stitch purl, alternately to the end of the row, then on the return row reverse the order of the stitches so that a plain stitch comes over a purl stitch of last row) for 4 inches, increasing 1 stitch at the beginning of the first row in order to bring the stitches up to 54.

To make the holes for the ribbon, work 2 moss-stitches, * make 1, take 2 tog., 4 moss stitches; repeat from * to the end of the work, ending with 2 moss-stitches. Now work again in moss-stitch for 12 rows, then the stitches will be divided for the foot.

Work in moss-stitch over the first 16 stitches, on the next 22 stitches work backwards and forwards in moss-stitch for 40 rows (always slipping the first stitch), then break off the wool and join to where the 16 stitches were left and with the same needle pick up 20 stitches along the side of the instep flap and also 11 stitches across the toe. With the spare needle work across the remaining 11 toe stitches and pick up 20 stitches along the other side of the instep flap, also the 16 remaining stitches on to the same needle. Work across all the stitches for 10 rows; then decrease 1 stitch at both ends of both needles for 5 rows. Then cast off or leave the stitches for grafting. Join up the seams and through the holes at the ankle thread the ribbon.

SOFA, Repairing a. The back of a sofa is composed of a shaped top rail as at A, Fig. 1, two ends B, a centre piece C, and a bottom rail D. These parts are generally secured together with dowels, as shown, and if loose they can be replaced and the joint glued up aga n. An alternative method of strengthning the frame is to screw on angle brackets at the corners as at E. This method should not be employed in the case of a badly-damaged frame.



SOFA: how to repair. Fig. 1. Pieces forming back framework

The frame itself is usually dowelled to the seat frame and screwed to the scroll ends. The seat frame with new cross rails is strong enough to resist strain of wear, but it is possible that the cross or end rails may have become loose or broken; in this case the method of repair is to fit two new rails across, one being additional, to strengthen the frame or remove a twist caused by a warped length.

The legs are usually secured with dowels, the repairing being generally a matter of fitting new dowels. It will be seen from Fig. 2, which shows a plan of the framing directly over one of the legs, that two of the dowels are fitted in the outer rail and one in the cross rail. In renewing them, a larger diameter dowel should be provided, and the old ones bored out; in addition the two flat surfaces should be scraped quite clean so that the glue will hold up tight. The leg with dowels is then fitted.

Castors may have been replaced two or three times and worked loose again, or the wood may have split. In the former case it is advisable to fit a stout dowel in the leg, as in Fig. 3; the end can be shaped so as to fit in the castor. If the leg has been split at the bottom, it will be as well to bind it with wire, suitable grooves being cut as in Fig. 4. By using an ordinary wood filler the wire binding can be entirely covered and will not be noticed. In such cases it is very often easier, instead of replacing the castors, to fit domes of silence as these do not impose as much strain upon the fractured part as would the fitting of new castors. The scroll ends are liable to work loose or break off at the tenon joints, as at H, Fig. 4, and K in Fig. 5. Although they can be glued up again, it is generally more satisfactory to cut the tenons off, fill up the mortises with suitable blocks of wood, and replace with a dowelled joint, as in Fig. 8. The dowels should enter both pieces for at least $1\frac{1}{2}$ in.

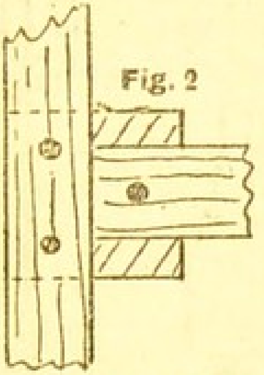


Fig. 2

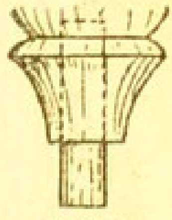


Fig. 3

SOFA. Fig. 2. Plan of framing above leg. **Fig. 3.** Worn leg repaired for fitting new castor

If the ends are not very loose, the joint can be strengthened by blocks of wood screwed to the inside of the frame, as at L, Fig. 9, but it will probably be necessary to fit in thin blocks each side, as at M, to bring the inside of the scroll upright to the same distance as the seat rail. Further strengthening may be necessary in dealing with the scroll ends by renewing the rails P, R, and T. These are placed there as much for upholstery purposes as for strengthening the construction. Usually they are secured by glued blocks, as at N, but in better work they are housed in the sides.

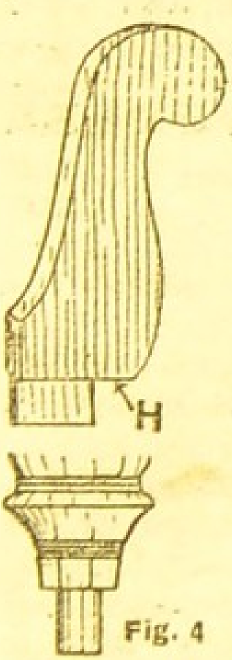


Fig. 4

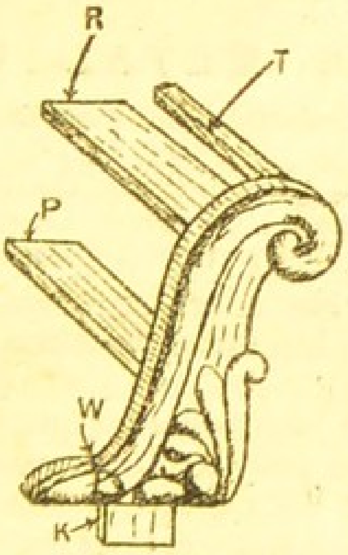
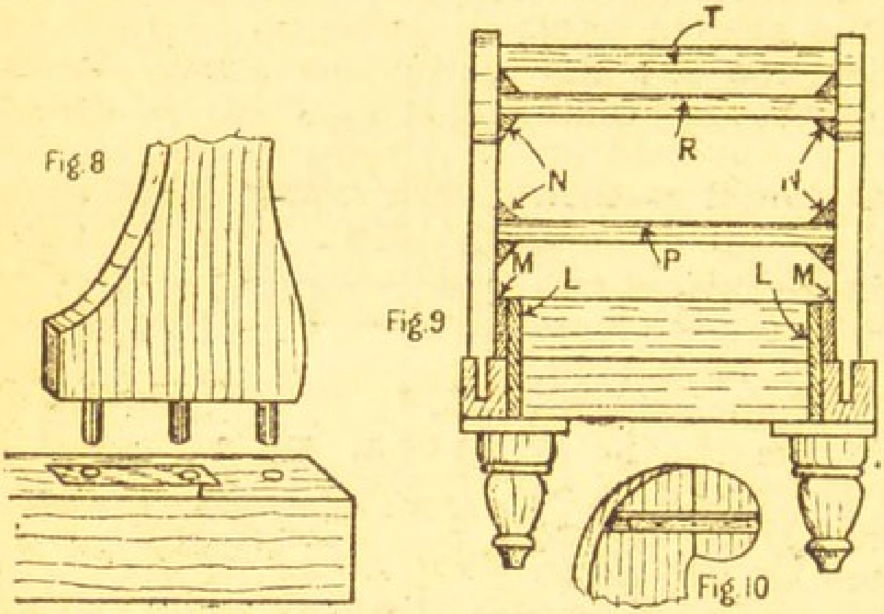


Fig. 5

SOFA. Fig. 4. Split leg bound with wire. **Fig. 5.** Scroll end of sofa

Breakages in the short grain of the wood are not unusual, either at the bottom, as at W, Fig. 5, or as in Fig. 10. In dealing with a break as at W, the best way is to screw on a suitable strip of hardwood, as shown. Breakages at the top are repaired with a narrow strip screwed on as in Fig. 10, but the broken edges, particularly if they are of long standing, must be thoroughly cleaned and glued together. Reglued joints should have newly-planed surfaces, but if this is impracticable, the surfaces must be scraped to remove old glue; where it is impossible to use a scraper, the wood should be cleaned with hot water and a stiff brush.



SOFA. Fig. 8. Mending broken joint of scroll end. **Fig. 9.** Details of end. **Fig. 10.** Repairing top of scroll

SOFTWOOD. The timbers that are classed as softwoods are those that are light in texture and are easily worked, the opposite kinds being the hardwoods. The chief of the softwoods are the coniferous trees such as the pine, fir, larch and yew. They abound in resin and yield turpentine and pitch.

SOLDERING FOR THE METAL WORKER

Enabling the Handyman to Undertake his own Repairs

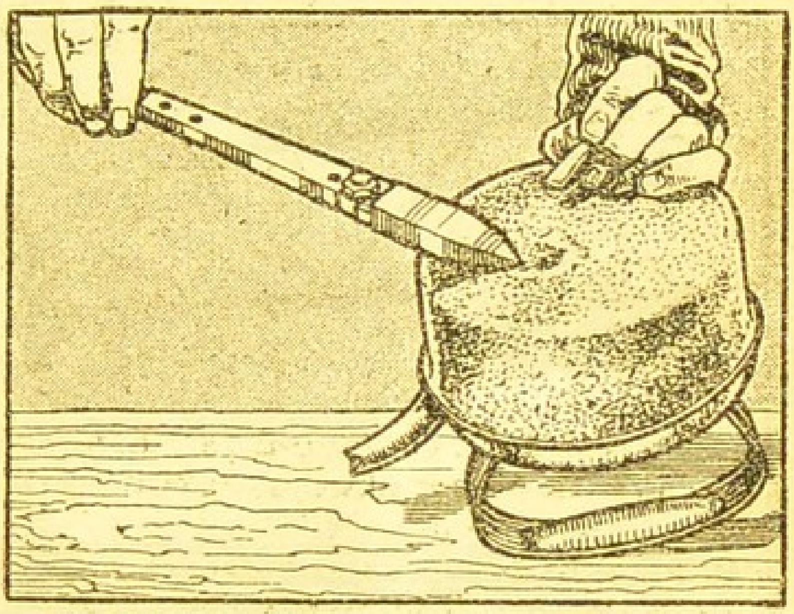
This process is necessary for a number of mending and constructional operations described in this Encyclopedia. The reader should therefore consult Aluminium; Bent Iron Work; Copper; Leaded Lights; Silver Work. See also Blow Pipe; Flux; Plumbing

The process of joining metals together by means of another metal that melts at a relatively low temperature is known as soldering.

The requirements for amateur soldering work consist of a soldering iron or copper bit, some solder, flux, emery paper, an old file or two and an odd knife for scraping the metal clean. In addition, there must be some means for heating the iron, and preferably some sacking or rough cloth with which to wipe it clean. The size of the iron and its type will depend on the nature of the work. For domestic use a plain bit weighing about $\frac{3}{4}$ to 1 lb. will suffice, and this may be the ordinary adjustable type of iron with a wooden handle. The most useful form of solder is tinman's solder in bars about $\frac{1}{2}$ in. wide and $\frac{3}{8}$ in. thick, sold by weight. Blow-pipe solder, which is harder, is sold in long, thin strips; this is best used with a large copper bit or a blow pipe. Tinman's solder also can be purchased in narrow strips.

The soldering acid or flux may be powdered resin, killed spirits, or one of the proprietary brands. A combined solder and flux in paste form is useful for small jobs, as the surfaces can be coated with the paste, held or wired together, and united by sweating, using a blow pipe or lamp, as later described. In an awkward corner the point of the soldering iron can be introduced to heat the joint.

The heating medium for the soldering iron is preferably a gas heater of some kind, a regular soldering stove, or a powerful blow lamp when gas heating is not available. Irons are also made that are self-heating. Some derive their heat from a self-contained gas burner, and others from an electric heating device.



SOLDERING. Fig. 1. Soldering disk over a hole in a tin kettle

Mending a Kettle. As an example of the methods of soft soldering, suppose a leak is to be mended in a tin kettle. The first step is to scrape or polish the metal with an old file or knife, and finish with rough emery paper. Then wipe the metal clean with a piece of clean cloth.

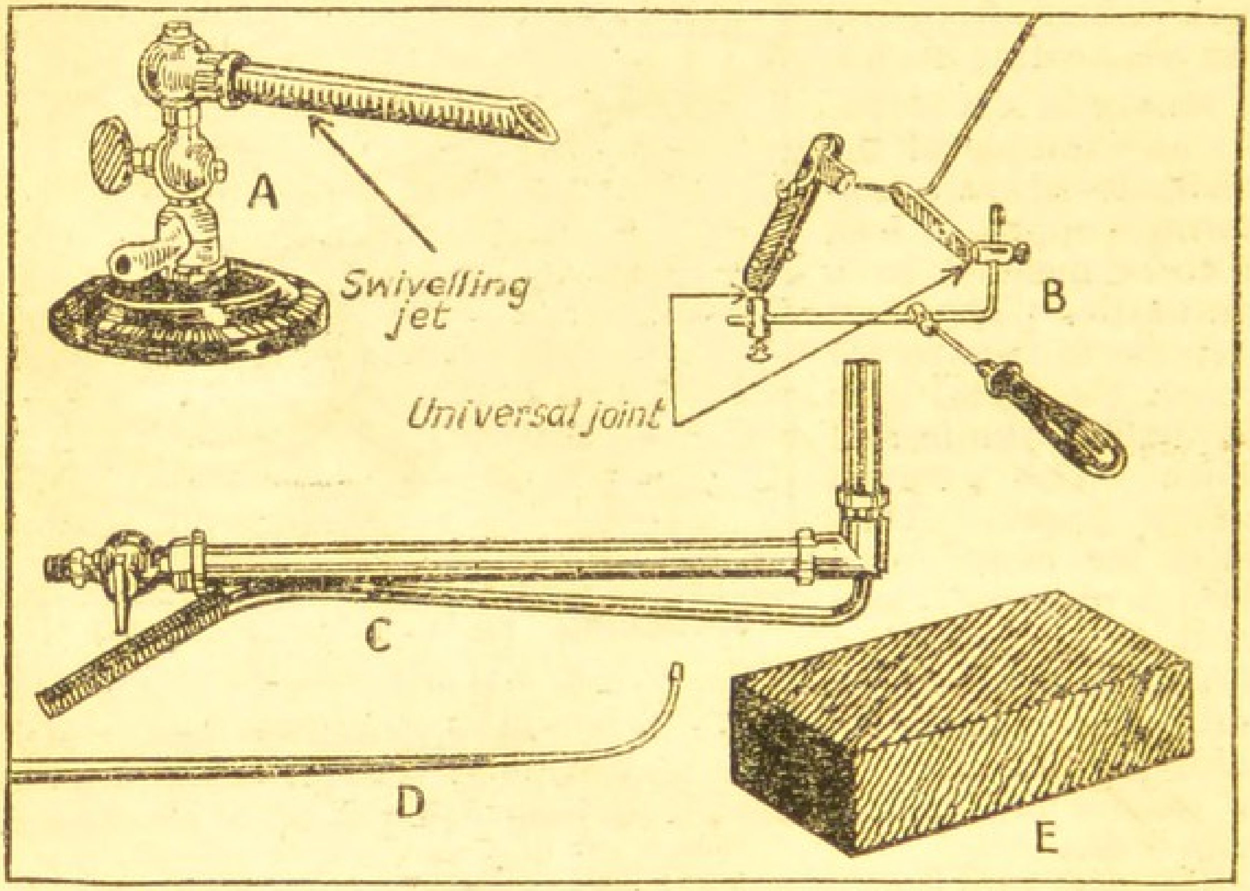
The iron is heated until the copper is almost but not quite red hot. Now take the bit from the fire and wipe it quickly with a cloth to remove any surface dust, and then rub the tip of the copper with a file.

The next step is to tin the bit; that is, to cause a film of solder to run on to and adhere to the point of the bit. Place a spot of flux on the centre of the clean piece of tinplate and dip the point of the hot iron into the flux for a moment. Then, holding the iron in the right hand and the strip of solder in the left, place the point of the iron on the tinplate and apply the solder to the edge of the iron.

The worker turns the iron over as the solder melts, moving it about and rubbing it into the little pool of molten metal until the solder adheres to all the four sides near the point of the iron. The iron need not be reheated until it fails to melt the solder freely. When this point is reached, take care not to overheat the iron and melt off the tinning, as if this is done it will have to be cleaned and retinned as already described. If carefully used the iron should not need tinning except at long intervals.

Presuming the iron to be still hot, the next step is to take a small disk of tinplate and place it over the hole on the cleaned part of the work in hand, to which flux will previously have been applied, adding a touch of flux to the edges. Press the iron on the edges of the tinplate disk and apply the solder to the side of the soldering bit, melting off a few lumps or blobs as shown in Fig. 1, and proceed to flow the solder all round the edges of the disk. At the same time press the soldering iron on the centre of the disk to assist in heating it. Then finish by running the iron around the joint to make the surface of the solder neat and tidy.

It is well, when the solder has been run round the patch, to press on the latter with the point of an old file or some similar object, so as to hold the patch firm until the solder cools. If the



SOLDERING. Fig. 2. Implements in hard soldering. A, bench gas burner. B, holder for small objects. C, gas blow pipe. D, mouth blow pipe. E, charcoal block
Courtesy of H. W. Burn & Co.

file is held upright on the centre of the patch the soldering iron can be worked round the edges of the patch to neaten joint. The kettle should be supported so that both hands are free.

TINNING A JOINT. For brass or copper the same procedure is adopted, except that it is necessary first to tin the surfaces to be united. This is accomplished by rubbing with the point of the tinned copper soldering bit and at the same time flowing on a further supply of solder. The surface is generally made smooth and bright by wiping it over with a clean rag while the solder is still hot and molten.

A method of soft soldering is known as sweating, and this does not call for the use of a soldering iron. The typical procedure can be illustrated by the case of a brass ferrule forming part of a pipe union for attachment to a gas fitting. The first steps in this case are to clean the surfaces thoroughly, and then to tin them by holding the parts in the flame of a blow lamp; as soon as the metal is hot, apply a trace of flux, and press the end of the stick of solder on to the metal. It should then flow over the surface and partly adhere. The tinning is completed by wiping the surface with a clean rag.

The parts are then placed in position, the flame of the blow lamp directed on to the joint, and the solder melted into place. The end of the joint should be pressed against some suitable object, the heat being concentrated on the outer part of the joint, remote from the lip, as the solder will always run towards the heat. If the greatest heat is at the inner end where the joint begins, the solder will be more difficult to flow into place. Small jobs can be carried out by using paste solder combined with flux. Sometimes the objects to be united can be held over the flame of a gas ring, spirit lamp, or Bunsen burner.

Zinc is soldered in the usual way, but with the use of killed spirit as a flux. Aluminium can be soldered, but only with specially-prepared solders and a suitable flux. There are several proprietary brands on the market.

HARD SOLDERING. To carry out hard soldering, or silver soldering, a blow lamp or blow pipe (Fig. 2) is essential, or some other form of easily controllable heat giving a long clean blue flame. The soldering is effected with silver, the metal being alloyed with a small proportion of brass, to lower the melting point. Articles made of silver can thus be united with the solder without danger of fusing them. This method is used by silversmiths and jewellers, and has the advantage that the joints are particularly strong and durable for small work, being in many respects superior to brazing. There are several kinds of flux that may be used; but probably the best is borax in lump form, which is reduced to a paste with water by rubbing the borax on the surface of a slate. The solder is obtainable in several grades, melting at different temperatures. To use it, the metal is cut into strips of suitable size and fed up to the job while playing on it with the blow-pipe flame or the jet of a blow lamp.

After the surfaces have been cleaned the borax paste is applied to the joint with the point of a small camel-hair brush. One or more of the strips of solder are bent around and placed on the borax flux. After this the flame of a blow lamp or gas blow pipe is directed on to the work. The clean part of the flame must be kept on the joint. This is generally a little distance from the tip, at a spot where the inner cone of flame is visible as a slightly different-coloured cone. If the dirty part of the flame is used the work may be oxidized and the result prove a failure. As the metal is heated the borax will froth and turn white, and finally melt. Soon the metal will appear to be red hot and the strip of silver will melt and flow around the joint.

The crux of the operation is to make the silver flow properly and only experience can give the requisite skill to accomplish this. It is largely a matter of correct temperature and correct position of the flame; the metal will always follow the heat of the flame, and can be drawn, as it were, to the desired spot. If the work is at all delayed the flux may all be burned, but this can be remedied by application of a further supply from a spoon made from a piece of thick iron wire beaten to a spoon-like end. If this is placed near the flame of the blow lamp it will keep hot, and when dipped into the borax some of the latter will adhere, and it can then be conveyed to the desired spot.

Should it be desirable to unsolder an article, the sweating process is perhaps the best when it can be carried out, the metal being heated, a small amount of flux applied, and the parts pulled asunder while the solder is molten. After any soldering process all traces of the flux or soldering acid must be removed by scouring the article in hot soda water or by the use of emery paper.

Some of the appropriate implements for hard soldering are illustrated in Fig. 2. The gas blow pipe (C) is used in conjunction with a small bellows. The gas burner (A) has a swivelling tube; when this is turned at right angles the flame is reduced to a tiny jet. The method of silver soldering jewelry and similar objects is somewhat different. The worker places the articles to be united on a charcoal block (Fig. 2, E) or a soldering "wig," and after applying the borax plays on the joint with a small blow pipe (D). The solder is cut into small pieces and placed in position with a pair of tweezers. The jobs are small, and the heating source can be a spirit lamp or a Bunsen burner. The parts to be soldered are fastened together with binding wire. For quite tiny objects one can use a holding device (Fig. 2, B) consisting of a pair of clips mounted on a rod which is held in the hand or a vice. The clips have universal joints, so that the parts, when gripped by them, can be brought into contact and are held fast while being soldered.

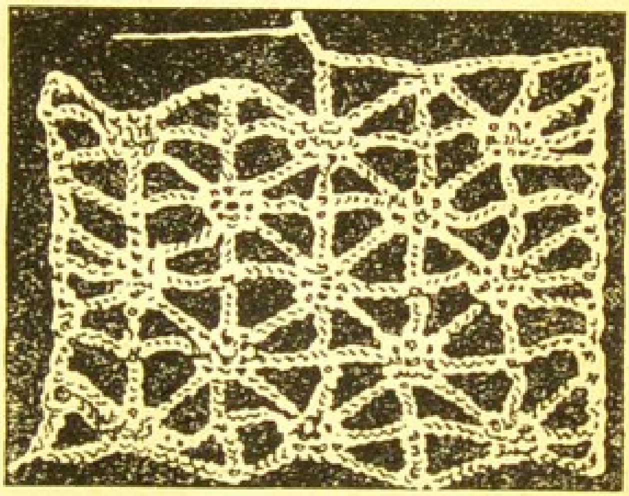
SPANNER. There are two main kinds of spanner in general use. Within its limits the adjustable type can be made to fit almost any nut as occasion demands; the fixed or key pattern is rigid but can be obtained in various sizes.

Wrenches, are perhaps the most common of the first type. These can be adjusted by means of a nut, which is generally in the handle of the tool. The fixed size spanner is often double ended, the two ends differing in size by about $\frac{1}{8}$ in. In box-type spanners the recess is capable of taking the whole thickness of the nut to be unscrewed, reducing considerably the risk of the spanner slipping off the nut. Some are tubular in form, with a T-handle, a cranked arm, or just a hole through which a loose "tommy" bar can be put to give leverage.

Rachet spanners are handy and take two main forms. In one sort the spanner itself is box shaped, fitting into a holder to which is attached a ratchet handle. In the other kind the spanner resembles the ordinary flat double ended type, but the jaws are disk shaped, interchangeable, and formed with ratchet teeth on the periphery. There is a pawl in the handle which engages with a tooth of the jaw and forces it round as the handle is moved forward and backward.

The cone spanner is for tightening up cones, as on an ordinary bicycle, without removing the wheel. Being made of thin material the spanner can be placed on the cone, and the latter turned the required amount, if the spindle nut is slackened sufficiently. Another handy type for a cycle is the spoke spanner. It fits over the nut on the rim ends of the spokes, and can be turned without taking the spanner off the nut.

SPIDER: A Crochet Pattern. This all over pattern derives its name from the solid centre-piece of double crochet, from which long chains branch out in different directions. The foundation chain on which the work begins should be a multiple of 14 with 5 stitches over. In the small piece illustrated there are 47 chain stitches, worked as follows :



SPIDER. The crochet stitch which goes by the name of the spider pattern

1st row : 1 double crochet in the 11th chain from the hook, 1 double crochet in each of the next 2 stitches, * 5 chains, miss 5 stitches, 1 double treble in the next stitch, 5 chains, miss 5 stitches, 1 double crochet in each of the next 3 stitches. Repeat from * until only 6 stitches are left, then make 5 chains, miss 5 stitches, 1 treble in the end stitch, 7 chains. Turn.

2nd row : * 3 double crochet on 3 double crochet, 5 chains, 1 double treble on double treble, 5 chains. Repeat from * across the row ending with 3 double crochets, then 5 chains, 1 treble in the 6th chain of the loop at the end, 1 chain. Turn.

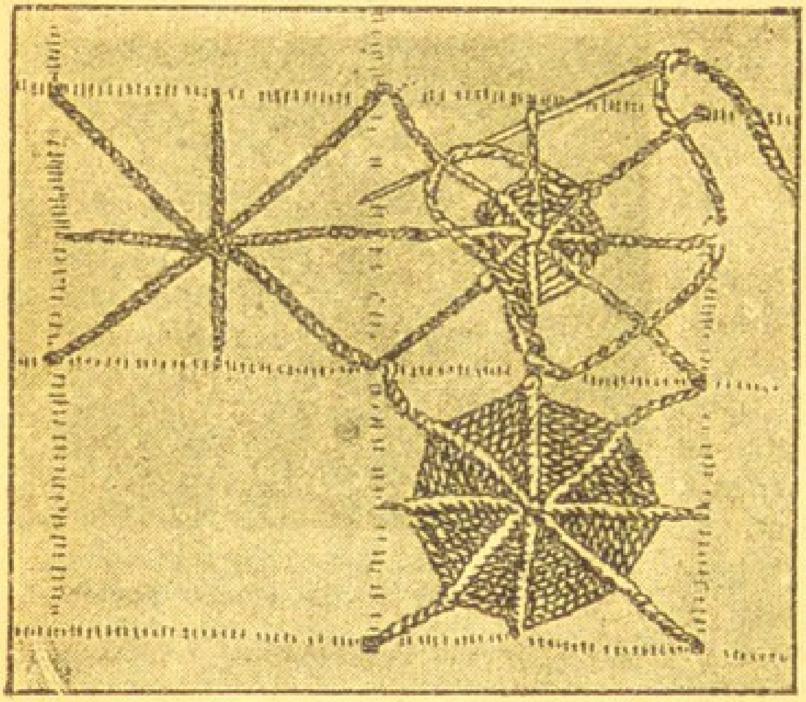
3rd row : * 1 double crochet on double crochet below, * 5 chains, 1 double treble in the centre double crochet, 5 chains, 1 double crochet in the chain before the double treble, 1 double crochet on double treble, 1 double crochet in the chain after the double treble. Repeat from * across the row, then 5 chains, 1 double treble on the centre double crochet, 5 chains, 1 treble in the 6th chain of the end loop, 1 chain. Turn.

4th row : 1 double crochet on the first chain, * 5 chains, 1 double treble on double treble, 5 chains, 3 double crochet on 3 double crochet. Repeat from * across the row, ending with 5 chains, 1 double treble on double treble, 5 chains, 1 treble on double crochet at the end, 7 chains. Turn.

5th row: * 1 double crochet on the chain before the double treble, 1 double crochet on double treble, 1 double crochet on chain, 5 chains, 1 double treble on the centre double crochet, 5 chains. Repeat from * across the row, 1 double crochet on chain, 1 double crochet on double treble, 1 double crochet on chain, 5 chains, 1 treble in double crochet at the end, 7 chains. Turn. Repeat from the 2nd to the 5th rows inclusive, according to the length of pattern required, finishing the last pattern at the end of the 4th row to give a straight edge.

SPIDER WEB, in Embroidery. This pattern is used in two different forms of work, one as a solid white or coloured linen embroidery for decorative purposes, and the other to fill in a empty corner where threads have been drawn.

In the first case fancy canvases and coarse linens are used, where the threads can be easily counted to form sections. In the illustration coarse linen is seen, worked with coarse sylko cotton giving bold relief to the pattern. Here 40 threads are counted each way, and the next thread is drawn out at even intervals; this divides the linen into sections.



SPIDER WEB, a pattern which is much used in solid embroidery, and also for filling up a corner in drawn thread work

To work, secure the thread on the wrong side at one corner of a section and cross in an oblique line to the opposite corner, then put the needle down to the wrong side. Bring the needle up again at the bottom right-hand corner and down again through the top left-hand corner; there will now be 2 threads crossing each other from the corners. Now cross the square in the same way, but working from the 2 sides. Bring the needle up in the centre of this section and make a small stitch across the lines, then another stitch in the opposite direction, so that there is a small cross-stitch in the middle holding the long lines in position. If one colour is being worked, the weaving can be continued without a break.

To join on a new colour, pass the thread back through the centre to the wrong side of the material and fasten off very securely with a few back stitches. Join the new thread under the back stitches, and pass through to the right side at the centre of the design to the left of one of the spokes. Pass the needle from right to left under the same spoke and under the second spoke at the same time, and draw up the thread closely. It will be seen that the thread encircles the first spoke. Pass the needle from right to left under the second and third spokes, and draw the thread up. As the second spoke was worked under in the previous stitch the thread will now encircle it. The work proceeds in this way in rounds, always passing the needle under 2 spokes, so that the thread goes under and round a spoke each time. This causes the rolled effect on the finished web as seen in the third section of the illustration, with a web completed. The second section shows the web in progress, with the needle in position. Here the spokes are laid in one colour, and the little centre cross-stitch is made in that colour in the third section, giving a little spot of colour at the centre, while the web is woven in the second colour entirely.

DRAWN THREAD WORK. To work the spider web in a drawn thread corner, the working thread is secured to the buttonhole stitches that are usually worked on the edge of the linen after the threads are drawn. The spokes are attached to the edges in the same manner, but a cross-stitch cannot be worked at the centre, as there is not a material foundation underneath, so two drawn thread knots are worked in opposite directions to hold the spokes in the centre. The latter are woven under and over as in ordinary darning, missing two threads at the beginning of each new round, so that the thread that was passed over in the previous round will be passed under in the second.

The change of round can be seen easily in the working, when the needle passes a second time under the same thread. To ensure an even weave, it is best to put the material in an ordinary round embroidery frame when working the corner pieces, that is, when the remainder of the work is being done over the fingers.

SPIRIT LEVEL. A spirit level is an instrument for ascertaining the level or adjusting the level of an object in relation to the horizontal.

Essentially, the instrument comprises a wooden or metal frame containing a glass tube closed at each end and almost filled with liquid. A small air bubble, however, remains visible in it, and when the tube is in a horizontal position, the bubble will be exactly in the middle of the length of the tube, and at the top of it. A spirit level is calibrated and tested at the time of embedding the bubble tube in the frame, and thereafter should not be disturbed, otherwise the instrument may be thrown out of truth. To facilitate the reading and to increase the accuracy of the result, two lines are generally marked on the top of the tube, in such a position that when the air bubble is exactly between them the instrument is perfectly horizontal. As an example of its use, suppose that a floor joist has to be set in a horizontal position. All that has to be done is to place the joist approximately in position, rest the spirit level upon it, and raise or lower the ends of the joist until the air bubble is exactly between the two lines marked on the tube. The joist will then be level. For ordinary purposes the regular carpenter's level will suffice. These levels are available in various sizes, but one about 10 in. long is very convenient. Practically all levels with a wooden body, or frame, have a brass plate at the top and brass tips at the bottom, to increase durability of the instrument. For building a longer level measuring about 24 in. will be found to be preferable. A useful type has two tubes, one at right angles to the other. The second tube is set near the end of the frame in a vertical position, so that the instrument can be used for plumbing uprights. When the bubble is in the middle of the tube it indicates that the object which is being tested is perfectly upright, as shown in the illustration.


SPIRIT LEVEL. Testing an upright

SPOKESHAVE. A spokeshave is a two-handed wood-working implement, consisting essentially of a stock or holder and a cast steel blade or cutter. The original and still extensively used spokeshave is a pattern with a wooden stock, and into the middle portion of this is fitted a steel cutter, having two tangs at right angles to the plane of the blade and located at each end of it.

The prongs of the spokeshave are pressed into holes cut in the wood, and as both hole and tangs are tapered, the blade holds firmly when tapped home. The other type has a malleable iron stock and a flat blade something like a plane iron. This is held to the stock by means of a clamped plate and a thumbscrew which goes through a slot in the blade. The cutter can be adjusted by pushing it in or out, and when in its correct position it is secured by twisting the thumbscrew. In the case of the wooden stocked spokeshave, the cut is regulated by tapping the cutter closer to or farther away from the working face of the stock.

The essential purpose of the spokeshave is to work curved surfaces, either externally or internally, so as to bring them to a correct and uniform curve. The work should be firmly held either in the vice or supported by blocks temporarily screwed to the work bench. The operator stands facing the work, and grasping the spokeshave in both hands, his thumbs pressed across the back part of the cutter, but, clear of the work. The implement is pressed firmly on to the wood and pushed forward. The cutter must never be worked against the grain.

Some spokeshaves are provided with an adjustable fence or guide, and with variously shaped blades, so that some form of moulding and reedings can be produced.

SPRIG, in Lace. In lacemaking this word refers to one of the separate pieces of lace fastened on a ground in appliqué lace. Material embroidered with sprigs, or which has sprigs in the pattern, is known as sprig embroidery or sprig muslin.

SPRUCE. Spruce or white deal is one of the cheapest and commonest woods, imported into Great Britain from N. Europe and N. America. It has a white, clean appearance, with distinct annual rings and with numerous small hard knots, the latter making it rather difficult to work, as they dull the cutting tools, otherwise the wood is fairly soft. It is light, elastic and resonant, the latter quality making it a suitable wood for sounding-boards and for violins.

As a tree spruce is tall and straight, yielding poles which are suitable for masts, spars, scaffold and telegraph poles, and for ladders when split. Builder's planks and temporary constructions are generally of spruce, and it is used for piles, packing cases, and similar rough work, and also for making paper pulp.

Its cheapness and clean appearance are reasons why spruce is employed for flooring, matchboarding, kitchen dressers and tables, and much other interior joinery. It is used also in boat-building and for oars. The Christmas tree is a small spruce.

STAINING. The object of staining generally is purely decorative. But certain stains have preservative qualities and thus answer a double purpose. By the use of a stain inferior woods may be made to resemble those of a finer quality, and hardwoods may be darkened to any shade for the purpose of enhancing their appearance.

While painting forms a completely new surface upon the wood, thus hiding the grain, a stain percolates into the grain, changing its colour without forming a fresh surface. There are many different varieties of stain, the chief difference being in the medium with which the colouring properties are mixed. This may be water, spirit, oil, wax, or varnish.

A useful wax stain is sold under the name of Stainax. It is applied with a brush, dries in a few hours, and results in a durable wax finish which can be polished with a brush. It is obtainable in a number of shades.

Another method of staining is by the use of chemicals, such as permanganate of potash, ammonia, and bichromate of potash. There is another class of chemical stain, the use of which involves two processes, a priming and a colouring coat. The solution combines with the wood to form pigments which are fast, and the colour may take a couple of days to develop. Stains may be either purchased ready made in liquid form, or obtained in the form of paste, powder and crystals.

For cabinet work or indoor fitments the wood should be first planed smooth and flat, and then well glasspapered with, first, No. Middle 2, and finished off with No. $1\frac{1}{2}$, using a cork rubber on which to hold the glass paper, and working it always in the same direction as the grain of the wood.

Where it is desired to stain existing woodwork, care should be taken to ensure its being clean and free from grease marks.

When staining wood of poor quality, it is sometimes advisable to dress the surface so that the stain may lie evenly. The dressing consists of a coating of size applied fairly thin and left to harden thoroughly before staining.

All nail holes and other indentations must be filled in before staining. If water stain is to be used, the stopping is made up of plaster of Paris, or of wax mixed with suitable colours. Ordinary oil putty is used if the work is to be treated with oil or varnish stains. Care must be taken to avoid marking the surrounding woodwork with the putty, as this may leave such places lighter than the rest when the stain is applied. The holes are rubbed down level with glasspaper afterwards.

For intricate parts of the work, a narrow, flat brush is the most suitable. A too fully charged brush is apt to give a streaky appearance to the wood, and there is the danger of the stain dropping from the brush on to the work.

The stain should be kept in airtight bottles, sufficient being made up to finish the whole of the work in hand, so that the colour will be uniform throughout. When required for use, it may be poured into a shallow vessel.

How to Use the Stain. The stain is applied by drawing the brush from one end of the work to the other in the same direction as the grain, working across from one side. It is essential that the edge of the colour should not be allowed to dry before the adjacent portion is stained, as this would result in a series of streaks; hence it is necessary to proceed smartly, especially when working on a large surface. A hot, dry atmosphere should be avoided, as one brushful will dry before the application of the next. It is a mistake to begin at the centre and work outward, as this necessitates working two edges of colour.

Having covered the whole surface, the brush should be pressed out to remove all surplus stain and lightly drawn to and fro over the work in a series of parallel strokes in the same direction as the grain. This will have the effect of removing any excess of stain in any one part. Some workers prefer to finish off with a piece of muslin folded into a rubber, which gives a more even finish and removes all brush marks. Rub evenly and with only a moderate pressure, as otherwise the stain will be rubbed off in patches.

When staining a piece of panelling or a door, the panels are first attended to, working across from one side to the other in parallel strokes, taking the brush well into the corners and into the quirks. Any inner members of the framework are stained, and then the rails, finishing off with the stiles. By this means the treatment of each successive portion of the work will clean off any stain, inadvertently overlapping at the joints, as the brush can be drawn cleanly in a line with the joints in the same direction as the grain. The mouldings are finally stained, using a small brush, and being careful to avoid touching the panels, especially when working on mouldings running transversely with the grain of the panels. The brush should be sparingly charged to prevent the accumulation of stain in the quirks and corners.

If a particularly dark colour is to be applied to a light wood, it is generally advisable to give two or more coats of a weaker stain rather than one heavy coat, as the latter is apt to dry unevenly and show brush marks. Each coat must be allowed to dry completely before any further staining is attempted. Full directions for varnishing are given in the article on varnish.

STAINING A FLOOR. Excellent colours are obtainable in a preservative stain sold under the name of Colron. The wax stain referred to would be quite suitable also. Varnish stains are considerably used for floors, though better perhaps for small areas, as they quickly tread out.

When staining a floor it is important first to clean it thoroughly and to remove any grease marks. The floor should be sized and allowed to harden. Any holes are filled in with putty, wax, or plaster, according to the medium used, and the whole lightly glasspapered and dusted. It may then be stained, working towards the door, so that it is not necessary to tread on the finished work. When using varnish or a varnish stain it is essential to avoid dust, as once this has settled on the wet surface it is impossible to remove it.

STANLEY PLANE. This is a combination plane extensively used by practical workmen, and it has many different uses. It is supplied with a large number of cutters. By using the various parts and adjustments, the plane can be used for rebating, ploughing grooves, beading, reeding, and fluting, for rounds and hollows, for making all shapes of moulding, for matching, chamfering, sash and dado, as a fillister, and a slitting cutter.

STAPLE. This name is applied to a U-shaped fastening device. Another application is to the loop shaped fastener used in conjunction with a hasp and padlock. The small staples in common use, which are known as netting staples, are made of tinned or galvanized iron wire, and may be purchased for household use in the form of packets containing about a gross. Various sizes are available, ranging from ½ in. to 1¼ in. long. The gauge of wire generally employed in their manufacture is No. 17 to No. 14.

A stronger kind is the fencing staple used for attaching wires to fence poles. These staples are generally from 1 in. to 2 in. long, and are made from bright wire of No. 10 to No. 6 gauge. Very strong staples are made with a pair of long thin points. Usually a thick gauge of wire is used, and such staples are handy for attaching a chain to a wall. Electric or telephone staples are made from flat wire, and when protected by a thin piece of fibre are known as insulating staples. *See* Lock.

STENCILLING AND ITS POSSIBILITIES

A Decorative Medium Affording Scope for Originality

This article belongs to a group that describes various ornamental handicrafts. Others are Lacquer Work; Painting on Textile Fabrics; Pattern Printing; Pokerwork; Raffia Work. See also Lampshades, etc.

A stencil is a plate made either of metal or cardboard on which a design has been traced and cut out for the purpose of transferring it to linen, cloth, or other material. The transfer is accomplished by brushing over the stencil with oils, water-colours, waterproof ink, or stain.

Almost any material can be stencilled. The best fabrics are probably casement cloth, velvet, satin, Arras cloth, and hessian. Chiffon muslin, and similar thin fabrics can be treated successfully, but they must be stippled and not rubbed. Glass, china, wood, leather, imitation vellum, and cardboard all lend themselves to stencilling. The outfit required consists simply of the colours and brushes together with a piece of plate glass or marble for cutting plates, oiled manilla paper, a stencil knife, and a drawing-board or table. Any good oil-colours may be used, but there are special stencil water-colours, and liquid oil-colours are sold in small bottles. No medium is required with water-colours, but for oils a stencilling medium is used.

When working in several colours on a one-plate stencil, it is advisable to use a piece of blotting-paper or oiled manilla to cover up the design where the colour is not to go. This is called masking. The piece of paper is moved about to form a screen as the work proceeds. In doing very large quantities of any design, a plate is generally cut for each colour, as one can work quicker, but for ordinary use a small mask is sufficient.

A separate brush should be kept for each colour, if possible. A Japanese stencil brush is used for thin materials. In working, the brush should be of a size suitable to the design that is to be transferred. Before using a new brush, soak it in cold water. After the work is finished clean the brushes with a little turpentine, and then with soap and water.

CUTTING A STENCIL PLATE. It is not difficult to cut out the designs at home; the beginner should choose a simple design first. If a copy is desired, make a tracing or rubbing of the design on a suitable piece of oiled manilla, which is the best paper for the purpose, leaving at least 1 in. margin all round for small things, and 2 or 3 in. for large plates, or finely-cut ones. It will be found that good outline is the important thing in selecting a design, such as a pictorial print, to copy.

Place the plate on a piece of marble or glass, and, holding a well-sharpened stencil knife at an angle of about 45°, cut out the design, working from the weak part of the plate towards the stout. Never cut towards any part of the work if there is risk of breaking the ties, which are the portions of the plate left in to hold the design together.

In cutting a flower the centre should be cut out first, then the petals cut from the centre outwards. Always cut the side of the petal next to the one already cut. When a corner is reached, cut across it both ways, so that the piece comes out; never pull the pieces out, as this will make the edges of the plate rough and untidy. Stencil plates must be clean cut.

For stencilling on ordinary materials such as canvas or casement cloth, for china, glass or wood, oil-colours are most suitable. Waterproof inks are excellent for lampshade work, as they are transparent. Barbola colours are good for stencilling on leather or suède articles. Bronze colours may be used, and patterns worked in silver and gold without other colours are most successful.

Stencil water-colours are used on parchment or for wallpaper decorations. For china and glass lacquer composed of sealing wax dissolved in methylated spirit may be employed.

Stencilling with Oil-Colours. Take a palette and squeeze out a little of each colour required, then shake up the medium and pour a little into a small saucer. If necessary, pin the material out on a board, then fix the plate in position and fasten the top corners with drawing-pins. The lower part of the plate is left free, so that it can be lifted up at intervals.

Dip one side of the crown of the brush into the medium, then, holding it almost upright on the palette, gradually work the necessary colour all over the crown. Rub the brush on an old rag or piece of blotting-paper to remove any superfluous colour, use an up-and-down movement for all thick materials, working as much as possible away from the edges of the plate. The correct way to hold the brush is illustrated. Working against the edge of the design often makes a thick, hard line all round the edge, which is very ugly. A round flower should be worked in the centre first, round and round, gradually working in this way until all the petals are coloured in.

The prettiest effects in stencilling are obtained by working one colour over the other. For leaves, use yellow on the tips, green from the base, and draw the two together with a little brown, blue, or red, according to the leaf that is being coloured. When stencilling on a woven fabric is finished, allow it to dry, then place a slightly damp cloth on the right side, and iron on the wrong side of the material. Remove the cloth and press well. This is only necessary for fixing the colours.

Velvet must not be ironed. If necessary, cover the iron with a damp cloth, and pull the velvet over it. When working on a dark material it is necessary to kill it first, otherwise light colours will not show on it. It is possible to remove colour from the background with a preparation called Javello. The design is stencilled in the ordinary way with this, and then put aside and washed. The design will then be bleached and pale colours may be stencilled on top of it. For a material which is unwashable, paint the whole design in white or a very pale shade of the colour to be used. When this foundation tint is dry, the stencilling is done over it in the ordinary way.

When stencilling on thin materials, do not work up and down, but stipple and gently pat the designs, still holding the brush upright. Use blotting-paper underneath, and work with the brush as dry as possible. Lift the material off the blotting-paper now and again, and it may be found that most of the colour is on the blotting-paper, and very little left on the fabric. This means that the brush is too wet or too hard.

When stencilling on china, place the vase, bowl, or other article in a large pan of cold water, and the latter must be brought slowly to the boil. This process serves not only to temper the china and render it less likely to break but also removes any stains that might disfigure the result. Once the water has boiled, take the pan from the fire and leave the china in it until it is cold ; then dry it thoroughly, and in order to guard against the possibility of a greasy surface, wipe it with a rag dipped in methylated spirit.

In working round any curved article it will be found necessary to snip the stencil plate top and bottom. Use the brush very dry and the colours sufficiently thick to prevent any white patches from showing through. Stippling is the best method, as the plate is difficult to fix and will be inclined to slip. When the design is finished, take off the plate, and with a clean rag wipe off any surplus colour. Begin drying the work in the open air, and when it is almost dry, hold it in the steam of a kettle.

When stencilling on glass use oil tube colours with quick-drying medium or special colours for painting on glass. The article to be decorated must be polished with methylated spirit to remove all grease. Hard surfaces such as wood, metal, china, or glass require a dry brush, as all the colour remains on the surface. Wood stains may be used for stencilling unpainted wooden articles. When dry, the work may be varnished or wax-polished.

Florescan Stencilling. A very attractive form of stencilling which resembles the Florentine work of the 17th century is known as Florescan stencilling. Florescan colours are sold in tubes and used with a medium. If required to wash or when painting on leather, the washable medium must be used.

When working stencils on curtains or covers the corners must always be taken into account. If possible, work all the corners first, and then arrange the centres of the sides. The other way is to place the centre of a design in the exact centre of one side, and then arrange the corner. Never work up to a corner or the centre without finding out whether the plate will fit. If not, it will be necessary to find some portion of the design which can be repeated to fill in an undecorated space.

In conclusion, the following points may be stressed : All bottles of medium should be well shaken ; liquid stencil colours should be kept stirred while in use ; brushes must not be too heavily charged ; superfluous colour should be removed on a piece of blotting-paper before the work is touched. All stencil plates should be cleaned as soon after use as possible. Rub them with a piece of paper or rag, then clean them with turpentine. Hang them up to dry, or lay them between pieces of newspaper.

STILE, in Carpentry. This is the term used for the outer upright pieces of a frame into which the rails are tenoned. In cabinet and other double doors, the two inner stiles are known as meeting stiles, and the meeting edges are either rebated or one stile provided with a projecting beading to cover the space.

STILETTO, for Needlework. This is a small, sharp-pointed instrument used for piercing eyelet-holes. Stilettos can be bought cheaply from all art needlework shops. Care should be taken to keep them free from rust.

STIPPLING. A flat effect is obtained with ordinary paint or distemper by the method known as stippling. The stippler used for paint is shown in Fig. 1, and Fig. 2 shows a larger brush for use with distemper. Both are made from hog-hair, and after use should be washed in luke-warm water if used with distemper, or with turpentine in the case of paint.

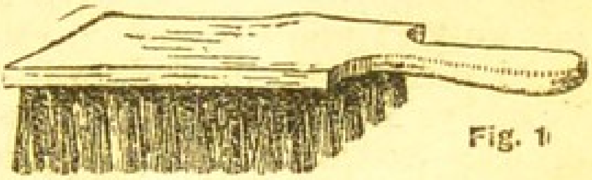


Fig. 1

Fig. 2

STIPPLING. Fig. 1. Stippler for paint. **Fig. 2.** Larger brush for use with distemper

Stippling should be done while the paint is wet. The method is to apply the paint or distemper evenly ; the direction does not matter as long as the surface is evenly covered. The stippler is then dabbed on the wet surface. The surface to be stippled should not be more than 1 sq. yd. at a time. Broken surfaces require considerable care, and it is often necessary to use a small sash tool as a stippler.

It is more difficult to use the stippler in applying a flatting paint. Only the tips of the hair should be used, and the brush must be kept clean by dipping it from time to time in turpentine and cleaning it on a piece of paper. Care should be taken not to drag the stippler over the surface, but to apply it with the hairs at right angles to the surface, and with a light touch.

STITCH, in Needlework. Of the various kinds of stitches used in needlework, running is employed for gathering, and also for joining materials, and hemming for turning down raw edges, while tacking, which is a temporary stitch, holds the fabric in position while the permanent stitches are put in. There are also fancy stitches, such as cross-stitch and herringboning, which are employed for decorative purposes.

STOCKINGS OF SEVERAL TEXTURES

Instructions for Making Knitted Hose

Other useful information will be found under the headings: Darning; Knitting; Needlework; Silk; Socks; Wool, etc.

To make a plain knitted stocking, 8 oz. of 4-ply fingering are required and four steel needles, No. 14. Some workers will like to rib the top of the stockings with needles No. 16, as the finer knitting affords a closer grip. The model is planned for wear with suspenders. Should garters be worn, the leg should be about 3 in. longer to allow for rolling over.

The wool must be wound very loosely, 2 or 3 fingers being taken in with every 16 or 18 windings round the ball. A quick knitter will like to have several yards of the wool pulled off the ball at once to lessen the number of unwindings.

For this stocking, cast on 80, arranging 26 on one needle and 27 stitches on each of the other two needles. Make the welt by knitting 2 and purling 2 alternately all round for 30 rounds.

An excellent and durable top for a stocking to be worn with suspenders takes the form of an ornamental hem. After casting on, knit 11 plain rounds. 12th round: Make 1 by bringing the wool round the needle, knit 2 together. Work thus all round. Work 11 plain rounds. Take an extra needle and with it pick up the cast-on stitches opposite those on the working needle. Fold the work so that this needle is at the back and those last knitted are in front. Knit a plain round, taking up a stitch from each needle, and work them off together as one stitch. Continue thus all round.

Take care that the stitches are exactly opposite one another, or the hem will be twisted. The 12th round forms a series of tiny scallops at the edge of the stocking. The 25th and 26th rounds are purled. For the 27th round make 1 and knit 2 together all round. Purl the 28th and 29th rounds.

Now begin the leg. In the next round raise an extra stitch in the middle, and purl this as a seam-stitch in every row till further notice. Knit plain for 80 rounds—that is, as many rounds as there were stitches cast on.

In the next round, begin to decrease to shape the calf. Knit as usual to within 3 stitches of the seam-stitch, * slip 1, knit 1, and draw the slipped stitch over it, knit 1, purl the seam-stitch, knit 1, knit 2 together, knit the rest of the round plain. Knit 8 rounds without decreasing. Repeat from * 8 times, thus reducing the number of stitches to 63. Knit 63 rounds plain for the ankle, that is, as many rounds as there are stitches on the needles.

Divide the stitches ready for the heel. Place 31 stitches on one needle with the seam-stitch in the middle. Put 15 stitches on to each of the remaining 2 needles. Leave these stitches for the present, as later on they will be wanted for the instep. Work in rows backward and forward (purl at the back and knit in front), always slipping the first stitch of a row. When 24 rows are done, decrease exactly as in the leg, and purl back. Repeat this row twice.

KNITTING THE HEEL. The heel is now ready to be worked off thus: Knit to the seam-stitch, knit that and the next together, knit 1. Turn, slip 1, purl 2 together, purl 1. Turn, slip 1, knit till the little hole is reached that was made by the decreasing of the preceding row, knit 2 together (the stitches on each side of the hole), knit 1. Return in the same way, purling instead of knitting. Continue thus till all the stitches are worked off.

The following directions make an excellent heel, with rather more spring in it than the former. When the flap is finished, knit to the seamstitch, then purl 1, knit 5, knit 2 together. Turn. Slip 1, purl 11, purl 2 together. * Turn. Slip 1, knit 11, knit 2 together. Turn. Slip 1, purl 11, purl 2 together. Repeat from * till all the stitches have been taken up.

Next, the stitches must be arranged for the instep. Pick up and draw the wool through the double loops that run down the side of the heel flap. After every third stitch increase by knitting and purling 2 in the edge of the work. When all have been picked up, slip 3 stitches on to this needle from the instep pin. Work across, and slip the last 3 stitches on to the needle with which the loops up the second edge of the heel-flap are to be picked up exactly as before. Knit with this needle to the centre of the heel where now future rounds are to be begun. Knit all round to get the stitches arranged in their places.

Shape the gussets next. At the end of the first needle, when 3 stitches are left, knit 2 together, knit 1. On the instep needle, knit 1, slip 1, knit 1, and draw the slipped stitch over, knit till 3 stitches are left, knit 2 together, knit 1. On the next foot needle, knit 1, slip 1, knit 1, and draw the slipped stitch over, knit plain to the end of the round, which is the beginning of the sole. Knit the next round, with no decreasing. Repeat these 2 rounds till 61 stitches are left. Work plain knitting for 50 rounds, counting from the end of the gusset. Some ways of finishing the foot require fewer, others more rounds for the foot, according as the shapes of the toes are longer or shorter. This round toe takes up 2½ in., others are little more than ½ in. deep.

SHAPING THE TOE. For the toe, knit 2 together to get an even number of stitches, then knit 6, knit 2 together all round. There will be about 3 stitches left over, but these will not interfere with the look of the toe. Knit 6 plain rounds. For the next round knit 2 together and knit 5 all round. The next 5 rounds are plain. For the next round knit 2 together and knit 4. Knit 4 plain rounds. Continue thus, gradually lessening the number of stitches, till the round in which it is knit 2 together, knit 1. Then work 1 plain round.

This shape of toe is most successful when joined into a circle at the tip by running a large needle threaded with the wool through the last stitches. Turn the stocking inside out, draw up the stitches closely and run the end of the wool in and out of the back of the toe till it is firmly secured. Cut it off closely.

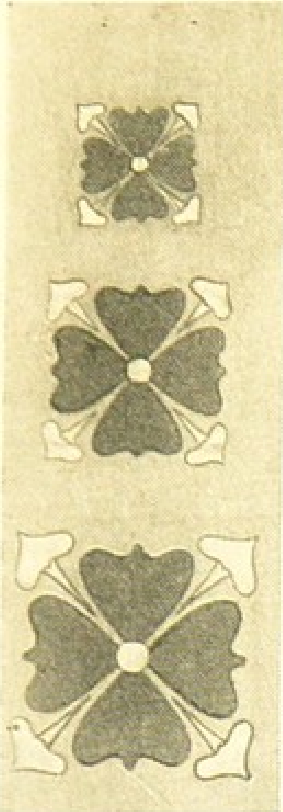
Should a square toe be preferred, proceed as follows when the foot is finished: Take one half of the stitches on to the instep needle and divide the rest on 2 foot or sole needles. Begin on a line with the seam-stitch, which can easily be traced down from the heel. ** Knit till 3 stitches are left, knit 2 together, knit 1. On the next needle, knit 1, slip 1, knit 1, and draw the slipped stitch over, knit the remainder till 3 stitches are left, knit 2 together, knit 1. On the last needle, knit 1, slip 1, knit 1, draw the slipped stitch over and knit to the end of the needle.

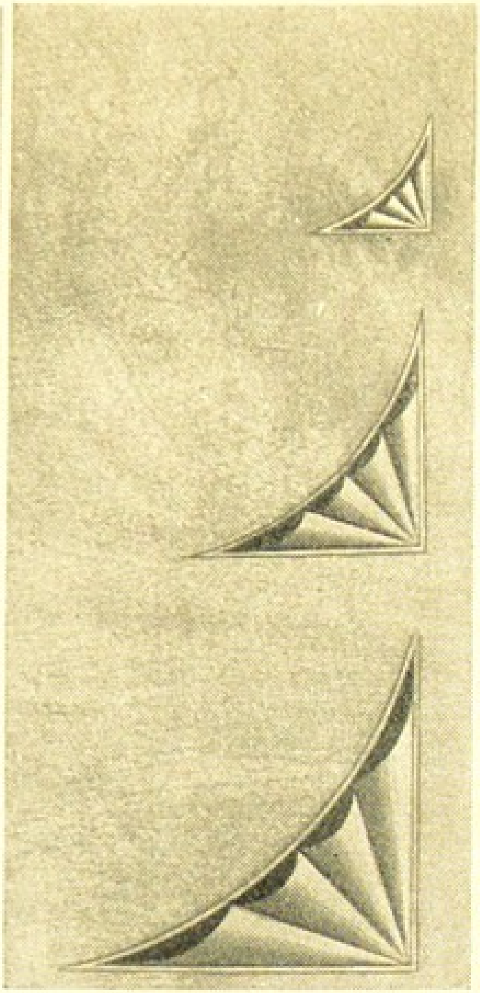
Knit one plain round. Repeat from ** till about 20 stitches remain. Keep 10 of these on the one needle, and slip the other 10 on to a single needle. Close the opening by turning the stocking wrong side out, take the stitches alternately from the 2 needles with the end of wool and a rug-needle. Fasten off by darning the wool on the wrong side. If grafting is preferred proceed thus with the end of wool threaded on a large rug needle. Put the two needles together; for the front pass the needle as if to knit through the first stitch and slip it off the needles, put needles into the second stitch, as if to purl, but only draw the thread through without slipping it off. For the back purl and slip off, then put the needle into the next stitch as if to knit, but keep it on and draw the thread through. As the stitches are slipped on to the wool, draw this up closely, to make the seam invisible.

When finished the woollen stockings should be laid wrong side out on an ironing board covered with a thick blanket. A damp cloth should be spread over them, and pressed with a moderately hot iron till dry. The stockings will then look like well-finished woven hosiery.

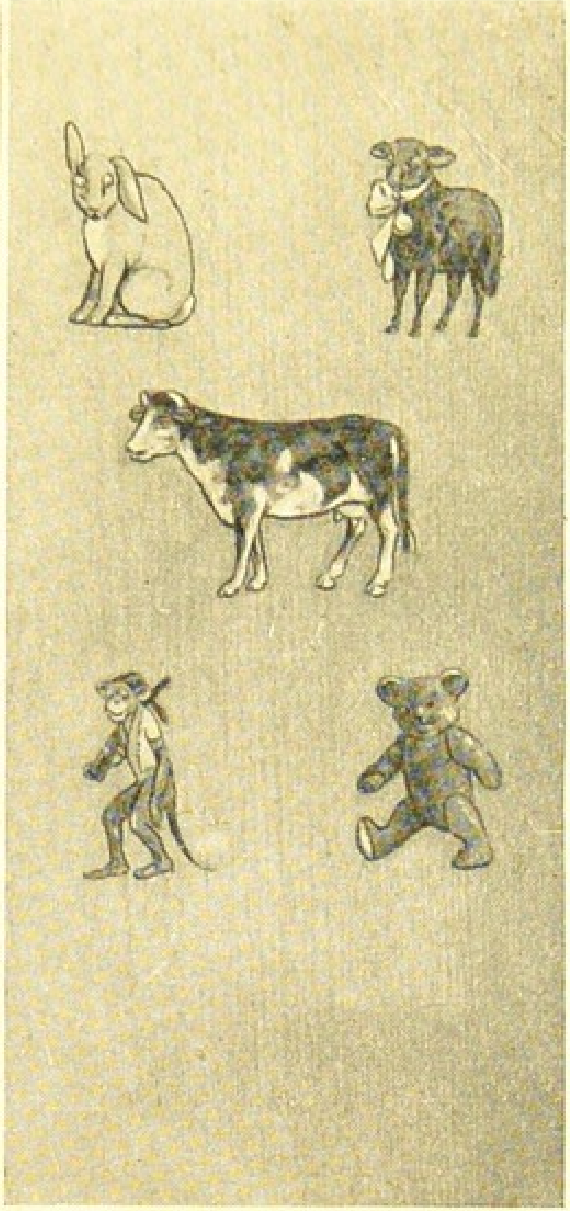
Boys' Stockings. A popular type of stockings for men and boys are those with turn-over tops. A pair of ribbed stockings of this kind, suitable for a boy of 10 to 14 years of age, can be knitted from the following directions. These include a turn-over top in three colours, as shown in Plate 44, besides a turn-over in a different ribbing from the stocking, but in the same colour of wool, also illustrated on the same plate.

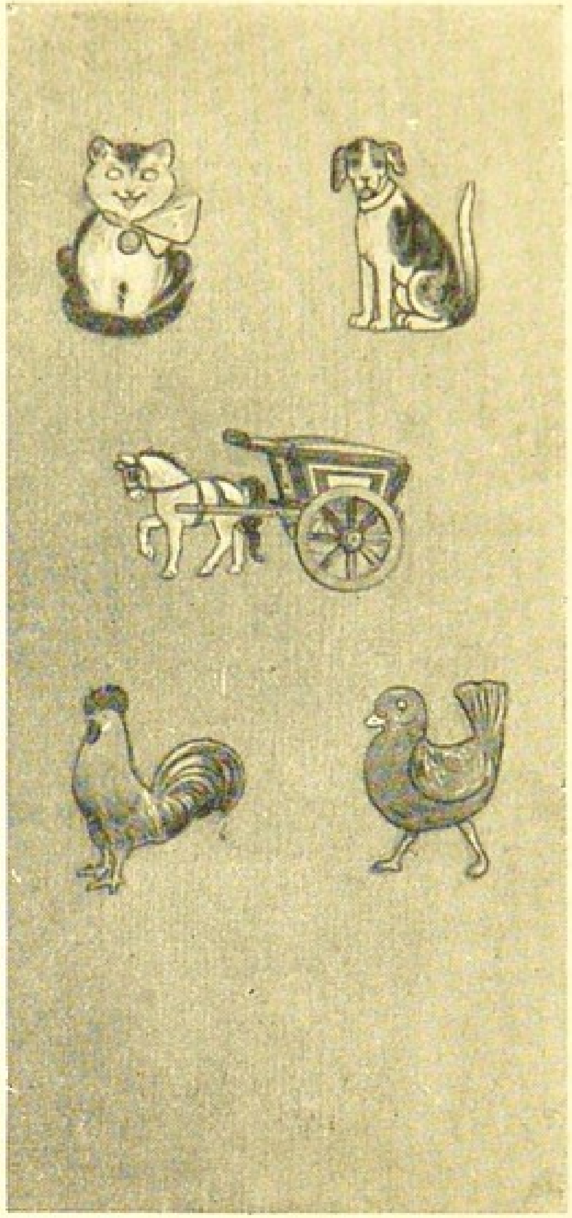
The stocking measures 24½ in. from the top to the bottom of the heel flap, including 3½ in. on the turn-over. The foot is 9 in. long from the back of the heel to the point of the toe, but the length of the latter can be varied in the centre of the foot before shaping the toe. The length of the leg can be altered in two places, either between the welt and the first decrease, or between the last decrease and the heel flap. The materials required to knit a pair are 6 oz. of 4-ply White Heather Scotch fingering wool in grey, a set of 4 No. 12 steel knitting needles. For the 3-colour top 1 oz. of Lovat mixture and 1 oz. of green or cardinal wool will be required as well as the grey.





Transfers in conventional designs for applying to wood surfaces

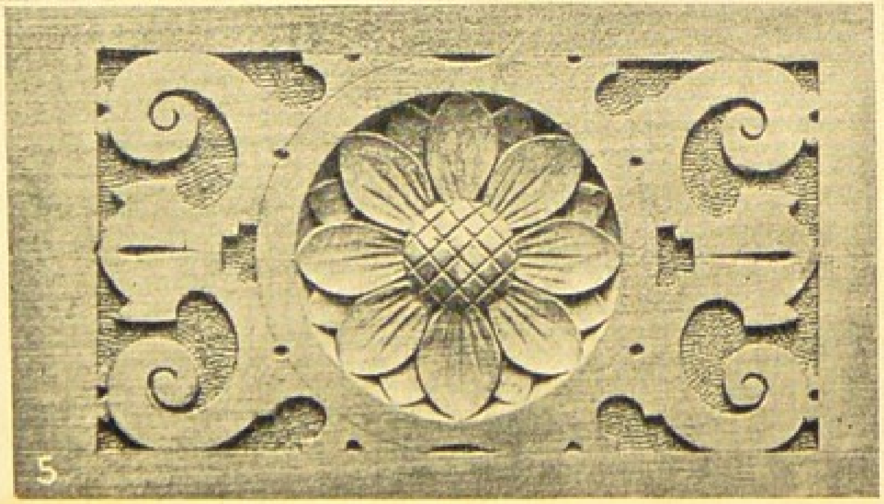




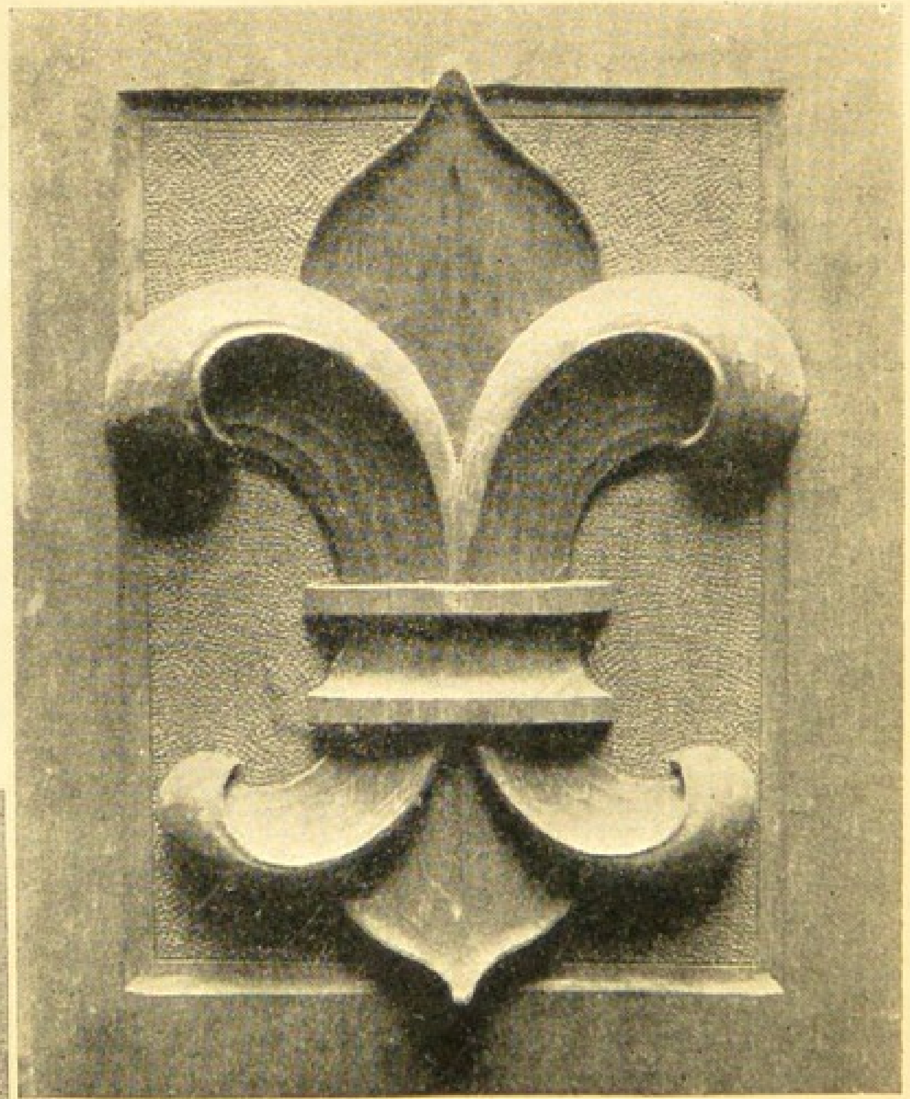
Right. Animals in transfers suitable for applying to the panels of a nursery cupboard

TRANSFERS AS A MEANS OF DECORATION

Left. Cutting out ground to leave pattern

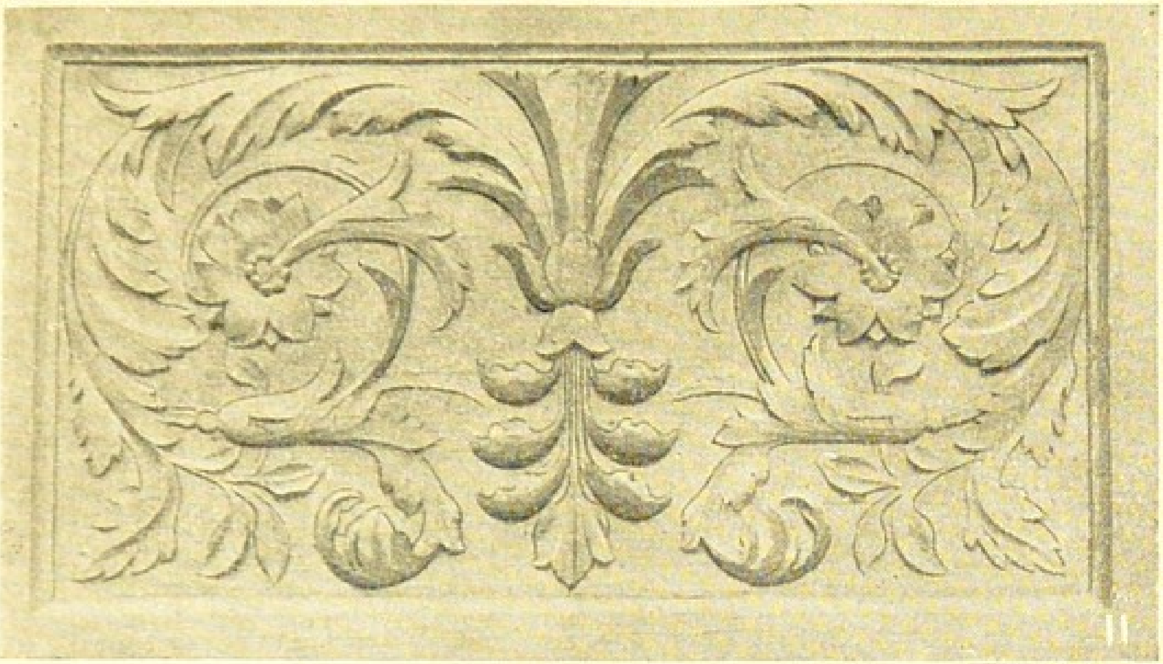


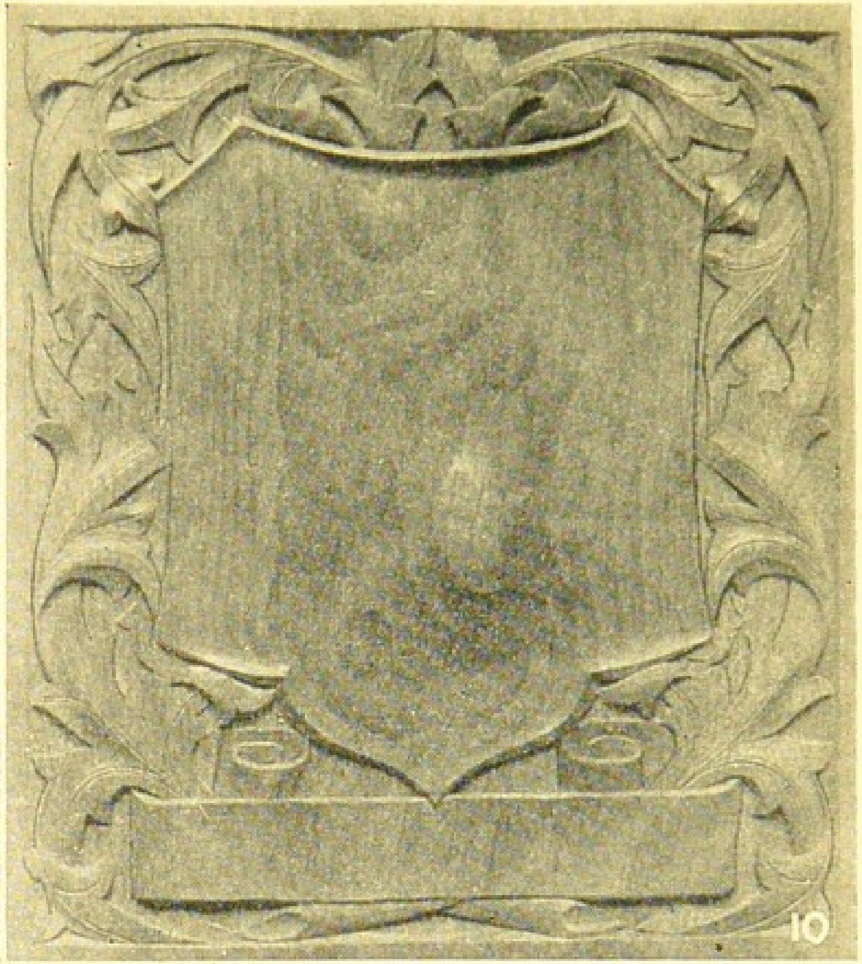
Right. Carved wooden panel with punched background



A simple but effective design for bold work

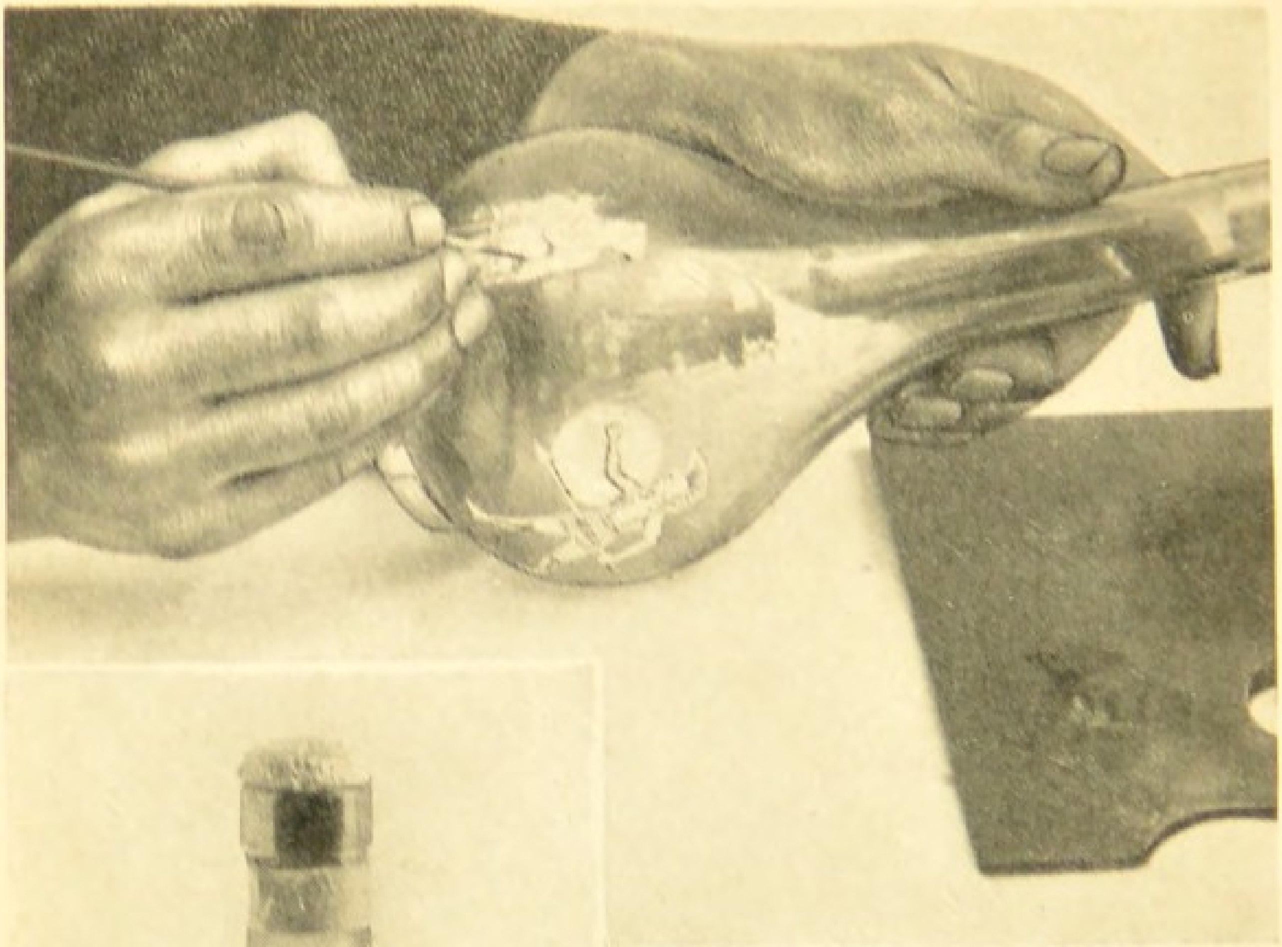
WOOD CARVING : THREE SIMPLE DESIGNS





Figs. 8 and 9. Methods of treating conventional forms. Fig. 10. Shield with low relief border carried out in a conventional design. Fig. 11. Showing the method of treating the classic form of the acanthus leaf in wood

WOOD CARVING : EXAMPLES OF MORE ADVANCED WORK



Left. Wine flask decorated with appliqué figures in tinfoil. Above. Finishing the decoration by adding lines with dull black paint

TINFOIL USED AS A METHOD OF DECORATION

To begin the work cast 26 stitches on each of 2 needles and 28 on the 3rd needle, to make 80 stitches in the round, and if making the turn-over in one colour do 3½ in. of single rib, that is, knitting and purling a stitch alternately all round. For the 3-colour turn-over begin with the grey wool, cast on the same number of stitches, and work 12 rounds in rib of knit 4 and purl 4 alternately. Here take the Lovat mixture, and, leaving the grey wool hanging, work 2 rounds in the new wool.

In the next round, do 2 stitches in grey and 2 stitches in Lovat mixture, letting the wool not in use pass behind loosely so as not to contract the work. Work another round the same as last round, keeping the respective colours over each other so that a dark square is formed, then work 2 more plain rounds of Lovat mixture. Take the cardinal wool, and work 1 plain round, then 1 grey round, 2 cardinal, 1 grey, and 1 cardinal, and fasten off the latter colour. From this point 3 rows of check are worked in grey and Lovat mixture.

For the 1st row of checks do 4 stitches in one colour and 4 stitches in the second colour alternately. Do 3 more rounds as the last one. For the next 4 rows reverse the colours, then do 4 more rounds as the 1st 4. Join on the cardinal wool again and do 1 plain round, then 1 grey, 2 cardinal, 1 grey, and 1 cardinal. Fasten off the cardinal securely, as this is not required again, and complete the turn-over with 2 rounds of Lovat mixture. Fasten off the latter colour and finish with the grey

Now turn this top inside out so that when the stocking is completed the right side of the turn-over will be uppermost.

Knit the next round plain, as this will form the turning edge of the top, and in that round increase 7 stitches by knitting in the front and back of a stitch at equal distances in the round to make 87 stitches. Having fewer stitches on the stocking top will give a firm grip and keep the stocking in place.

Decreasing the Leg. The stitches should now be arranged 30 on each of 2 needles and 27 on the 3rd, so that each needle ends with a completed rib, as the rib continues in the pattern of knit 2 and purl 1 alternately all round. Continue in this pattern for 14½ in. from the 1st round, when the work will be long enough to begin the leg decreases, thus: * knit the 1st 2 stitches together, continue in the rib up to within 3 stitches of the end of the round, then knit 2 together through the back of the stitches, and purl the last stitch. Knit 6 rounds without shaping, but taking care to keep the continuity of the rib after the decreasings. Repeat from * until 9 stitches are decreased at each side and 18 stitches less in the round.

Continue ribbing on these stitches until the stocking measures 21½ in. from the top, counting the turn-over. This brings the work to the top of the heel-flap, so more rounds can be worked here for a longer stocking before beginning the heel. In the last round knit together the last 2 stitches.

To work the heel knit the first 17 stitches of the round on to one needle, slip the last 17 stitches of the same round on to the other end of the same needle, making 34 stitches for the heel. Divide the other stitches equally on 2 needles, and leave them for the instep. On the heel stitches purl and knit a row alternately until 33 more rows are worked, always slipping the first stitch; the last row will be a purl row.

To turn the heel knit 20, knit 2 together, turn. Always slip the 1st stitch after the turn. Purl 7, purl 2 together, turn; knit 8, knit 2 together, turn; purl 9, purl 2 together, turn; knit 10, knit 2 together, turn. Continue in this manner until all the heel stitches are knitted on to one row again, then knit back 10 stitches and leave the heel stitches on 2 needles. Slip all the instep stitches on one needle, so releasing one as a working needle.

For the 1st needle knit the remaining 10 stitches of the heel, and knit up 17 stitches at the side of the heel. For the 2nd needle knit the instep stitches, and on the 3rd needle pick up and knit 17 stitches on the other side of the heel and the remaining 10 heel stitches. Knit one round plain, then decrease for the instep in the next round thus: Knit to the last 3 stitches of the 1st needle, knit 2 together, knit 1. Knit the 2nd needle without shaping. On the third needle, knit 1, knit 2 together, through the back of the loops, knit to the end of the needle. Repeat the last 2 rounds until only 17 stitches remain on each of the 1st and 3rd needles, working the rib pattern on the 2nd needle only.

After the instep shaping is finished, work one more round, increasing 2 stitches on the 2nd needle to bring the stitches up to 70. Then continue on these stitches, ribbing only the 2nd needle, for 58 rounds, or until the toe is reached. The heel, sole, and toe will be in plain knitting. Extra rounds can be worked here before shaping the toe if a longer foot be desired, allowing for nearly 2 in. more to finish the toe.

The toe proceeds in plain knitting, and in the 1st round the 9th and 10th stitches are knitted together, then 2 rounds are worked without any decreasing, and these 2 plain rounds are worked after every decrease round. In the 4th round knit every 8th and 9th stitch together; in the 7th round every 7th and 8th stitch; in the 10th round, every 6th and 7th stitch; in the 13th round, every 5th and 6th stitch; in the 16th round, every 4th and 5th stitch.

Run a double thread through all the remaining stitches, and darn in the end very securely. An alternative method for finishing a toe is by the process known as grafting.

If the instructions given in this article are closely followed, the result will be most pleasing. Hand-knitted stockings not only wear longer than bought ones, but are cheaper and very much more economical in every way.

STOCKS AND DIES

How to Form External and Internal Threads on Metal

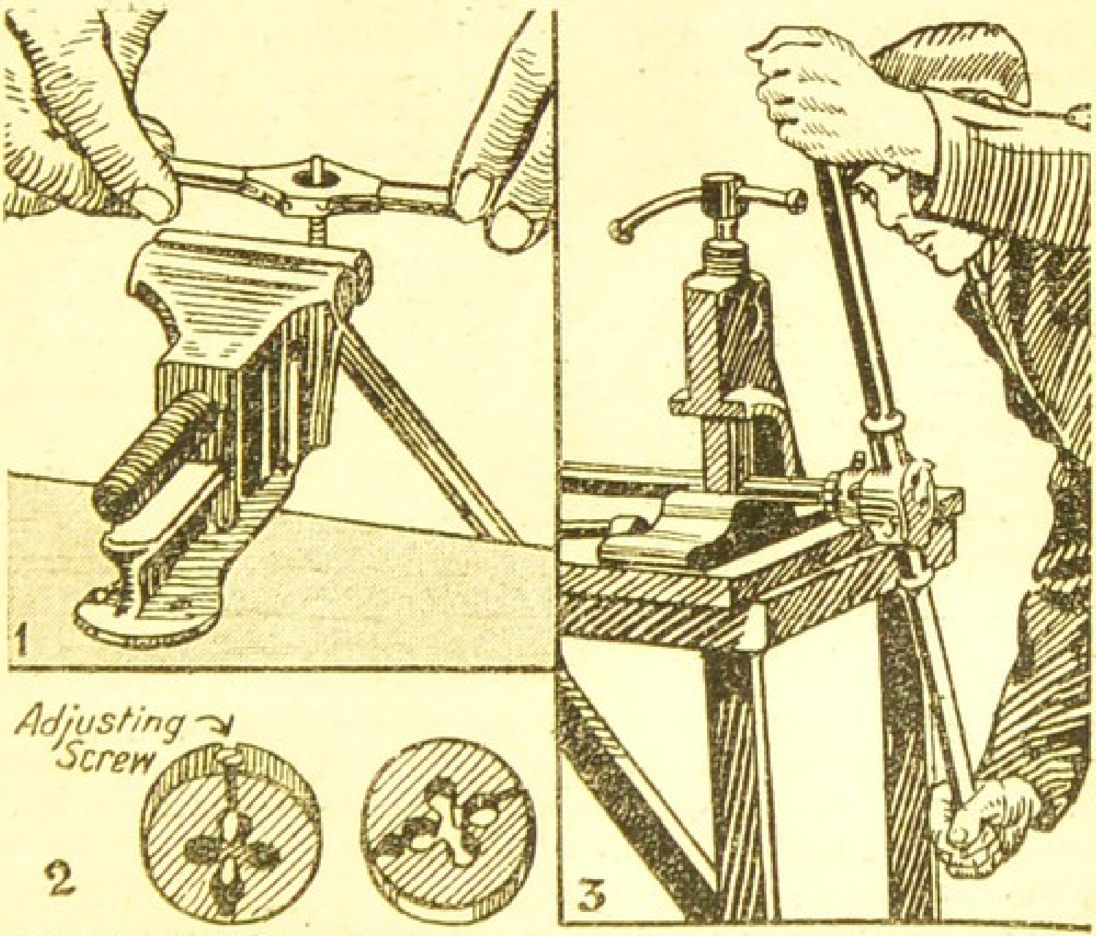
This contribution explains the method of cutting an external screw thread by the use of a die, and also the tapping of holes. The mechanical process of screw cutting in the lathe is dealt with in an earlier article on Screw Threads. See also Lathes ; Metal Turning ; Screw Plate

For small diameter screws, a stock for use with circular dies is suitable. Such a stock would measure about 8 in. in length, and contain a circular socket or aperture for the small size die measuring $\frac{13}{16}$ in diameter. This is suitable for screwing in brass up to $\frac{3}{8}$ in. diameter or thereabouts, and rather less on steel.

For work from about $\frac{1}{4}$ in. to $\frac{1}{2}$ in. diameter, one of the engineer's type of stocks would be used, with a pair of adjustable (two-part) dies. For gas-fitting purposes, larger stocks employing separate dies are generally used.

External Threads. The function of a screwing die being to cut a screw thread upon the outside of a circular piece of metal, the interior of the die is fashioned in the form of the screw thread. Parts of the diameter are cut or ground away to form a cutting edge, and the threads themselves are ground away at the front or entering edge, to facilitate starting the screw thread.

Most circular dies have a small set screw which, when screwed in, expands the die slightly and thus increases its effective



STOCKS AND DIES. Fig. 1. Small circular die stock used in cutting a screw thread. **Fig. 2.** Adjustable circular dies. **Fig. 3.** How large die in stock is employed for screwing gas barrel diameter. Two-part dies are adjusted for diameter by means of a set screw or screws in the body of the die stock. It is important that the die be adjusted to cut to the desired diameter. Screw it on to a clean piece of metal that has already been threaded to the proper size, then adjust the die until it is stiff to move by hand. For steel set the dies a shade closer, and for copper or aluminium a shade slacker.

Plenty of lubricating oil or soapy water should be used while cutting the threads, and the die should be worked down gradually. Give it half a dozen turns, then reverse the direction for a turn; this clears the chips, frees the dies, and often avoids stripping the threads. Do not force the die beyond its cutting powers, which can be judged by the chips coming away cleanly and freely. If the chips clog and bind, reverse the motion. Screw the die back from the work, clear the cutting edges by wiping away the chips, and apply the lubricant freely. Proceed with the work by giving the die a half turn, and then backwards a quarter turn, and so on, gradually coaxing the die.

INTERNAL THREADS. Taps provide the simplest method of forming the screw thread in a nut, or in the end of a length of cylindrical tube. Three or four flutes or grooves are formed longitudinally on the tap, cutting away portions of the screw thread. The shape of the flutes is designed so that one of its walls forms a cutting edge. The opposite end of the tap is usually left plain, and finished with a square-shaped portion. The tap is turned by a tap wrench.

The cutting part of the tap is shaped in various ways apart from the ordinary fluting. A set of taps for any particular size includes a taper, second, and plug or bottoming tap. In the case of the taper tap the screw thread portion is ground away for about $\frac{2}{3}$ of the length of the screwed part, so that it becomes tapered. In the second tap the tapering is restricted to a very slight amount at the end, the bulk of the screwed portion being of full diameter. In the plug, or bottoming tap, no part of the thread is ground off.

Before the hole can be tapped it must be drilled out to a certain size, dependent upon that of the screw thread which is to be formed within it. Suppose, for instance, the screw which is to be inserted into the tapped hole is $\frac{1}{4}$ in. diameter. The hole will then have to be drilled out about $\frac{3}{16}$ in. diameter. The correct size of drill to use is most quickly determined with the aid of a drill and tapping gauge, an instrument consisting of a metal plate with a series of numbered holes through it. The hole marked $\frac{1}{4}$ in. (tapping size) will actually measure less than $\frac{1}{4}$ in., and denotes the correct size of drill to employ to prepare the tapping.

Gauges are generally based on the assumption that the Whitworth system of screw thread will be used. With other systems of screw threads, such as the B.A. or British standard fine, or the gas threads, the correct size to drill the hole can be ascertained from the tables of tapping sizes which are given in engineering text books. Some of those most likely to be required by the amateur are given in the accompanying table. It should be noted that in the gas thread system the sizes for the taps are based on the bore of the tube, and not the diameter as in the case of a rod.

When the hole has been drilled through a piece of metal, the taper tap should be inserted into it, and if both are correct the end of the taper tap should just fit in the hole. The tap should be given 2 or 3 half turns to the right. It should then be turned backward a half turn and forward for 2 or 3 more half turns, then back again, and so on until the tap has nearly screwed right through the hole to its full diameter.

Whitworth		Gas		B.	
Size	Drill	Size	Drill	Size	Drill
$\frac{1}{8}$	No. 38	$\frac{1}{8}$	11/32	0	9–11
$\frac{3}{16}$	No. 25	$\frac{1}{4}$	29/64	1	15–17
$\frac{1}{4}$	No. 9	$\frac{3}{8}$	19/32	2	24–25
$\frac{5}{16}$	$\frac{1}{4}$	$\frac{1}{2}$	47/64	3	28–29
$\frac{3}{8}$	19/64	$\frac{3}{4}$	61/64	4	31–33
$\frac{7}{16}$	11/32	1	1 $\frac{3}{16}$	5	38–39
$\frac{1}{2}$	27/64	$1\frac{1}{4}$	1 17/32	6	42–43
$\frac{5}{8}$	33/64	$1\frac{1}{2}$	1 45/64	7	45–48
$\frac{3}{4}$	41/64	2	2 5/32	8	48–51
$\frac{7}{8}$	47/64	$2\frac{1}{2}$	2 25/32	9	51–53
1	27/32	3	3 9/32	10	53–55

It is then unscrewed and the hole finished by tapping it out afresh, either with the second or the plug tap. The second is the best to use when the tap can be passed right through the hole. In the case of a blind hole—that is, one that is drilled for a certain depth into a solid piece of metal—a start has to be made with the taper tap to the maximum depth, following with the second and finishing with the plug tap. In this case the greatest care is needed to avoid breaking the tap by forcing it too harshly into the hole, or by jamming it on the bottom of the hole. When tapping iron or steel the tap should be well lubricated with light machine oil.

It is important that the tap should be rotated about its own centre line; if allowed to swing from side to side in even the slightest degree the hole or the threaded portion will be enlarged or distorted. Special care is needed when starting the tap.

Whatever size of tap is used, the same method is followed in all cases likely to be met with by the amateur. It is exceedingly important to use a tap of the correct diameter and thread form for the screw which is to be fitted into the hole. This however presents very little difficulty in practice, as bolts and screws used in the home are generally screwed on the Whitworth system. Small work, such as that in wireless receiving apparatus, scientific instruments, and the like, is generally screwed on the B.A. system, as regards the small size, up to about ¼ in.

As taps can be purchased separately, the amateur will be well advised to buy those needed for any particular job, and gradually accumulate a stock as circumstances necessitate.

STOLE. To make a fur scarf or stole from several skins, first arrange the latter so that all the fur lies in one direction, and number each skin in order on the back before starting to join them. The careful matching of the skins, not only in colour, but also in both texture and length of fur, is most important.

Having matched the skins, cut a paper pattern as large as the largest oblong that can be contrived from the smallest of the pelts. Cut them all out by that, placing each pelt fur downward on a deal table and marking round the pattern in pencil or ink upon the leather side before proceeding to cut through the lines. Holding the skin taut between the fingers, cut it with a very sharp penknife. To join them, place the cut edges back to back, fur inside, and threading a special 3-sided fur-sewing needle with stout No. 30 cotton, overcast them together, firmly and strongly enough to hold the skins side by side, but not so closely or tightly as to draw the cut edges up into a ridge. In sewing smooth the fur down and away from the cut edges which are being joined by means of passing the needle between them.

When the skins have all been joined line the stole with silk or satin or brocade that matches or tones with the fur, with or without an interlining of domet or flannel, or a thin layer of wadding. Any interlining should reach barely to the edges of the fur, while the lining proper should be cut at least 1 in. wider all round, to allow for a good turning. The interlining should be attached with a few invisible stitches to the fur, before starting to line it.

STRAP. Odd straps may be bought from leather stores, and it is worth while buying a good one, for cheap leather wears rapidly and sometimes stretches. When it becomes necessary to make new holes in a strap, use a sharp skewer, holding the leather over it and pressing the point through. This is more satisfactory than cutting the strap with a penknife.

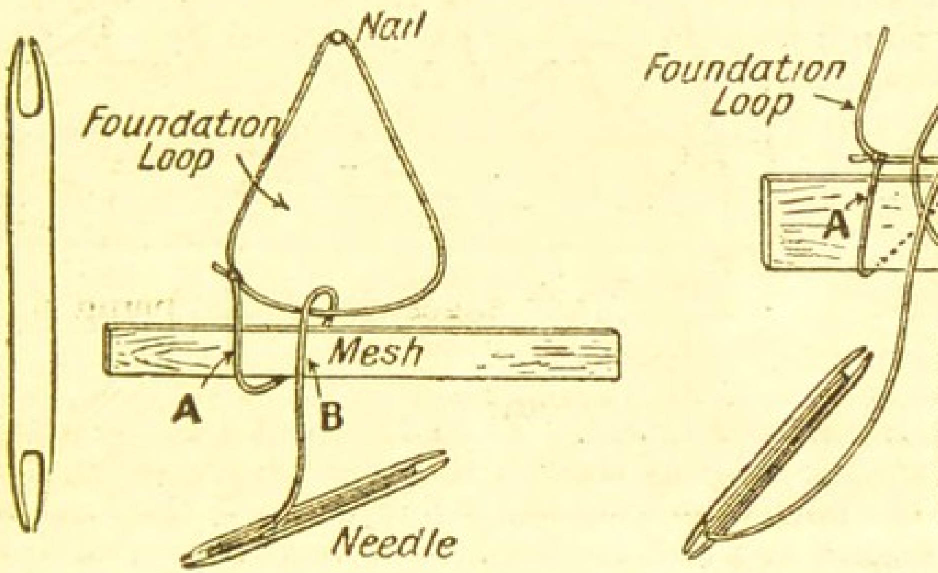
When straps have been laid aside for some time, and are to be used again, make certain that the buckle is firm. If the leather has become hard, soak it in hot soapy water for a few hours, and then hang it up in an airy place to dry. Finish by rubbing it vigorously with a soft rag dipped in linseed oil.

STRETCHER, in Woodwork. In woodwork, a stretcher is a piece of wood joining two rails which is used for strengthening the framework of cabinets, tables, chairs, and other forms of construction.

STRING BAG, How to Make. A string bag is fairly easy to make. To make one that will hold six tennis balls, the only requisites are a ball of string, white string, strong but not too thick, being the most suitable, a netting needle, and a piece of wood resembling an ordinary rule, i.e. about 12 in. long and 1 in. wide.

The netting needle should be of wood or bone. The needle, or mesh, as it is called, should be 5 or 6 in. long and about $\frac{1}{2}$ or $\frac{3}{4}$ in. wide. It is forked at both ends so that the string can be wound upon it. This should be tied very tightly and only a little at a time so that the needle will slip easily through the loops.

The work consists of netting, which is a series of loops knotted evenly. To begin with, the worker should make a foundation loop with a separate piece of string. This should be about 10 in. long, and its ends knotted together. It should then be slipped



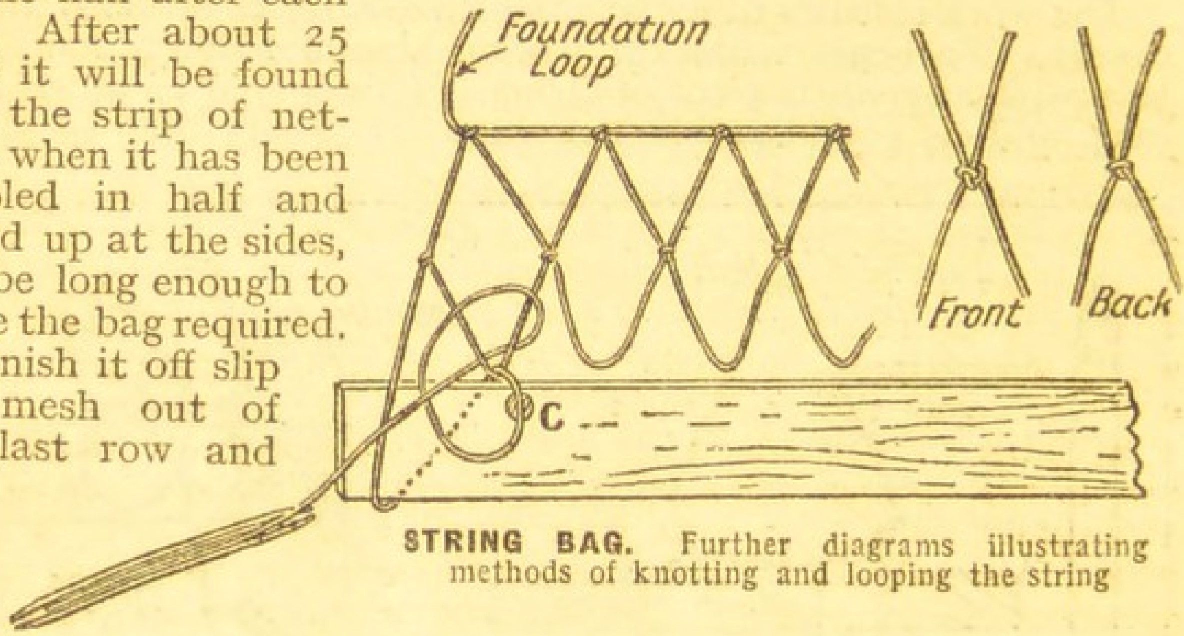
STRING BAG. Diagrams showing netting needle and method of making loops and knots in the string

over the knob of the chair, or on a nail, or anything else that will allow it to be pulled at a height convenient to the worker. Having arranged the foundation loop with an ordinary knot, it should be fastened to the end of the string on the needle.

Then, holding the mesh with left hand, the worker should wind the string, marked A in the diagrams, from the needle once round the mesh and pass it through the foundation loop. He next draws the mesh up to the foundation loop, and places the first finger of the left hand upon the string B, at the point C. He next casts a loop of the working thread and passes the needle to the right of the foundation loop, between it and the mesh and through the loop which has just been cast. This enables the worker to form a knot which he can then draw tight against the first finger, which should be kept on the string B until this is done. It is important to bear in mind that the string is drawn towards the worker, not upward.

Fifteen stitches or loops should be cast in this way on to the foundation loop. The mesh may then be slipped out and removed, while a complete turn is given to the foundation loop on the nail. The work is turned over so that the work is begun on the left-hand side again, but at the same point at which it was finished off on the right. This strip, ready turned for the first stitch on a new row, will be seen on the bottom of the diagram. The next row is continued in the same way, but a separate loop instead of the foundation thread should be taken up.

The whole bag is made in this way, row after row of knotted loops being worked from left to right. The work must be turned on the nail after each row. After about 25 rows it will be found that the strip of netting, when it has been doubled in half and joined up at the sides, will be long enough to make the bag required. To finish it off slip the mesh out of the last row and



STRING BAG. Further diagrams illustrating methods of knotting and looping the string

neatly cut off the needle string. Then take out the foundation loop and join up the sides as though they were being sewn, using the fingers as the needle, poking the string through the loop, and joining with a knot top and bottom. The bag is then complete except for the draw-string at the top. This should be threaded through the loops which form the mouth of the bag. It should be about 20 in. long and of stouter string than the bag itself. The ends should be knotted after it has been threaded through the loops at the neck of the bag.

STRINGING. Stringings mean very thin lines of inlaid wood put round panels and the edges of constructional parts of furniture. Satinwood stringing on mahogany is used to give a light line on dark wood, and ebony to give the opposite effect.

STROKING, in Needlework. This process consists in placing side by side, in even folds, the little flutes made in material by gathering, thus giving a much neater effect. Before stroking can be done, the gathering thread must be drawn up fairly tight and wound round a pin inserted in the material at the left end of the gathering. The cotton must not be broken off, as the gathers are afterwards released to the size required.

Take the material in the left hand, with the right side of the fabric towards you; then take a needle in the right hand, with the point upward. Beginning at the left hand end of the work, raise each gather gently with the point of the needle, and stroke down into the little ruck which lies between, moving it gently to the left, so that it is placed under the thumb. Repeat this process until all the gathers are stroked under the thumb; then release the cotton at the left end, to make the gathering the desired size, and fasten off.

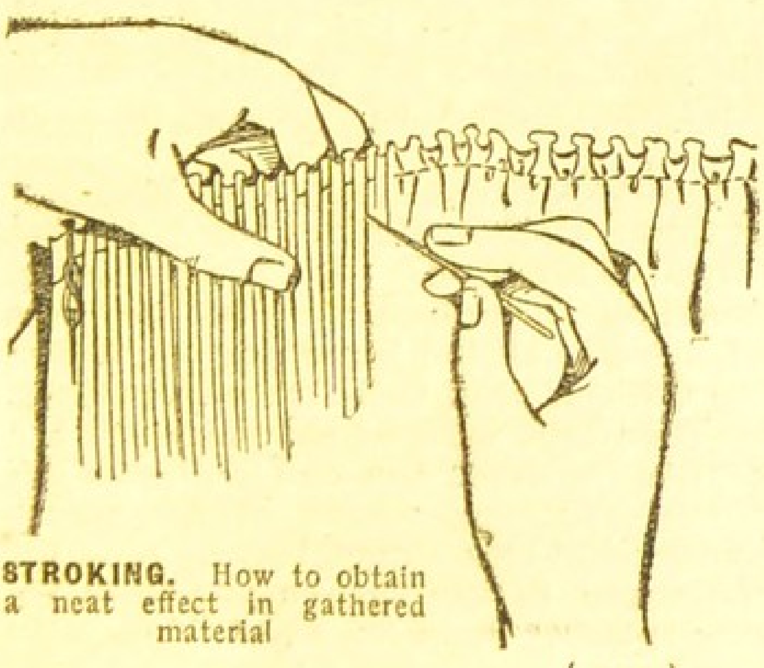
Care must be taken to stroke the portion of the material above the gathering thread, as well as below it, and in order not to scratch the material, it is best to use a blunt-pointed tapestry embroidery needle for the stroking. (*See* below.)

STUD, in Engineering. A stud or stud-bolt is a headless bolt with a screw thread formed at each end and an unscrewed portion between. It is screwed tightly into some fixed member, and the projecting end, in conjunction with a nut, serves to hold in position some other part.

SUÈDE. Obtained from sheepskin dressed soft and finished on the flesh side with a very fine nap, suède can be sewn and worked for all purposes just as easily as velvet. Suède is utilized largely in the manufacture of gloves, shoes, handbags, belts, hats, and sports coats. Artificial flowers are made from it, and it is dyed to many different shades.

SWAGE. When finishing iron while it is hot, blacksmiths use a tool known as a swage. There are several forms, but essentially they all consist of a form of hammer head or some other face which has a ½-round groove across it. Swages are generally used in pairs. One, known as the bottom tool, has a shank which fits into a hole made for that purpose in the anvil. The upper tool is held with an iron rod handle, which is grasped by the smith in the right hand while the work to be swaged or rounded is held in the left hand.

The metal is brought up to its proper heat, and roughly rounded by hammering in the ordinary way, somewhat as described in the article on forging. After this treatment it is reheated, if necessary, and rested in the groove in the bottom tool. The top tool is then placed into position on the upper side of the work, and an assistant strikes the top tool a heavy blow with a sledge or other hammer, according to the size of the work. At the same time the smith partially revolves the metal between each hammer



STROKING. How to obtain a neat effect in gathered material blow, thus ultimately rounding off the metal and working it up to a smooth surface. If carefully done, tolerably good rods can be obtained.

Instead of using the bottom tool, a large rectangular block is often utilized which has grooves across its edges. It is known as a swage block.

SWEATER. This heavy type of jersey is made in various sizes both for men and boys, the chest measurement being the usual standard. As regards pattern, some are made with a collar and some without.

The knitted garment, known as the pullover, is a kind of sweater. Most of them have two pockets, some have a decoration around the neck and elsewhere, while others are quite plain.

How to Knit. To knit a useful, standard type sweater with a V-shaped neck the requisites are 18 oz. of Beehive fleecy wool, two No. 7 and four No. 10 bone knitting needles, pointed at both ends. The garment should be worked at a tension to produce about 5 stitches and $7\frac{1}{2}$ rows to the inch measured over the plain portion. For the back, cast 96 stitches on the No. 7 needles. 1st row: Knit 4, * purl 2, knit 2. Repeat from * to the end of the row, always slipping the first stitch throughout. Repeat this row 20 times. 22nd row: Knit plain. 23rd row: Knit 2, purl to the last 2 stitches and knit 2. Repeat these last 2 rows until the work measures 30 in. from the beginning. Cast off 26 stitches at each end, and leave the 44 stitches at the centre on a No. 10 needle.

The front should be worked exactly like the back until it measures 22 in., finishing with a purl row. Then begin to shape the neck as follows: 1st row: Knit 45, and then turn. Leave the remaining stitches for the second half of the neck. Continue in the pattern, decreasing once at the neck end of the needle in every third row until only 36 stitches remain; then cast off. Taking the needle where the stitches are left, slip the first 6 stitches, at the centre of the front, on to a No. 10 needle, and, on the remaining stitches, knit the second half of the neck to correspond with the first.

To make the sleeves, cast on 76 stitches. 1st row: Knit 4, * purl 2, and knit 2. Repeat from * to the end of the row. Repeat this row 30 times. 32nd row: Knit plain. 33rd row: Knit 2, purl for the last 2 stitches and knit 2. Repeat these last two rows throughout the sleeve and increase at the beginning and end of the 7th, then every following 6th row until there are 7 increasings at each side of the work. Then knit without shaping until the underarm seam measures 18 in. without the cuff and cast off loosely. To make up the sweater, press each of the pieces carefully. Sew up the shoulder and side seams, leaving 9 in. for the armholes. Sew up the seams of the sleeves and then fix these latter in the armholes, placing seam to seam.

To make the collar, with the No. 10 needles knit the 44 stitches that were left at the back of the neck. Follow on with a second needle, and knit up 29 stitches at the side of the neck and 3 stitches off the extra needle. With a third needle knit the next 3 stitches and knit up 29 stitches at the other side of the neck. Knit 16 rounds in rib of knit 2 and purl 2, increasing 4 stitches in the first round at the centre of each of the second and third needles. Cast off loosely. The collar can be made to look very effective by introducing stripes of a second colour.

SYCAMORE. The timber obtained from the sycamore is close, compact, and easily worked, and it takes a smooth, glossy surface from a finely-set plane. If it is properly seasoned and sawn on the quarter it will not shrink or twist to any extent. It is nearly white in colour with a yellowish tinge. Owing to the method of conversion the surface shows a pretty figuring, particularly when the wood is cut nearly parallel to the medullary rays.

The wood is much in demand for general turnery. It is used for rollers of mangles and washing machines, dairy utensils, and bread boards; it is also employed for violin backs. Owing to its close grain it is adapted for making wooden bowls, and for the same reason it is suitable for wood-carving and particularly for chip-carving. It takes stain well, and can be used as a substitute for ebony. It can be obtained in boards over 12 in. wide, and is also procurable as plywood.

TACKING. The stitch known as tacking is a temporary one, being used to hold a hem, seam, or other part of a garment in position while the permanent stitches are put in. Coloured cotton should be used for tacking white materials and white cotton for dark materials, so that the stitches can be easily distinguished.

Begin the tacking by knotting the cotton at one end and pushing the needle straight through the material. Work from right to left, and make the tacking stitches about ½ in. long and to lie a little above the line where the permanent stitches are to be made. After pushing the needle through to the wrong side, bring it out again ¼ in. farther on in a line horizontal to that where it was put in, and continue to the end of the work in this way.

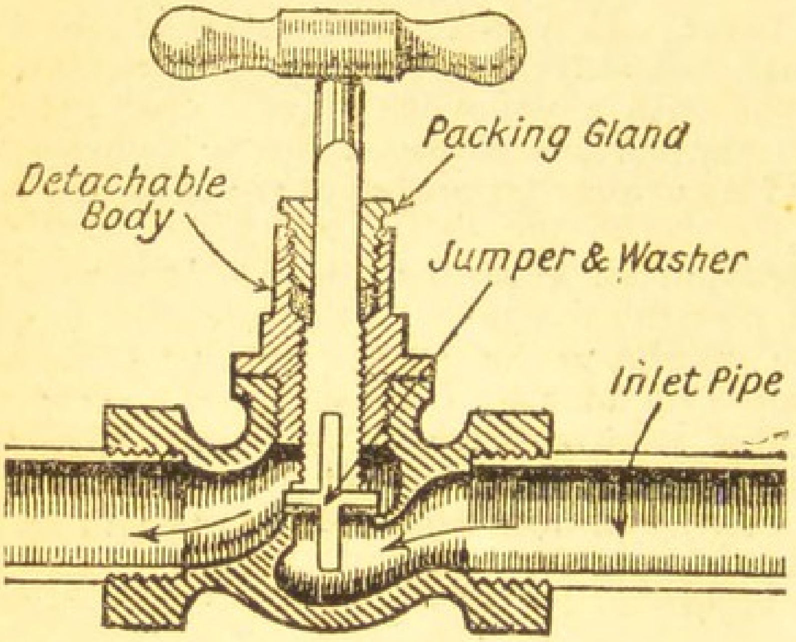
Tacking should be finished with a back-stitch. When removing tacking stitches, care should be taken to see that the material is not torn or puckered.

TALLOW. Tallow is an animal fat largely consisting of stearin, palmitin, and olein. The highest grades are used commercially for the making of candles and the lower grades in the manufacture of soap and dressing leather. Tallow can be used to some extent as a lubricant in cases where rope or cord runs over a pulley. Fishing and other lines are rendered more or less waterproof when rubbed with tallow.

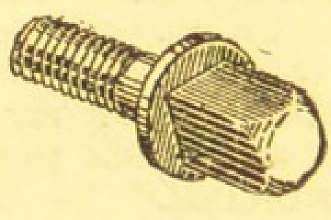
Tow impregnated with tallow can be employed for the making of joints in the stuffing box or gland of pumps, etc.

TAP. The water taps in general use in the home are of two classes, known as plug and screw-down taps.

The plug tap consists of a body and a plug, the body having a passage-way through it which is crossed at right angles by a second passage-way tapered in shape. This is occupied by a similarly shaped piece of metal known as the plug. The plug has a hole through it lineable with the first or through-way hole. When the plug is turned in its socket so that the hole in the plug is opposite that in the body, the liquid passes through. When the hole in the plug is at right angles, the through-way is closed and no liquid can pass, if the plug is a perfect fit in the socket. This kind of tap is used for water at low pressure. A similar type is used on gas pipes.



TAP. Sectional view showing principal parts of the screw-down type of stop cock



The screw-down tap consists of a handle and screwed rod which turns in the upper part of the body and has at the lower end an enlarged portion known as the jumper. This can be raised or lowered under the action of the handle, the function of the jumper being to close or open an aperture between an upper and lower water-way formed in the body of the tap. The construction is clearly indicated in the diagram of a sectional view, which illustrates a stop cock.

Screw-down taps are generally used on all water fittings in connexion with public supplies, as they are durable and reliable in use and tend to minimize wastage of water. It may be noted that some considerable pressure of water is needed to operate the screw-down tap, so that it is useless fitting this type to a rainwater tank, for example. A plug tap should be employed for such purposes.

The component parts are as follows: handle, barrel, jumper, jumper nut, washer, joint washer, body, cap, fixing nut, union piece and nut.

The tap usually fitted to water pipes for domestic purposes is known as a screw-down bib cock. The components are the body, the washer which makes the joint between the body and the barrel watertight, the jumper washer, and jumper with retaining nut. The jumper seats on to a valve face within the body, and is practically the only part that is likely to give trouble. It is replaced when needed with a new washer, which can be obtained in various sizes from ironmongers. A washer of a special material is needed for pipes on the hot-water system. As soon as the pipe commences to drip, and water is not easily turned off, a new washer should be fitted. Sometimes the jumper nut gets corroded and will not unscrew; in such a case it is best to fix a new jumper and washer complete.

The barrel at the top consists of a stuffing box to keep the joint between the screwed part of the handle and the barrel watertight. The lower part of the barrel is threaded to screw into the top of the body. Usually this part is screwed left-handed, that is, the barrel is unscrewed by turning it backward, or against the clock. It is sometimes fitted with a set-screw to prevent it unscrewing. This should be looked for at the start, removed if present, and the barrel can then be unscrewed with a large spanner applied to the hexagonal part at the bottom of the barrel.

The same principle is adopted with stop cocks and other taps, including the pillar types of bath and lavatory basin valves. The internal structure and arrangements are similar to the foregoing, but the outlet from the body is set at an angle to enable the tap to stand in a vertical position. This has the advantage that the pipes can be more readily erected and are less obtrusive, as they can be hidden to a large extent behind the basin or bath.

As will be evident from an inspection of the diagram, there is a right and a wrong way to fit a stop cock, the correct way being with the lower of the waterways towards the direction of flow of the water. This is because the water as it passes the jumper and washer is then able to lift it off its seat, and thus there is a minimum of friction in passing. If the tap be arranged the other way round, the water will tend to force the jumper down and thus partially choke the waterway, and there will be much more pressure needed to force the water through the stop cock. On some makes of tap the jumper is positively attached to the spindle by a floating joint, and this joint automatically lifts the washer and jumper from the valve seat.

TAPE. It is not always best to buy cotton tape in mixed packets. A small assortment in varying widths is useful, but the stock bundles usually include a proportion of the less needed sizes, and these take up room in the workbox.

Linen tape is naturally stronger and more durable than cotton tape, and, although usually unbleached, it whitens in the course of washing. Tape makes an excellent substitute for twine, especially in packing stationery and books. Stationers sell special tape for such use, as well as red cotton tape for tying documents and narrow green silk tape for batches of typewritten sheets.

Special tape is also made for heading and gathering curtains, which pulls out flat for washing. These headings ensure good pleating and are supplied in all colours and in various widths.

TAPE MEASURE. A good tape measure is an indispensable adjunct to the workbasket. It is, as the name implies, made on a strip of material which looks like tape, usually about 1 in. wide, and is finished off at one end either with a metal tab or a loop. The length is usually 60 in. and is divided into inches on one side and centimetres on the other. The whole can be rolled up neatly and put away in the workbasket without taking up valuable space. Similar measures are made in narrower widths in a box or reel which contains a spring. This draws the measure back automatically when the end is released and involves no winding.

TAPESTRY NEEDLEWORK: DESIGNS AND STITCHES

Embroidery for Chair Seats, and other Canvas Coverings

This article describes the practical application of this decorative needlecraft in the home. See also Bag; Embroidery; Laid Work

Included under the heading of tapestry needlework are all the canvas embroideries in which the stitchery covers the whole groundwork of the fabric and in which the work is done on counted threads. A fascinating thing about the work for furnishing purposes is that designs can be obtained or evolved which suit any type of room and furniture, but in which the same simple stitch or group of stitches are employed, however intricate the appearance of the work when completed. Materials, including designs with colour charts, canvas already traced for working, or with the patterns outlined and colours suggested by painting them on the fabric, wool and silk embroidery threads, canvases in a variety of meshes, needlework frames and needles are stocked by all good art needlework shops and departments in stores.

Tapestry wools vary in thickness according to the nature of the work, canvas and design. For a large piece of work such as a chair seat, which will be required to withstand constant wear, a heavier type of thread is required than for a bag design embroidered on finer canvas. Various excellent makes of wool are obtainable.

Silk threads should not be used for upholstery covering as they do not withstand wear. In several old pieces where silk thread have been introduced into portions of the original work the wool worked portions are unimpaired, but the silk ones have perished. Silks are, however, useful for brightening smaller designs for pole fire screens, cushions, cosies, blotters and purses. Artificial silks, owing to their brilliancy, are often liked for this purpose. For very fine work Filo and Filoselle threads are recommended as the strands can be split and any thickness used that the worker requires. Mercerized embroidery cottons such as Sylko are sometimes employed, and wear well, but nothing can beat the beauty of wools for this form of embroidery. Tapestry wools are best used for heavier work, light crewel wools for fine petit-point embroidery on such articles as bags.

Tapestry is worked on either a single thread canvas, or double thread Penelope canvas. and a variety of meshes are made according to whether designs require many holes to the inch or comparatively few. For instance, there might be 120 stitches across a design, and if the work was wanted to measure 12 inches across when finished, the canvas should have 10 holes to the inch. Double strung canvas is best for covering furniture. The canvas is obtainable in single and double widths when bought by the yard. Special blunt pointed tapestry needles should be used for the work.

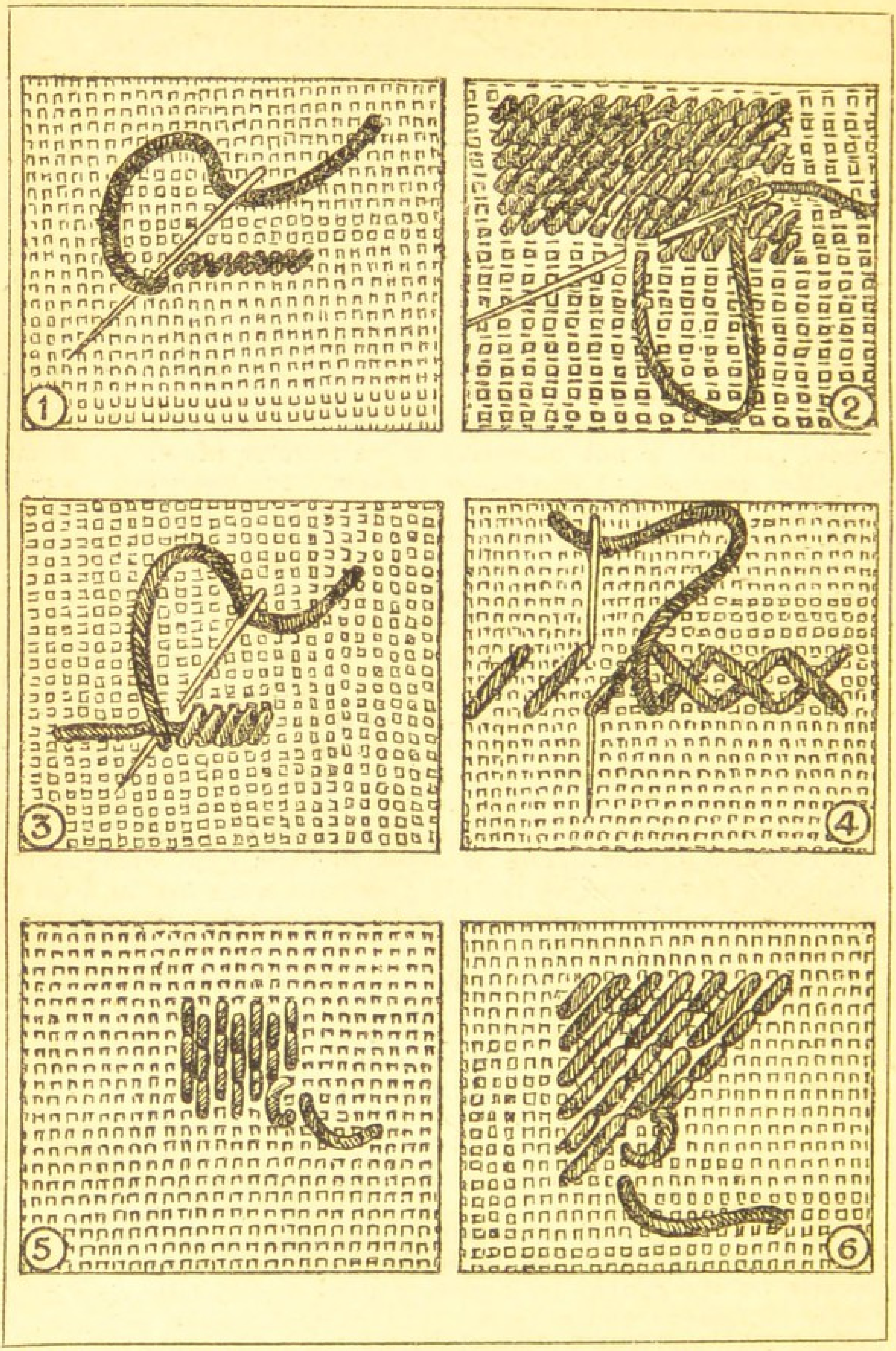
For large pieces of embroidery it is wise to use an embroidery frame, but this is not necessary for a smaller piece. A frame simplifies the task as there is a tendency for the work to pull crookedly. Should this happen the remedy is to damp the work thoroughly on the wrong side, place it face downward on a piece of clean cotton cloth on a board and tack it flat to the board, testing with a ruler to see that the work is stretched to the exact shape required when finished, and leave it to dry.

Colours and Designs. For all fine needle tapestry it is essential that colours should be subtly graded. The richness of pattern is obtained by the use of 4 or 5 shades of one colour in proximity and by the contrasted plain colour of the solid background. Expert workers get wools specially dyed according to their colour charts. When copying some of the older designs it should be remembered that colours were originally brighter and probably cruder. This is especially the case with greens. The lovely blue-greens of the old Jacobean work are to a great extent the result of accident. The blue dyes employed endured, while the yellow were fugitive.

Another hint which can be applied when embroidering a cover for a period chair or stool is to change the pale shades slightly in the repeats of the pattern to give the partially faded effect of mellowing age. The result is to make the new cover belong to the frame instead of proclaiming its modernity at a glance. If in spite of careful choice of "old" colours to suit period pieces the result is still too crude, the tapestry may be dipped in tea and then tacked to a board or frame to dry and preserve the required shape.

While art needlework shops supply designs elaborately prepared there are many pieces of beautiful work which can be done directly on the canvas by counting stitches and following clear charts of designs and colours. The pattern motifs are always worked first and the backgrounds put in afterwards to ensure uniformity.

Period designs are obtainable in Florentine, Cluny, Gothic, Gobelin, English 17th Century, Queen Anne, Chippendale, Adam,



TAPESTRY NEEDLEWORK: stitches most used. **Fig. 1.** Petit point on single thread canvas. **Fig. 2.** Tent stitch on double thread canvas. **Fig. 3.** Gros point over a laid thread. **Fig. 4.** Cross-stitch as worked in tapestry. **Fig. 5.** Straight filling stitch. **Fig. 6.** Mosaic stitch much used for backgrounds for bags

Victorian, and also in Louis styles. The last are often used for embroidering beautiful bags with a figure or landscape motif surrounded by a scrolled frame and floral pattern. A great help to anyone who wishes to work a cover for an antique stool or chair is to visit the Victoria and Albert Museum and study the needlework covers of furniture in the collections there. For the most part earlier designs show a tendency to all-over patterns, which have again appeared in tapestry work for quite modern pieces, particularly Florentine patterns consisting of vandykes or wavy lines in which the rich effect is gained by use of varied colours. Many of the later designs were composed of central floral or pictorial motifs, either surrounded by fancy borders or a plain continuation of the background stitchery.

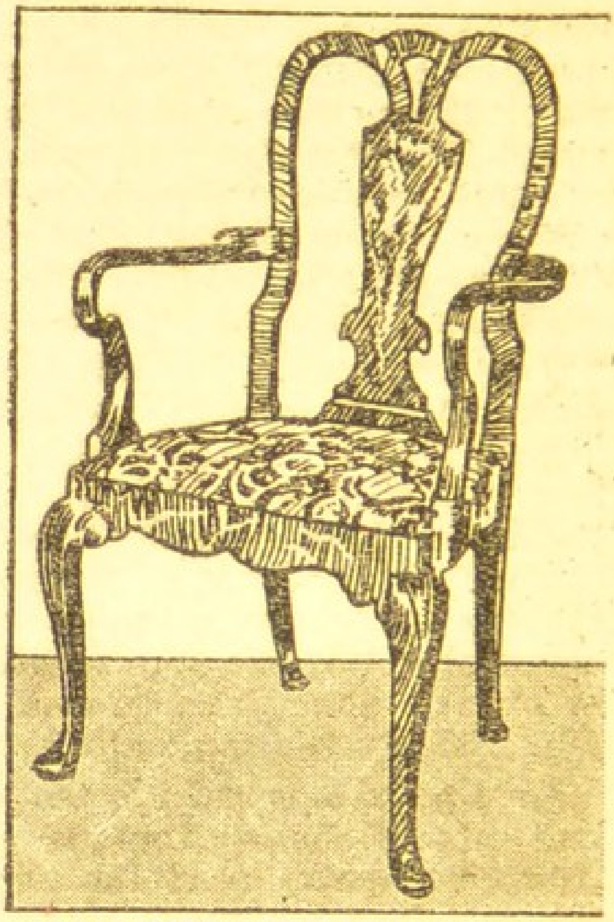
THE STITCHES. The stitches most used in needle tapestry are petit point, gros point, cross-stitch, straight Gobelin stitch and mosaic stitch. Whole pieces can be worked in either of the first two stitches. Petit point is often known as tent stitch; the finest effects are gained by it on a small-meshed single thread canvas. This stitch is worked diagonally over one thread of the canvas and is actually worked from left to right upward diagonally, but the row progresses from right to left, as shown in Fig. 1. For alternate rows the work is turned upside down. Fig. 2 shows the same stitch on double thread canvas.

Gros point is worked in the same way, but over two threads or two sets of double threads on a double-thread canvas. This stitch is greatly used for chair seats and for groundings. A padded effect is gained by laying a thread, as shown in Fig. 3, between the threads of a horizontal line of the canvas and working the stitch over it. Do not pull the wool tightly when working over a coarse canvas as it is a sign of bad stitchery when the canvas threads show through. Some workers use double wool for heavier types of designs on coarse meshes. Do not thread the needle with more than about 20 in. of working thread.

Cross-stitch for tapestry is usually worked over 2 vertical and 2 horizontal single or double threads of the canvas. To ensure an even look stitches must always be crossed the same way. In a pattern each stitch should be finished singly, but when working a grounding it is permissible to work the first half of the stitch along a row and return crossing. (*See* Fig. 4.)

Straight Gobelin stitch is worked in horizontal rows for groundings. The thread is carried vertically over 2 threads of single-thread canvas (or 2 double threads of double-thread canvas), leaving each time one thread of material between the stitches. The effect is vertical and not diagonal. This stitch is used to imitate the ribbed grounding of Gobelin woven tapestries. A straight filling stitch, shown in Fig. 5, and a wide oblique Gobelin stitch are sometimes used. The latter covers 2 vertical and 3 horizontal single or double threads of the canvas, and advances one thread of the canvas at a time. Mosaic stitch makes another useful grounding, as shown in Fig. 6. It is worked along the 1st row with a long slanting stitch and a short one alternately. The 2nd row completes this by adding the second short stitch. The 3rd row is like the 1st and the 4th row like the 2nd. The final row is all of short stitches. A stitch used in Florentine patterns is worked in slanting lines, the thread being carried alternately over 2 and 4 crossings of the canvas, the stitches in the 2nd row being short where those in the previous were long, and so on to cover the canvas. There are many other stitches which the experienced worker uses occasionally. Sometimes stitches seem to evolve of themselves to suit the particular pattern, but the beginner is advised to use the simple ones until proficiency is gained in keeping the work flat and the stitchery even.

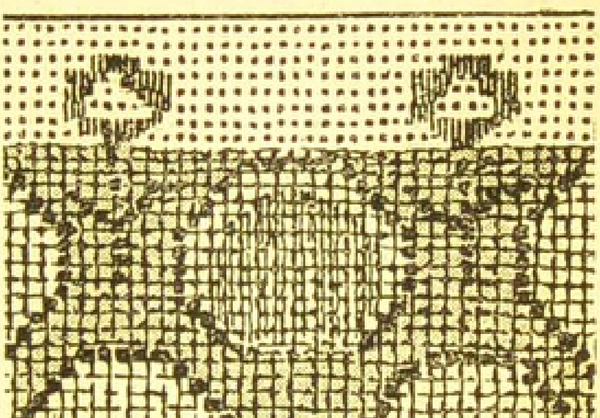
To secure the first stitch when a laid thread is not used, a knot is made at the end of the wool, the needle passed through the canvas from the right-hand side about ½ in. from the starting point. As the work proceeds from left to right after a few stitches the end of the wool is caught in at the back. Afterwards fresh lengths of wool are darned in at the back of the stitches. When using a number of shades of the same coloured wool, knot the cut skeins loosely on to a wooden curtain ring, keeping all the greens together, all the pinks, etc.



TAPESTRY NEEDLEWORK. Fig. 7.
Queen Anne style chair covered tapestry needlework
Courtesy of Bartholomew & Fletcher

FURNITURE COVERINGS. The Queen Anne style elbow chair in Fig. 7 shows the beautiful effect of a needle tapestry covered seat. The design is an all-over floral one of the period, worked in petit point in wool on a double-thread canvas. A cover for a chair or stool with a drop-in seat is easier to make up than one for an over-stuffed frame. When the work is finished, the loose seat is taken out, the tapestry stretched over it, and brought smoothly down to the underside. Tacks with large heads are obtainable, which are placed at frequent intervals to secure the work to the under framework of the drop-in seat. This is then neatened with a piece of hessian, the edges of which are turned in under itself. It is important, when measuring the canvas to be embroidered, to allow a good margin for turning. A conventional floral pattern is shown in Fig. 8 which could be used with any style of furniture, but would look best for a chair of the style illustrated.

It is carried out in gros point on a double-thread Penelope canvas with 12 threads to the inch, using tapestry wools. Sufficient canvas should be bought to allow a 4-in. margin all round. This pattern has only one motif, so that the beginner becomes quickly used to working it, and in each alternate row of motifs the colours are the same. Thus the 1st row of these conventional flowers could be done in two shades of pink, with a yellow centre, outlined with maroon, and pale green used for the stem. The 2nd row of flowers have dark green stems and are outlined with the same shade, filled in with deep rose and crimson brown and yellow centres. It will be noticed that part of the centres of a row of flowers are worked at the top in the illustration, repeating the colours of the 2nd row underneath. The centre of the canvas is first marked and an upright line drawn through it. The rest of the fabric is then spaced out into squares, the size of each recurring motif. The grounding is put in last, also in petit point, and could be in stone colour, or a dull fawn or black according to the colour scheme of the room.



TAPESTRY NEEDLEWORK. Fig. 8. All-over pattern of a single conventional floral motif repeated at regular intervals, a suitable design for the Queen Anne style chair shown in Fig. 7

BAGS AND POCHETTES. For bags worked with beautiful designs in petit point the finest canvas is used, and in some cases silk Filoselle is employed for the design and in others fine wools. Occasionally, silks are employed for portions of the design only. Pochettes are often worked on rather coarser meshed double-thread canvas and with tapestry wools, as they are more handled and used for ordinary occasions, while the bags in finest embroidery are reserved for the evening.

A bag in petit point with a simple floral wreath or posy would require $\frac{3}{4}$ yd. of 23-in. wide single-thread canvas, a bag frame about 6 in. across, and silk for lining. The shape of the front of the bag is marked out on the canvas, making it the width of the frame across the top, 8 in. deep and curving out the sides with rounded corners at the bottom. The designs on the front might require about 20 skeins of coloured silks, while the back of the bag and the grounding would require about 12 skeins of the same shade. Beautiful designs in Louis styles require to be traced for working. Such designs on canvas ready for working can be bought in a number of patterns. Ornamental frames can be purchased to accord with various styles and fine petit point needs good mounting.

In gros point or petit point conventional patterns of stripes, triangles, encroaching squares and circles are all easily worked, and patterns can be copied from modern woven fabrics for pochettes and larger bag coverings. Shaded vandykes worked in wide Gobelin stitch or in a straight stitch taken vertically over 3 holes are most effective for bags with wooden frames. It may, however, be remembered that no stitchery is so durable as petit point or cross-stitch on a medium meshed canvas. The longer the stitch the greater the possibility of threads being caught and pulled out of shape in handling and wear. The making up of bags and pochettes is described in the article Bag. They can also be made up in needlework shops. Some workers merely damp their finished embroidery on the wrong side and tack it on to a covered board to stretch it back to the required shape when finished; others find that it is best to press the tapestry with a moderately hot iron, placing the work face downward on a thickly padded ironing board.

TARNISHING. The best way to prevent tarnishing is to have the objects lacquered when such a course is possible, as this, when well done, is invisible if a clear or crystal lacquer be employed.

To remove tarnish stains from silverware wash the objects in hot water with a trace of ammonia in it, following this with a good washing with clear hot water and finishing with a rouge polish. Tarnished brass and copper ware can usually be cleaned with a very weak solution of sulphuric acid in water. Only a trace of the acid must be used, as it is very violent in action and would speedily corrode the metal. The articles should be thoroughly washed afterwards in hot soda water to neutralise the acid bath, and then polished, and, if desired, lacquered.

Another method of treating tarnished silverware is to rub it well with a solution of powdered magnesia and follow with a polishing with the dry powdered magnesia, finishing in the usual way. Steel and iron are best cleaned with a mild abrasive. For slightly affected pieces this may be a light sprinkling of fine emery on an old stocking moistened with a few drops of lubricating oil. When the tarnishing is severe] the best plan is to use the finest old emery paper and finish off with a good metal polish.

TARSO. This is a method of cutting a design on wood which gives it almost the appearance of inlay. It is a modern form of the old intarsia and affords a simple method for the amateur to decorate such surfaces as screen panels and trays. For the latter, when glazed it would be almost indistinguishable from marquetry. Many poker-work designs can be adapted to this work by those who have no outfit for the former craft. More or less conventional designs can be carried out effectively, and the outfit is of the simplest, consisting of a tarso or cutting knife, a supply of stains in various colours, and some polish.

The satisfactory appearance of the finished tarso depends largely upon clear, even outline, and therefore it is best to work on a flat panel. A box should not be taken for a first attempt unless books are built up alongside level with the top to provide a support for the hand. It is better to begin on something small and fairly simple. A good design is illustrated in Plate 7. It is equally suitable for an empty grate screen panel or for a blotter. The colours used would be dark brown, green, black and white. The incision should be about $\frac{1}{32}$ in. The design must be followed very carefully, and the various lines cut correctly. Cut anything that lies underneath first, and the rest of the design later. When all the lines are incised, the panel should be sandpapered, working with the grain, never against it. Finish off this stage by giving a final rub with the back of the sandpaper.

The next step is to colour the design by painting in water stains with a brush. The stains must be used almost pure, and made to look even and solid. It is an excellent plan to add 1 drop of ammonia to the stain before using it to prevent the colour from spreading. No shading must be attempted, the aim being to make the design look as though it is inlaid and not painted on. The background is left uncoloured. The colours are left to dry; if not sufficiently dense, any part that needs strengthening should be coloured again.

A very high polish is required. First the whole surface of the wood is covered by applying a coat of wood filler with a brush, and this is left to dry thoroughly. If the surface is not sufficiently covered, a second coat may be applied and left to dry. Then put some fine glaze polish into a pad, and body in until a good covering is obtained. Oil polish should not be used for this work. It is well to avoid working too long on the surface; the moment it becomes tacky it should be put on one side and work started on another piece. As soon as a good body of polish is obtained, take a clean pad, put 1 drop of glaze on it, and rub the surface hard, working up and down as quickly as possible until the whole surface is absolutely bright and free from any disfiguring appearance of streakiness.

TASSEL. To make a woollen tassel, such as might be used to finish the ends of a girdle for a dressing gown, take a small piece of card, as wide as the required length of the tassel, and bind the wool round it several times, the number of threads in the tassel depending entirely upon individual taste. These strands of wool are tied tightly together at one edge of the card and are cut at the other, all that remains to be done being to hold the ends in one hand and twist a strand of wool several times round just below the point where it is tied.

TATTING, in Needlework. An old-fashioned kind of fancy-work, tatting can be worked in crochet cotton or in purse silk, a tatting shuttle and a crochet hook or bone pin being also required. The shuttles are made of bone, tortoiseshell, ivory, and of ebony inlaid with mother-of-pearl, and have a block in the centre pierced with a hole, through which the cotton is passed.

To fill the shuttle, thread the end of the cotton through the hole, tie it, and then pass it through the ends of the shuttle round and round the block until it is level with the ends of the shuttle. The cotton should then be cut off, about 1 yard of it being left to hang loose. Workers should note that the crochet needle or bone pin is needed when joining the loops.

In learning the stitch, the chief thing to remember is that the thread over the hand is to be kept loose, while the thread from the shuttle is drawn tightly. The work resembles the button-hole-stitch used in making a loop for buttons, the thread from the shuttle corresponding with the loops of the button loop, and the thread over the hand corresponding with the buttonhole stitch worked upon them. Take the end of the thread in the left hand, between the thumb and the finger, and pass it over the fingers of the left hand; then bring it back to the thumb and finger again, so that there is a ring of thread round the fingers.

With the shuttle in the right hand, throw the thread from the shuttle round the back of the left hand and pass the shuttle under the thread round the fingers; then draw it back over that thread and pull it out tightly, letting the loop over the fingers become slack. This forms a loop on the shuttle string, tightened by expanding the fingers.

The first half of the stitch is now completed, but in making the second half do not throw the shuttle thread round the left hand, as previously, but simply pass the shuttle over the loop round the fingers and draw it back under it, thus reversing the process of the first half. Make quite certain after each stitch that the shuttle thread will draw, for if it will not, an error has been made, and the stitch must be unpicked. When twelve stitches have been made, draw up the shuttle thread until the stitches form a ring, the first and last stitch meeting. Leave about $\frac{1}{4}$ in. of thread between this and the next ring, which should be worked in the same way.

These rings are joined together by the picot stitch, which is made by leaving a short length of cotton between the stitches, which, when the ring is joined up, forms a little loop. In a large piece of work the rings are sometimes sewn together, but ordinarily these loops provide the best means of joining them. Begin by making 4 stitches, and leave a small length of cotton between these and the next stitch. Some practice is necessary in judging the right length, for all loops must be of the same size. Then work 4 stitches and another picot, 4 more stitches and a picot, finishing with 4 stitches and then drawing them up into a ring. There is now a ring with 3 picots, and the following ring must be joined to the right-hand picot.

Begin the next ring in the same way, and when 4 stitches are made, insert the crochet needle in the picot of the last ring, and draw the cotton which is round the fingers partly through the picot; pass the shuttle through this loop, and then pull the finger thread tight. Proceed with the same number of stitches and picots as in the last ring.

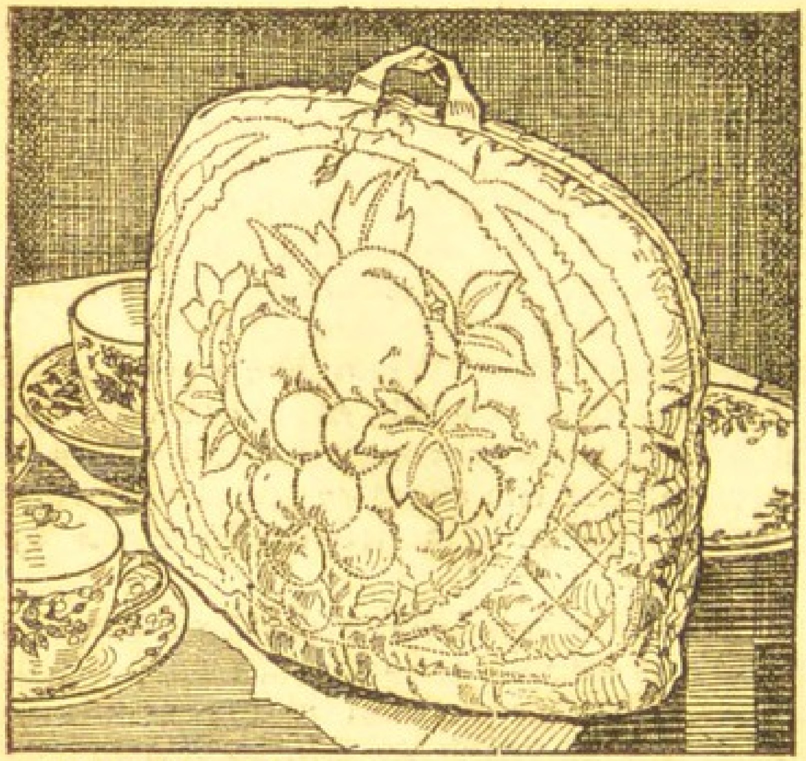
TEA COSY. A tea cosy, in common with every other well thought out accessory, should be chosen with due regard to its surroundings both in style and colour. Conventional shapes are used in smaller sizes for the cosies which form part of a set for the breakfast tray, with egg cosy and tray cloth to match. Quaint shapes are seen in the cottage designs worked in various materials and in developments of the same idea.

It is advisable to have an independent lining for most cosies of conventional shape, and to slip the cover over it when the latter is completed. In the case of suède or a silk or satin cover which has been hand-painted, stencilled or very delicately embroidered, it is sometimes desirable to have the lining renewed, or cleaned separately. In the case of a washable linen cover of pale colour, this will require laundering separately. When the cover is of white linen decorated with drawn-thread work, or lace motifs and insertions, the lining which will show through should be of a colour to suit the table ware, so that the effect of the needlework is enhanced. A separate lining can be attached to the cover by a few stitches to keep it in place.

Cosies vary in size from those designed for individual teapots to the large covers for family breakfast teapots. A very small cosy cut in conventional semicircular fashion measures about 9 in. across the bottom and is 7 in. high at the centre of the curve. A medium size is $14\frac{1}{2}$ in. by 8 in., while a larger one has a height of 10 in. and a width of 16 in. Whatever the size required to fit the outer cover, allow 1 in. all round for turnings when cutting the lining fabric. The wadding for interlining must be cut exactly to the size of the cosy when finished and no turnings allowed. Sateen is a useful material for linings, but for better cosies, silk and crêpe-de-Chine are used for the inside of the lining next the teapot, while a cotton material serves for the outer lining next the cover, unless this happens to be decorated with openwork.

Cut four semicircles of the lining fabric and two of wadding (some workers use this in double thickness), sew the two semicircles for the outside of the lining pad together face to face, stitching firmly all round except at the bottom. Turn them inside out and then stitch the two inner lining pieces together in the same way, but do not turn. The two pieces of wadding are now sewn together round the top and sides with long tacking stitches. If the edges of the wadding are overcast they will not fray out. Slip the wadding inside the outer lining, catch them together with a few tacking stitches to hold the wadding in place, and then push, smooth and stitch the inner lining into position. The bottom edges should now be neatly sewn together all round to complete the lining pad. An inner lining of silk or sateen to match the cosy cover is made and adjusted to a wadded interlining when the latter is bought covered in white cotton material.

AFTERNOON TEA COSIES. Whether a cosy cover is a separate affair or at one with the padded lining, any embroidery or painting is done before the fabric is made up. Linen cosies are particularly dainty when of pale colours worked in stranded cottons either with garlands of flowers forming a border, or with a single motif placed on either side. Cross-stitch is another favourite method of trimming and beautiful covers are made in drawn-thread work, broderie Anglaise and Richelieu work. The most successful results are obtained by having a tray cloth or table cloth to match this style of cosy. Suitable transfers and designs are obtainable in great variety.



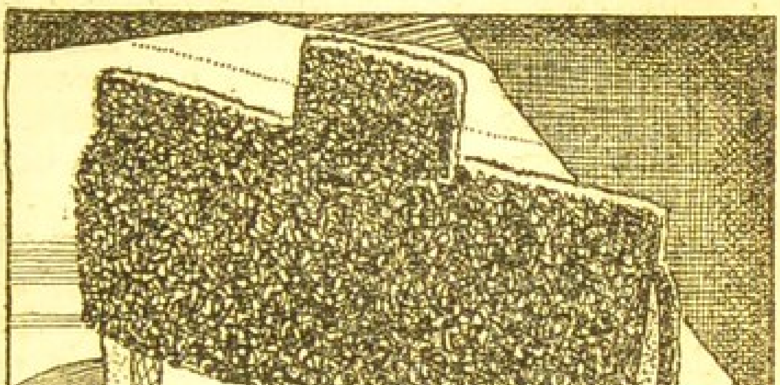
TEA COSY. Fig. 1. Cosy of rose pink crepe de Chine, suitable to accompany a dainty tea service. The design and border are quilted by hand

Cloth cosies are trimmed with laid work in gold or silver thread, with ribbon work, or with conventional appliqué designs. Needle tapestry in wool or silk may be employed to cover a whole canvas foundation, or for a motif to be applied to a cloth, silk or satin tea cosy. Decorative patchwork makes attractive cosies in silk, velvet or suède. For these fabrics a good finishing touch is a cord sewn along the bottom and outside edges. This should be done with silk of the same colour as the cord and after the cover has been joined. Take up a tiny piece of the fabric and a few threads of the cord and pull them together ; then run the needle under the covering material for the longer stitches and take small stitches in the cord. The ends of this must be neatly finished off. To form a handle a loop of the cord should be twisted and left in the middle of the top. Tinsel cords are often used when silver or gold thread is introduced into the embroidery. Thonging is sometimes employed as a finish when suède is the material of the cover.

Nothing could be more appropriate for a cosy than fancy quilting. The example of this work illustrated in Fig. 1 was carried out in rose-coloured crêpe de Chine, quilted by hand with back-stitching in silk thread to match.

As quilting is done on fabric with an interlining, the inside lining of the cosy made of the same material as that quilted is usually attached to the outer cover, an extra layer of wadding being inserted between the two. Such cosies are prettiest in delicate colours and require to be dry-cleaned. The semicircular edges of the one illustrated are finished with a self-piping and strap handle. Sometimes the piping is twisted into a looped bow to form the handle at the top. It is very interesting to work out quilting patterns for oneself with the aid of an original drawing or suitable embroidery transfer for the centres of the front and back of the cosy. The border for this, and outer border for quilting is drawn in diagonal lines directly in pencil on to the fabric after taking measurements for correct spacing.

Cottage Shapes. Felt, raffia cloth, linen, crash, blanket cloth and embroidery canvas are all used as foundation materials for the building of cottage cosies. It is not difficult to evolve one's own patterns out of brown paper, cutting the roof portion separately, a back and a front piece of the same size, and two side pieces. The chimney which forms the handle is a straight piece doubled over and sewn on to the middle of the roof.



TEA COSY. Fig. 2. Cottage cosy made of felt. The lattice windows, rose trees and flower border are worked in bright coloured wools and easy stitches

The cosy illustrated in Fig. 2 is made of felt. The thatched roof is of brown, the chimney of brick red, the walls of fawn and the door of dark green felt. The height including the roof should be about 10½ in. when flat. A piece of brown felt measuring about 9 in. deep by 11 in. wide would be sufficient to form the roof, back and front when doubled, and the front and back walls of the cosy would be each 7 in. deep (to allow for joining to the roof), and 10 in. wide. The roof projects slightly at either side. The sides are about 4½ in. wide and 10 in. high, being cut up to a point between the back and front of the roof. The door is a scrap of felt [buttonholed to the wall piece. The design of windows, etc., can easily be drawn with a coloured crayon.

Bright-coloured wools are used for the embroidery. The windows are done in chain stitch, the woodwork to match the door, and the lattice in dark grey. The rose tree is in stem stitch, brown for the stalk, single stitches in green for the leaves and a French knot for the centres of the pink roses. The groups of smaller flowers are worked with single upright stitches, small ones crossing these in green to form the leaves and stems and the flower heads put in with lazy-daisy stitch, buttonhole rings and French knots for the buds. Any other stitches can be introduced which the worker fancies, and the flower embroidery can be continued at the sides in one group and a few brown stitches to represent the earth of the bed. The back can correspond with the front, but leaving out the door and the rose tree. The cottage walls when embroidered are tacked together and made up by firmly buttonholing the edges with wool to match the felt. Begin at the bottom so that all the edges are even at the base. Lay the roof in place over the four sides of the cottage, and stitch it down with long running stitches. It is a good plan to buttonhole the points of the side walls and catch the roof through to the buttonhole stitches. Buttonhole the little piece of brick red felt for the chimney in the same colour, and attach it in the position shown.

Cottage cosies are obtainable, shaped in canvas, and ready to be embroidered in tapestry needlework. Transfers can also be bought suitable for linen or raffia cloth covers. Details vary for roofs, windows and garden effects, but in the main the shapes are much the same.

TEAK. This is a heavy hardwood, dark brown in colour, sometimes with a greenish shade. Like oak and some other woods, it darkens with exposure and age. It is oily, does not suffer by contact with iron, and is durable under water. Its grain is straight and rather coarse, with a dull surface. When freshly cut it has a peculiar smell, something like leather. Though not very difficult to work, it contains a phosphate of lime which soon dulls the edges of cutting tools.

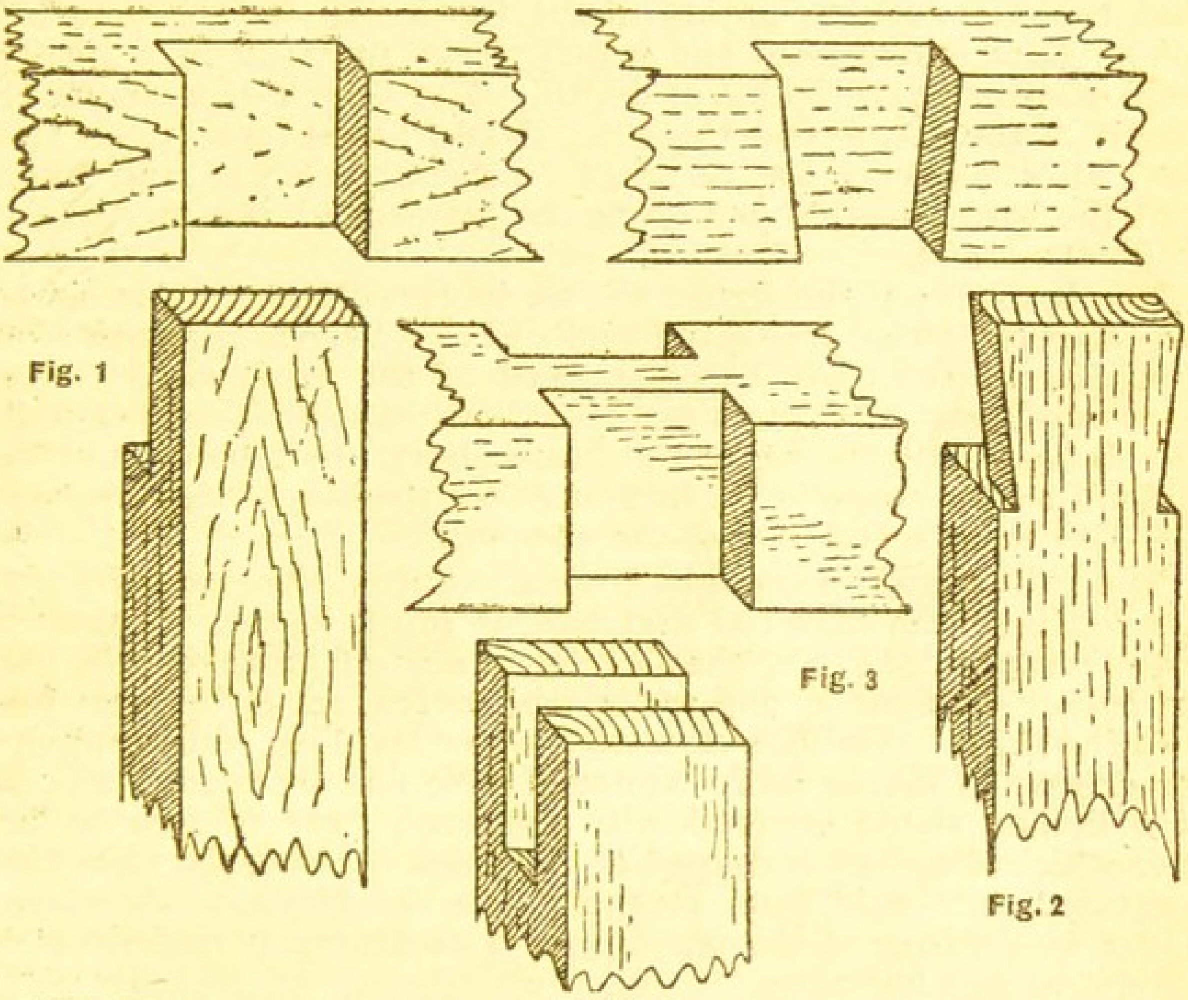
Teak is largely used for furniture in India, its native place, but only to a small extent in Great Britain, its dull appearance and its weight being against it. It is used occasionally for floors, stair treads, window and door sills, and similar purposes.

TEE JOINT. This phrase is applied to the position of a joint rather than to the form of its construction, and is used when a centre or intermediate upright runs into a top rail. For example, the tee joint may be halved, (Fig. 1 on next page) or dovetailed, as in Fig. 2. The bridle joint in Fig. 3 is often used as a tee joint, and so is the ordinary mortise and tenon. The name is not applied to similar positions of upright and rail where the former is stub tenoned.

TELEPHONE COVER. A convenient cover for the telephone instrument can be made by adapting a small white wood hanging cupboard. This should be of sufficient height and depth to admit of the instrument standing on a shelf, with space beneath for the directory and pad.

The back is cut out to admit the instrument and a small horizontal slot at one side next the wall for the cord. The cupboard should be brought into the colour scheme of the hall with enamel or stain, and the door presents an excellent panel surface for a piece of well-chosen painted fretwork or tarso decoration.

There are many rooms in which a wall cupboard is not suitable, but in which an undisguised telephone has too businesslike an air. A dome-shaped oak stand can be obtained which is like a



TEE JOINT. Three methods of attaching a centre upright to a top rail. **Fig. 1.** Halved tee joint. **Fig. 2.** Dovetailed. **Fig. 3.** Bridle joint

small cabinet, or a cover can be purchased or made at home after the style shown on Plate 50. The head and arms and also the wire frame for the billowing skirt which conceals the telephone can be bought for about 5s. Any silk, velvet, brocade, etc., is used for the dress, and this can be fashioned in an Elizabethan, early Stuart, Queen Anne, Georgian or early Victorian style, when skirts were worn over farthingales, hoops or crinolines.

If a new piece of material is to be bought, $\frac{7}{8}$ yd. of 50-in. width is sufficient to make a dress with gimp or tinsel lace for trimming and ribbon for a sash. A shot artificial silk is inexpensive and quite charming in mauve and blue, or rose and gold. A frame measures usually 10 to 12 in. across at the base and is from 15 to 17 in. high. The wires must be covered in the same way as a lampshade frame and either coloured silk or cambric strips cut on the cross 1 in. wide is best for the purpose (*see* Lampshade).

A variety of heads are obtainable with hair done in different styles and made of silk, of real hair like an ordinary doll's or with curls of the same composition or china as the face and arms. In some ways the last is the most serviceable choice, as there is nothing to get out of order and the doll has a Dresden china appearance. The head portion is provided with wires which when twisted firmly round the upper wire of the frame attach the two together. This is done before the wires are bound so that there is nothing untidy about the inside of the cover.

The skirt is cut from the width of the material in a straight piece measuring 18-20 in. in depth. The length depends on the height of the frame and the skirt should be an inch longer than this, after allowing for turnings. Having hemmed and joined it at the back, it is slipped on to the frame and neatly gathered to fit the waist.

The bodice on the figure shown in the illustration is simply two doubled strips measured and cut the length required to fit from the waist in front to the waist at the back when crossed back and front. To them are sewn little straight pieces to make the sleeves gathered to fit the arms above the elbow. Cut out and adjust the strips in paper first to see the exact length needed, and also what width to cut the sleeves.

The frill requires a straight strip about 3 in. wide and cut from the width of the material and half as much again. It may be edged with lace, as may the sleeves, or a tinsel gimp may be used for both. Instead of one wider frill several narrower ones may trim the skirt. A ribbon sash with a bow and long ends completes the dress. A rather more trimmed style has an under petticoat of a lighter shade covered with gathered rows of narrow lace over which the skirt is draped at the sides. The bodice has then a crossed lace fichu and lace frills to the sleeves. A woman clever at dressing dolls can design a charming period dress in colours to suit her room.

WOODEN SCREENS. Small wooden screens are particularly attractive whether painted in plain colours with a severely geometrical border, or handsomely decorated in gesso, Italian Renaissance work, lacquer work, or Tarso.

A screen of the type illustrated on Plate 50 is expensive to buy, but if made at home can be produced for a trifling cost. The materials required are sufficient thin plywood (q.v.) to make the 3 folds (the middle one being 16 in. high at the top of the curve, and measuring 7 in. across, while the sides each measure $5\frac{1}{2}$ in.), 4 small screen hinges, sandpaper, enamel, or brush lacquer colour for the ground, and oil colours, liquid oil colours or bronzes for the design. A coat of varnish should be given on completion to enhance the colours.

Plywood can be obtained in various thicknesses, but a thin one is best, as it is easier to cut. A small fretsaw will be required for this purpose. Draw the outline of the panels on the plywood and cut out carefully. The edges must then be sandpapered thoroughly, enamel or paint the background colours, trace or draw the design and border and paint them. Stencilling medium may be used to thin oil colours, and any type of design can be chosen that is suitable to the style of the room.

A pretty telephone pad is made as a companion accessory to the screen by curving out the top of a piece of plywood large enough to extend well beyond the paper pad when this is affixed with glue. The margin of the wood is curved, coloured and decorated to match the screen. A charming method for ornamenting such a screen and pad would be that adopted for painting flower designs in liquid enamels, and described in the article on Enamelling.

Another type of plywood screen requires more skill with the fretsaw, and is only useful when the telephone is on a table in a corner, but has a very charming effect when well done. It is a flat representation of a bouquet, basket, or bowl of flowers, painted in natural colours and measuring 16 in. by 12 in. at the tallest and widest points. When drawing out the design on the plywood, care is taken to place large, simple leaf-forms on the outer edge, so that these may be easily cut with the fretsaw. The screen is supported at the base by means of a block of wood glued at the back. The block is large enough for the telephone to stand on, and sufficiently solid to counterweight the screen when the instrument is removed for use. Sometimes the idea of the lady in full skirts is adapted to plywood and paint, and the figure is then cut out and supported in the manner just described.

Care must be taken when drawing the design to see that the telephone will be fully covered by the skirt before the figure tapers above the waist-line. The block and the back of such screens should be painted the same shade. In the case of the bouquet designs, green or brown is the best choice, as they do not clash with the brilliant colours employed for the flowers. Metallic paint in silver or gold adds a gay note to the figure design. *See* also Plate 49.

Although not so durable, excellent little screens and telephone pads can be obtained in parchment-covered cardboard of a heavy make. These are quite inexpensive and can be decorated charmingly with pencil painting, or in any of the ways suggested for decorating parchment in the article on Lampshades. When varnished, the parchment keeps clean for a long time. Parchment paper screens are also supplied in sheet form, traced ready for colouring. They are designed in three sections with a wire frame for mounting the work when completed.

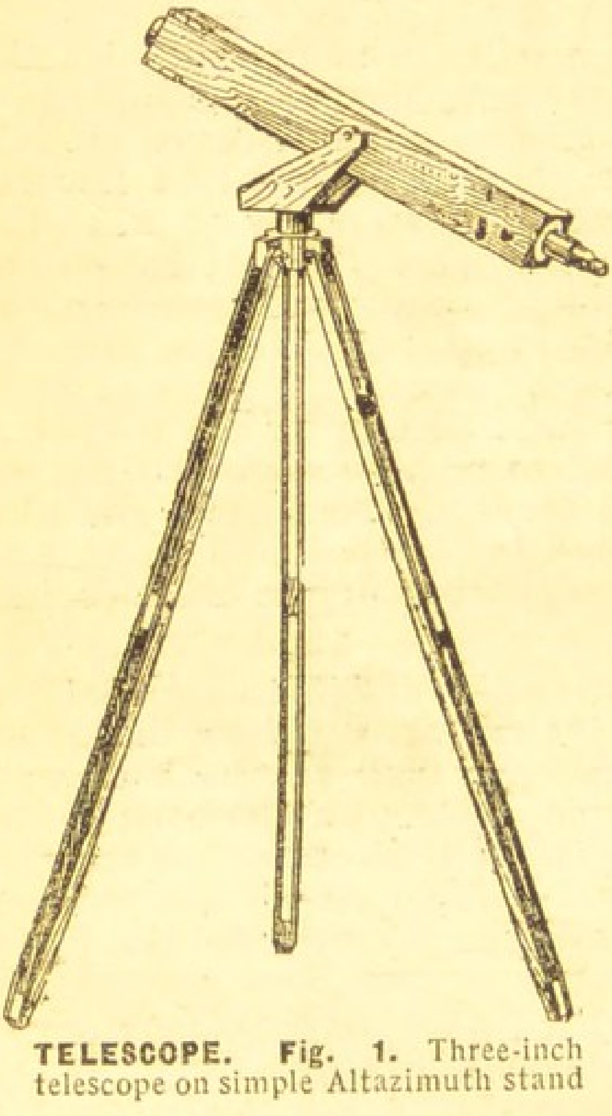
TELESCOPES FOR THE AMATEUR

Their Scientific Principle and Mechanical Construction

This article describes how a telescope can be put together by an amateur, using commercial components and parts. The reader's attention is directed also to the articles Microscope; Modelling; Paste Board; Riveting; Soldering, etc.

There are two main types of telescope, refracting and reflecting. The former is suitable for either terrestrial or astronomical observations, and the latter for astronomical observations only.

In the refracting telescope the light from the object observed passes direct through the object glass, and the image formed is observed through a magnifying eyepiece. In the commonest form of reflecting telescope, known as the Newtonian reflector, the light from the object observed is collected by a mirror at the base of the tube, and reflected into a small mirror. The image formed on the small mirror is observed and magnified through the eyepiece.



TELESCOPE. Fig. 1. Three-inch telescope on simple Altazimuth stand

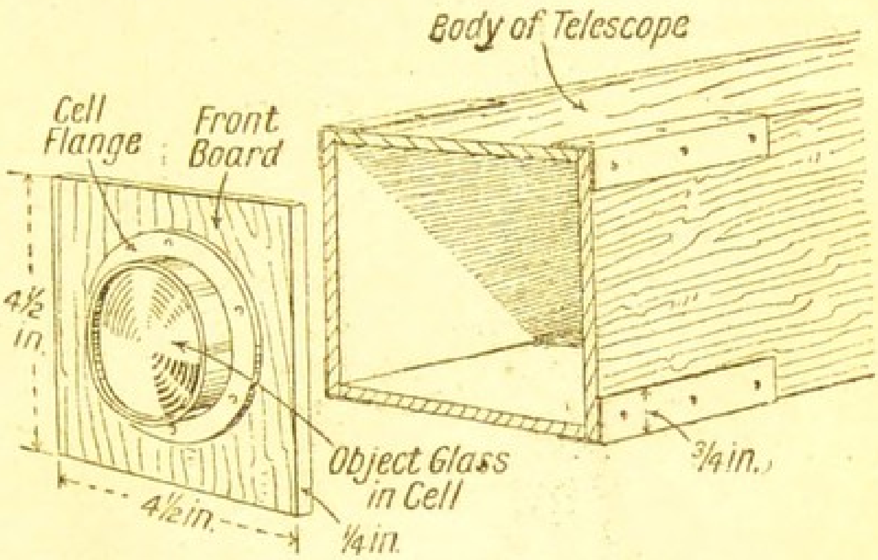
For amateur work, a 3 in. telescope can be made from commercial components, or in a simplified form as in Fig. 1. It is essential to use an object glass by some reputable maker, which should be preferably mounted in a cell with adjusting screws, and must be fitted with a screw flange as in Fig. 2. The object of the adjusting screws is to make the final slight corrections necessary when testing the instrument after complete assembly. Two or three eyepieces of various focal lengths by the same maker should be purchased, and an eyepiece drawtube fitted, if possible, with a rack and pinion for focusing. These parts can be obtained from any optician or instrument dealer who handles telescopes and other optical instruments. As there are three standard sizes in use for astronomical eyepieces and screw threads, it is advisable to buy all the parts before starting on the body of the telescope. The best woods to use are mahogany or oak, the latter being preferable.

The length of the body will be determined by the focal length of the objective, and if this is not known to within ¼ in. it can be measured in the following way: Set up the objective on a board

4 or 5 ft. long, and point it out of a window at the most distant object, which must be at least a $\frac{1}{4}$ mile away. The moon at night makes a splendid object. At the other end of the board set up a white card or the focusing screen of a camera. Move this along until a perfectly sharp image of the object is obtained. Then measure the distance accurately from the screen to the front of the objective cell with a steel tape. This distance is the focal length of the objective.

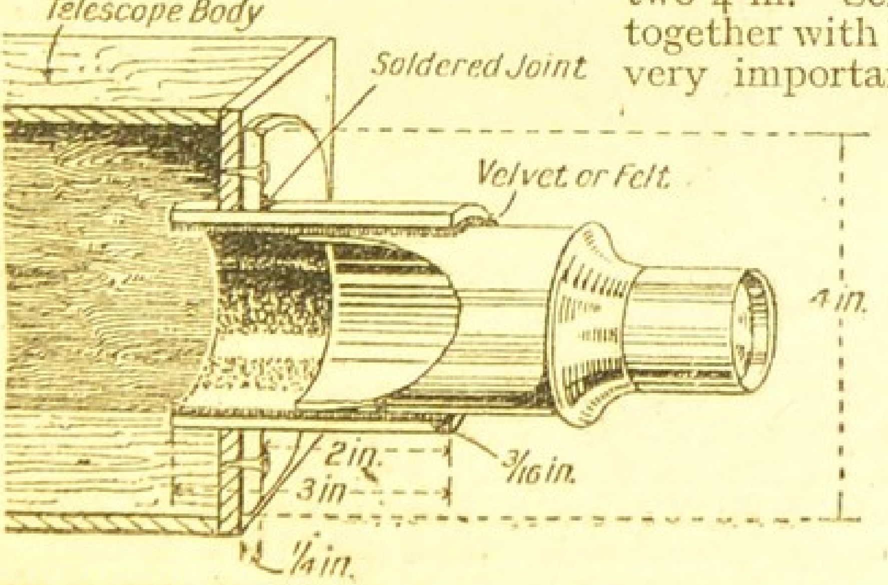
The wood for the body must be at least $\frac{1}{4}$ in. thick to prevent warping. Cut out two square pieces of wood $4\frac{1}{2}$ in. by $4\frac{1}{2}$ in., and mark out the centres accurately. Next turn out the centre of one piece of wood on a lathe, and screw the flange to this.

To construct the body select wood as straight as possible. The four pieces should be of such length that the distance from the front of the object glass cell is 3 in. less than the focal length of the objective. This distance will, of course, also depend upon the thickness of the cell. For the sake of clearness the following measurements are adopted. Diameter of O. G. cell, $3\frac{1}{4}$ in.; diameter of cell flange, 4 in.; focal length from front of cell, 36 in.; square ends of wood, $4\frac{1}{2}$ in.; thickness of wood, $\frac{1}{4}$ in.; length of sides, 33 in.



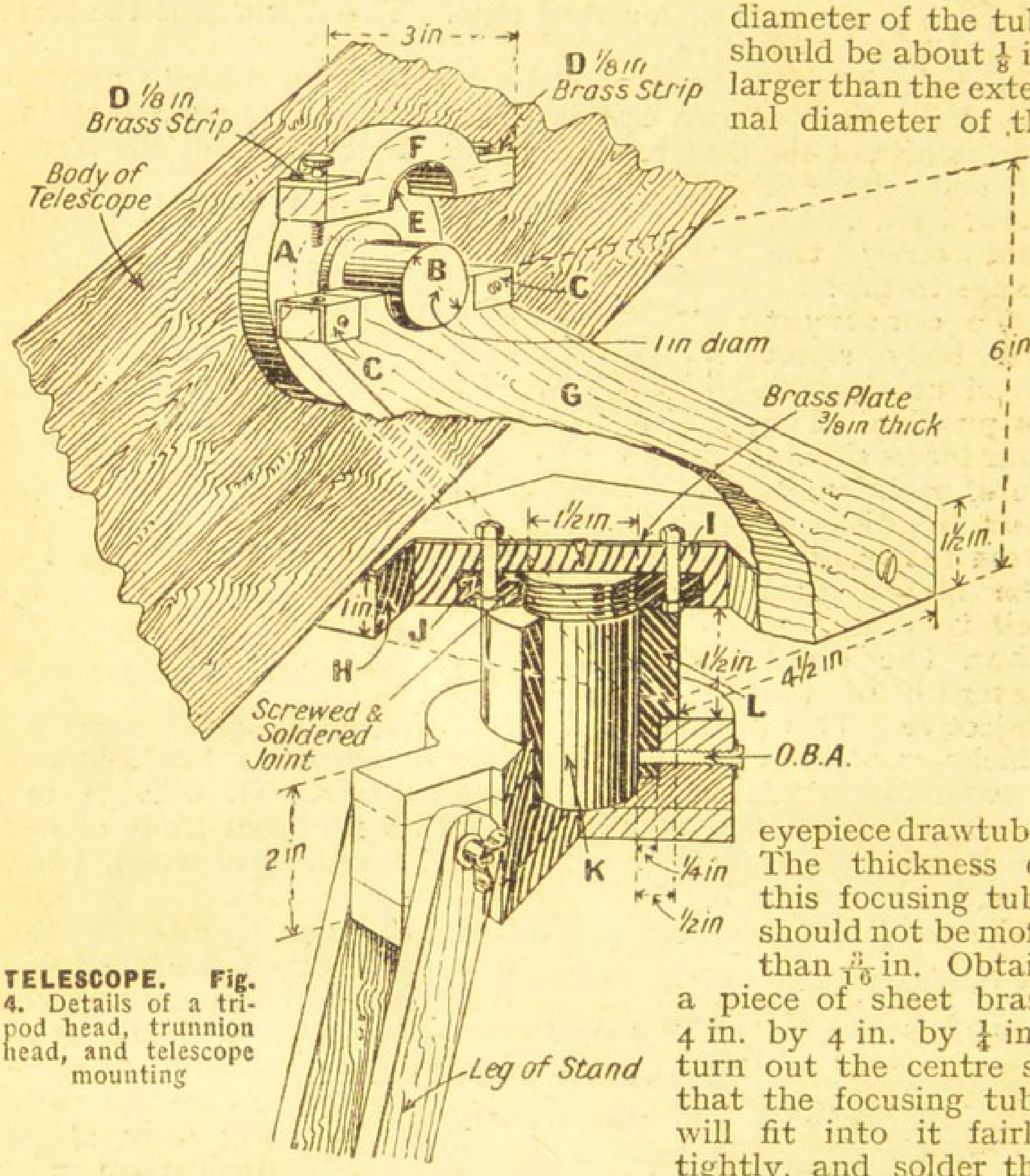
TELESCOPE. Fig. 2. Details of flange, lens and tube

The width of two strips would therefore be $4\frac{1}{2}$ in., and the other two 4 in. Screw the four pieces together with brass screws. It is very important that the ends should be truly square and parallel; any slight deviation must be corrected by filing with a coarse file. Now obtain 2 ft. of right-angle brass strips, about $\frac{1}{8}$ in. thick and with the faces about $\frac{3}{4}$ in. wide; saw this up into 3 in.



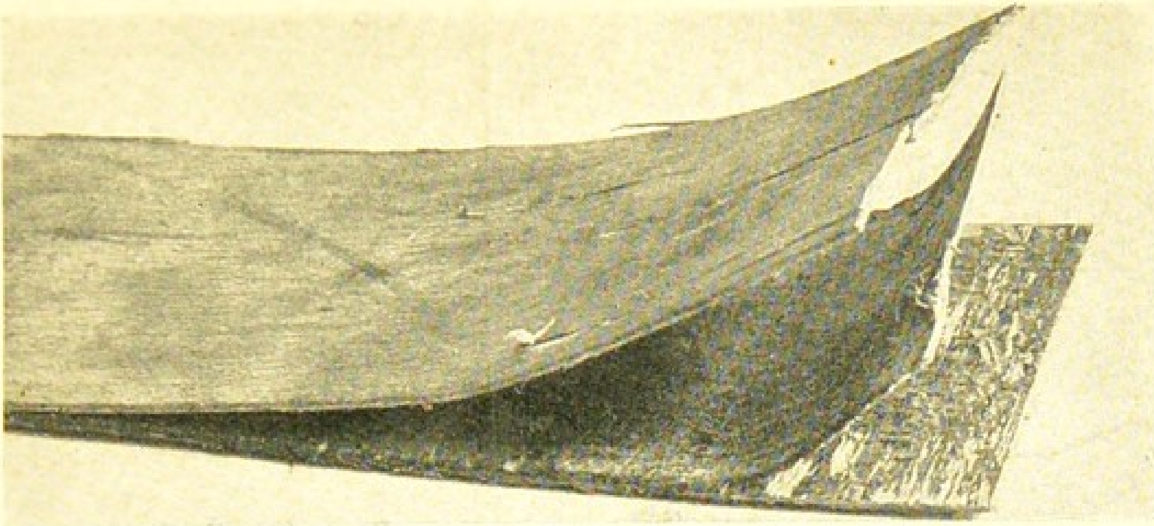
TELESCOPE. Fig. 3. Method of mounting eyepiece drawtube pieces and drill three screw holes in the side of each piece. Screw one of these pieces to each corner of the telescope body as shown in Fig. 2, as this will help to give rigidity to the instrument.

A plain eyepiece drawtube has next to be fitted. Purchase a piece of brass tube 3 in. long, into which the eyepiece drawtube should slide with about $\frac{1}{16}$ in. clearance, i.e. the internal diameter of the tube should be about $\frac{1}{8}$ in. larger than the external diameter of the eyepiece drawtube. The thickness of this focusing tube should not be more than $\frac{3}{16}$ in. Obtain a piece of sheet brass 4 in. by 4 in. by $\frac{1}{4}$ in., turn out the centre so that the focusing tube will fit into it fairly tightly, and solder the tube into the brass plate, leaving 2 in. projecting on one side, Fig. 3. Take the other piece of wood, $4\frac{1}{2}$ in. by $4\frac{1}{2}$ in., and turn out the centre so that the end of the focusing tube will fit it tightly. Care must be taken to ensure that the axis of the tube is truly in the centre of the piece of wood. Screw on the brass plate with the focusing tube. Glue or seccotine into the inside of the focusing tube a piece of thick velvet or fine surface felt of such a thickness that the eyepiece will slide with a good close motion.

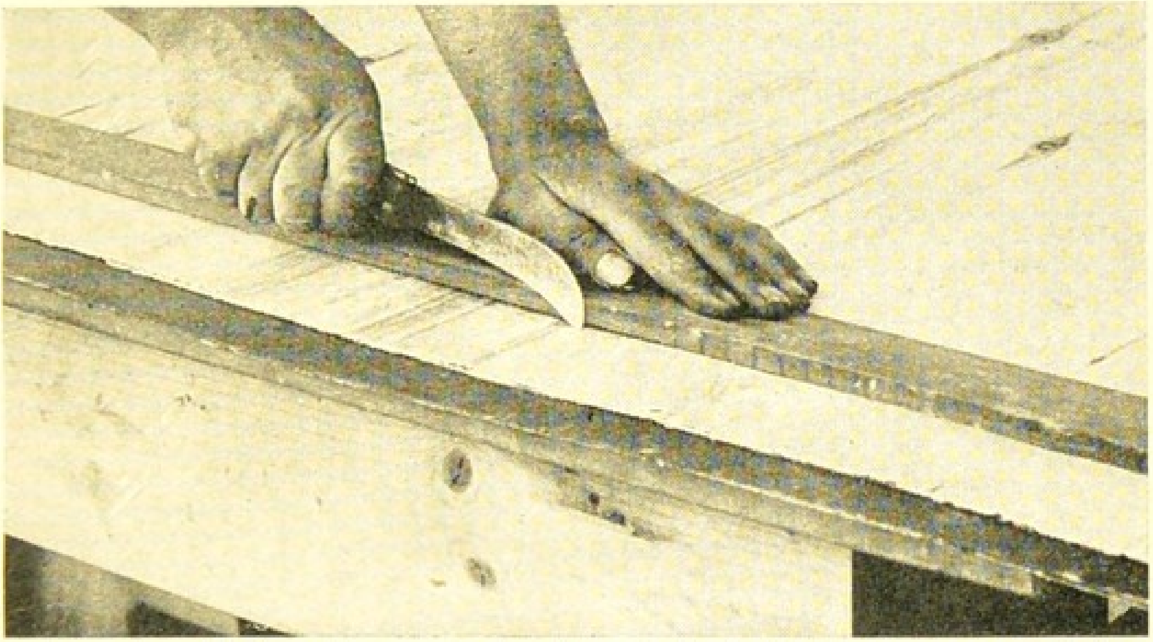


TELESCOPE. Fig. 4. Details of a tripod head, trunnion head, and telescope mounting

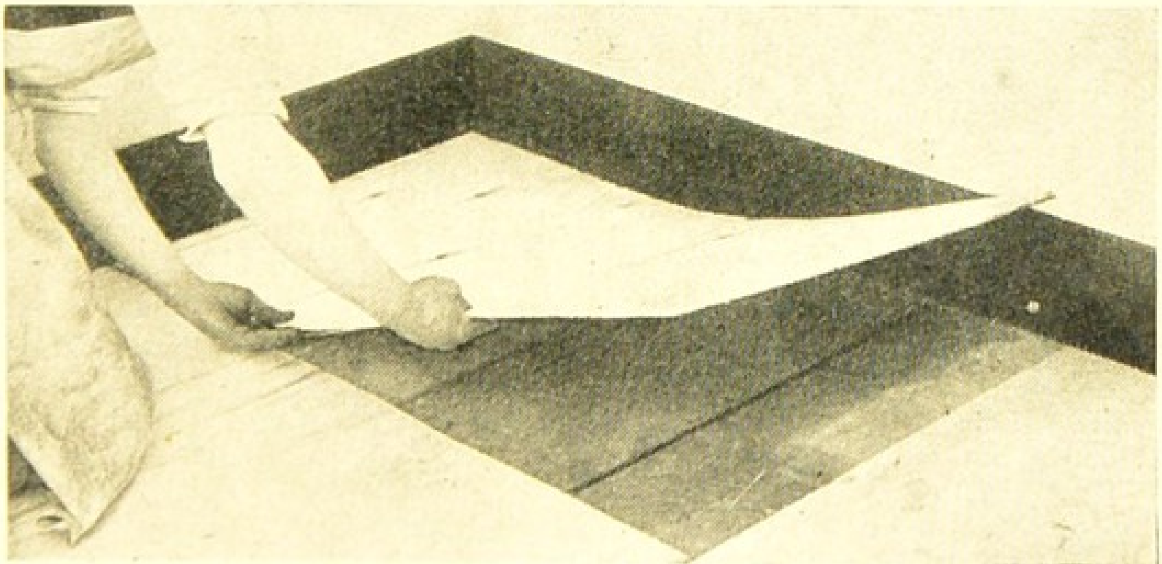
For the rack and pinion drawtube turn out the centre of the



Three-ply. Section separated to show laminated structure



Three-ply. Part cutting a sheet with a jack knife, final severance being effected by bending back

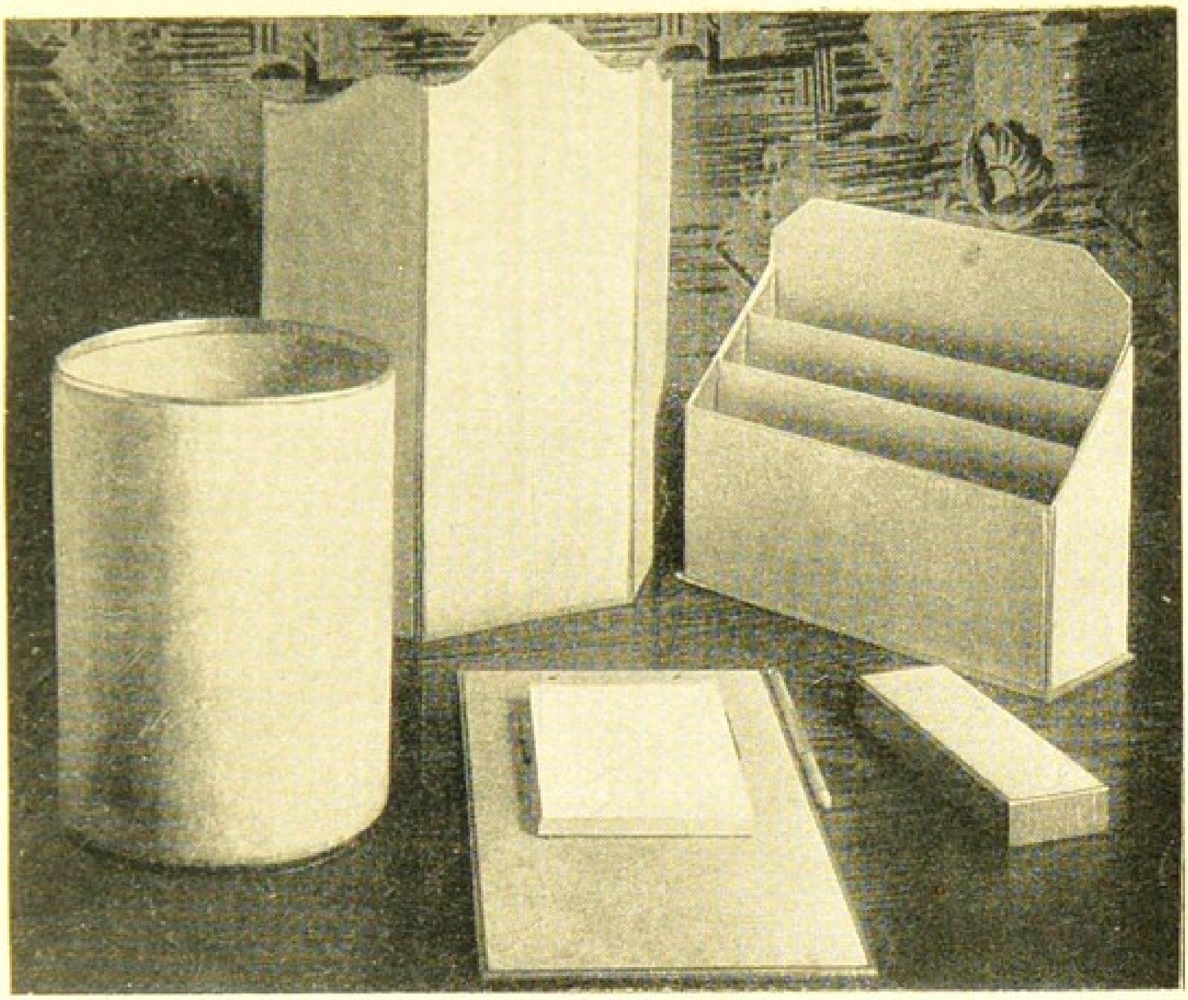


Three-ply. Resurfacing a floor with three-ply sheets

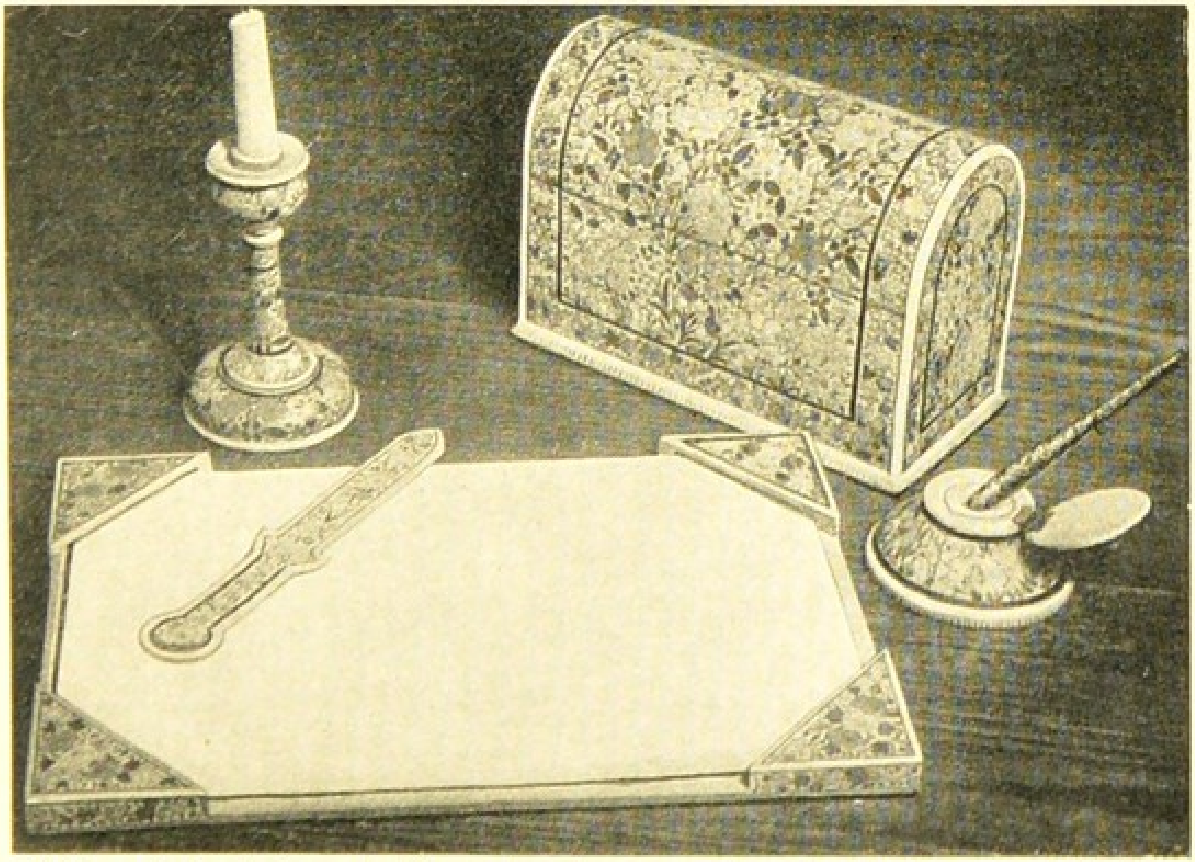
WOOD OF GREAT VALUE TO THE AMATEUR WORKER

Rug with effective pine cone design worked in shades of terra-cotta, biscuit, pale green, gold, tan and deep blue. Rugs such as this, which can easily be made with little practice, wear much longer than more expensive purchased articles

RUG MAKING : AN INTERESTING AND PROFITABLE PASTIME

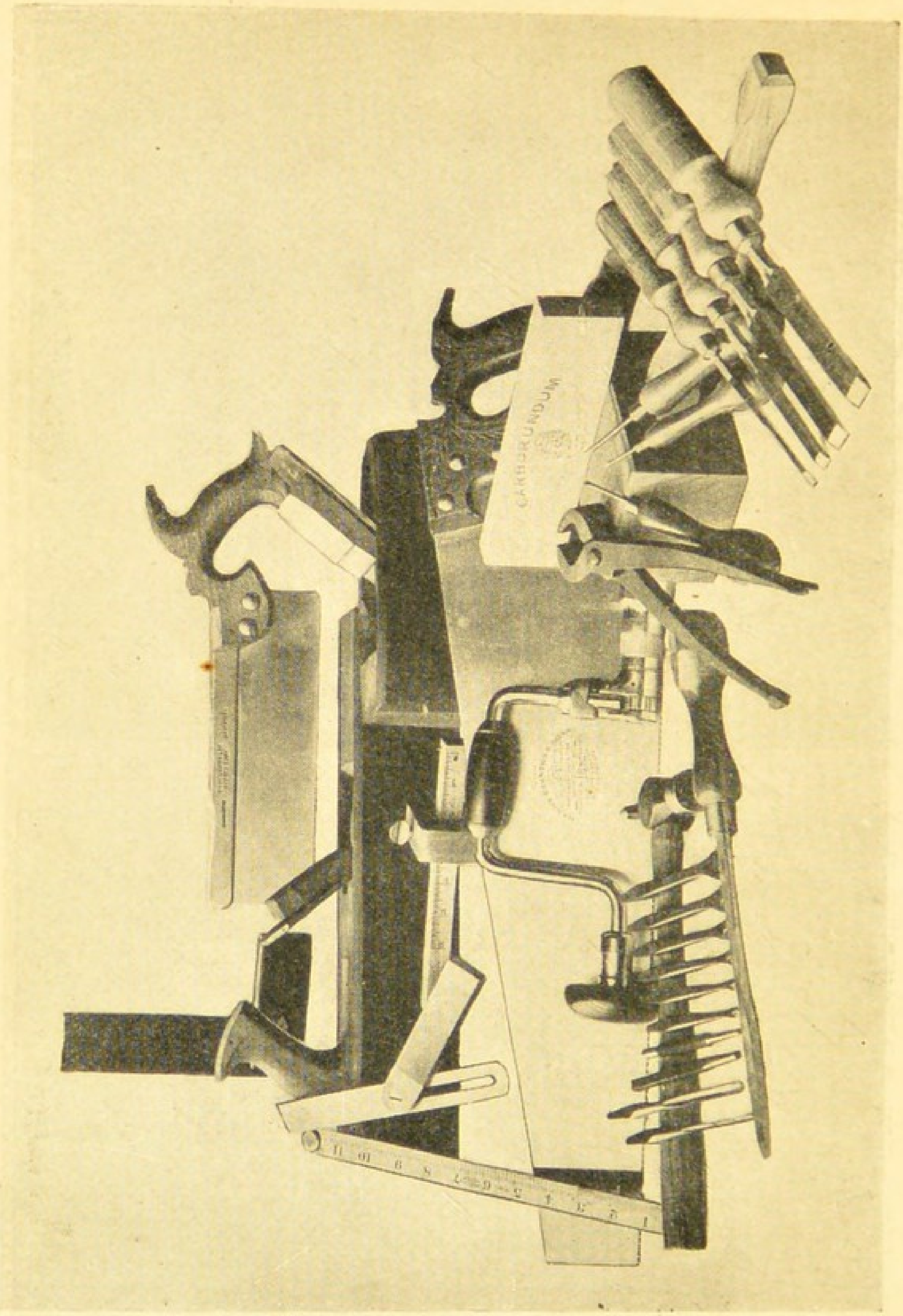


Inexpensive accessories covered in imitation parchment which can be bought ready for painting or ornamenting by means of coloured prints



Writing desk set decorated in modern lacquer work, adapted from an old Indian design in delicate colouring

ACCESSORIES OF THE WRITING DESK



Tools which are essential for a preliminary outfit with which to undertake household repairs. They comprise a hand saw, tenon saw, jack and smoothing planes, four chisels, brace and bits, try square, sliding bevel, three bradawls, marking gauge, 2-ft. rule, pincers, screwdriver, hammer, mallet, nail punch and oilston

NECESSARY TOOLS FOR THE HANDYMAN

Courtesy of R. Melhuish, Ltd.

brass plate to the size of the diameter of the drawtube and solder this direct to the brass plate, then fit the square wood end to it. The distance from the plate to the shoulder of the tube should be 2 in., as previously.

As it is unlikely that any amateur has the means at hand for cutting gears or a spiral worm drive, a simple mounting known as the Altazimuth type should be made. This has movements in altitude and azimuth, also the telescope can be placed in the zenith position. With this mounting it will be perfectly easy to follow the course of any star across the heavens. Material to be worked up to the dimensions shown in the table below when finished will be required, and some of these must be altered to suit individual cases. The various parts are shown in position in Fig. 4. The brass rod B and the disk A, when screwed and soldered together, should be mounted half-way down the length of the telescope body, and must be exactly level on both sides, otherwise the telescope will not be balanced. It should also be noted that the body will not swing truly in the trunnion bearings unless this fitting is very carefully and accurately done.

	Long in.	Wide in.	Thick in.	Diameter in.
2 brass disks (A) ..			½	3
2 ,, rods (B) ..	1¾			1
4 ,, tubes (C) square section ..	1		⅛	
4 brass sheets (D) ..	1	½	⅛	
2 ,, tubes (E) ..	1		⅛	1
2 oak strips (F) ..	1	1	3	
2 ,, blocks (G) ..	6	5	1	
1 ,, block (H) ..	4½	4½	1	
1 brass sheet (I) ..	4½	4½	⅛	
1 ,, ,, (J) ..			½	3
1 ,, rod (K) ..	3			1½
1 ,, tube (L) ..	2½		½	1½

Part of the square tube C should be sawn away with a fine hack saw; this leaves the 3-side strip desired. The rod B should be turned to fit the tube E, and the final fitting done by grinding with fine emery powder or rottenstone and oil. The tube E must be sawn in half with a fine hack saw, first plugging the centre with a piece of wood so that the tube will not be distorted by the action of the saw. Next saw the 4 pieces of wood F and G to the shape shown, and screw the brass plates and half tubes into position. It is important that the screw holes be countersunk so that the heads of the screws are below the surface.

The brass plate J must be marked out and drilled for six No. 0, B.A. clearance holes, and the centre turned out and threaded to take the rod K, 20 to 26 threads per in. Screw the plate I to the block of wood H, then turn out the centre of H on one side to the depth and diameter of the plate J. Clamp them together, and the 6 holes can be marked out and drilled with the certainty that they will be exactly in register. Now solder the rod K to the plate J, and fit the whole together with No. 0, B.A. screws and nuts. Be careful to see that the screws are countersunk.

The tube L should now be turned out to take the rod K, and the final fitting done by grinding as with the telescope trunnions.

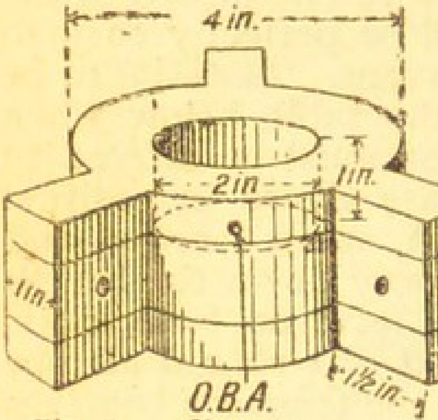


Fig. 5

TELESCOPE. Fig. 5. Left, details of the tripod head made of laminated oak. **Fig. 6.** Dimensions and details of tripod leg

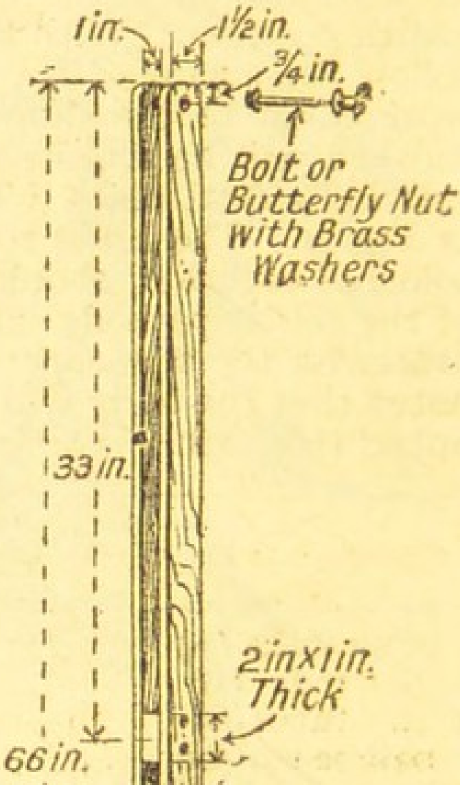


Fig. 6

It will be better to grind the top face between the tube and the plate J, and if the surfaces are carefully cleaned after grinding with benzine, and are smeared with thick vaseline, a smooth movement for rotating the telescope should result. The whole working of these movements will depend upon the care given to this fitting and grinding, and they will repay careful and accurate attention to these details. It is, of course, necessary that everything should be truly centred, and for this reason it is essential that all parts should be turned up on a lathe. The tripod is constructed of wood with three open legs to reduce the weight. It should present no difficulties to anyone who can use a saw, chisel, and plane. First prepare the tripod head by laminating 3 pieces to form a block of oak 7 in. diameter, 2 in. thick, as in Fig. 5. For the legs, 6 strips of oak 5 ft. 6 in. by $1\frac{1}{2}$ in. by $\frac{1}{2}$ in. are required. They should be shaped as shown in Fig. 6 and 3 blocks 2 in. by $1\frac{1}{2}$ in. by 1 in. should be screwed between each two strips, the centre one being 33 in. from the ends.

The points of the feet can then be shaped, and the holes drilled at the tops of the legs to take a bolt $2\frac{1}{2}$ in. long and about $\frac{3}{8}$ in. diameter with washers and butterfly nuts. Turn out the centre of the tripod head to take the tube L, but only carry this hole half-way, as it would needlessly weaken the block to turn the hole right through. Screw the tube L to the block, taking care that the screws do not penetrate the tube, otherwise the fitting of the telescope mounting will be upset.

Painting the Parts. Before finally assembling all parts, the inside of the telescope body and the insides of all eyepiece tubes must be painted with a dull matt optical black to avoid internal reflections. This black can be purchased from any of the paint or varnish firms, but it must dry a dead black without the slightest suspicion of a sheen. All external brass parts should be polished and lacquered with a hard, colourless or pale gold lacquer; alternatively these parts may be black lacquered or stove enamelled. All wood parts can be polished or varnished according to taste, and must not be left exposed without some means of protection against the effects of moisture.

All bearings should be thoroughly ground together, cleaned, and kept greased with a thick vaseline, and they should be wiped and regreased fairly frequently. None of the measurements which have been given need be strictly adhered to, but can be easily adapted to suit the design to meet particular requirements, and, as the purchase of suitable sheet brass and tube may perhaps present difficulties, no limits are placed on the sizes of screws, but they must be of brass.

The instrument has next to be tested. First try the balance of the telescope body, place in an eyepiece, and focus a distant object. Loosen the trunnion heads, and if the body does not balance nicely place some small weights on the light end until correct balance is restored. Then obtain a piece of sheet lead of similar weight and neatly screw this to the telescope body.

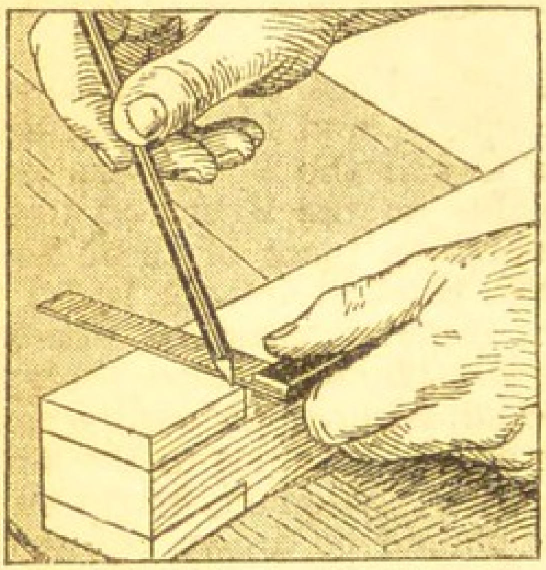
Slight variations in the weight of different eyepiece fittings can be compensated by tightening the trunnion head screws. Squaring on is the term given to the adjustment for setting the planes of the objective and eyepiece at right angles to the axis of the telescope and parallel to each other. A small, bright star should be focused, and the eyepiece should be drawn out very slightly until the star image becomes a series of rings. This appearance is known as the star disk, and these rings tell whether the definition of the objective is good and also the amount of spherical and chromatic aberration that is present. The following objects should be easily seen under good atmospheric conditions with a good 3 in. objective and oculars giving magnifications up to × 200: The five brightest satellites of Saturn, the polar spots on Mars, the planet Uranus, should be recognizable; the details of the moon's surface; all stars up to the tenth magnitude.

TEMPERING. The process of heating and cooling steel to give it hardness is known as tempering. It is the opposite of annealing, by which a metal is softened. Different methods of tempering are employed according to the size and nature of the steel, but the principle is the same. The steel is first hardened by being heated to a dull red glow and plunged into cold water or oil, the rapid cooling thus obtained making the metal dead hard.

In this state it is generally too brittle and hard for practical purposes, and it is polished up bright and heated again, but this time by a more gradual process. When it has been brought to the required heat it is once more immersed in water or oil, which fixes the temper.

The degree of hardness or temper is indicated by the colour of the metal. If a bar of brightly polished cast steel is slowly heated from one end, a series of colour changes will travel along the bar in a definite and regular order. The first colour appearing is a light straw or yellow. Quenching the hardened metal at this state gives the hardest of cutting edges. The light straw is followed by a dark straw colour, giving a rather softer temper. Dark straw gives place to brown, a usual temper for plane irons and wood-cutting tools. Light blue is the next colour, and this is the stage at which most knives are tempered. When it changes to a dark shade a fairly soft temper is obtained for articles such as wood saws and many forms of springs.

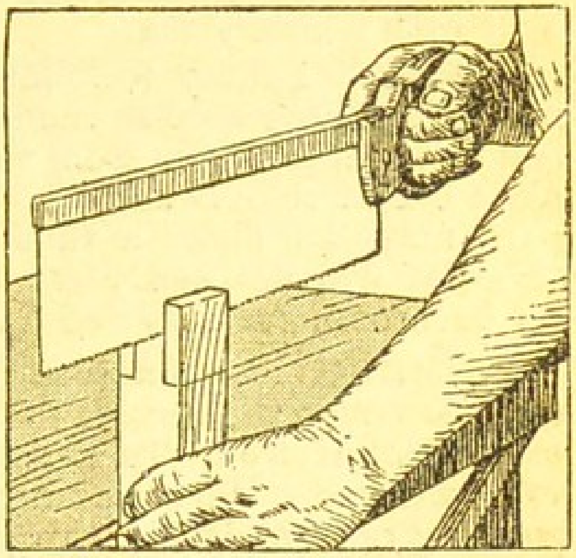
ANNEALING. Metals are annealed to make them softer and more easily workable. Steel and iron are annealed to remove the internal strains that are incident to manufacture. The piece of metal can be brought to a bright red heat in the stove, or in a forge or furnace if available. It is then left in the hot ashes all night, to allow it to cool slowly. Brass is annealed by slow and continued heating, taking care not to burn or melt the metal. Copper is annealed by bringing the metal to a dull red heat and then plunging it into cold water. In the case of pipes and similar objects the worker should beware of the escaping steam.



TENON. Fig. 1. Marking out tenon with marking gauge before cutting

TENON, in Woodwork. A mortise and tenon joint is employed in all classes of woodwork. The tenon is that part of it which fits into the slot or cavity cut in another piece of material. The tenon can be shaped almost entirely with a hand saw, preferably the type known as the tenon saw. In making a tenon the wood is first prepared to its finished size and marked out, as in Fig. 1, with a marking gauge and set square. The breadth of the tenon should be about $\frac{1}{3}$ the breadth of the wood. Resting the material on the bench against the bench hook, a cut is made with the saw across the grain of the wood at the shoulder or termination of the tenon. This cut must be very carefully made. If it is even a fraction out of truth or out of square, or not quite perpendicular to the face, a bad joint will result, especially if, as is often the case, it should be impracticable to trim up the shoulder with a paring chisel. A similar cut is made on the opposite side.

After this, the work is preferably set upright in the vice, and two cuts are made with the saw at right angles to the first, and in the direction of the grain, as in Fig. 2. Here again it is imperative that the cuts be made very accurately to the lines marked on the work. The aim should be to saw away the exact amount of wood so that the tenon can be fitted into the mortise with the minimum of trimming and finishing.



TENON. Fig. 2. Cutting the tenon with a tenon saw

To ensure a close fit it is desirable to chisel across the grain of the wood, removing the saw cuts and generally smoothing the surface. It is usual practice to drive a tenon home with a mallet, but common sense must be employed when doing this, as if the tenon is too tight and driven home too violently, the wood in the vicinity of the mortise will split. The aim should be to make all four sides of the tenon fit snugly against the four walls of the mortise. The example illustrated is the simplest form of tenon. There are many developments of it according to the nature of the joints which are to be made. The principal forms are described under the heading Mortise.

TENON SAW. For household use the most serviceable size of tenon saw is from 10 to 18 in. long, with about 10 teeth to the inch. The saw blade is reinforced by a backing piece of metal.

The teeth are bent over to the right and left alternately, an arrangement known as the set, which enables the blade to move freely in the slot cut by the teeth. If the set is insufficient, the blade will jam in the slot and probably buckle or distort. It is important to allow for the breadth of the saw kerf, for which reason the wood should be sawn on the waste side of the line and not actually on the line itself.

In use the tenon saw is grasped in the right hand with the right forefinger extended on one side of the handle, and the right thumb on the opposite side. The bulk of the handle is gripped with the second, third, and fourth fingers of the right hand, the first finger and thumb guiding the path of the saw. The blade must be kept perfectly upright with sufficient outward pressure to make the teeth bite into the fibres of the wood. The forward stroke does the cutting; the return stroke brings the saw back without allowing the teeth to rasp the surface of the wood

A wooden strip should be made to protect the teeth. It is equal in length to the blade of the saw, and measures about $\frac{3}{4}$ in. broad and about $\frac{3}{8}$ in. thick. A saw cut is made along one edge for a depth of about $\frac{1}{4}$ in. and when the saw is not in use the strip is laid over the teeth of the saw and secured in place with a piece of tape. Before putting the saw away, the blade should be wiped over with a greasy rag.

TERRY. Turkey towelling is the kind of terry cloth that is most commonly used in the home. Bath robes or dressing gowns can be made at home from this material, which can be bought in plain bright colours and also with coloured patterns. In making bath mats for floors a thick quality should be used, otherwise the mat will not easily remain flat. Terry cloth is also useful for bathroom curtains and for nursery cushion covers.

THIMBLE. A thimble is a small cap of metal or other material used to cover the second finger of the right hand when sewing, to protect it from the needle. Though some people prefer to work without a thimble, most find that if they do so the constant pressing of the needle through the material makes the finger tip sore, and frequently breaks the skin. This is especially the case with very fine needles, or when working a stiff or hard material. Thimbles are made in gold, silver, plated brass, bone, celluloid, etc., and are either plain or decorated around the edge, the top and sides being covered with small indentations to prevent the needle from glancing off it. A thimble should be used that fits the finger well, as one too small will become painful by the pressure, while one too large will be continually dropping off.

THREAD. It is an economy not only to buy the best quality of thread but to secure the right kind for the purpose in hand. Domestic sewing cotton consists of six separate strands twisted together to the requisite tightness. No. 24 is a strong coarse thread for buttons, 40 or 50 for hand seaming. For sewing machines thread of 60 or 80 is suitable.

Linen thread is stronger but more uneven than cotton and especially useful for boot-buttons, carpet-sewing, rug-backing, and similar uses. Silk sewing thread is used throughout by the best tailors; for buttonholes which have to take much wear silk buttonhole twist is indispensable. Mercerized cotton can be used for buttonholing but does not give the same satisfaction.

Threads are specially made for crochet, embroidery, knitting, and other forms of fancy work, and experience has taught the manufacturers which numbers are best for particular purposes, and their advice is always valuable, as threads are prepared with a view to the needles or hooks with which they are to be employed, and with an eye to appearance. Artificial silk threads are largely used for embroidery as well as for knitting, and they may give trouble unless suitable needles are used.

THREE-PLY WOOD AND ITS USES

Built-up Material of Great Value to the Amateur Woodworker

Other information on this subject will be found under the heading Plywood. See the entries on the various articles for which it is used in one way or another, e.g. Picture Framing. See also Grain; Panelling; Partition; Wood

Three-ply consists of timber or other material built up on the triple laminated principle, the term being usually restricted to timber that measures up to about ¼ in. in thickness. It is a most useful material for the amateur, as it facilitates a great many wood-working operations, and has a wide scope of general usefulness. There are many forms of it, some manufactured by proprietary methods and known under their trade names.

In general, 3-ply takes the form of a large sheet of wood measuring, for example, 60 in. by 48 in. This is composed of three separate pieces or sheets. The first has the grain running from top to bottom of the board; in the second the grain runs from side to side, while in the third it runs from top to bottom. Each of these layers is cemented in the process of manufacture. Wood prepared in this way possesses considerable strength mechanically, while at the same time it is pliable and can be bent to a variety of shapes; it is easily cut to different patterns, and can be built into many forms of structure. Sheets measuring about 50 in. by 40 in. can be obtained from most timber merchants and ironmongers.

Three-ply is made in various thicknesses and grades or qualities. The finest which is likely to be used by the amateur is known as 3 mm. and is slightly less than ⅛ in. thick. The next thickness, 4 mm. or ⅛ in., is suitable for such work as the backs of cabinets, the covering of wall surfaces, panels of doors and other work. Thicker 3-ply is usually sold in its fractional size, that is, $\frac{3}{16}$ in. or whatever the thickness may be.

The structure is depicted in Plate 57, where a piece of 3-ply has been cut across and part of the layers removed to show the arrangement of the grain. The object in making the grain of one layer at right angles to the next is to make the sheet as stiff and strong as possible. Ordinary board can be split easily down the middle, that is, in the direction of the grain, but it is much more difficult to break it across the grain. This is because the fibres of most woods are more difficult to break when at right angles to their length than it is to separate one of the fibres from an adjacent one. Moreover, each fibre in the breadth of the wood is available to resist the strain imposed upon it, whereas only those adjacent to the split are effected when the timber is split in the direction of the grain.

It is important to bear this fact in mind when using 3-ply, as it is obvious that if two of the laminae have their grain running in the same direction and one at right angles to them, the sheet can be bent more readily in one direction than the other. Consequently on curved work the face grain should be used in whichever way it can be bent most easily. This is usually found to be with the face grain of the sheet running in the same direction as the axis of the cylinder-like surface which is to be covered by the 3-ply.

It is first necessary to prepare rough grounds or framework on the curved edges so that the 3-ply can be attached to it. In this case, the grain of the wood runs in a vertical direction, and the 3-ply is attached to the groundwork with ordinary oval brads. Such applications are found in the treads of some staircases which can be finished off with a rounded corner, the curved part of which may be made up of 3-ply. Another application is in the construction of a simple lamp bracket where a small piece of ply wood is cut to shape, bent around the rounded end of the bracket and secured with glue and fine nails. The object is to provide a support to prevent the lamp or other article placed on the bracket from being accidentally displaced or overturned.

More intricate curved shapes can be produced. Three-ply can be extensively used for the covering of ceiling and wall surfaces; the sheets should be of such a size that they will work into the general dimensions of the building with a minimum of waste. For example, if the wall surface to be covered is 8 ft. in height, as is often the case, sheets that measure 48 in. in one direction will be preferable to those which measure 52 to 60 in., as two 48 in. sheets can be utilized to a large extent without having to cut them at all.

In lining a small timber building, such as a garage, workshop, or photographic dark room, the 3-ply can usually be nailed directly to studding. It is necessary to fit rough grounds or distance pieces in a horizontal direction between the studs at all points where the edge of the 3-ply will go when the sheet is fixed into its place. These pieces should measure 2 in. square and be so placed that the edge of the lower sheet will terminate at about the centre line of the rough groundwork, leaving enough material for the attachment of the other sheet.

It is best to start the work from the ground or floor level and work upward; the edges of the sheets should not be butted against each other, but should be separated by a gap of about $\frac{1}{8}$ in. Three-ply is quickly nailed into position with 1 in. French nails or other suitable nails, spaced about 3 to 4 in. apart or rather less, when the joints are to be covered with panel strips. The use of the latter has two advantages. By covering the joint between adjacent sheets it presents a neater appearance, and gives something of a panelled effect to the room.

Facing With Wood. For more particular purposes, such as covering the walls of a dining-room, it may be desired to finish in a natural colour, as, for instance, dark oak. Ordinary 3-ply is usually made of birch or alder and this can be stained with water stain, Solignum, or any other good quality wood stain. If expense is not material, a 3-ply should be obtained faced with the wood of the type it is desired to reveal. Two of the laminae would probably be of birch or alder, but the facing layer would be of oak, mahogany or other fancy wood. Although the cost is higher than that of the ordinary 3-ply, it avoids the use of stain, improves the appearance, and increases the durability.

As 3-ply is obtainable in comparatively large sheets it is often very useful for making up a large table for table tennis and other games. The whole table can be prepared of 3-ply for the top of the table, and this is rested upon trestles, or, if preferred, on legs framed together. It is also extremely valuable as a backing for pictures, and cabinets. A good plan is to cut a rebate on the inner edge of the back of the cabinet and to cut a sheet of 3-ply exactly to the proper size, press it into the rebate and secure it either by glue and pins, or by screws, if it is likely at any time that the back of the cabinet will have to be removed.

Another use for 3-ply is for the panels of door for a store cupboard. The framework is first prepared, the corner joints made with mortise and tenons. A groove is ploughed in the inner edge of the framework to a depth of about ½ in., and a sheet of 3-ply cut to the size of the opening within the framework plus about ⅜ in. on all sides. The framework is partly put together, the 3-ply sheet inserted in the groove, after which the joints are closed up and secured. The panel should not be glued or fixed in any other way, otherwise it will be liable to buckle, and the framework should be securely jointed. If it is intended to stain the work, the panel should be stained before it is fixed into its place, so that when the timber subsequently dries and shrinks, the white edge will not be visible round the panel.

Three-ply can be cut with a tenon saw or with a fine toothed hand saw provided the sheet be well supported, as, for example, over the edge of the bench or stout table. It is desirable to lay a long board on the top of the 3-ply and hold it down firmly while sawing, as the thinness of the wood and the peculiar arrangement of the grain render it rather liable to tear at the edges. Any inequalities which may occur on the edges while sawing can be removed with a small plane or by smoothing with fairly coarse sandpaper wrapped around a block of wood.

A practical plan is to mark out the shape of the panel on the sheet of 3-ply, then rest it on a smooth, flat surface and with a pocket or jack knife, or with a linoleum knife, guided by a strip of wood or straight edge, cut the sheet as nearly through as possible. By bending the sheet slightly it will crack along the lines and will finish up with an edge similar to that obtained by sawing. It is desirable to cut through two of the laminae.

Sometimes it is possible to use large sheets of 3-ply when resurfacing a rough floor, but this is not always successful, much depending upon the condition of the floor. The best plan is to commence laying the sheets from that wall which is the straightest, that is, free from projections such as chimney breasts, window and doorway openings. The end sheets in the angles of the walls will probably have to be cut to fit, and this should be done with considerable accuracy by scribing to the wall. The next set of sheets should be laid in line with the first, as this usually results in a more regular appearance.

An alternative plan is to commence with a half-sheet and then to use the ordinary full-sized sheets, thus making the joints in one row midway between those of the first. The sheets should be secured with small brass pins driven in around the edges, and a few here and there near the centres of the sheets if they show a tendency to buckle. The surface may be finished by staining and waxing, or in any other manner, such as, for example, painting. Three-ply is admirably adapted to the formation of round columns, either for permanent or temporary use. The interior of the column should be made of four uprights braced together, preferably in the form of lattice work, but the sides of the uprights should be in a line with the circumference. The 3-ply is cut to the required size and bent round the framing to form a complete cylinder with butted edges. In order to retain the wood in position while the nails are being driven in, string should be tied round both top and bottom.

Another method is to divide the circumference into four sections and cover the joins of the sections with half-round moulding. If the columns are high and more than one length of 3-ply is required, the horizontal join can be covered with a band of thin wood bevelled on the front and the back sawn through at frequent intervals. Square columns can be made in the same way, but the framing should be made with the corners on the diagonal; the 3-ply is nailed on the framing and the corners covered with upright beads, which can be nailed together without difficulty.

A further application for 3-ply is in the form of silhouette toys for children. These can be made in a great variety of patterns, and as they are usually of small size it is generally possible to make them up from odd pieces left over after doing some more important work. The wood is most conveniently sawn to shape by means of a fret saw. A small silhouette can be made by cutting out an advertisement illustration and carefully pasting it on to a sheet of 3-ply.

When the paste has become quite dry, the pattern can be sawn out with a fret saw. The edges should be sandpapered and the figure mounted on a wooden block. This is done by making a slot across the upper centre part of the block, inserting the lower end of the 3-ply, and securing it with glue or fine pins. Three-ply is extensively used in many industries, examples including small attaché cases, egg boxes, tea chests, and the like. It can be stained, distempered, or finished with any of the recognized paints, varnishes or enamels. This should be applied on a groundwork of stopping or undercoating, the ply-wood being sandpapered and rubbed down just as in painting any ordinary wooden surface.

Three-ply is usually purchased at so much per square foot, but the amateur will find that it is generally more economical to purchase squares; that is, several sheets covering together an area 10 ft. by 10 ft. It is important to store the wood so that it will not buckle or warp. There are several ways of doing this. One is by taking 4 pieces of wood, each about 6 in. longer than the breadth of the sheets, and about 1 in. thick and 4 in. wide. These are screwed or bolted at the ends and are located several inches from the upper and lower edges of the sheets, one in front of the other and thereby clamped together. The sheets can be clamped together and the framework fixed to the wall until it is required

THUMBSCREW. There are various domestic uses for the thumbscrew, which is a form of screw having a flattened or wing-shaped end by which it may be rotated. It is part of the equipment found in the mincing machine, and various forms of food choppers which are fixed by means of the thumbscrew to the side of a table or dresser.

The heads of thumbscrews are either cast or machined with the screw riveted, or otherwise attached. A common method is to slot the end of the screw and secure the flat head inside the slot by riveting. Thumbscrews sometimes have a quick thread so that a few turns will tighten up the object. Many are fitted with a double thread, usually of square section, and are used for securing the top and bottom sections of shutters and windows.

TINFOIL, Uses of. Strictly speaking, tinfoil is a very thin sheet of pure tin only a few thousandths of an inch in thickness. In practice, however, the term is applied to any very thin silver-coloured sheet metal, which is often known as silver-paper. There are many grades of this class of material, varying from the pure tinfoil to a fibrous material akin to paper and coated or impregnated with a metallic mixture. This sheet lead or a white metal alloy is also commonly known as tinfoil.

There are many uses for tinfoil in the home. For example, it can be employed to exclude air, as confectioners do with chocolates and other sweets. It can also be used for covering the stoppers of bottles of preserved fruits or jam. When the bottle has been closed, a covering of tinfoil is pressed firmly over the cork and around the top of the neck of the bottle. Another use for tinfoil is in the covering of small toys for children. The very thinnest and most pliable foil should be chosen and is simply worked over the article to be covered, which may first be coated with a thin film of Seccotine or shellac varnish.

Yet another use for the material is found in the decoration of such objects as photographs. To do this, strips of tinfoil are cut and applied to the photograph, which may be mounted on a piece of cardboard and covered with glass. The binding is lightly coated with Seccotine and the tinfoil is rested on the table and the frame held vertically and pressed down upon it. The edges are then folded over upward. All four sides are treated in the same way, after which the decorated portion is prepared, drawing the design full size on a sheet of tinfoil, and outlining it lightly with a fine brush and Indian ink.

The design should be simple in character and preferably of a floral or some flowing pattern. The cutting is easily effected with scissors. The inner portions of the design may either be pierced with a pocket-knife or more expeditiously with a pair of curved manicure scissors. These, having curved and small blades, facilitate the shaping of the internal portions of the design. If a knife blade is used, it must be kept sharp and the foil cut on a piece of glass.

After the pattern has been cut out in this way the back of the tinfoil is lightly coated with Seccotine, applied to the surface of the glass, and pressed firmly into place. After it has been allowed to set for a few minutes, the modelling can be put on to the leaves, petals, and other parts of the design, with a round-ended stick of hardwood or bone, manipulated in the same way as a lead pencil. This slightly indents the tinfoil, and by raising it imparts depth and colour to the material.

Tinfoil can be modelled in the same way as thin pewter, but it requires care to avoid fracture. A good method is to work the tinfoil over an object in low relief, and fill up the hollows underneath with plaster.

A development of this is the ornamentation of glass bottles and vases with tinfoil. The decorative effect in this case depends on the selection of a suitably shaped bottle; those used for some Italian wines and liqueurs are often suitable. Triangular pickle and other bottles of uncommon forms should be selected in preference to more usual patterns. It will be found advantageous to break the design into separate sections, so that it may be cut out as units, cemented in its place, and completed.

The neck of the bottle may be left open, when it will be suitable for flowers or dried grasses, or it may be closed with a cork, the upper part of which has been suitably shaped and covered with tinfoil and secured in its place with Seccotine or other adhesive. The figures or design are cut out and fixed to the glass. When they are dry they can be treated by lining with a fine brush and some dull black paint. The effect of doing the work in this way is that of chasing on silverwork, and gives a modelling to the figures that cannot generally be obtained by other methods. If the work is neatly done, the bottles or vases of this nature will stand a good deal of work and wear, and impart an individual touch to any room in which they are placed.

Other uses for tinfoil are associated with electrical work, as in the construction of the plates of the Wimshurst machine, small condensers for wireless work, covers for Leyden jars, and other purposes. In case of emergency tinfoil can be used for stopping a leak in a gas, water, or oil pipe. The method is first to well wrap the pipe with tinfoil and press it closely into contact with the pipe, then cover the tinfoil with insulating tape or with a wrapping of string neatly and evenly applied. This holds the tinfoil in place.

TINPLATE WORK. Tinplate is a sheet of iron or steel coated with tin on either side. It is commonly made in two qualities or varieties, known as charcoal and coke brands. These names originated when tinplate was made from charcoal iron for the better quality plate, and coke iron for the inferior grades. The distinguishing names are retained, but now represent the depth and finish of the tin coating.

Coke plates are largely used for can construction. For commercial tinplate a common proportion of pure tin to the sq. ft. of plate is ·023 or ·024 lb. Tinplates are made in sizes measuring 10 in. by 14 in., and also in multiples of these sizes for larger work. The sizes most commonly used measure 20 in. by 18 in. and 20 in. by 14 in.

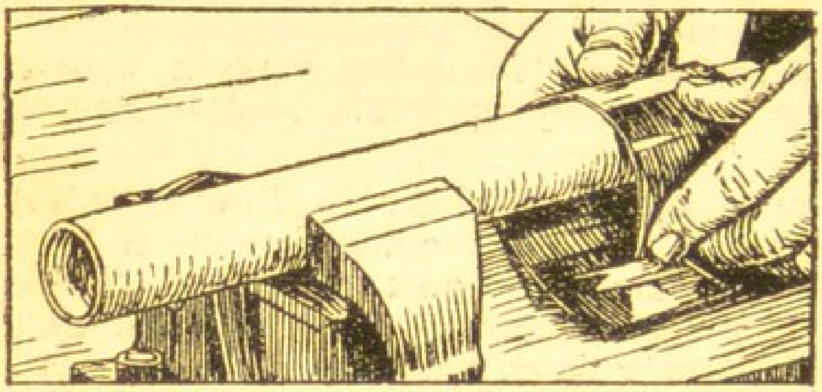
The thickness of tinplate varies to standard commercial sizes, measured in Stubbs' wire gauge. The thinner gauge plates are known by the table of weights and gauges herewith:

Designation	Gauge	Weight per sq. ft.
56 lb.	38	0·257
75 ,,	34	0·345
100 ,,	30	0·459
130 ,,	26	0·803

Tinplate is often called block tin or simply tin, but these appellations are erroneous. Tinplate in which a certain amount of lead is added is known as terneplate, and consists of soft sheet steel plates coated with a tin-lead alloy, of which a common alloy is made with $\frac{1}{3}$ pure tin to $\frac{2}{3}$ lead. This form of tinplate has considerable rust-resisting properties, and is used in roofing work. For this reason it is also known as roofing plate. Terneplate is manufactured in the same sizes as tinplate.

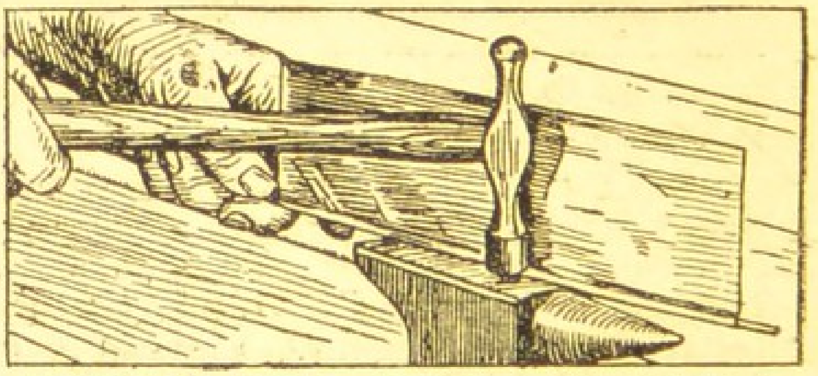
Tinplate lends itself to the construction of many articles to be found in the household. A sharp pair of tinman's snips should be used for cutting the plate, and the amateur may find it an advantage to wear an old pair of gloves, as it is very easy to cut the hands on the rough and sharp edges of the material. In cutting tinplate, care should be taken to keep the tin free from scratches or buckles.

HOW TO BEND TINPLATE. In order to bend it, the tinplate is smoothed round a cylindrical former where a uniform curved surface is required. Care must be taken to avoid too sharp a bend in one particular place. The whole length of the sheet should be held, and the bending process not localised to one edge of the sheet. In bending the sheet into a curved surface the most difficult part will be found to be the ends of the material. The commencing end should first be bent to the required radius, then the main body of the sheet.



TINPLATE. Fig. 1. Bending to a cylindrical shape

The operation of bending a sheet of tinplate to a cylindrical shape is shown in Fig. 1. Where an article of conical shape is required, a correspondingly tapered former should be used, the tinplate being first marked out to the correct shape. The risk of wasting the material by incorrect cutting may be obviated by marking and cutting a sheet of stiff brown paper to the size required. If this is found to be correct, the paper may be placed on the tinplate, or the tinplate marked off from the paper. Before cutting, allowance must be made for the seam or method of joining. Where a soldered joint is to be made only a slight overlap will be required; it is known as a simple lap seam.



TINPLATE. Fig. 2. Forming a neat edge to a sheet of tin by working it round a wire

Further strength is imparted to the joint by means of the grooved seam. The edges are turned up on opposite sides of the tinplate to form a hook when the ends are brought together. After the ends of the cylinder have been folded together the seam is hammered flat by inserting a bar to the inside of the tube, on which the seam rests during the hammering process. In allowing for the seam in marking out, three times the width of the single turned-over edge should be allowed. If the joint is to be watertight the seam must also be soldered.

An easy method of turning over the edge or lip is to hold a straight strip of metal against the bend while the lip is hammered flat to the top of the strip. Where it is required to fit a bottom to a cylindrical object in tinplate several methods of fitting are available. Probably the most simple for the amateur is to cut a disk of tinplate fitting exactly inside the bottom of the cylinder or container. When the work is in position it is turned upside down and the bottom soldered in place. Further to secure the bottom, a ring of brass or similar wire is fitted to the inside of it and soldered in position.

Where the edge of a tinplate article is left exposed, it can be bent round a wire to form a neat edging (Fig. 2). It is best done in the early stages when the sheet is flat.

TOBACCO JAR. Tobacco jars can be made of many different materials. For example, they may be constructed from pewter, aluminium, china or earthenware. Another plan is to make them in oak or other hardwood, but these materials have not the essential quality of being easily made airtight. A good tobacco jar can be made from a glass jar such as is used for preserving fruit, and usually has some special means of closing to render it airtight. Generally the lid is pressed firmly into engagement with a rubber ring which seals the aperture.

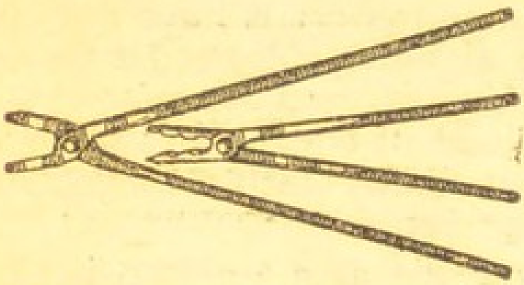
A glass vessel can be converted for use as a tobacco jar by the use of brass strips and a steel spring arranged to serve as a handle and keep the lid securely closed. After the jar has been selected, it should be thoroughly cleaned and three brass rings prepared from strip metal about $\frac{3}{8}$ in. wide and $\frac{1}{16}$ in. thick. These are worked around near the neck or bottom of the jar and united by riveting and soldering. Two other pieces of similar brass strip are bent to form the upright members of the handle. The upper parts of the two handle strips are connected by short, curved strip brass to the upper brass ring. The junction of the four ends of the strip is effected by silver soldering to a brass tube about $1\frac{1}{4}$ in. long and of $\frac{3}{16}$ in. diameter.

The spring is bent from slat spring steel about $\frac{3}{8}$ in. broad and rather less than $\frac{1}{16}$ in. thick. One end is fitted to a brass shank of about $\frac{1}{8}$ in. diameter, and of such a size and length that it will turn easily in the tube attached to the handle strips. It may be fitted by slotting a piece of rod and riveting to the spring, the joint being further strengthened with a small ferrule or collar. The lower end of the swivel pin is held in position by means of a small nut, the corners of which may be filed away. The opposite end of the spring has a flat formed upon it, and is firmly attached to a small disk of ebonite that fits into a recess in the top of the glass cover. The spring is bolted to the ebonite disk by means of a small nut on the underside.

An india-rubber ring, fitted between the ebonite disk and the top of the glass cover, makes an airtight seal. To prevent the cover separating from the spring, a washer and nut are provided on the lower end of the bolt and are not tightened against the cover, but are secured a small distance from it, to allow free play for the spring.

In use a large diameter india-rubber ring is placed around the upper shouldered neck of the jar and the cover placed upon it. It is held in firm contact by the pressure of the spring. Whenever tobacco is needed, the cover is removed and turned aside to give access to the interior of the jar, the spring meanwhile supporting the cover in readiness for its replacement. Further embellishments can be introduced with the application of enamel or tinfoil figures.

TONGS, for Metal Work. Special tongs are used to hold iron pipes in gas and hot water fitting. The gas tongs is a convenient tool for gripping gas piping without damaging the pipe. It is made of forged steel and hardened at the gripping end. One end is curved to encircle the pipe, while the other end is short and has a sharp, square inner edge which bites into the softer metal of the pipe, thereby holding it securely. Tongs of this type are made only for one size of pipe.



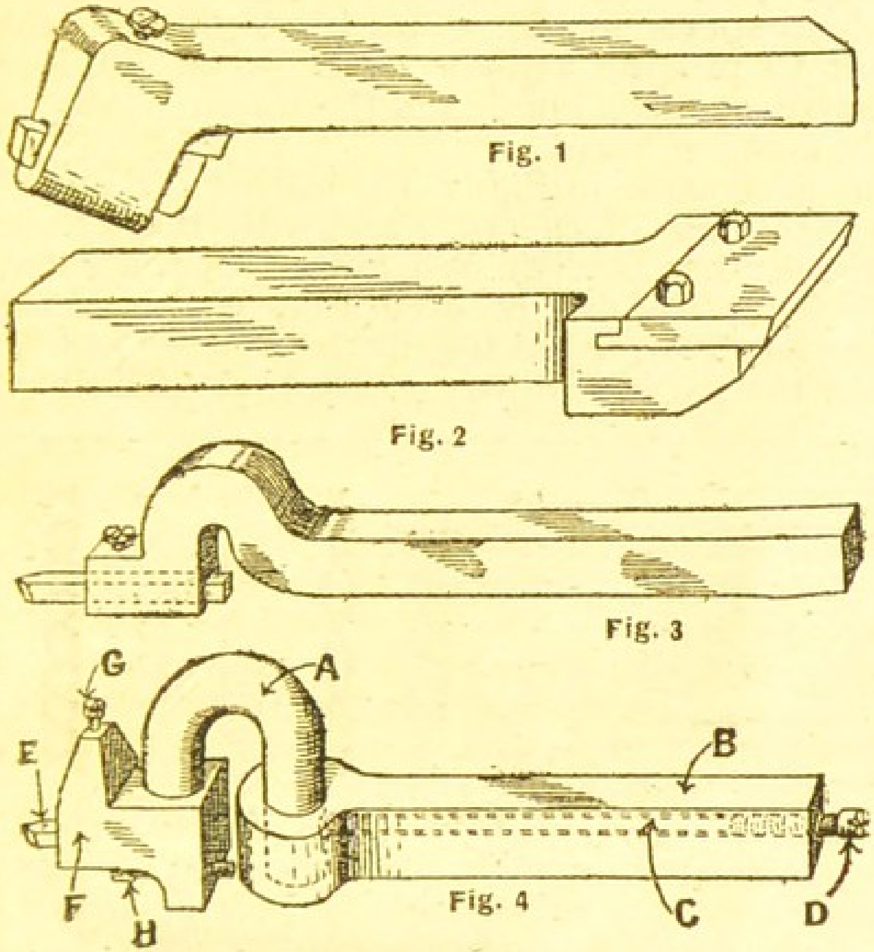
TONGS. Blacksmith's tongs useful for brazing and similar work

TONGUED JOINT. This is a joint in which a small projection along the length of one part, known as the tongue, fits into a slot or groove in the other part and so completes the joint. A common application is found in tongued and grooved floor-boards. This material is finished on one side and generally measures in width 4 in. to 5 in. The average thickness is nominally 1 in., but actually it measures slightly over $\frac{7}{8}$ in. Thicker boards are available, but are seldom used except in high-grade work or where very considerable strength is needed, ordinary 1 in. tongued and grooved flooring being quite satisfactory for most domestic work. The amateur will find that this class of timber with its tongued joint is extremely useful for a great many purposes.

In the construction of tongued joints, a tonguing and grooving plane is usually employed, which has variously shaped irons and adjustable fences, and makes grooves $\frac{1}{4}$ in. in width. On one side is an adjustable fence composed of a strip of hardwood which locates the position of the groove in respect to the working face of the material.

The general method of using this type of plane, consists of securing the work in a vertical position on the bench between blocks of wood or by holding it in the bench vice. The plane is rested on the upper surface of the work with the fence resting against the face, and worked backward and forward in the usual way. The tongue can be made with the same plane, and finished by the regular tonguing and grooving plane or matching plane, specially prepared for the purpose. The plough plane is also used for this class of work.

TOOL HOLDER. As employed by woodworkers and others, a holder for small tools is quite different from that employed on a lathe. The former is a handle made of wood and fitted with steel jaw to hold various tools. The jaws are contained in a brass ferrule, and are adjustable to take anything from a needle to a file. Some holders made of hardwood take the form of a hollow handle with a screw-off end to contain a set of small tools.



TOOL HOLDER. Fig. 1. Form for use with small tools which are held by a screw. **Fig. 2.** Holder for use with a forming tool. **Fig. 3.** Holder for threading operations. **Fig. 4.** Adaptation of Fig. 3

The tool holder used by the metal turner is made in several shapes. A simple form for use with small tools is illustrated in Fig. 1, the tool being held in place with a set screw. The holder is made of steel and is convenient for a small lathe, as small pieces of tool steel can be easily ground to any desired shape and inserted in the holder; it saves having a large number of large tools. Another form of holder is shown in Fig. 2. It is convenient to use with a forming tool as indicated, but if the shank were the same width all along, it would be difficult to bolt a narrow tool to it.

The holder in Fig. 3 is used for threading operations, but can be employed for light turning. A convenient adaptation of this holder is illustrated in Fig. 4, and is adjustable to 3 positions. The head A fits in a round hole in the body B, and is held in position by the rod C, which is secured by the set screw at D, so that it is a simple matter to turn the head to the right or left from the central position.

To ensure rigidness, 3 flats are ground on the round part of the head fitting in the hole in the body. The tool E is placed in the socket F, and held in place by the set screw G. The screw H is used for adjustment, its normal position being $\frac{1}{32}$ in. from the body, but if a rigid tool is required the screw should be tightened up against the body.

TOOLING, for Leather. Hand tooling on leather is done with wheels or fillets and various shapes in stamps, and is an important section of leather-work and bookbinding. It is possible by the use of these tools to execute patterns on the leather which may, if desired, be coated with gold leaf.

The example of a simple pattern in tooling given in Fig. 1 is produced with a wheel, a dot, and a straight stamp. The wheel is shown in Fig. 2, and can be obtained with a variety of patterns, some of which appear in Fig. 3, but it will be sufficient for a commencement to provide a plain wheel. The dot is a plain punch with a small, rounded point, and the stamp, as shown in Fig. 4, is generally made of brass.

In working out the decoration in Fig. 1, the leather is damped and the wheel warmed. The lines are made with the wheels pressing well into the leather, and at first guided with a ruler, but with experience the wheel can be accurately guided along a line previously drawn. The curved line in the centre must be done direct, and then the pattern on the stamp is pressed down

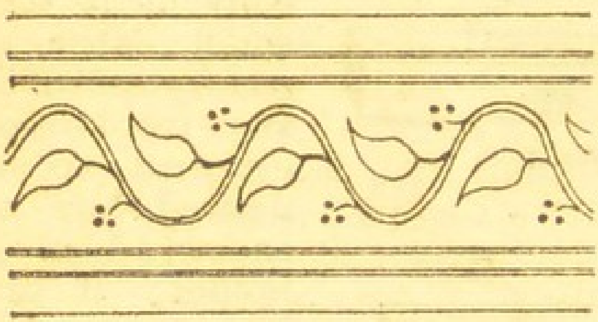


Fig. 1

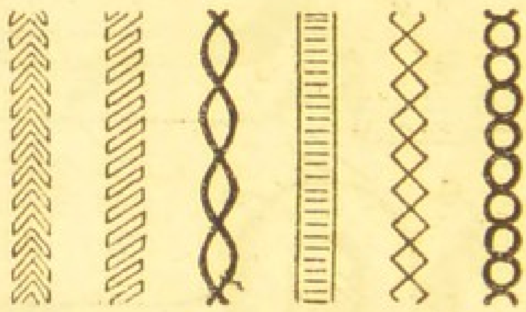


Fig. 3

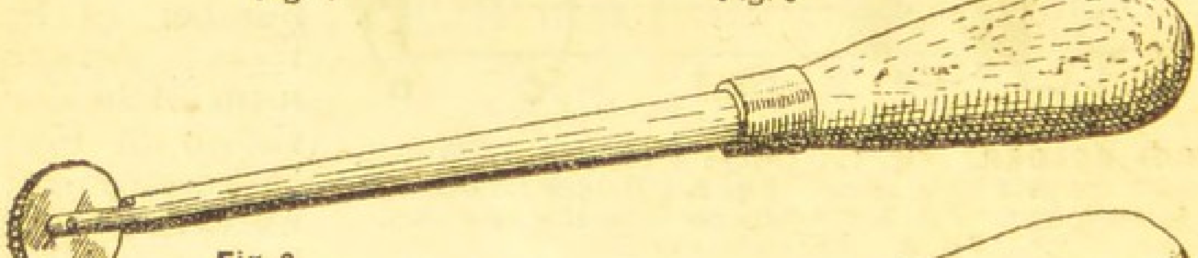


Fig. 2

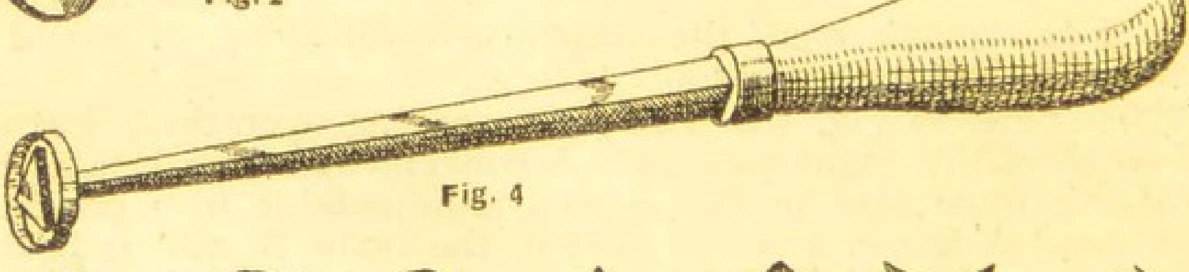


Fig. 4

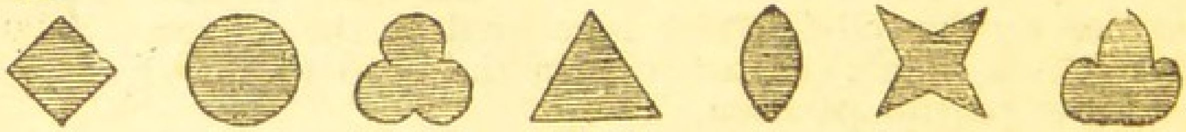


Fig. 5

TOOLING. Fig. 1. Pattern for simple tooling. **Fig. 2.** Wheel. **Fig. 3.** Patterns for wheels. **Fig. 4.** Stamp. **Fig. 5.** Simple home-made stamp forms firmly in the correct place. The dots can be made in the same way or the punch lightly tapped with a hammer.

Blind tooling with the stamps, hot or cold, on the damp leather is generally applied in the decoration of book covers and other flat objects. In the case of beginners and in intricate tooling the design should be drawn on paper and cut exactly to the shape of the leather. The paper is laid on the leather and the stamps impressed on the surface with care. The best way to hold the stamp is to grasp it firmly in the right hand with the thumb on top of the handle. The thumb of the left hand should be used to guide the tool. Tool forms can be made from brass rods held in the jaws of a tool holder. Those shown in Fig. 5 can be shaped with a file. The surface of the stamps should be perfectly smooth and a piece of leather should be used for polishing them during use.

Gold, silver, and bronze tooling is used to enrich the appearance of the work, and, although requiring skill, is not beyond the powers of the amateur. The leather is first washed with the water taken off thin flour paste, and when dry is given a final washing with size in a lukewarm condition. When the leather is nearly dry, the tool impressions are coated with glair made from 3 parts of white of egg and $\frac{1}{3}$ part of vinegar. The gold leaf is placed on a cushion formed by a piece of deerskin or similar smooth leather mounted on a piece of cork, and the surface rubbed over with fine pumice powder to provide a suitable surface to hold the leaf when cutting.

The cutting should be done with a palette knife, which can also be used to transfer the leaf to the cushion, by a sawing action. The leaf is transferred to the work with a dabber of cottonwool on which the slightest amount of vaseline has been rubbed. Press the dabber to the pattern, and when the gold leaf is in place apply a hot tool to the surface. The correct degree of heat can be tested by placing the tool on a piece of damp cottonwool and leaving it until the hiss has subsided, then polishing the surface with a piece of chamois leather before application. To keep the stamps clean in heating, they should be placed on a metal plate over a gas burner.

Owing to the liability of silver to oxidize, silver leaf after pressing should be coated with varnish. Powder bronzes and aluminium can be mixed with medium, applied with a brush, and then pressed in the same way with a hot iron.

TOOL RACK. Tools cannot be kept in order if they are allowed to lie about the bench, and the best means of preserving the cutting edges is to place them in a rack directly after use. The rack illustrated in Fig. 1 can be made from machine-planed wood 2 in. by 1 in.; the component parts are detailed in Fig. 2.

The uprights A are 18 in. long; the top is cut off on the top corners $\frac{1}{2}$ in. each way. The feet B, which act as supports for planes, are 9 in. long, with a slot 2 in. by 1 in. on the inside back corners to fit against the uprights, to which they are afterwards screwed. Two shelves cut to a finished length of $15\frac{1}{2}$ in. are housed into $\frac{1}{4}$ in. deep grooves cut on the inside of the uprights, the bottom shelf C being 6 in. up and the top one D, 8 in. above. The grooves should be set out with the 2 pieces side by side, so that they are exactly the same height, the shelves being fitted and provided with holes for the reception of the tools.

On the top shelf draw a line $\frac{3}{4}$ in. from the back, and then set out the positions of the holes, varying the sizes and the distance apart; none of the holes should be more than 1 in. in diameter. The bottom shelf is reserved for boring bits, nail punch, bradawls, and other small tools; the bits should fit in square slots made by boring a small hole and then trimming from the top to a taper with a $\frac{1}{4}$ in. chisel.

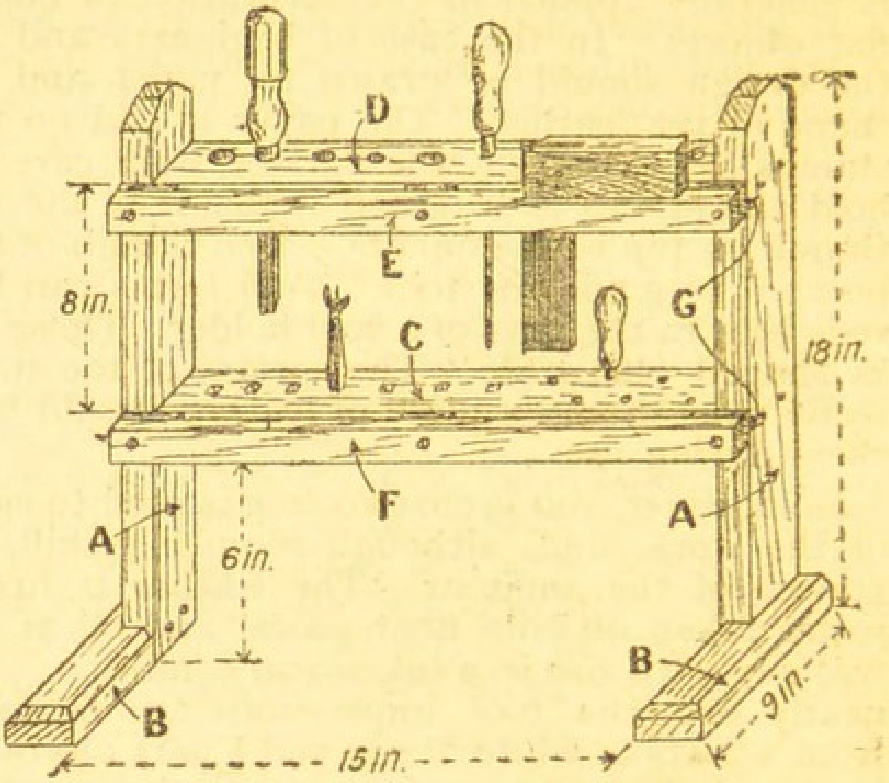


Fig. 1

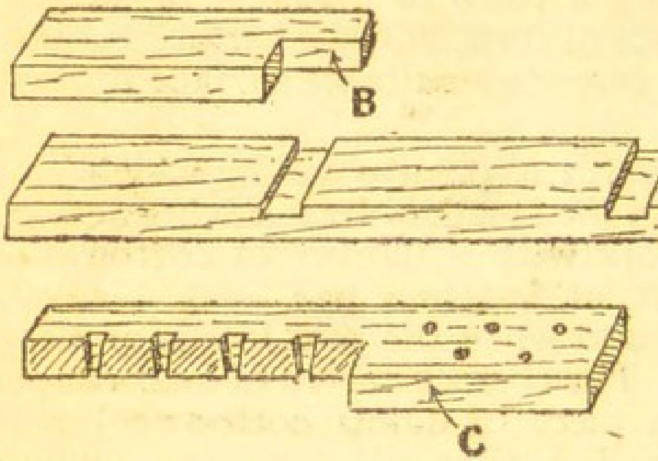


Fig. 2

TOOL RACK. Fig. 1. Useful rack for the amateur worker's bench. **Fig. 2.** Details of the various parts

The parts should now be screwed together and two 17 in. by 1 in. by $\frac{5}{8}$ in. strips, E and F, planed up. These are screwed to the front of each shelf with three 1 in. lengths of 1 in. by $\frac{1}{4}$ in. wood, G, between, one at each end and one in the centre, holes being carefully bored through both pieces. These long slots will do for several tools, including the tenon saw, the square, and the bevel.

TOOTH BRUSH RACK. In order to hold tooth brushes a rack can be obtained either in wirework or wood, both singly and in conjunction with soap racks. An easily made rack in wood is shown in Fig. 1, a small piece of hardwood 9 in. by $1\frac{1}{2}$ in.

by $\frac{1}{4}$ in. being sufficient. The wood is marked out as in Fig. 2; the shelf is $1\frac{1}{2}$ in. and the back $7\frac{1}{2}$ in. While the wood is in one piece, the slots for the brushes should be marked out 1 in. deep, and the sides set out with a marking gauge; the first marking is $\frac{3}{8}$ in. from the sides, the second $\frac{5}{8}$ in.

The sides of the slots are sawn down with a tenon or dovetail saw and the waste removed with a chisel. The groove is marked out $1\frac{1}{2}$ in. down from the top of the back, but the thickness of the wood must be carefully measured so that the groove can be cut the exact width. The two parts are cut apart, the ends trimmed smooth with a sharp chisel, the corners removed in the same way, and the hole bored for hanging. The shelf is glued and bradded in place to complete the rack.

Similar racks can be made for more than two brushes, but where there are many in family a useful tooth-brush rack can be made with a piece of aluminium with a strip bent in semicircles riveted on as in Fig. 3. This rack can be kept quite clean, and is easy to make, as the half-round openings in the strip can be bent with a pair of round-nose pliers.

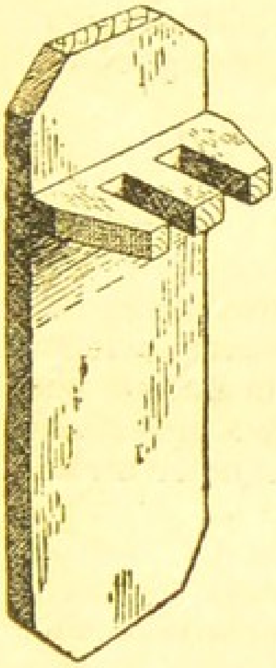


Fig. 1

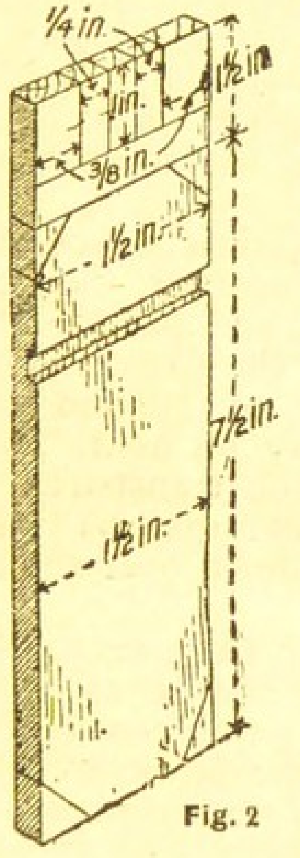


Fig. 2

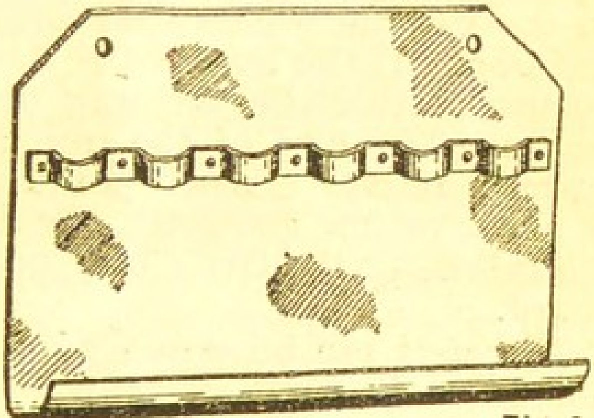


Fig. 3

TOOTH BRUSH RACK. Fig. 1. Easily made hardwood rack. **Fig. 2.** How to mark it out. **Fig. 3.** Aluminium rack for several tooth brushes

T PLATE. Steel or iron plates in shape resembling the letter T are sometimes employed to strengthen the joints of woodwork. They are arranged in pairs, one on either side of the joint, and bolted right through the timbers, holes being provided in the wood and the plates for this purpose. T plates are also placed on the tie-beam and the vertical posts of a queen-post truss.

TRACING, on Paper. The operation of transferring a drawing or picture by means of prepared paper can be done in two ways. A sheet of tracing paper, which is specially prepared semi-transparent paper, is placed on the drawing, and the lines underneath are drawn over with a pencil. This method of providing a duplicate of a prepared drawing is used by architects and builders as well as woodworkers and engineers, but tracing cloth is often employed instead of the paper, as it is not so easily torn. Duplicate plans and elevations can be made thus and tinted with coloured inks or water colours.

Another method of transferring drawings is to trace them through a sheet of carbon paper placed underneath the drawing. This method is useful for transferring designs on to metal, wood, and other materials.

In all tracing it is necessary to keep exactly to the original lines; at the same time it gives the skilled draughtsman an opportunity of correcting faulty lines on the original. In using carbon paper, it is advisable to pin the drawing at the top so that the progress of the work can be followed, otherwise it may be found on the completion of the work that important details have been omitted.

TRANSFER. Designs printed on thin, transparent paper and capable of being transferred to other surfaces are known as transfers. They are used for embroidery, beadwork, painting on glass and textile fabrics, pattern printing, leather work, gesso and barbola work, batik, and for transferring designs on to lampshades.

To use a transfer on a textile fabric, place the latter on an ironing table with the right side upward, then pin the transfer to it with the waxed side down, and press with a moderately hot iron. If the material is thin, the flat of the iron should not be used, otherwise the wax may spread and cause disfiguring marks. The heel of the iron may be used, however, without harmful results. When painting on transparent materials such as gauze or fine georgette, the design may be tacked underneath the fabric, or the latter may be pinned over the transfer on to a board.

Transfers can be employed when the wax has been ironed off. As the outline still remains they can be used in the following manner for transferring to paper, parchment and prepared wood surfaces: Cover the portion of the fabric to which the design is to be transferred with a sheet of carbon paper, lay the transfer on top, and pencil over all the lines.

TRANSFER FOR APPLYING DECORATION. Another kind of transfer is specially prepared for applying decoration to various materials in the form of lines, coloured designs, and pictures. Imitations of painted decoration, marquetry work, bandings, stringing, sign writing, graining, floral patterns, etc., can be obtained in the form of transfers.

In applying transfers to wood, the surface must be perfectly smooth and clean and preferably bodied up with French polish, although this is not essential. The exact position of the transfer must be marked lightly, the outlines of the design being indicated on the back of the transfer, so that it is not difficult to place the paper in the correct position. First cut away most of the unnecessary paper surrounding the edges of the transfer, leaving a margin of about $\frac{1}{8}$ in.

The face of the transfer is wiped over with a clean duster, and then with a small, stiff brush it is given a thin coat of gold size. The paper is then placed on one side, free from dust, for the size to dry. A suitable size can be made by dissolving $\frac{1}{2}$ oz. of best gelatine in 1 pint of water. If the wood has been bodied up, the surface should be rubbed down with powdered pumice-stone placed in a pounce bag and finally wiped over with a clean, dry rag.

The transfer is ready for application when the gold size is tacky. On no account must the surface be wet. It can be tested by placing the end of the finger on it. If the finger sticks without pressure the surface is not dry enough, but if a little pressure is needed to make it stick to the finger it is ready for application. If the transfer is on duplex paper, it should be divided and the thick backing paper thrown away. The surface of the transfer is carefully placed in position and well rubbed into contact with the work. It should be noted that when once the transfer has been placed on the wood it cannot be shifted without spoiling it. It is therefore best to commence with one corner and gradually press it into contact; this method also minimizes the chance of air bubbles appearing under the transfer.

Immediately the transfer has been pressed well down on the surface, rub it further into contact with a slightly damp sponge. The sponge is dipped in warm water to wet it thoroughly, and the paper surface of the transfer is wetted, allowing about 5 min. for the water to soak in. One corner is lifted up and the paper is peeled off, leaving the design on the wood. The coloured surface is lightly washed over with the wet sponge, working from the centre to the outsides, and it is then dried by gentle pressure with a clean cotton rag. Any air bubbles may be removed by pricking with a needle point and pressing the transfer down with a wet finger tip.

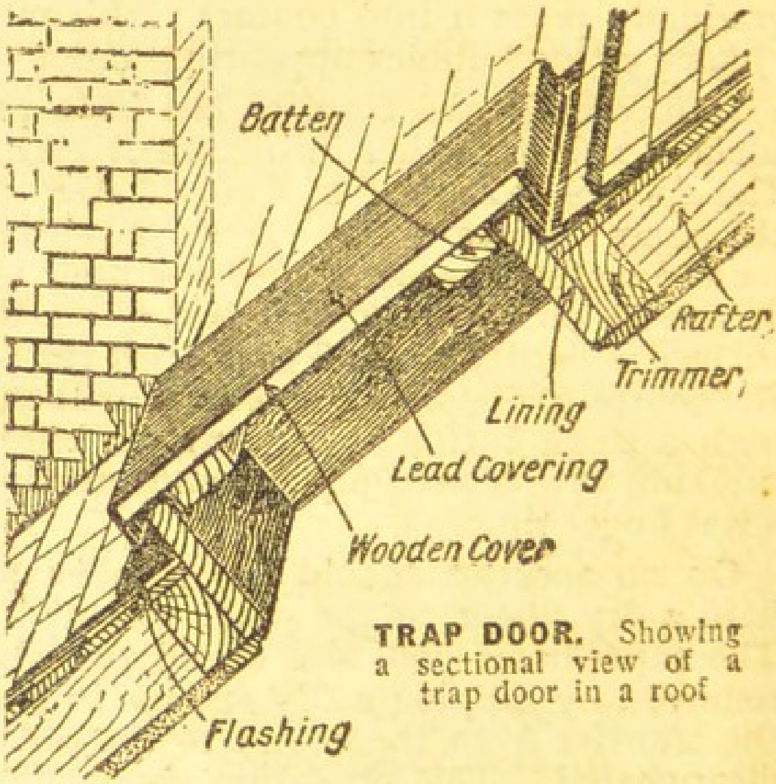
On no account should the transfer at this stage be touched with a dry finger, as the paint will stick to it and spoil the work. The superfluous gold size round the edge of the transfer can be removed by dipping a dry sponge in turpentine and wiping over the transfer from the centre to the outside until all traces have disappeared. This operation should not take more than a few seconds or the turpentine will attack the paint and dissolve it. Directly the size has been removed, the surface should be wiped dry with a clean cotton rag. When dry, the colour will harden, and can be coated with a transparent polish.

The method of applying coloured transfers or linings to polished metal surfaces is somewhat similar, but special care will be needed to fit the paper on curved surfaces, otherwise the finished work will appear slovenly. In transfers of lines making a panel with ends, these portions should be applied first and then joined up with butt and not overlapping joints. To make an effective join, the length of line between the end portions must be accurately measured, and, in the case of the end pieces as well as the lines, as much of the outside paper as possible cut off.

TRAP DOOR. The general use of a trap door is to close an aperture through a floor, ceiling or roof. It is a horizontal door and usually consists of stout boards jointed together and strengthened by cross battens. The framework round the trap door must be strong enough to support any load which may be brought upon the floor.

A commonly adopted plan is to make an aperture between two or more joists or rafters, bridging the space between them with stout timber about 25 per cent, thicker and equal in depth to rafters or joist. These timbers are known as trimmers and should be tusk tenoned to the others. Intermediate rafters or joists that have to be cut to form the aperture are mortised and tenoned into the trimmers.

Fillets of wood are in the majority of cases fitted around the inner faces of the trap hole with their upper surfaces at such a depth as is necessitated by the thickness of the trap door. Notches or openings are cut in the fillets where necessary to clear the battens. For a floor trap door, the upper surface of the floor is cut back so as to reveal about half the thickness of the joists and this is then filled in with a mitred framework.



TRAP DOOR. Showing a sectional view of a trap door in a roof

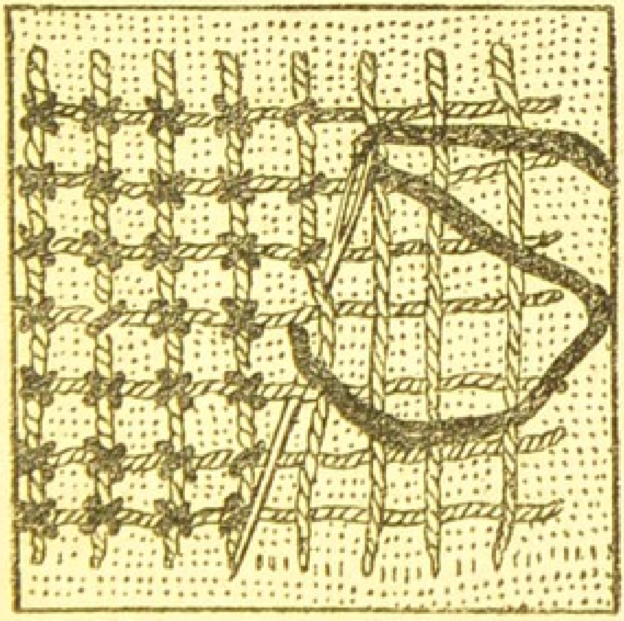
The trap door should be very solidly constructed and fit the hole accurately, and when in position should be flush with the normal surface of the floor. It requires to be properly hinged with cellar or trap door hinges. These comprise three parts: two are fitted to the framework and the trap door, and the third serves as a link connecting the other two, there being two hinge points, one near each end of the link. The trimming has to be cut away so that the flap hinge can be sunk into it with its upper surface level with that of the floor.

When the trap door does not exceed about 21 in., square ordinary butt hinges may be used. These are fitted vertically into the joint between the trap door and the floor boards. Good stout screws should be used to secure them, the hinges being of the malleable cast variety, possessing sufficient strength to stand the strain. To enable the trap door to be lifted, fit a small ring handle, and, to prevent the trap door being opened, it is a wise precaution to provide it with a couple of bolts on the underside.

Loft Doors. When fitting a small trap door for access to a loft, or other similar part of a building, its width should not be greater than that between two joists, and then it will suffice to fit two cross members between them and secure them with stout spikes driven through the ceiling joists. The door can be of floor board with cross-pieces of 3 in. by 1 in. deal, screwed to the upper side. It rests on fillets in the aperture.

Roof Doors. Trap doors when fitted into a roof are usually made to lift off bodily, although examples are found in which the hinged flap is used. However it may be arranged the outer surface must be covered with weatherproof material, such as sheet lead or zinc. A cross sectional view of an external trap door is shown in the diagram, the aperture through the roof being framed up with trimmers. The inner faces of the opening are lined with stout timber projecting several inches above the normal roof surface, and covered by a flashing of lead or other material to ensure a water-tight joint. The trap door should be several inches larger each way than the trimming, and should fit on a bed, or fillet on the under side, to keep it in position. The outer edge of the door is preferably fitted with a small, downward projecting batten of wood and the whole covered with lead.

TRELLIS, in Needlework. This filling stitch is used to cover large spaces in embroidery on linen and is worked on counted threads of the fabric. It consists of horizontal and perpendicular lines of working threads held down by a cross stitch where the lines meet. In some designs a tiny running stitch crosses the junction of lines.



TRELLIS IN NEEDLEWORK. Method of making stitch, useful for covering large spaces

The threads of the ground material should be counted both ways, so that they are set evenly apart. If the small stitches which form the first half of the crosses are worked in one direction in one long row, and in the reverse direction on the return journey, all the crosses will be worked in the same way and give a more even effect. The illustration shows the needle in the correct position, forming the cross stitch at the junction of two lines.

TRY SQUARE. This is a carpenter's tool employed for testing the accuracy of right angles. It consists of a flat parallel-sided steel blade attached to a stock made of a parallel-sided piece of hardwood. The working edge of the stock is faced with a strip of brass, the angle between the face of the brass and the inner edge of the steel blade being exactly 90°.

In a well-made square the outer edges should be at right angles, and when the square is placed on a level surface in a vertical position the blade should be at right angles to the level surface.

T SQUARE. Employed for drawing parallel lines, usually horizontal, a T square comprises a long blade of mahogany or other wood and a stock made of thicker wood. The working edges of the blade and the stock should be at right angles to one another, the blade and the stock being firmly united by dowel pins and screws. Its most extensive application is in the preparation of drawings, when the T square is used in conjunction with a drawing board. It should be slightly longer than the board. Probably the most serviceable pattern is a mahogany T square about 30 in. long. A common type is made in pearwood. The usual practice is to have the left-hand edge of the drawing board smooth and true, and to work the T square from this edge.

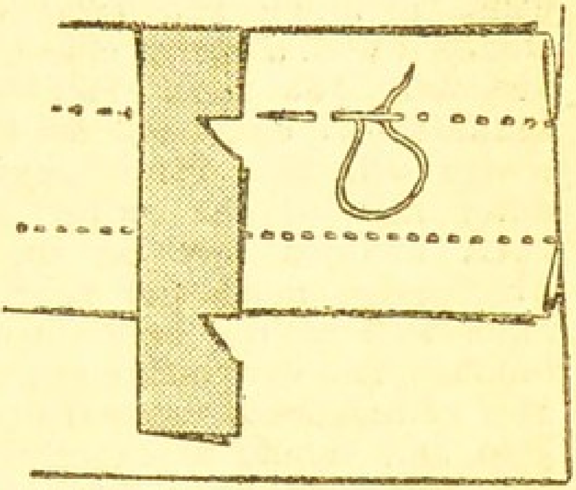
TUBING. Flexible metallic tubing is largely employed for connecting gas rings or gas table lamps where portability is desired. The best method of cutting this tubing is to file a slot along one of the spirals until it is thin enough to break off. A three-square file is suitable for the purpose, but a hack saw may be used.

TUCK, Making a. A stitched fold taken up double in the material and arranged to lie over single material constitutes a tuck. They are made on the right side of the fabric, and vary in width. The distances allowed between the tucks is very much a matter of taste. Narrow tucks may almost touch each other, or the space apart may be the tuck's width ; where the tucks are very wide the distance between may be less than their width. Unless the tucks are being made in a garment cut from a paper pattern on which both the tucks and spaces would be marked, it is a good plan to experiment with a piece of paper till a good effect is gained.

The narrowest tucks are termed pin tucks. As these only necessitate the taking up of a few threads of material in each, a group will not seriously affect the length or width of a garment, but for wider tucks extra material must be allowed. For instance, a tuck that is to be $\frac{3}{8}$ in. wide when finished will take up $\frac{3}{4}$ in. of material, and lie over $\frac{3}{8}$ in., i.e. the tuck width.

In making tucks the great point is that they must be straight, whatever the width. For a pin tuck it is sufficient, at the position needed, to take up the tiniest fold of the material, crease it, and run in the stitches as near as possible to the fold, repeating the process for succeeding tucks. For a deeper tuck, take up a fold in the material at the position needed, crease firmly, then below the fold at the requisite depth put in a row of stitching right through the double thickness of the material.

To keep the tuck of an even width throughout it is a good plan to use a guide as shown. For this guide cut a narrow strip of cardboard, place the top edge to the folded edge of the tuck, and where the stitching is required make a straight cut into the card, and cut down again in a sloping direction as shown. When working, this piece of cardboard can be slipped along the tuck, and the stitching put in a thread or so below the straight cut, so keeping it even. For each succeeding tuck the same notch is used for the width, but to maintain an equal distance between the tucks another straight and sloping cut is made in the card at the position of the folded-down edge of the first tuck.



TUCK. Showing the use of a cardboard gauge to ensure evenness of the tucks

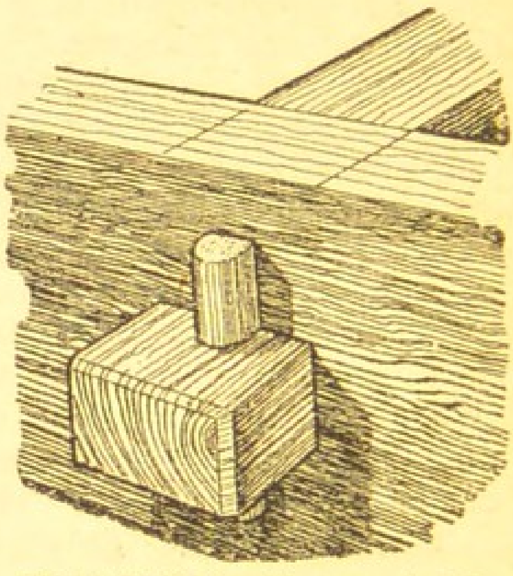
TULIPWOOD. This is a richly figured wood used in former days for inlaying and marquetry. It was used to decorate pieces of furniture made in the Adam and Louis styles, and was employed with much effect by the great French cabinet makers.

TURNING. The mechanical processes which can be grouped under this general heading may be divided into two independent groups, those associated with the turning of wood, and the whole series which apply substantially to the turning of any kind of metal and most of the manufactured compositions, such as ebonite, celluloid, and the like. These are treated under the title of metal turning. The mechanical requirements of the wood and metal turner respectively are somewhat different. For wood turning a lathe with a large flywheel is needed, and a small mandrel pulley, whereas in metal turning the proportions are reversed. The amateur may well consider the purchase of a Verschoyle mandrel, an inexpensive appliance which permits a wide variety of useful and ornamental work to be done in both wood and metal.

TUSK TENON. The joint used in carpentry under the name of the tusk tenon is so called because the tenon itself is longer than usual and extends beyond the face of the material to which it is jointed. It is held by means of a wedge driven through a hole near the outer end of the tenon.

The disposition of the parts is shown in the sketch in the following page of a trimmer tenoned and wedged to a joist. The joint is largely used in building construction for all openings through floors and ceilings, the chief reason being that the wedge holds the tenoned member firm against the rafters or joists, and prevents the latter from springing.

The length of the tenon which extends beyond the rafter should be at least equal to the thickness of the rafter through which it passes. It is shaped and fitted in the same way as a tenon joint, after which the exact position for the wedge is marked, the tenon withdrawn from the mortise, and a hole drilled through, using a brace and large diameter bit. The hole has to be enlarged with a paring chisel, and the outer face should be slightly tapered. The inner face—that is, the nearest side to the shoulder—is cut back so that the wedge will bear firmly against the outer face of the rafter and the outer inclined face on the tenon. The wedge must not bear on the inner wall of the hole through the tenon. The wedge should be preferably of hardwood tapered to suit the hole, and should fit exactly. When the trimmers have been fixed in place, the wedges are inserted, the rafters preferably being cramped together while wedges are driven home.



TUSK TENON. The completed joint

TURN BUCKLE. This name is given to a type of straining device, and also to a fastener for a cupboard door. It sometimes comprises a body in which are screwed one or more portions adapted to receive the ends of wires, cords, or the like. The common type has two screwed ends, and will thus exert a tension upon two cords simultaneously. One end of a central body has a right-handed thread and the other a left-handed thread, the eye bolts or screwed portions being similarly threaded. When the body portion is turned the outer portions are drawn together, producing a tension in the cord or wire. Numerous varieties of this style of turn buckle are available, and should be chosen according to their utility, length of travel, and so forth.

CUPBOARD TURN BUCKLE. Another type of turn buckle, for securing cupboard doors and other hinged structures, comprises a brass base plate in which a square, screwed shank turns, the outer end being provided with a handle and the inner end having a small lever adjustably attached to the spindle. The lever is fixed either with a small setscrew or by a screw thread and lock nut. In use the spindle passes through a clearance hole drilled through the framework of the door, the plate being screwed to the outside. The position of the lever is adjusted on the spindle so that when the door is closed and the handle turned the lever stands at right angles or parallel with the floor, thus preventing the door from opening.

A type of turn buckle suitable for most purposes has a phosphor-bronze body with a hole in the centre for the insertion of a tommy-bar or key to vary the adjustment.

There is another kind of turn buckle which is used chiefly for securing shutters. It is in the form of a pivoted catch which operates by gravity, the weight of the handle being so disposed that it keeps the catch normally in a locked position.

Cupboard turns are liable to wear the edge of the door, especially if carelessly used. To avoid this and to repair worn doors, a neat angle plate should be fitted on the opposite door. It can be made in thin brass and let into the wood.

TURN BUTTON. Used for fastening doors and flaps, the turn button is made in wood and metal. The simplest form, which is commonly used, consists of a piece of hardwood shaped at both ends and bored with a hole for a screw.

Turn buttons in japanned iron and brass are obtainable in a variety of patterns, those made in iron are sold in sizes from $1\frac{1}{2}$ in. increasing by $\frac{1}{4}$ in. to $2\frac{1}{2}$ in. The same pattern in brass increases in like proportions from $\frac{3}{4}$ in. to $2\frac{1}{2}$ in. Convenient half buttons in japanned iron can be obtained from $1\frac{3}{4}$ in. to 2 in., and in brass from $\frac{3}{4}$ in. to 1 in. A neater form of turn button is one in which the button part is riveted to a brass plate, with the corresponding metal plate being attached to the face of the door stile. This is used on thin wood or where extra neatness is desired, and it should be attached by means of flat-headed brass screws. One great advantage of this type is that the button cannot wear away the edge of the door.

UPHOLSTERY AND UPHOLSTERING

With Directions for the Subsidiary Branch of Making Loose Covers

In this article the intricacies of the upholsterer's craft are clearly explained so that the amateur of average skill can execute many useful jobs in connection with household furniture. Attention is also drawn to the articles on Chintz; Cretonne; Horsehair; Tapestry; Needlework.

Upholstering consists chiefly in stuffing, covering, and re-covering furniture. Needlework coverings can be adapted to modern pieces, but are most suitable for re-covering antique chairs or reproductions of antique styles. Hand-woven materials can be produced in a variety of stripes, small patterns and shot effects in wool, silk or flax fibres, separately or in combination, and many variations are possible with a simple setting up of the loom. One piece of furniture can be covered in such fabric, or a whole set of chairs to match, with excellent results if due regard is paid to colour and weaving.

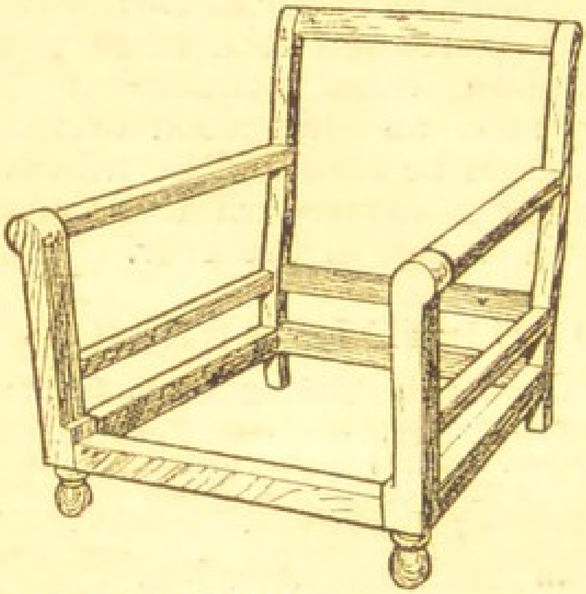
A great deal of work is carried out with machine-made tapestry, which may be woven either from cotton, silk, artificial silk, wool, or a mixture of either. Ordinary upholstering tapestry varies in width from about 48 to 52 in. and is thus economical for cutting. It can be obtained in a variety of patterns and colours, and is thus adaptable to all forms of decoration. Many of the finest modern designs are in artificial silk mixtures.

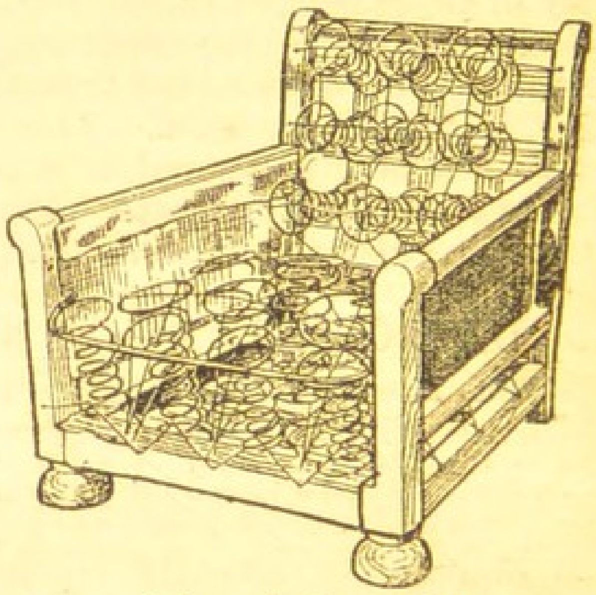
Tapestry of good quality is expensive, and it is therefore important to choose a design which will cut to the best advantage.

Thus, if the selected pattern has a marked feature, such as a cluster of flowers, which is only repeated every 50 in., obviously this should appear in the centre of the back or seat of the chair. To obtain this result, especially if only one or two pieces of furniture are to be covered, would mean a considerable amount of waste, consequently it is better to choose a simple all-over style of covering. The same difficulty has to be coped with in damask, another excellent upholstery fabric.

A material in extensive use is velvet, in 50 in. width, and obtainable in many colours. Plush is also used, and other materials include mohair fabrics in plain colours and checked designs, rep, chintz and cretonne, the latter a braided cotton fabric, much cheaper but less durable than tapestry. Closely woven tweed has an excellent effect on oak-framed chairs.

Good leather upholstery is suitable for dining-room furniture. Leather is obtainable in the form of skins of irregular shape,





UPHOLSTERY. Fig. 1. Frame of a divan easy chair ready for upholstering. **Fig. 2.** Chair with back and seat webbed and sprung, prepared for stuffing

ranging from about 22 by 26 in. in the smaller ones to about 30 by 35 in. in the larger. As the leather has to be stretched in upholstering, even minute blemishes are speedily revealed.

Many excellent leather substitutes are on the market with various trade marks and branded names, among which may be mentioned Pegamoid and Rexine. Oil baize, or decorene, of British make is another fabric of this class which is often used. Among the various forms of ornament for coverings are the gimps or strips of tape-like material for edging, fringes and cords, brassheaded and other tacks, and buttons.

Method of Using Tools. Most of the tools required will be found in the average home, an exception being a webbing strainer.

This is a pair of pliers with wide jaws or flanges. One of the jaws has a broad projecting portion which engages the side of the chair, while the webbing is gripped between the jaws; the flanged portion rests against the side of the chair, and the handles are pressed downward, thus getting a leverage on the webbing.

The other tools include a strong pair of scissors and a small chisel, with a mallet to drive it. A rasp, tape measure, and rule are also needed, and preferably some sort of low table or stand whereon to rest the work. Two or three upholsterer's packing needles, which have two points, ordinary packing needles, and a regulator are also required. The latter is a piece of steel from 6 to 18 in. long, and tapered at one end to a fine point, the other having a flattened portion. The pointed end of the regulator is inserted into the stuffing material while the operation of stitching is in progress.

The flattened end of the regulator is used in buttoned work, and also for tucking away any odd ends of stuffing or fabric. The needles should range from 4 to 12 in. in length. In difficult cases it is desirable to use a semicircular as well as a pattern known as a spring needle. This latter type of needle is straight for some three-quarters of its length, while the remaining portion is curved. Some needles are made with bayonet-pointed ends, so as to cut cleanly through the covering material.

Broadly speaking, there are two methods of upholstering. In one, the chair seat or other part of furniture is simply padded with some suitable stuffing and the exterior covered with the desired tapestry or other fabric. By the other method, upholsterer's springs are used to give resiliency to the seat, etc.

Webbing is one of the most important of the materials employed. The best qualities are made of flax, and are sold in pieces about 18 yds. in length, the width varying from 1 in. to 2½ in. The webbing has to be thoroughly stretched before it is used. One method is to suspend it by looping it over stout bars hung from the ceiling and hanging heavy weights on the lower ends of the webbing.

Hessian, sometimes known as spring canvas, is used for the coverings of the tops of the springs. Scrym, a light canvas with an open mesh, is employed to keep the padding on top of the springs in its proper place and shape.

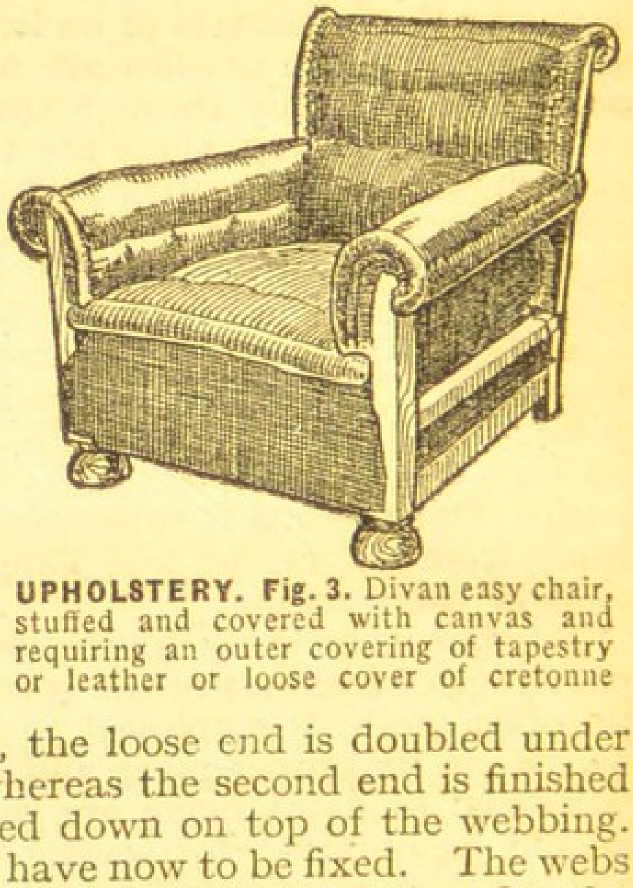
Special kinds of twine are required. Fine or stitching twine should be obtained for sewing the edges of the scrym; spring twine, which is thicker, is used to fasten the springs to the webbing. The stoutest material is often known as laid cord, and is used to tie the springs down to the proper size and shape. The webbing is attached to the framework by tacks, which should be of the cut or fine variety, and either brass or black enamelled. Proofed tin tacks are stouter and have larger heads. Those about ⅝ in. long should be used for fastening the webbing; others, from ⅜ in. to ½ in., being utilized for tacking canvas, etc.

MATERIALS FOR STUFFING. For the stuffing, nothing beats horsehair. Fibre, which is a species of fine cord, is often used as a substitute for horsehair, but lacks its springiness. Coconut fibre can be employed for common work, or alva, which is a kind of dried seaweed. Wood wool, composed of finely shredded shavings of wood, is extensively used, and possesses considerable springiness, besides being exceptionally clean and sanitary.

A great deal of stuffing is carried out with wool and flock. Ordinary wadding is useful to the amateur for stuffing, and particularly as a covering immediately beneath the outer covering of tapestry, etc. This serves to impart a smoothness to the finished work.

RE-UPHOLSTERING A CHAIR. In re-upholstering an ordinary chair the old coverings and webbing are first removed by prizing out the tacks, holding the gimps, tearing off the covering, removing padding and springs, and finally removing the webbing. The chair should then be thoroughly cleaned and any repolishing or staining carried out on the framing.

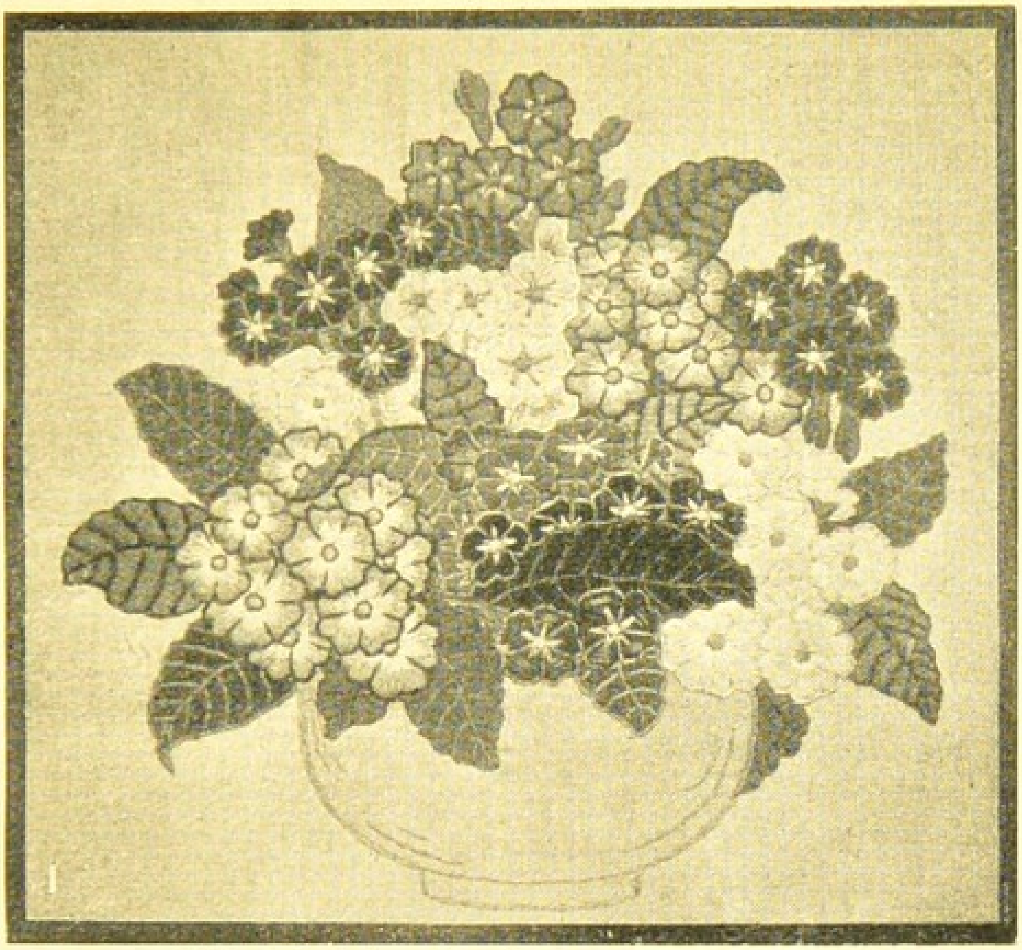
The first process in the actual re-upholstering is to take a piece of webbing, fold over the end so as to double it, and nail it to one side of the chair frame. The webbing is cut to length, which should be rather more than the width of the frame. The overhanging end of the webbing is grasped between the projecting jaws of the webbing strainer and the latter pressed downward with the left hand. The webbing is then secured while it is stretched very tightly by driving a tack or two through it near to the inner edge of the framing. It is important to obtain the utmost leverage on the webbing, so as to stretch it as tightly as possible. The overhanging part is folded back on to the top of the webbing, and nailed. It should be noted that when the webbing is arranged in this way, the loose end is doubled under the webbing in the first fixing, whereas the second end is finished by being doubled over and tacked down on top of the webbing.



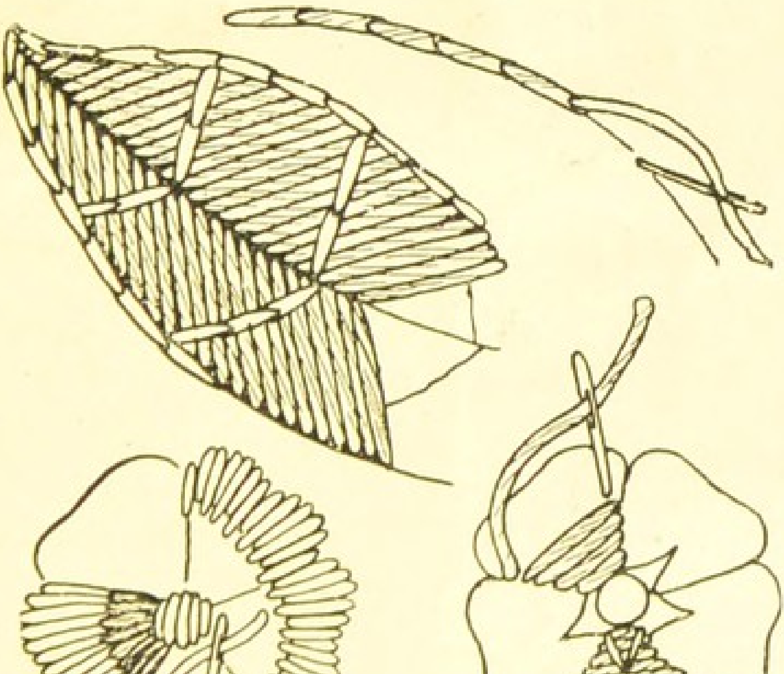
UPHOLSTERY. Fig. 3. Divan easy chair, stuffed and covered with canvas and requiring an outer covering of tapestry or leather or loose cover of cretonne

The remainder of the webbings have now to be fixed. The webs should interlace, with one piece alternately over and under the others, each of these webs being attached in exactly the same way as the first. A piece of canvas has to be fastened to the framework, and old canvas may be used if in good condition.

The seat can be padded with any of the materials mentioned. If ordinary flock is used it is worked between the hands to make it even and uniform. It should be distributed over the canvas and worked into the desired curvature of the finished seat using more flock in the centre than at the sides. After the flock has been arranged, the second canvas or scrym is laid over the flock and tacked to the edges of the framework of the chair.

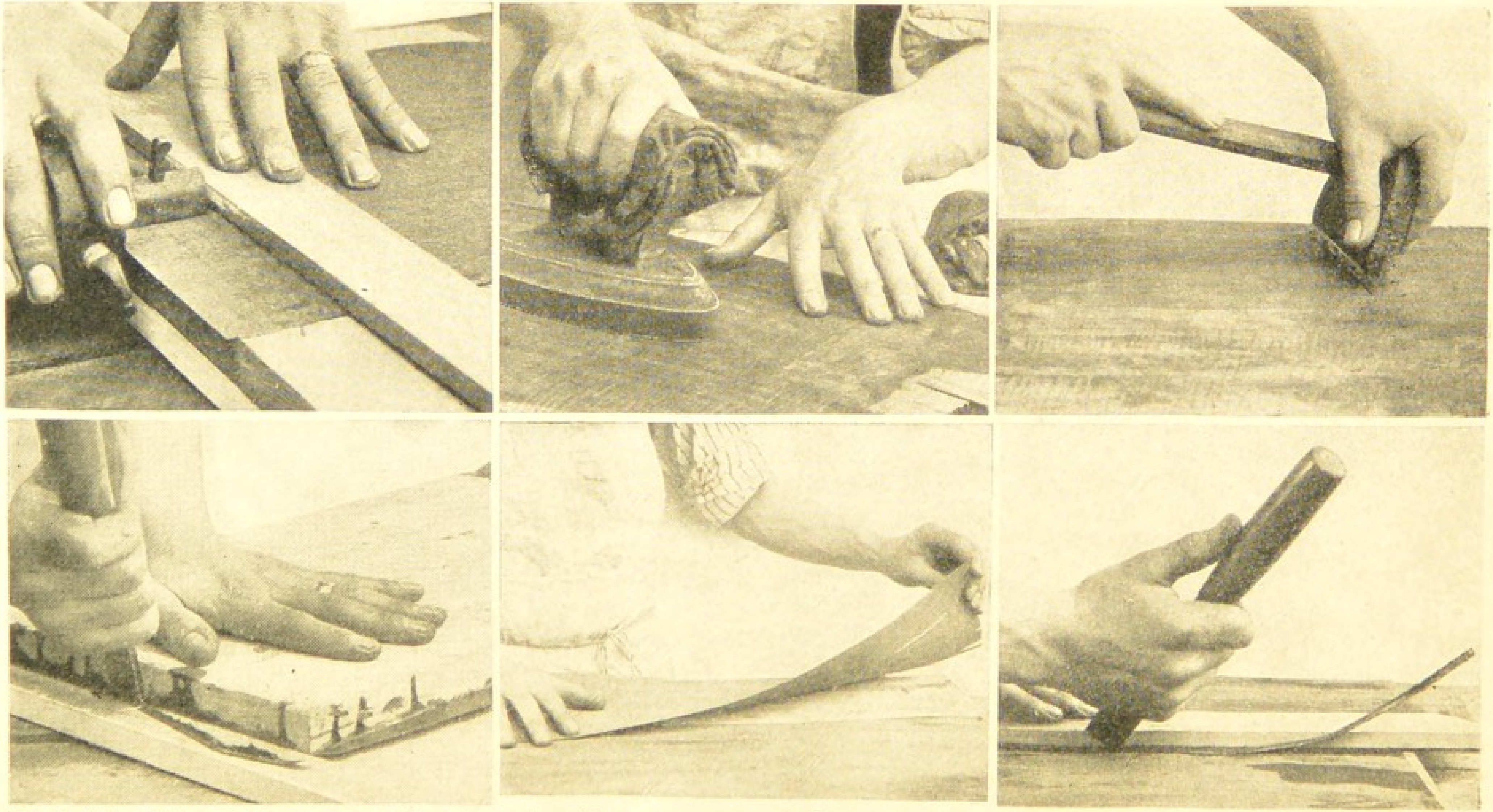


Pictorial design of polyanthus grouped in a bowl worked in natural colours on grey linen



Details for working flowers and leaves. The flower on the right is embroidered in satin stitch; that on the left also partly in long and short stitch

WOOLWORK : A FLORAL DESIGN AND HOW TO EMBROIDER IT

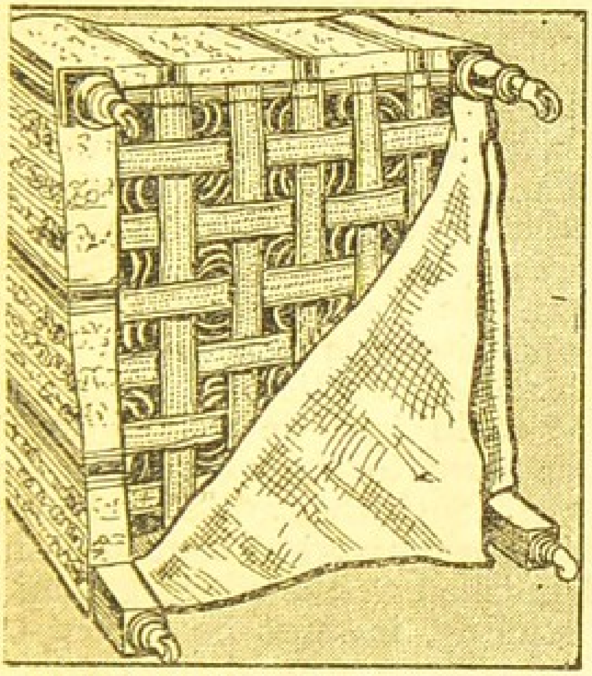


Top, left to right. Cutting narrow strips of veneer with a cutting gauge. Heating the glue under the veneer with a flat-iron. Use of veneering hammer to squeeze glue out beneath veneer. Above, left to right. Cutting overhanging edges away with a chisel. One-half of veneer laid and remainder being placed in position, edges overlapping. Cutting through both thicknesses to make a clean joint

VENEERING : A SERIES OF OPERATIONS ILLUSTRATED

The material chosen for the covering must be cut to allow sufficient overhang on all four sides. It is then fixed to the front part of the chair frame by driving in a few tacks. The cover should be pleated neatly at the corners by folding the material so as to leave only one fold showing at the corner. The covering is drawn tightly and uniformly as the tacks are driven, and should be neatly and carefully fitted around the tacking lines. It is finished by trimming with gimp, secured with covered tacks. The gimp should be worked all round to cover the joint between the covering and the frame of the chair.

USE OF SPRINGS. The method of upholstering a chair with springs differs considerably. In this case the webbing is applied to the bottom of the frame. The chair is first prepared as already described. It is often placed upside down on a stout table or trestle, and the webbing applied to the underside of the frame. Springs have to be sewn on to the top of the webbing. The usual plan is to employ three springs, two on the front part of the chair and one behind them centrally. They are sewn in place by stitching through the webbing in three positions for each spring, drawing the twine tightly each time, and continuing from one spring to the other until this part of the work is completed. To stitch, the needle is thrust through from the top of the webbing with the right hand, and pressed through with the left hand, and, when necessary, passed backward again from the left to the right, and so on until the fastening is quite completed.



UPHOLSTERY. Fig. 4. Showing how the bottom of an easy chair is covered with linen or canvas
Courtesy of Our Homes and Gardens

The springs have next to be fastened with thick string or laid cord. The springs are secured in such a way that the strings draw them down and slightly depress them. They should be fastened in the first place to each side of the framing, the strings being attached to tacks driven into the frame itself. Another string is used to connect between the front two and the rear spring, and the latter is secured by another supporting string to the back of the frame. The object of fastening the springs in this way is to prevent them from grinding or rubbing when the chair is in use.

The purpose of compressing the springs at the start is to ensure that they will constantly exert a pressure between the lower webbing and the underside of the covering material, and thereby keep the chair seat in its proper shape. The size of the springs is usually about 6 in. in length and No. 8 gauge. The height of the seat from the bottom of the frame to the top of the seat, when it is finished, should be about $5\frac{1}{2}$ in. If the seat is to finish 6 in. from bottom to top, it is usual to allow $1\frac{1}{2}$ in. for the thickness of the filling or stuffing, and therefore it is necessary to compress the springs by about $1\frac{1}{2}$ in.

In placing the springs, the finishing end of the coils should all point in the same direction, towards the front of the seat. The springs should always rest on two webs where they overlap each other. It is also necessary to tie the springs in such a way that their upper surfaces conform generally to the curvature of the seat or other part of the chair, and the springs must always be lashed in such a way that they can exert their pressure in the same line as that of their own length, i.e. upwards and not sideways.

COVERING THE SPRINGS. When the springs are fixed satisfactorily they have to be covered with a piece of strong canvas. This is first fixed to the back rail with a few temporary tacks. The canvas is then held tightly and tacked to the front rail. The sides are tacked alternately: first with a tack near to the back of the chair on one side, then the canvas is pulled tight and fastened with tacks on the opposite side and so on until it is tacked all round. It must not be drawn tightly enough to depress the springs further, but should just lie evenly upon them. The tops of the springs are sewn to the canvas with a spring needle. The needle is passed through the canvas and each spring sewn in three places, the string being worked continuously from one spring to the other, and finished at the starting point.

Whatever material is used for stuffing, it must be picked or teased out into a loose mass, packed on and around the canvas, and built up as nearly as possible to the desired shape of the seat. To prevent the stuffing from moving, it should be fastened with a hair tie, which is a twine worked around the outside of the curved part of the canvas and caught to the stuffing by sewing at the corners. The string should be about 3 in. up from the frame, and there should be about 8 or 9 in. of space between each tie. This twine is left quite loose and is tightened up when all the stuffing has been worked in.

After the sides have been packed up tightly with stuffing, the centre is filled in and the whole arranged as smoothly and evenly as possible. The scrym has then to be applied to the whole so as to cover and enclose the stuffing. The first side to be fastened is the back, the canvas being temporarily secured with three tacks. The stuffing is lightly compressed with one hand and the scrym secured temporarily to the front rail. The scrym is an open mesh, the strands of which can quite easily be seen, and in fastening or tacking it down these strands should be kept as straight as possible.

The sides of the scrym are tacked to the frame, being turned in so as to reveal the edge. This being accomplished, the scrym has to be tied or sewn to the spring canvas with an 8 in. straight needle. This is used with a fine twine and stitches are made by thrusting the needle through from a point at a distance of a few inches from the point which will form the edge of the chair, the start being made from one back edge. The point of the needle is worked through the stuffing, and emerges through the side of the canvas. To form the edge of the seat, twine is worked in a similar manner from the upper part through the stuffing, and out at the side and drawn tight to form an edge or roll of stuffing. It is important that the line of this work be kept a good shape, as upon that will depend the appearance of the finished chair.

Second Stuffing. When the roll or edge has been sewn in this way the chair is in the state known as first stuffing, and can be covered, if desired, without further stuffing. It is, however, an advantage to apply an additional stuffing, which may be of horsehair, wadding, or other material. It should be sewn in such a way that the stuffing cannot shift or work up into lumps, for which reason ties made with loops of fine twine are provided. The ties are made around the seat about 2 in. from the edge, and several ties provided in the centre portion of the seat. The hair is closely worked under the ties and, when completed with horsehair, the surface should appear to be covered with short, curly pieces. The corners are fitted with buckram or thin cardboard folded and tacked to the corners of the frame to give it shape.

They terminate a little distance below the upper surface of the stiffening, and the edges should be rounded so as not to reveal any marked angles. This second stuffing may be covered with unbleached calico, or some light material, which is temporarily tacked to the chair, the back corners being fitted in the manner already described.

It only remains to cover the underside of the chair with a lining of canvas, turning under the edges and tacking them firmly to the underside of the frame, thus covering the web completely.

The chair is now ready for its covering, which may be of any desired material. This is carefully tacked to the sides of the frame, neatly worked at the corners, and finished with gimp.

Stuff-over Work. A more ambitious undertaking is that of completely upholstering a chair from the frame and doing the work on a system usually described as stuff-over. The rough frame can be obtained ready for use or taken from an old chair which has been stripped of its stuffing.

The general appearance of a divan chair frame is seen in Fig. 1, while the other illustration, Fig. 2, shows the frame webbed and sprung.

The first step is to apply the webbing to the underside of the lower frame work of the seat and also to the back part of the framework and the sides. The spaces between the arms are filled in with a piece of scrym or canvas, and the springs are then sewn to the web. A stout cane or similar light, flexible bar is lashed across between the two upper portions of the upright part of the chair frame, attaching it to the springs, as in Fig. 2, and not to the framework of the chair.

The purpose of the cane is to provide a resilient edge for the seat. The method of sewing the springs of both back and seat and connecting them together with laid cord is shown in the illustration. In this type of divan chair with a spring edge the lower cross rail on the upper part of the frame, known as the front rail, is located only a few inches above the floor. The cross rail must be sufficiently wide to support the greater portion of the bottom part of the spring. Before the springs at the front are actually fitted, a piece of webbing or a double piece of canvas should be placed between them and the rail, and the end pieces attached to them to avoid any chance of their working forward. Another point is to support the middle portion or waist of the spring by lashing from back to front and from side to side with cord.

The seat is covered with spring canvas sewn together around the spring edge so as to case or enclose it. A still better plan is to cover the springs only, and arrange a separate covering for the spring edge by working the canvas so that the pull on it when the chair is sat upon does not draw the spring edge inwards. This can be managed by temporarily fixing the canvas on the front by passing it over the spring edge, fastening it to the stuffing rails at the sides of the chair, then removing the temporary tacks from the front part of the canvas and folding it back along the edge of the spring edge. This portion is then fastened to the front rail with stout cord or ties, the canvas folded back again over the spring edge and tacked to the front rail. In this way a furrow is formed between the spring portion and the spring edge, which relieves the latter of the bulk of the pressure from the springs.

The chair is stuffed by the double stuffing method. The first stuffing should be with horsehair for preference, tied in the manner already described. After the seat has been stuffed it is covered with scrym ; the back and sides are permanently tacked, the scrym being fastened at the front by means of a circular needle and fine twine. The second stuffing is then proceeded with and covered as before. The back and arms are started after the seat has been stuffed. The arms may be sprung, if desired, with springs about 4 in. long. The spring of the back of the chair should be commenced with the springs, the form being obtained by the use of those of proper length and strength. The swell at the back part should have thicker springs 6 to 8 in. long. In canvassing the back, great care must be taken not to strain the fullness of the material, and so to obtain neatness by folding.

In the case of a bordered chair the covering is pinned u… sewn with the circular needle, the border being bulged… wadding and a little hair. The covering is pinned under … edge and corded wherever necessary. Any fullness should be disposed of as the work progresses by pleating and folding. The outside pieces are then fitted. The bottom of a chair of this type is covered with linen or canvas, as shown in Fig. 4, and the chair is finished with gimp and cord. Gimp is used to outline the design and to cover any bad surface that may show. The cording is secured with a small circular needle and carpet thread. The amateur will probably find it helpful, if a corded edge is to be worked on the tapestry, to apply it first in the manner adopted for making loose covers. Some of the finishing cords and circular gimps are merely applied with tacks or sewn in place, according to the nature of the materials.

LOOSE SEATS AND FRAMES. There are many other applications of upholstery which can be carried out in a similar manner. In some cases loose seats are used, and are webbed and upholstered on an independent wood or metal frame. The general procedure is the same as has been described, except that in the case of metal frames the webbing is folded round the rod and secured by sewing. When buttons are sewn through the material to form a depression and so add to its appearance and strength, they are secured with fine twine sewn with a long, fine needle, and they are sewn through the stuffing to the spring canvas. Provision for the button points must be made in the early stages of stuffing. Button work should not be undertaken by the amateur until some experience has been gained in more simple work.

LOOSE COVERS. Detachable coverings made of printed linen, cretonne, chintz, cotton rep, or gingham are useful either to protect a delicate upholstery fabric or to cover up a shabby one. When making loose covers for settees, chesterfields, and large armchairs, it is sometimes more advantageous to buy the 50 in. width if it saves extensions on either side in order to get a whole width in the middle to balance the design. Small all-over patterns or plain shot reps are simplest to plan and cut to advantage.

Paper patterns should be taken of the chairs, etc., which require covers. Ordinary large newspapers can be used and the type and folds of the sheets are a guide to accurate placing on the chair when making the pattern.

The parts to be measured for an armchair or settee of the usual types are: inner back; outer back; seat, front to back and the width from side to side; inside arms; band for front of seat to cover stuffed upholstery or frame; two outside arms; two small front arm pieces (not always necessary); frill. Measure off a length twice round the bottom of the chair if this frill is

If the armchair is straight this extra piece may be avoided by making the pattern right over and cutting the inner and outer backs in one length. In some chairs with rounded tops, as in Fig. 3, the inner back is taken over the stuffed top, and seamed over the outer edge of the top to the outer back piece.

Take a sheet of paper and pin it to the inner back. Let a fold of the paper run straight down the middle. The pattern need only be cut on one side if the paper is doubled in this way. Cut off by the seams of the upholstery, but an allowance of 6 in. for a tuck in at sides and back of the seat and of 2 in. for turnings must be allowed when cutting out the material. Next take the pattern for the outer back and then for the seat. Pin the paper from the back of the seat with a fold of the doubled paper down the middle. Cut off at sides where it touches the arm and back and at front edge. It should be noted that an allowance for the tuck in of 6 in. for both sides and for back of seat portion must be made when cutting material.

Take a pattern of one arm only, first from inside over the stuffed edge, and cut off at the seam. Again 6 in. will have to be allowed for the tuck-in at sides in order to join the seat portion, when cutting material; then pin the paper outside the arm and cut off the pattern by the top seam and lower edge of the chair. Pin a piece of paper to the front of the arm and cut out to shape of the upholstered piece. Any fullness will have to be pleated up to fit the curve of the front arm. Next take pattern of the straight band in front of the seat which connects the two arms.

If notches are cut in the pattern pieces at connecting points it is a guide to joining them correctly. A duplicate of the right arm should be cut out in paper to avoid the danger afterwards of cutting out 2 lefts or 2 rights in the material. Mark the patterns of the arms left and right.

When making up, pin the pattern carefully on to the material, remembering to leave 2 in. or at least 1½ in. for turnings and the 6 in. for the tuck-ins where necessary. Make sure that the fabric is quite straight before cutting out. The pieces of material can be pinned on to the chair before sewing in order to ensure accuracy.

The seams may be bound with bias strips of the material or piped. For the latter method strips of the material cut on the cross and 1 in. wide are required. Allow an extra ¼ yard for each chair; strips of plain fabric, such as linen or casement cloth, look well to match the ground colour of a patterned cretonne. Lay the material for covers right side up to cut out. If a fabric with a large design has been chosen, see in planning out the pattern pieces on it that the main motifs of the design are well placed to come in the centre of the inner back and seat. Also that the design matches on the arms. With a large flowered pattern it is well to allow an extra yard of material.

For bound seams the cover should be pinned up with on the right side, and fitted closely on to the chair. For seams the turnings are pinned up on the wrong side and the cover should fit easily as the piping takes up room. All visible seams should be piped. Any fullness at curves should be neatly darted, gathered, or pleated into position.

The tuck-in seams and any others that do not require piping or binding should be machined first. An opening is left at one side of the outer back, or at both sides if the chair is large or in the case of a settee, so that the cover can easily be removed and replaced. The edge of the open seam must be faced on one side and have a wrap over to neaten it on the other. Press-studs of strong quality are the most convenient fasteners to use for fixing the opening.

For making the frill, join up the pieces and press the seams first. For a boxpleated frill take up a 2-in. wide tuck at every 4 in. Flatten each tuck to make a boxpleat, press, and tack into place along the top. Seam to the cover with neatened raw edge on the inside. A gathered frill is simpler to make. Having joined the pieces, divide them into even sections and gather with double cotton. Divide the edge of the cover into the same number of sections, pin them together, with the right sides facing, and stitch.

VARNISHING. To get the best results a job like the varnishing of an outer door should be done at a time when there is the least likelihood of dust or disturbance. After removing any dust and rubbing down any parts which require such treatment, the application of the varnish may be commenced.

The brush is dipped into the varnish to about one-third the length of the bristles and applied straight to the door. A surplus should be avoided so that the brush does not drip. It is worked in the same direction as the grain of the wood with a light pressure, then crosswise once, and finally with single strokes with the grain. It is necessary to work smartly, as the varnish sets fairly quickly. The object in view is to obtain a flat surface free from brush marks. Experience will soon show the worker just how much the varnish may be worked.

The panelled portions of the door are varnished first, taking care to work well into the corners and edges. The varnish should be applied in a fair body, but great care must be exercised to avoid running. Having completed the recessed part, the rails and stiles are next attended to. The stiles are first varnished, and the rails last, so that the joints are cleanly finished off. If, on a similar door, mouldings are present, these should be picked in lastly with a smaller brush, care being taken to avoid touching the panels or stiles, and working the varnish well out of should be cleanly finished, so that the brush is always drawn in the same direction as the grain of the wood.

Rubbing Down. When thoroughly dry the whole should be rubbed down with the felting pad. This is done by damping the work slightly with a sponge, dipping the felting pad into the pumice powder, and rubbing it on the surface with a circular motion. The quirks and mouldings may be smoothed down with fine glasspaper, care being taken not to rub too vigorously, as this may remove the varnish. The whole should be dried with a duster, removing any traces of dust caused by the glasspaper.

The second coat is applied in a similar way to the first. If only two coats are desired, this should be finished off as cleanly as possible, the final strokes being always in one direction and the brush only lightly charged. When a third coat is to be applied, this is done in a similar way, rubbing down between each and being sure that the first coat is quite dry before attempting further work. Working on wet or tacky varnish has the effect of pulling off the previous coat.

Re-varnishing woodwork requires a similar process, but it must be remembered that varnish is transparent, and any defects in the under coat will show plainly when the whole is finished, so that if the original varnish is badly damaged it will probably be best entirely to remove it. If, however, it is in fair condition, it should be first thoroughly cleaned with soap and water to remove any dirt and grease. A cotton rag is used for this purpose.

A painted surface may be varnished over, provided that the surface is flat and not glossy. Plenty of turpentine in place of oil should be used in the final coat of paint when intended to be varnished. The process is then similar to that described for new woodwork, except that it is unnecessary to size the work.

For old painted work, the surface should be cleaned with water to which is added soda, and any nail holes or other indentations filled in with putty toned to the required hue with colours ground in oil. The putty is applied with a knife, care being taken not to smear the surrounding surface and to smooth it. If soda is used to clean the work, it should be well rinsed off afterwards with clean water and thoroughly dried. The varnishing may then be carried out.

Treating a Floor. In varnishing a floor the area to be treated should be first well scrubbed and, when dry, given a coating of size, and once again left to dry. It is then smoothed down with fine glasspaper, and all dust removed, first with a brush and finally with a cotton duster. Assuming an oil stain has been used, a varnish with a similar composition can be employed in much the same manner as described for other work.

The varnish is used freely, and is well worked out, especially at the corners. The best method is to commence at one side and work towards the door when the whole floor is to be coated, as otherwise it may be impossible to leave the room without treading on the wet varnish. If two coats are desired, the first should be allowed to set first, and is then felted down and dusted before the second, in the manner already described.

In cases where a large area has to be dealt with it may be worth while using one of the clear cellulose varnishes, applied by a spray. A portable sprayer with foot pump can be obtained for a quite small outlay, and would soon pay for itself on the many and varied jobs for which it is suitable.

VELLUM. In the preparation of vellum for writing or illuminating considerable care is required, and although it is often stretched on a board by professional workers, the better plan for the amateur is to mount it on a board prepared for the purpose. The materials required are a sheet of mounting board of the thickness known as 8 sheet, a basin in which hot water is placed, covered by a saucer, two teaspoonfuls of Seccotine and two of hot water being mixed together in the saucer, a basin of cold water, some sheets of clean white paper and some greaseproof paper or thin vegetable parchment, two pieces of clean linen about the size of a handkerchief, two small sponges, some fine pumice powder, two flat boards, a piece of heavy cardboard, and some weights for the purpose of keeping the mounted vellum under steady pressure.

First of all the vellum is placed right side up on a sheet of clean paper and thoroughly damped with a sponge with cold water; the surplus water is wiped off with one of the linen cloths, and then the vellum is turned over and the same procedure carried out on the other side. Wipe off the surplus moisture as before, and then dip the other sponge in the Seccotine mixture and thoroughly cover the back, taking care that the extreme edges are covered with the Seccotine.

The vellum is now lifted up and placed in the centre of the mount, with the edges quite square. Beginning at the top, the surface is stroked down with a clean linen cloth to remove the air from underneath and to bring the material into the closest contact with the mount. A sheet of clean white paper is placed on the top of the vellum, the cardboard is laid over it, and the mounted work is put between two boards with the weights on top. The vellum should be kept under pressure for at least twelve hours in order to allow it to dry quite firm and even before decorating it.

The material is now ready, and should be dusted over with some fine pumice powder, but on no account should it be touched with the fingers. The design or lettering to be placed on the vellum is first drawn out on a piece of thin paper as carefully as possible. The back of the paper is rubbed over with blacklead and thoroughly rubbed in with a piece of rag. The drawing is placed in position, and the lines transferred to the vellum with an agate tracer or fine stylo, only the thinnest line being required.

Ordinary carbon transfer paper is not suitable for use with vellum, owing to its greasy nature and the liability of making other marks caused by the pressure of the fingers on the paper while working.

For the ink work, a waterproof Indian ink should be used. A ruling pen should be employed for straight lines and other lines that can be drawn with a compass; for freehand lines and lettering a fine drawing-pen is required. Colouring is done with the best quality of water colours mixed with a little gum arabic. Gold can be applied, but it should be shell gold and mixed with gum arabic. For silver effects it is better to use aluminium in the same way as the gold, as it is not liable to tarnish as is the case with silver. The lines can easily be rubbed out with putty rubber.

Scraps of vellum boiled down make an excellent size for applying gold-leaf, and this is the material generally used. For the purposes of bookbinding there are several kinds of vellum available. Prepared or artist's vellum is prepared in the natural colour of the skin. Roman vellum is similar but darker; it is always attached to the boards with the flesh side downward. Vellum can be cleaned with benzine applied with a sponge, stains being removed in this way without destroying the texture.

VELOUR. The French name for velvet is given in Great Britain both to wool and cotton plain cloths made with a short and more or less velvety nap, which is produced by finishing the cloth in a special manner. Cotton velour, which makes rich-looking curtains, showing a double tone of colour, is obtainable in a fine range of colours, warranted not to fade.

VELVET. The most exquisite shades can be dyed on silk velvet and no fabric shows off a fine colour to greater advantage. The mohair velvets or moquettes are used largely in place of silk velvet for upholstery.

When cutting velvet for shaped pieces, care should be taken to cut it on the cross, otherwise there may be trouble in getting it to lie flat. Velvet can be freshened in appearance by steaming with a hot iron. The face of the iron should be turned uppermost and the velvet passed over the surface by hand. Cuttings of velvet should always be saved. Worn-out velvet can be used as a polishing cloth for boots, metal and furniture.

Unless velvet is so arranged that the pile lies all in one direction, different shades will appear on the article, and the result will be patchy. The material should be examined in a strong light before it is cut, and the pieces so placed together afterwards that the shading is uniform. If the pile is running in the right direction the velvet will appear dark when held up to the light.

CATCH STITCH. A special stitch used for hemming velvet is termed catch stitch. It is done by turning down the velvet once —not twice as is usually the case in hemming—and sewing from right to left. Commence by taking a stitch on the turned-down portion without bringing the needle through to the right side; then make a tiny stitch immediately below the turning, taking up only a thread of the right side of the material. Continue thus until the hemming is completed. When accurately done no stitches can be seen on the right side of the velvet.

VELVETEEN. The best velveteens to buy are those guaranteed to have a fast pile, meaning that the tufts are not loose enough to work out easily and are a fast colour. In better qualities of these fabrics there is a good range of shades.

VENEERING FOR THE AMATEUR CABINET MAKER

A Decorative and Useful Method of Surface Treatment

In this Volume are associated articles dealing with Inlaying and Marquetry. See also Cabinet Making

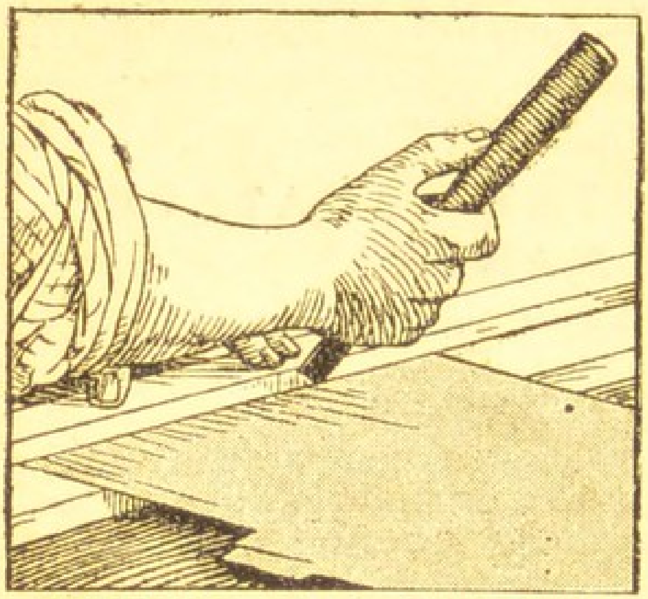
Veneering is the process of applying a comparatively thin sheet of wood of fine or rare quality to a groundwork of a plainer variety of wood. It thus enables many beautiful woods to be employed for decorative work which are prone to twist or crack if made use of in the solid. A typical example is the employment of curls and burrs, which would prove completely unsatisfactory unless applied in the form of veneers.

It is also the only satisfactory method of employing such decorative effects as quartering, balanced matching of grain, and other flat treatments in which the work relies for its effect upon the disposition of various woods, the grain of which runs in contrary directions. In shaped work veneering is almost indispensable. To cut the wood in the solid would entail a certain amount of end graining showing, an undesirable feature in itself owing to its exhibiting no beauty of grain and the fact that it does not polish well.

There are two kinds of veneer, known as knife, and saw cut, according to the instrument employed. Knife cut is the thinner of the two, and is cut by one of two methods, either rotary or flat. In the former a log is placed in a structure similar in principle to a lathe and having a long knife edge stretching along its whole length. The knife is adjusted to cut the required thickness and moves forward against the log as it revolves, thus cutting a veneer the same length as the log and of practically unlimited width.

This method has the effect of giving a very enlarged grain, and is impracticable when, for example, a wood is to be cut which relies for its appearance upon the medullary rays, as in figured oak, for which the flat-knife method is adopted. The finer woods are cut in this way, a machine similar to a plane taking off veneers. Saw cut veneers run from $\frac{1}{32}$ in. to $\frac{1}{16}$ in. and are cut with a circular saw.

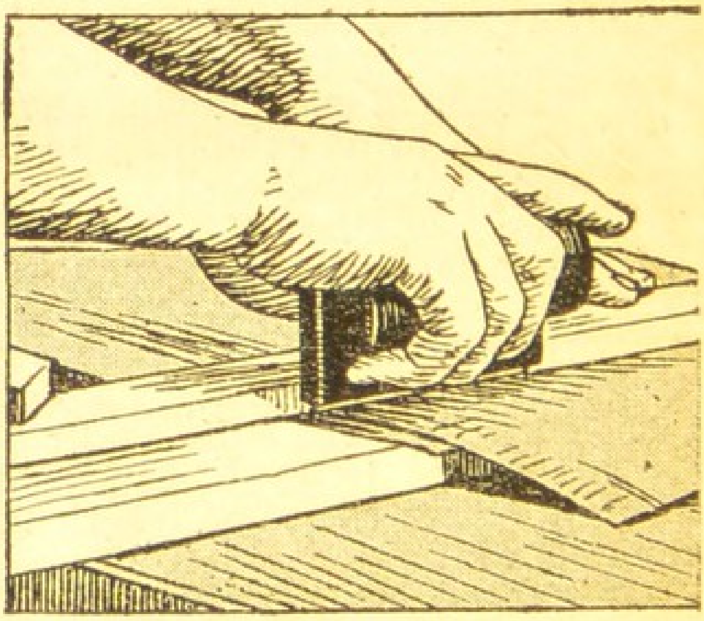
PREPARING THE GROUND. A very important consideration in veneering is the ground to which it is to be applied. The wood should be as straight in the grain as possible, clean and dry, and with the least tendency to warp and shrink. For these reasons Honduras mahogany is the most suitable, as it is not only reliable but holds the glue well. Yellow pine also makes a good ground, and if possible, a board having the medullary rays running through it should be chosen, as boards cut in this way are less likely to twist. All soft woods should be sized before the glue is applied for the veneering process, as otherwise the ground will be apt to soak up more than its share of the glue and leave the veneer liable to peel off.



VENEERING. Fig. 1. Cutting knife-cut veneer with a chisel

As the tendency of veneer is to pull the ground, making a hollow surface, it is advisable to apply the veneer on the heart side of the wood so that the natural pull of the wood is opposed to that of the veneer. Another good plan, in order to avoid undue twisting, is to damp the back of the ground. Note that whenever possible the wood should be veneered on both sides.

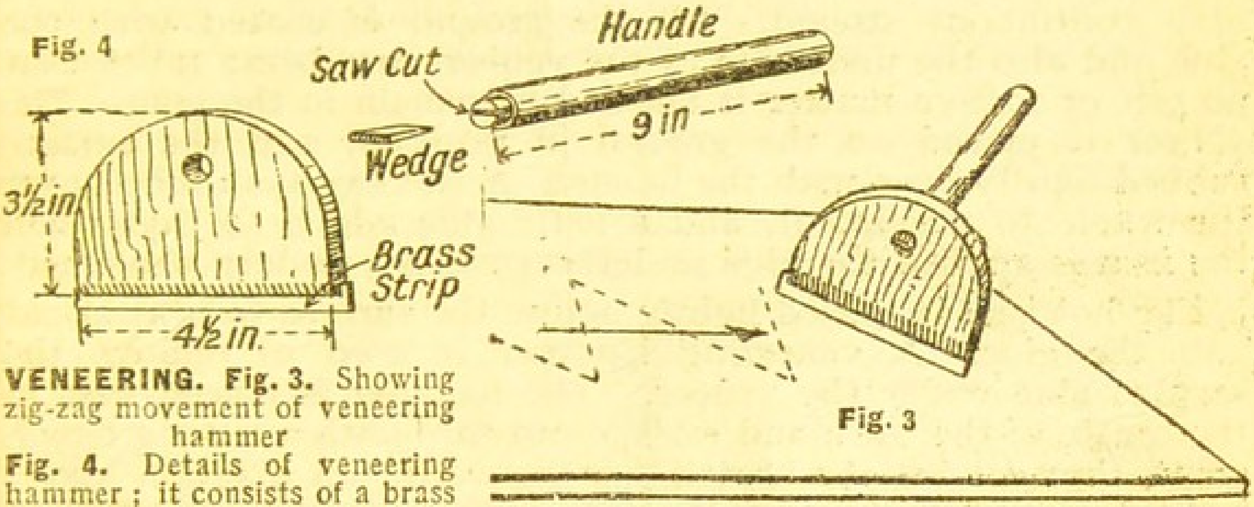
All grounds should be roughened with a toothing plane before any veneer is applied. This is done after the ground has first been planed perfectly true and flat. After the use of the toothing plane the ground is ready for the veneer, except in the case of a pine or deal ground, when it is neccessary first to size it. The size, which is composed of thin glue, is applied hot with a brush and allowed to harden, when it is rubbed down with coarse glasspaper and all dust removed with a brush.



VENEERING. Fig. 2. Cutting saw-cut veneer with a veneer saw worked against a straight edge

CUTTING THE VENEER. A piece of veneer is now cut to the size required. If knife-cut veneer is used, this operation may be accomplished with a chisel, as in Fig. 1, using a straight edge to ensure a straight cut. The straight edge should be firmly held down with the left hand as shown and the chisel held in the right with the bevelled side against the straight edge, and drawn across the veneer. The veneer should be placed on a flat board during the cutting to give support for the chisel, and care should be exercised at the completion of the cut to avoid tearing away the edge of the veneer. An extra allowance of about $\frac{1}{2}$ in. should be made on all sides.

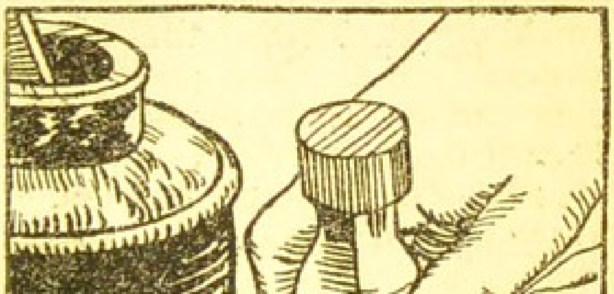
Saw-cut veneers may be cut with a chisel, if desired, although a better method is to use a veneer saw, as illustrated in Fig. 2. The saw consists of a blade having a slightly rounded edge, and



VENEERING. Fig. 3. Showing zig-zag movement of veneering hammer
Fig. 4. Details of veneering hammer; it consists of a brass blade fitted into a block of wood with handle attached

fitted with a handle screwed to one side of the blade. It is worked against a straight edge, which, if a wide piece of veneer is being cut, should be hand-screwed or cramped to the bench.

For cutting narrow strips of veneer of equal width a cutting gauge may be used. In this case the sheet of veneer is placed to overhang slightly a flat board, and another board or a batten sufficiently long to reach the width of the sheet placed on the top a short distance from the end and firmly held down with the left hand. The purpose of the top batten is to prevent the veneer from buckling, which would render it liable to split.



VENEERING. Fig. 5. Laying banding, using the back of an ordinary hammer to press out the superfluous glue

A cutting gauge is then set to the required width and worked along the edge of the sheet. Only a slight pressure should be maintained, making several light cuts in preference to one deep one. The veneer should not be cut right through from one side, but is reversed after being cut half through.

Applying Veneer. For the actual process of veneering two methods are available, the hammer and the caul. The latter is used for laying saw-cut veneers, and in all cases where built-up patterns of veneers such as quartering and the like are employed. The former method is employed successfully for the majority of knife-cut veneers. Having trued up the ground a flat-iron is heated to be ready when glue is prepared and applied.

The glue should be as hot as possible, and of such a consistency that when the brush is lifted from the pot the glue runs down in a continuous stream. All the ground is coated with the glue and also the underside of the veneer, care being taken that no grit or foreign matter is allowed to remain in the glue. The veneer is placed on the ground in position, and the surface rubbed lightly over with the hands. A wet swab is rubbed over the whole to moisten it, and a little glue added so that when the iron is applied the glue underneath is not unduly weakened.

The hot iron is passed lightly across the surface to heat about half the glue. A veneering hammer is used to remove the surplus glue under the veneer. The hammer is placed first in the centre of the work and worked outward with a zig-zag movement, thus driving the heated glue outward. A diagram showing the correct movement is given in Fig. 3. It is essential to work outward from the centre, since the object is to bring the veneer into as close proximity with the ground as possible, and this can be accomplished only by driving out the surplus glue. It will be found necessary to re-heat the glue with the iron once or twice during the process.

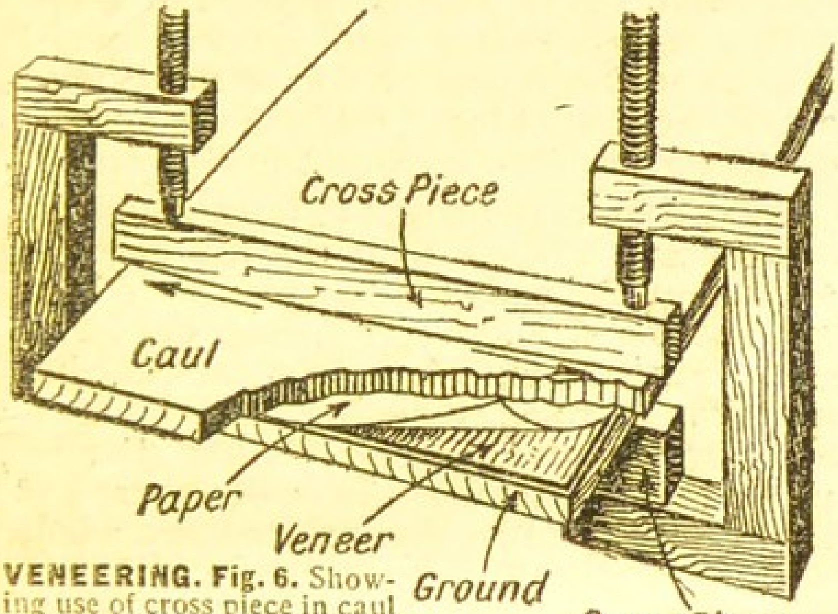
When the whole has been worked over with the hammer, the surface is wiped clean with the swab and tested to see that the veneer is everywhere down. This may be done by lightly tapping with the finger nails, when, if the work is correctly done, a solid feel is apparent. Any bubbles will be obvious from a hollow sound, and any such places should be remedied by re-heating and working flat with the hammer.

Particular attention must be paid to the edges, which are apt to work up. The overhanging edges are cut away, placing the work veneer side downward on a flat board, pressing tightly downward with the left hand, and drawing a keen chisel across the veneer. The cross-grain ends should be cut first, since these are the most apt to split away at the ends, the remaining sides being cut after cleaning off any ragged corners. The work is then left to harden, placing it with the veneer side downward.

With a very wide board requiring two widths of veneer, one sheet should be laid as described and the second sheet put down in a similar way, allowing it to overlap the first by about 1 in. A straight edge is placed along the overlapping portion and firmly held in position while a cut sufficiently deep to pass through both thicknesses is made along its length with a chisel. The surplus of the upper thickness is removed and the veneer raised so that the surplus of the lower veneer may be taken away. The veneer is then replaced, heated with the iron, and rubbed down with the hammer. Pieces of old newspaper should be glued over the joint to prevent it from opening while drying.

Details of a veneering hammer are given in Fig. 4, which shows it to consist of a brass blade having a rounded edge fitted into a cut made in a block of wood, this being fitted with a rounded handle. When the work is quite set, if any bubbles or blisters are seen they should be removed by slitting the veneer, with a thin chisel or penknife to let the air out, working a little glue under the veneer and then heating and finally pressing out with the hammer.

CROSS BANDED WORK. Fig. 5 shows the treatment of veneered work having a cross banding and an inlaid line at the edges. This is easily accomplished by first veneering the centre portion as already described, except that it is unnecessary to allow the veneer to overlap, rather cutting it slightly smaller than the actual size of the ground. This done, it should be allowed to set.



VENEERING. Fig. 6. Showing use of cross piece in caul veneering a large surface

Several strips of cross-grain veneer are then cut with cutting gauge to slightly more than the width required for the finished banding. One edge of all these should be planed true on a shooting board, a batten being placed on the top of the veneer to prevent it from buckling. An iron plane or finely set trying plane is used.

The cutting gauge is set to the width required for the banding, including the line, and a cut made on all four edges of the work deep enough to cut through the veneer, the surplus veneer being removed with a chisel. If any difficulty is experienced in removing it, the glue should be heated with the flat iron, when the veneer will be found to peel off. The line is then mitred to fit at the corners and glued round, driving in a few veneer pins at the side of the line if any difficulty is found in keeping it in place. It should be left to harden. The banding is cut to length with mitred corners and glued in position, using the flat peine of an ordinary hammer to press the glue out, as in Fig. 5. If this is done quickly and very hot glue used, it will not be necessary to reheat the glue with the flat iron. Paper should be glued over all the joints in order to prevent them opening.

The edges of a board or other piece of work are veneered by placing the work in a vice for the purpose. This should not be done until the veneer on tne top surface is quite set, after which the edges should be planed, using a very keen edged plane finely set. Strips of veneer are cut and laid by means of the back of a hammer. When set they are trimmed off and the surface scraped and glasspapered. It is essential to allow all veneered work to set thoroughly before attempting to clean it up, which is done with a steel scraper, afterwards finished with glasspaper.

USE OF THE CAUL. To lay saw-cut veneers and built-up patterns by means of a caul requires a different procedure. The veneer is first cut to size and the ground prepared as described for the hammer method, and both then glued, the veneer placed in position and a sheet of paper placed on top. In a pattern, two veneer pins should be driven in to prevent it from shifting. The caul consists of a board about 1 in. thick and slightly larger than the ground to be veneered. It is slightly rounded in shape on one side. This is thoroughly heated and quickly hand-screwed, round side down, on to the veneer on top of the paper; the latter prevents the caul from sticking. For a large surface to be caul veneered cross pieces are used as shown in Fig. 6.

The upper pieces are rounded on under edges to force glue out; the lower pieces are straight and thicker than the top ones, so that when pressure is applied at the ends the top pieces are bent so that their lower edges become straight. It is essential in all cases of caul veneering to work smartly when once the caul has been heated so that the glue is thoroughly melted.

To veneer patterns such as those given in Figs. 7 and 8, the design is first drawn on paper and the various pieces of veneer cut to shape and glued on to the design. It is then treated as a whole and laid with a caul.

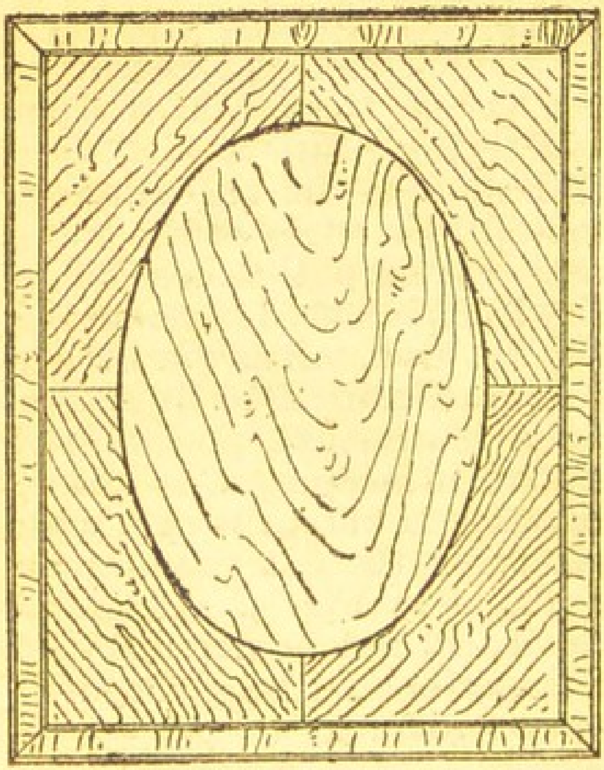


Fig. 7

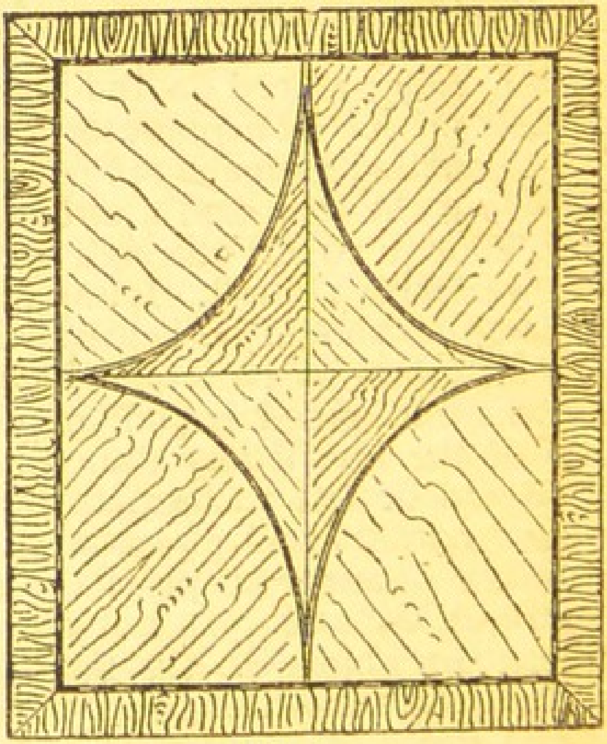


Fig. 8

VENEERING. Figs. 7 and 8. Two examples of built-up veneer patterns

VENETIAN BLIND. Although it has been largely replaced by the ordinary spring blind, which is easier to keep clean and in order, or by casement curtains, the Venetian blind has advantages. It is the British substitute for the continental shutter, and has the same useful quality of keeping out the sun and at the same time permitting effective ventilation. Moreover, it permits the gradation of the light, which may be fully obscured by having the slats closed or partially by having them slanting. The great drawbacks are the clumsy appearance of these blinds and the extra cleaning which they entail. Few people would select them for a new house, but where already installed they can be used without trouble for long periods providing the adjustments are correct.

The blinds should be dusted with a soft brush at frequent intervals, the laths should be turned down with the laths inclined to the window, and the brush stroked from side to side, working from the top to the bottom on the window side first. The laths are then turned the opposite way and the same procedure followed on the inside of the room.

VERDIGRIS. This is a green or greenish blue substance formed by the action of an acid on copper and on metal alloys containing copper. It is used as a stain and a dye, and for this purpose is produced by subjecting copper to the action of acetic acid.

Articles made of brass are liable to the formation of verdigris, which can be removed by dipping in a strong potash solution. Hydrochloric acid in a weak solution can be used for removing verdigris from articles of rolled gold, and, unless plated articles are badly coated, when the above method can be used it will be sufficient to wash them in strong soda water. Sub-acetate of copper or verdigris can be employed as a green stain by dissolving it in a hot solution of vinegar. It is also employed in making an ebony stain.

VERNIER, on Calipers. This is a device applied to a scale to give accurate readings in fractions of the smallest division of the scale. It is used on micrometers, caliper gauges, and scientific instruments that are designed to work very exactly.

In the type of sliding caliper gauge used in engineering the vernier is engraved on a sliding jaw, and the scale on the shaft gives measurements in tenths of inches. The vernier scale has ten divisions, together equal to nine divisions of the scale; each therefore representing $\frac{9}{10}$ of $\frac{1}{10}$ in. In reading, suppose the zero mark of the vernier has passed the inch mark of the scale, but has not reached the next $\frac{1}{10}$ inch mark. To decide the value of the fraction the vernier is consulted, and its 7 line is found to correspond exactly with a scale mark. The 6 line of the vernier is $\frac{1}{10}$ of $\frac{1}{10}$ inch to the right of the nearest scale mark on its left; the 5 line, $\frac{2}{10}$ of $\frac{1}{10}$ inch; and so on to the zero mark, which is $\frac{7}{10}$ of $\frac{1}{10}$ inch beyond one inch. The reading therefore is 1·07 inch. A finer reading could be made if the vernier scale had 20 divisions equal to 19 of the scale, as the difference would then only be $\frac{1}{20}$ of $\frac{1}{10}$ inch.

The vernier incorporated in a micrometer gauge is essentially similar in principle, though the scale is engraved around the thimble of the gauge.

VERNIS MARTIN. A brilliant lacquer or varnish used in the painted decoration of articles such as fans, fancy tables, and cabinet panels, takes its name from a French family who during the 18th century developed a form of artistic decoration based on oriental lacquer work.

VICE. The principal requirements in a vice are strength, rigidity, and a tight grip. Vices are made of many patterns, each specially suitable for a particular class of work.

In a useful vice where a single tool only can be purchased, one jaw is fixed while the other is moved in or out as required by a screw mechanism concealed in the body of the vice. The screw is turned by a tommy bar which can slide through a hole in the projecting head of the screw, and has knobs on its ends to prevent it from dropping out. In addition there is a spring catch at the side, a touch on which frees the screw mechanism so that the vice can be opened or closed rapidly by hand, the screw mechanism being then used for the final closing of the jaws tight on the job.

The jaws of a vice are serrated and hardened in order to provide a good non-slipping grip, and therefore some protection is needed when finished surfaces have to be held. This protection is conveniently afforded by covering the jaws with pieces of tinplate, sheet copper, or lead, bent to angle iron form; hardwood blocks are often convenient, especially when holding objects of awkward shape.

When fixing a vice it is essential that it should be held on to something very rigid, as any movement, however slight, is most objectionable, especially when filing. If the available bench proves to be unsteady, it can generally be improved by screwing wooden battens, say, 2 in. by 1 in., diagonally from the bottom of one leg to the top of the second all round the bench and screwing the legs to the floor with angle brackets. This will stiffen it up considerably.

In choosing a vice the first consideration is the purpose for which it will chiefly be required. If heavy work is to be done, such as forging or smith's work, then one of the regular blacksmith's leg vices is essential, but for the repair of a car or for bending heavy metal a regulation engineer's vice should be chosen. The width of the jaws should preferably be about $3\frac{1}{2}$ in., and the opening up to about 6 or 7 in. This class of vice must be securely bolted to a strong and rigid bench, and the heavier the latter is the better.

The portable bench pattern vice has a number of advantages, chief of which is the provision of a self-contained cramp with cramping screw which enables the vice to be attached to the work bench, kitchen table, or other convenient means of support. If the vice is to be used for any length of time, a couple of wood screws can be inserted in addition, to prevent it shifting.

WOODWORKER'S VICE. For woodworking, a joiner's or carpenter's vice is usually most serviceable. It is made in several sizes, usually with a quick release mechanism. This comprises a small trigger, located near the screw handle, the action being to press the trigger and pull the vice-jaw in or out to its approximate position, then release the trigger and tighten up.

These vices have smooth faces to the jaws, and can often be used with wooden faces which can be screwed in position when they are needed, holes being provided for that purpose. This type of vice is attached to the underside of the work bench with the upper edges of the jaws flush or slightly below the surface of the bench. It is imperative that the vice should be securely fixed, either by the use of coach screws or by bolts with the heads recessed below the surface of the bench and the holes properly plugged with wood.

When circular work is to be dealt with, a pipe vice is the best. It consists essentially of a horizontal sole plate or base with an upright portion upon it, through which works the jaw with a V-shaped end. This slides in a passage way formed within the case and closes down to a slot in the lower jaw which is similarly V-shaped. When the handle is turned, the jaws are forced together and the pipe is securely held. As such a vice is subjected to considerable twisting strains it must be bolted to a rigid bench.

In addition there are various hand vices, the smallest of which is the jeweller's pin vice designed to hold fine wire while being worked. Some forms of the last named resemble a chuck in shape and action. A useful pattern for the amateur is a small vice with a long extension piece on the opposite side to the jaws, these being hinged together. This part of the vice can be held in the hand, the work being grasped between the jaws by tightening up the thumbscrew. A considerable range of work can be dealt with by such instruments and they will often take the place of a bench vice, where it is not practicable to take the work to the bench.

Vices as a rule do not receive sufficient care and attention. Except in the very heaviest patterns the vice should not be used as an anvil. The screw and the working portions ought to be lubricated from time to time so that they may work freely and easily. In this connexion it is well to clean out the screw and screw thread of the moving part occasionally by washing them out with paraffin, brushing away any chips or grit, and thoroughly oiling.

VULCANITE. The real difference between vulcanite and ebonite consists in the quantity of sulphur used in the manufacture. Vulcanite is made by incorporating india-rubber or gutta-percha with ordinary sulphur and lampblack in a masticating machine. It is pressed into moulds and heated in a steam oven at a temperature of 315° F. In use and methods of working vulcanite and ebonite are practically identical.

WADDING. Cotton wadding, which may be bought cheaply at any draper's, is used for padding such articles as cosies, and also as an interlining for quilting. A layer of wadding, cut to the same dimensions, is laid between the outer fabric and the lining, and the three are quilted together. A special attachment for quilting is sold by sewing machine makers.

Common wadding is usually of a brownish colour. Surgical wadding or cotton should always be employed for wounds or for direct application to the skin, as in making pneumonia jackets. In re-covering chairs it is often advisable to lay a sheet of common wadding under the embroidered canvas, cloth or leather.

WALNUT. This wood is fairly hard, heavy, and close in grain, easy to work, and does not warp or shrink much. There is the European variety, the best of which grows in Italy; the American black walnut, which is darker in colour; and another American variety called satin walnut. The Italian and American black walnut are those chiefly used for the better class furniture. Satin walnut is used for cheaper furniture, and is not considered a high-class furniture wood. It is soft and tough, and liable to shrink and warp considerably, but is an easy wood to work. It is a light brown or yellowish colour with darker streaks, and shows a satiny surface when planed. The others range in colour from greyish to purplish brown, often streaked with darker shades. American black walnut looks very well when treated with a wax polish.

WEATHERBOARD. The particular class of timber known as weatherboard is used extensively in the construction of small buildings. It is commonly made with a feather edge and is wedge-shaped in section, being 1 in. thick on one side and ¼ in. on the other, averaging in width 5 to 6 in.

The boards are weather-tight in virtue of their characteristic overlap, the lower edge of one plank overlapping by about an inch the upper edge of the plank beneath it.

It would be undesirable to expose the end grain of the weather-board to the full force of the weather, and for this reason vertical timbers, or cover strips, should be employed at all external angles. These strips are erected first, and the weatherboard fitted into the space between them when the timber is of sufficient length to reach from one side of the wall to the other side.

In addition to the ordinary form it is possible to get rebated weatherboard, the use of which permits of a flat surface on the inside. For good work T. and G. matched weatherboard should be used.

WEBBING, In Upholstery. In upholstery, webbing in the form of a wide tape is used for supporting the stuffing and springs of chairs. There are two kinds, the best being English, which is recognised by its black and white diagonal pattern. Its strength is known by numbers, Nos. 10, 12, and 14 being in general use. English web is put up in pieces of 18 yd. A cheaper quality is woven in stripes, and the sizes are known by the number of stripes of colour in the width.

Although webbing is a closely woven material, it stretches in use, and when it is attached to a chair frame it is necessary to stretch it as much as possible. The upholsterer uses special pliers for this purpose, but it is generally possible to use a short length of wood as a lever. *See* Upholstery.

WELDING. A simplified process of welding or uniting ferrous metals consists in heating the parts to a white heat, placing them one upon the other, and hammering them into union. Autogenous welding has to a large extent taken the place of the older method, especially for small work. The apparatus consists of a blow pipe with oxygen and acetylene gas under high pressure. These gases are mixed within the blow pipe, and emerge at a high velocity from a small nozzle. Ordinary welding can be carried out by the amateur, but considerable practice is required. Success depends on the proper heating of the metal, the direction of the hammer blows, and often the use of a suitable flux placed between the joint faces in order to assist adhesion.

While the practice of welding is generally limited to the ferrous metals, it can be employed with modifications for some others. Autogenous welding is particularly applicable to articles made of cast iron, which, by their nature, cannot be united by hammering.

WHETSTONE. Used for sharpening scythes, hooks, axes, and other cutting tools, whetstones are made from stone, emery and carborundum, and in shape are either round or flat, the former being smaller at the ends than in the centre. Generally a coarse stone is employed without a lubricant; those with a fine grain, especially if made of carborundum, should be used with a thin mineral oil.

To sharpen a tool, the side of the stone is placed flat on the blade and moved along with a spiral motion, keeping it flat against the blade and placing the correct amount of pressure on the down stroke; the up stroke should be as light as possible to prevent the formation of a wire edge.

WHITENING. The name of whitening or whiting is usually given to the well-washed residue of chalk. It should form, when crushed, a fine powder and when placed in water should separate into fine particles at the bottom of the vessel and is not soluble. It is used for many purposes in the workshop and the home. In making whitewash it is mixed with size; it is used for polishing and it forms the basis of several kinds of wood-filler.

WHITEWASH. Whitewash is usually a mixture of slaked lime and water. Whitening is also used. The ingredients that are required for internal work are the whitening, some size, and a little ivory black or blue to keep the colour white.

To prepare the whitewash, break up a quantity of the whitening, say, about 6 lb., in the pail, which should contain sufficient water to cover it. Allow the whitening to become thoroughly soaked or dissolved, and pour off any surplus water. Having stirred it, add a quart of hot double size, previously prepared. The mixture is then given a thorough stirring, and set aside to cool, when it will form a jelly-like compound. Blue or other material should be added at the same time as the size.

When required for use, the mixture is diluted with cold water and applied immediately. For exterior work ordinary lime may be used as paste and sufficient of this used with water to form a thick liquid. The paste is best kept in a box or pail sunk in a hole in the ground and covered with water to keep it from drying. When required for use, the water is poured off and the lime, a smooth, white mixture, is employed.

Whitewash or limewash made in this way can be applied directly to the exterior surface of brickwork with a large, old whitewash or distemper brush, one good coat being usually sufficient. It should not be applied too thickly or it will be liable to flake off, nor should the mixture be too weak or it will not dry with a clear surface. If the brickwork has not previously been whitewashed, it should be brushed down with a stiff bristled brush. If the surface has already been whitewashed, it is desirable to wash it down with copious supplies of water and brush it thoroughly.

Ceilings. To whitewash a ceiling more preliminary preparation is necessary, either covering the floor with old newspaper or dust sheets, or entirely removing the floor covering. All small furniture should be placed in another room, the larger pieces being assembled in the centre of the room or in any other convenient position and covered with dust sheets. To keep the whitewash from spattering over the floor and the walls, it is a good plan to fix a dust sheet or other covering over the walls, or at least those portions where whitewashing is in progress.

The whitewash is then prepared as already described. Another pail or bucket filled with clear water will be needed for the preliminary washing down, which simply consists of brushing the ceiling vigorously with a disused whitewash brush. This removes the bulk of the previous coat of whitewash. The ceiling is allowed to dry, and if very good results are required it may be covered with clearcole, a thin liquid obtained by dissolving some size and a small quantity of alum in hot water and adding a little whiting. When brushed over the ceiling, this stops the suction and makes the whitewash take better, but it is often omitted on ceilings in good condition.

As soon as the clearcole or the washing off is dry, any cracks are made good with Keen's cement or a plaster, and the whitewashing proper is commenced. It ought to be continued uninterruptedly until the whole of the ceiling is finished. The work should commence at one corner of the room and may include the cornice and frieze, if desired. The whitewash can probably be applied by the amateur to the cornice and mouldings with a small brush, but the bulk of the ceiling is best dealt with by the large distemper brush.

There is a knack in applying whitewash which it is not easy to describe. The essential thing is to charge the brush with sufficient colour to enable the largest area to be covered without refilling the brush. To do this the brush must be immersed fully in the whitewash; any surplus is wiped off by stroking the brush on the edge of the pail, any surplus at the tip being similarly wiped off on the edge of the pail or on a bar placed across it. Under these conditions the brush will be found to hold a considerable quantity of whitewash, which may be applied to the ceiling with a kind of slapping and stroking motion. In a sense, the whitewash is flicked on the ceiling on the first part of the stroke, and the other part of the stroke is a smoothing operation.

Whitewash is practically transparent while it is wet. The quantity that is applied can be judged by the feel of the brush while it is being wiped over the surface of the ceiling. At the first application of the brush the feeling is that there is too much of the fluid, whereas towards the end of the stroke there is a drag. The correct quantity is that which is applied when the brush is about half full. The manner in which the brush works then should be taken as the standard to be adhered to throughout.

WHITEWOOD. The timber that is known as whitewood is really spruce. It is less strong and durable, and therefore less suited for outdoor work, than is red timber, but has a number of indoor uses. When employed for joinery purposes it requires keen tools for its proper manipulation, but when it is finished it presents a fine lustrous surface with a creamy colour. It thus forms an excellent material for table tops, dressers, cupboards and other fitments of a house; also for floor boards, as it will keep its clean appearance. The name whitewood is also given to bass.

WICKERWORK. This is another name for basketwork made with osiers, and is applied to baskets, stands, tables and chairs. Wickerwork repairs are often not worth troubling about, owing to the limitations of the material. After being in use for some time, the osiers become very dry and brittle, and if replaced with new material there is always a risk that the new stuff will prove too strong for the old portions left in. This is particularly noticeable when new lengths are woven between the old stakes.

If wicker chairs are damaged, the better plan is to effect repairs with a suitable thickness of pith cane rather than with osier rods. The material can be rendered quite pliable by soaking it in water, and it will dry out without straining the existing portions.

White wickerwork should be washed with a strong cold solution of salt and water, then wiped as dry as possible and left in the sun to bleach. Hot water, which destroys the natural polish of the wood, should not be used; neither should soap nor soda, both of which have a detrimental effect. Brown wicker furniture is best cleaned by rubbing it with a rag dipped in paraffin

WILLOW. This is a soft, light wood with smooth, lustrous surface, tough and pliable, brownish or yellowish white in colour; it may be bruised by a blow but is not likely to split. Its most important use is for cricket bats, but only the best parts of the tree are good enough for this purpose, and it is cleft instead of sawn. Willow as flooring wears well and has a smooth surface susceptible of a fine polish, besides being non-inflammable. It is employed for hurdles, poles, cutting boards, knife boards, and by the cooper and turner; scrap willow is used in toymaking. Sometimes spade and shovel handles are of willow, and next to alder it is the best wood for clogs.

The chief varieties are known as white and red willow; the latter, which has a red tinge is generally preferred, but it is not plentiful. The willow is much cultivated for wickerwork and basket-making, and is not allowed to grow beyond the stage of osier or withy rods. With this are used the twigs and small branches which are cut periodically from growing pollard willows. Another way in which young willow is used is by splitting it into thin slices for making woven crates, hampers, baskets, and hats.

WIRE. Wire can be obtained in many different shapes and sizes, and is produced commercially by means of powerful machinery which draws the heated metal through a series of holes of gradually diminishing size in a metal plate. Wire is employed for innumerable purposes in the home. It can be used for binding and repairing, for clothes lines, for supports for flowers in the garden or in pots and for hanging pictures and curtains. It can be kept straight for the latter purpose by using wire strainers, and it is also obtainable in coiled, spiral form for the same purpose. It is made up in the form of nails, pins, hooks, staples, and tacks. Wire is found in the form of gauze, netting, fencing, and is also utilised in the manufacture of a great many household utensils.

Wire Gauges. Gauges for measuring the thickness of wire are made in several shapes, and there are a number of different systems employed in measuring. The thickness of the wire is denoted by numbers, except in the case of the Lancashire steel wire gauge, in which letters are used. In most gauges the lowest number indicates the thickest wire, but in the Whitworth gauge the reverse is the case. The Whitworth gauge ranges from ·5 in. (No. 500) to ·001 (No. 1), and it has the advantage that the number of the gauge is a key to the dimension. In the other gauges in ordinary use the number is no indication of the size of the wire. The British imperial standard gauge, indicated by the letters S.W.G., is the English legal standard for measurement, and its graduations extend from 7/0 = ·5 in. to 36 = ·0076 in., and include 43 numbers. The Birmingham wire gauge is still in general use, and many wires are quoted as B.W.G. Its numbers range from 0000 4/0 to 18, and with slight differences in the second and third decimal point from 19 to 36. Wire from the United States is measured by the Brown and Sharpe (B. & S.W.G.).

WOOD. Wood as used by the cabinet maker and the woodworker in general is the seasoned product of the timber tree, and as such is divided into two classes, softwoods and hardwoods. It is usual to describe as softwoods those obtained from trees bearing needle-pointed leaves, and to classify as hardwoods those from trees bearing broad leaves. Only a very small quantity of the wood used in this country is home grown; the main supplies come from all parts of the world, generally cut into recognized sizes and partly seasoned.

The most commonly used wood is known as deal, but this is the name of the size into which several varieties of pine or fir are cut. Under the one species of pine there are several entirely different woods, ranging from one of the softest to one of the hardest. The same difference is found among the hardwoods; for example, lime is soft and even textured, and lignum vitae is exceedingly hard and difficult to work.

The matter of shrinkage is of importance in all forms of cabinet making, and it can be taken as a general rule that the softer the wood the more liable it is to shrink. There are other faults which generally go with a liability to excessive shrinkage. Among them are shakes. These are splits in the direction of the grain at right and other angles to the annual rings as well as along the line of the rings, the latter being known as cup shakes. The pines are liable to knots, and it is rarely possible to obtain a board of yellow deal without knots, but if they are only small it does not matter very much; large knots however, are liable to fall out, especially in thin boards.

The difference between heartwood and sapwood can generally be noted by a difference in colour and in the brilliancy of the planed wood. The heartwood is the fully developed portion of the tree, and the sapwood is only partly lignified. Satin walnut is a case in point for the tree produces very wide sapwood, which is imported under the name of hazel pine. The heartwood of yellow deal is of a bright golden colour and has a distinct lustre, while the sapwood planes up to a rough spongy surface.

Timber for Carpentry. The timbers used for carpentry are mostly softwoods, such as red deal, white deal or spruce, and red or yellow pine. Red deal is in general use for window frames, cold frames, doors, and similar outside work which is to be finished by painting. White deal is used principally for flooring boards, tongued and grooved partition work, and common inside fixings, such as shelving. The better type of work, such as table tops, the ends of cupboards, panels, etc., calls for a medium quality of yellow pine. Tongued and grooved matchboarding and flooring boards are sold by the square, a square being nominally 100 sq. ft.; but smaller quantities may be purchased at per sq. yd. White deal shelving, machine-planed on both sides and both edges, can be obtained in varying widths from 9 to 11 in. wide at per foot super.

There is a large variety of ready-made mouldings for picture rails, hat and coat rails, cornices, sash bars and skirtings; these are obtainable at the rate of per 100 ft. For small quantities of mixed woods, such as mahogany, walnut and canary, the amateur is advised to purchase what are called cuttings at the local manufacturing cabinet shop. Some kinds of wood are obtainable in wider widths than others. For example, oak is not generally obtainable in wider widths than 11 in. and averages 8 in. wide; satin walnut averages 9 in., but can be obtained 14 in. wide. Black walnut averages 7 in., and is obtainable up to 11 in., while American whitewood and mahogany, with an average width of 10 in., are available up to 23 and 24 in. wide. Yellow deal does not run more than 11 in., but Oregon pine is easily obtainable in widths up to 24 in. It does not follow, however, that the wider widths are more suitable for all wide work, for it is often an advantage to glue up several narrow widths as they are then much less liable to warp.

Colour and Grain. The colour of the wood is another consideration in the choice of wood, and in this respect there is great variety. A choice can be made from the almost pure white woods such as sycamore, spruce, and holly, to the black of ebony. Yellow woods are numerous in both soft and hard varieties, e.g. yellow deal and boxwood. Red woods include red pine, sequoia, radouk, mahogany, and rosewood. Brown woods are obtainable in the form of satin walnut, chestnut, and snakewood, while walnut is of a purplish tint.

In addition to the actual colour of the wood, the peculiarities of the grain enter into considerations of choice, not only the distinguishing grain of the wood, but the accidental formations and malformations. As a rule, any wood cut parallel with the diameter is even in grain and when there is a difference between spring and autumn growth, as exampled in yellow deal, this contrast of colour can be accentuated by cutting the wood at various angles. The commonest example of the cross grain cutting of wood is seen in the silver grain of oak, which owes its effect to the method of sawing the wood diagonally to the medullary rays, those lines of hard cells which radiate from the centre of the tree.

The burr effect in such woods as walnut, amboyna, and thuya is produced by the growth of small branches on the lower portion of the trunk, which do not pierce the bark. A type of figuring known as the curl is caused by the natural flow of the grain, which originates at the commencing growth of a branch. The grain effect in the pollard oak and other woods, as well as in bird's-eye maple, is due to malformation; in the former case it is due to a fungus growth, and also by cutting the branches close to the trunk, and in the latter to the ravages of a boring insect. It will be seen, then, that the figuring of wood is due either to the method of conversion, which is often wasteful, or to malformations, which are rare.

SURFACE TREATMENT. Owing to the comparatively porous nature of the grain, the untreated surface of wood is liable to disease, especially when exposed to damp. External constructional work should be either painted or coated with a wood preservative, and all internal woodwork, in cases where it is not usual to treat in this way, should be kept dry and surrounded with a current of air.

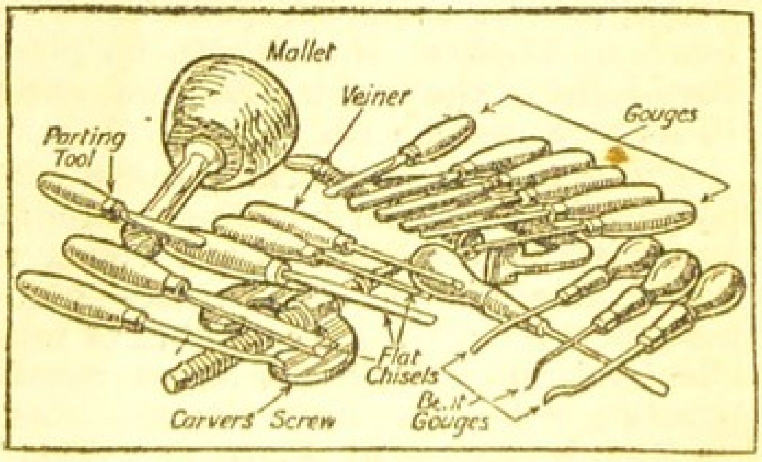
WOOD CARVING: ITS PRINCIPLES AND PRACTICE

Helpful Information for this Decorative Work

The amateur will find scope in this handicraft for artistic expression, which can be carried out with an inexpensive equipment. See Gouge; Tools, and also the entries on Chip Carving; Fretwork

Wood carving is the one branch of sculpture that the amateur can follow with little expense, and good chance of success. It is not, however, an end in itself, but a means of decorating wood.

The beginner should purchase tools as they are required for wood carving and, although most of the tools illustrated at Fig. 1 are essential for advanced work, there is no need to purchase them all at once. Much preliminary practice can be obtained by the use of a firmer gouge and a veiner, and with the former tool a series of cuts should be made on a piece of even-grained wood, as shown at Fig. 2. It does not matter very much what the size is, anything from $\frac{3}{8}$ in. to $\frac{3}{4}$ in. will do, but lines should be made on the wood as a guide before the cutting is commenced by the worker. The simplest cuts are made by pressing the gouge into the wood in a vertical position. The gouge is now set back $\frac{1}{8}$ in. and inclined slightly backward, this having the effect of removing a chip of wood of segmental shape. This is followed by a similar commencing cut a little farther back, with the distance of the second cut increased. Several cuts should be made thus, each time increasing the distance until it is possible to scoop out a space of 1 in. long up to the first vertical cut taken.

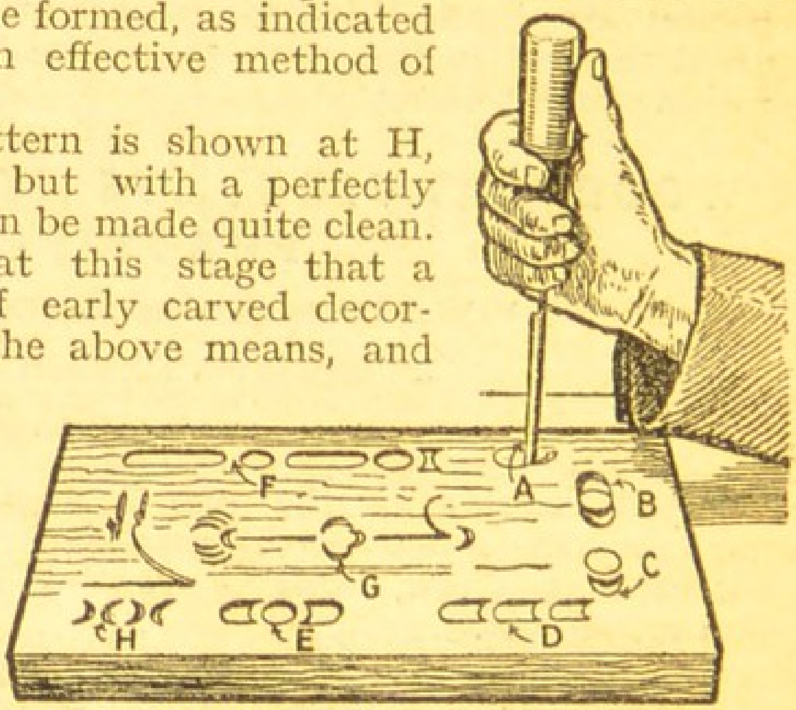


WOOD CARVING. Fig. 1. Selection of tools necessary to the wood carver
Courtesy of The Manual Training Tool Co. (Sheffield)

On slowly turning the gouge round on its own curve, a circular cut can be made, and when this is accomplished the scooped cuts can be made each side, as at A and B, Fig. 2. A pattern combining the first and second methods is shown at C and D.

The next stage is to cut a circular space and combine it with the cuts at D to form the patterns at E and F. The use of the veiner in conjunction with the first practised cuts enables a variety of patterns to be formed, as indicated at G. This provides an effective method of wood decoration.

Another form of pattern is shown at H, and is more difficult, but with a perfectly sharp gouge the cuts can be made quite clean. It should be noted at this stage that a considerable amount of early carved decoration was effected by the above means, and numerous examples can be seen on old chests, settles, and other furniture. Most of the cuts illustrated at Fig. 2 are done in the direction of the grain, but practice in other directions of the grain must be acquired when some confidence has been gained in the use of the gouge.



WOOD CARVING. Fig. 2. Preliminary cuts with gouge and veiner, showing method of forming a simple pattern. Explanations of the lettering are given in the text

The keen edge of the tool soon becomes dull. Owing to the extra keenness required, a leather strop or two should be provided, so that the sharpened edge can be stropped. Leather belting is useful, one piece being thick, and the other thin enough to fold so that it is able to conform with the inner curve of the tool.

A Simple Panel. Having become proficient in making simple gouge cuts in all directions, a simple pattern form may be attempted, and for this purpose a parting tool and a flat gouge will be required. The work can be screwed to a small block of wood so that it can be placed in the vice. Generally the height of the bench is too low, and it will be found convenient to make a stand with 1 in. or 1¼ in. wood.

The first stage in working out a pattern is to outline it with a parting tool. A leaf formation is indicated with the parting tool, and with the addition of the veiner the whole of the work can be effectively done. It is a good plan to do as much cutting as possible with the fewest number of tools, and if the pattern can be effectively done with the above mentioned tools much valuable practice will have been accomplished. An example of simple carving is shown at Plate 54. This is a spray of oak leaves with a few acorns. The first stage after the drawing has been transferred to the wood is to cut out the background.

In the first place, the outline should be cut down with a vertical cut, and the waste removed with a flat gouge. It will be seen that the stalk of the lower acorn is missing. This is the result of careless outlining. In approaching a thin stalk, the first cut should be at least $\frac{1}{8}$ in. away from the required line, and the ground should be removed before the wood is cut back to the correct line. If this is omitted, it is quite possible for the gouge to slip and entirely remove all across grain stalks, or, if it does not actually cut into them, the grain may be sufficiently raised to cause them to break off in the subsequent finishing. The leaves should be finished with a veiner, and a slight amount of modelling with a flat gouge.

Bold work with broader cuts should now be attempted by the amateur craftsman, and a good example is illustrated. The wood should be of even grain about 12 in. by 9 in. or 10 in. by 7 in., and $1\frac{1}{2}$ in. thick at least. The pattern should be marked out and then cut down, leaving the pattern standing out. The first stage is to cut the inner portion down and then the top and bottom portions, leaving the two side leaves to be roughly shaped with suitable gouges and flat chisels. In work of this description each portion should be roughed out in turn, making no attempt to obtain any finish until the general shape of the curves has been worked. A certain amount of undercutting at the top of the curves will be necessary, but the finishing of these portions should be left until the top rounded portions of the work are finished.

This exercise is to gain command over the tools, and not primarily to produce a piece of ornament. The left hand should be used just as much as the right, for the latter will hold the tool and give the necessary guidance to it, but the left hand is essential for purposes of resistance. Sweeping cuts with both gouge and chisel should be practised, and considerable skill will be required to enable the tool to be stopped before the cut becomes deep and perhaps begins to pull the grain apart. This must be avoided or infinite trouble may be caused. It is in the latter that the left hand will be most helpful, and it can be taken as a general rule that the tool should never be driven forward with one hand without the counter-resistance of the other.

Another important point which experience will teach is not to put too much force on the tool when working in the direction of the grain, or near a delicate piece of cutting, the method being to remove the material by a series of small cuts.

The finishing cuts on the rounds should conform to the main direction. This is not so evident in Plate 54, except in the sweep of the hollows, but the main idea of the finishing marks should be to convey to the eye the main form of the shape.

In dealing with the carving of natural forms, much depends on the position of the finished work, and as the carver is limited by the grain of the wood in exactly imitating many forms, it becomes necessary to utilize the effect of light and shade. It is impossible to represent exactly any natural form in wood by means of carving tools. Some slight alteration here or there must be made to conform with the limitations of the material and with the effect of light and shade, so that the representation must be conventional. The beginner, modelling leaf and flower shapes, need not conventionalize to any extent until the difficulties of technique have been overcome.

In working out the shape, the first stage consists in forming the main shape and cutting away to form the background. The main direction of the curves should be roughed out with suitable gouges, and the final shaving effected with suitable flat gouges and chisels. The lightest possible touch should be used, and the working tool held in complete restraint. This is particularly required when approaching the edges of the leaves, and as far as possible the shape should be completed on the top surface before the undercutting is attempted. The exact position of the tool cannot be stated, as it should be changed cut by cut to conform with the direction of the grain, but in the main the fibres of the wood should be sliced.

All cuts should be made entirely with the hands directing the tool, the mallet being reserved for such work as outlining and cutting out large outer surfaces. Some very hard woods may require such pressure that is beyond hand power to perform; but, generally, if the tool is kept perfectly sharp, and small, thin cuts are made, there will be no need for mallet work.

Where necessary, the left hand should hold the chisel and continually restrain it, while the mallet is used to give a number of light taps. Nothing in the way of heavy blows should be allowed, even with the hardest woods. It is far better to attend carefully to the keenness of the cutting edges of the carving tools.

Many woods are suitable for carving, but they should be of even and uniform grain, free from knots and shakes, and have been thoroughly seasoned. The grain should be as close as possible and free from strong markings. Of the softer woods more suitable to the beginner, but still useful for many forms of carving, are yellow pine, American whitewood, basswood, lime, and Kauri pine, and of these yellow pine will be found the best for preliminary work. Of slightly harder woods, there are sycamore, satin walnut, beech, and holly, and of hardwoods, oak, walnut, and sometimes mahogany can be used.

It is generally easier to obtain suitably seasoned yellow pine, and if used in at least 1 in. thickness no trouble should be experienced in working it, but it is not suitable for high relief. American whitewood and basswood are good for preliminary practice, but tools require more sharpening than is necessary with yellow pine. Lime is not so easily procurable, but if it is properly sawn and thoroughly seasoned it is an ideal material.

As a rule, carving should not be polished; the only treatment allowable is that of oiling or waxing, and these are used to protect the surface.

WOOLWORK. The term woolwork broadly used includes all work done with wool yarn and needles, or special hooks, from darning and knitting to crochet and knotted rug-making. In particular it is applied to pictorial designs and needlework pictures carried out partly or wholly in coloured wools.

The term wool embroidery is also a broad one, covering any decorative stitchery in wools, but in particular the term is employed for fancy work in which naturalistic or conventional designs are partially embroidered in wools leaving portions of the background fabric exposed. Woolwork pictures as carried out in the 17th and 18th centuries would be too tedious for most needlewomen of to-day, although smaller pictorial designs are still exquisitely worked in petit point for bags.

MATERIALS AND DESIGNS. Very effective woolwork or embroidery can, however, be quickly achieved on rather coarse linen, coloured or unbleached, using skeins of tapestry wools, or penny balls of embroidery wools with crewel needles.

An embroidery frame will be needed by most workers for a solid pictorial design such as is illustrated in Plate 61, which could be charmingly adapted and worked in natural colours on linen for a cushion, screen or blotter panel, or framed and glazed for wall decoration. An embroidery frame consisting of two wooden hoops would be a suitable one on which to work a panel of small size, but if the panel is a large one, the regulation embroidery frame with rollers on which the work can be evenly stretched will be needed. For work of less solid design a frame is not necessary, but to prevent puckering a good method is to pass the needle up and down through the embroidery as if on a frame.

A great variety of transfer designs can be bought either for flowers, figure or geometrical embroidery or many different ideas can be utilized. Flower, bird, animal or Japanese prints can be traced and transferred by means of carbon paper to the material to be embroidered.

Interesting conventional designs can be worked out by pencilling the outlines of coins to mark rounds for flowers and evenly spacing a number of these on a piece of paper the size of the work, then transferring the drawing to the material. Large flowers can be worked in buttonhole stitch with an inner ring of chain-stitch and centre of French knots; smaller ones in lazy-daisy stitch and rose stitch. The intervening spaces can be filled in with trellis stitch (q.v.), or with diamond or diaper stitch (*see* Laid Work). Instead of working these designs all over a cushion, bedspread or duchesse set, they may be enclosed in a circle made by drawing round a plate of the size required and outlining the edge of the circle with china stitch in black wool bordered with back stitch. The rest of the work can be speedily carried out in Berlin wools in Victorian shades of bright blue, grass-green, magenta and foxglove pink, and can be done on felt or hessian, crash, rattine or linen.

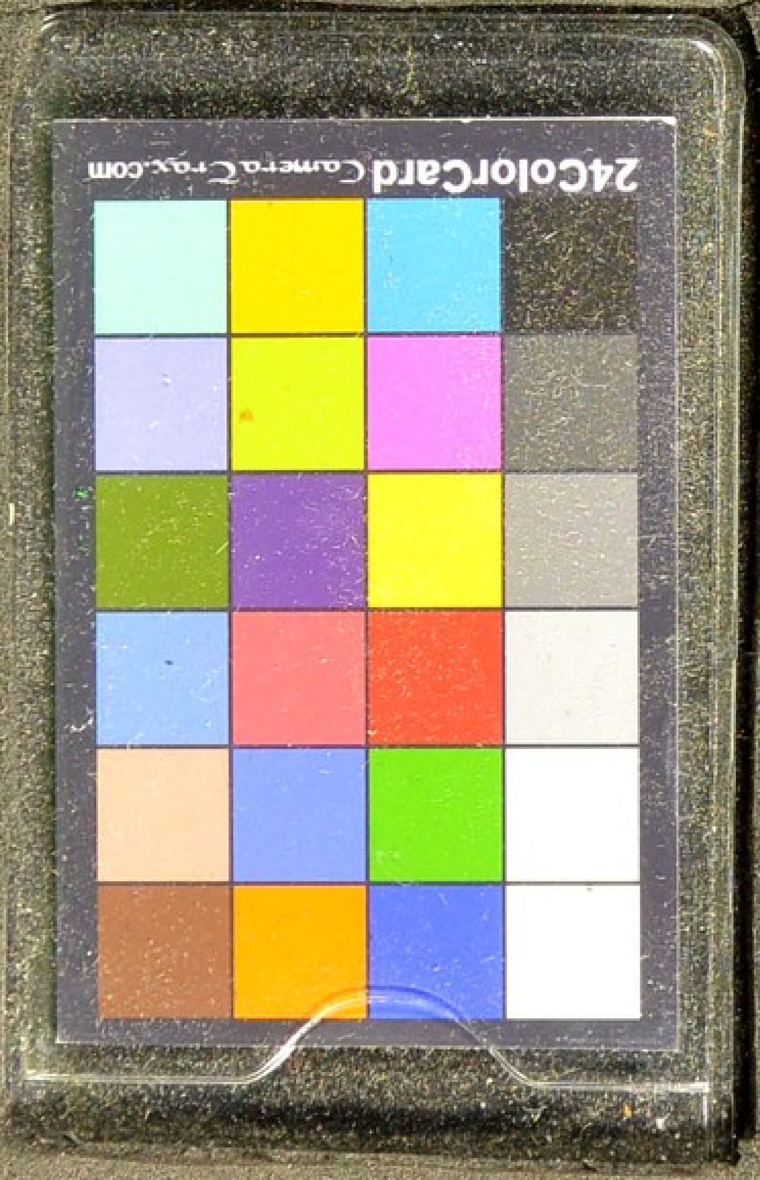
Most of the stitches used for woolwork are among the various stitches illustrated in the article on Embroidery. When starting a piece of work it is a good plan to select the stitches which will be most useful for the various portions of the design. The stitches which may be used for the flowers in the design illustrated are also shown in Plate 61. The flower on the right can be worked in satin stitch as shown, and then outlined in back stitch; that on the left in long and short stitch on the outer portion of the petals, and with satin stitch in different shades for the inner portion and centre. The leaves can also be worked in satin stitch, with the veins in stem stitch, back stitch or crewel stitch, in a darker shade of green. The bowl may be outlined in crewel stitch with one or two lines of shading. Each group of flowers is worked in one of two ways; a glance at the illustration will show which method is applied to each.

WRITING DESK SET. Accessories for the writing desk or table are more likely to add a decorative finishing touch to a room when chosen as a set than when selected as odd pieces without relation to each other or to their surroundings. Sets may be comprised of a blotter, inkstand, pen tray and notepaper rack, or they may also include one or a pair of candlesticks, paper-weight, ash tray and waste paper basket. If the telephone stands on the desk a screen and pad might be added. Sometimes there is a combined fountain pen stand and ash tray.

The various types of writing table will suggest certain styles of accessories. Coloured glass, in an amber or green shade, looks particularly well on a walnut or mahogany table, for such details as pens and ash trays, candlesticks and inkstands in combination with lacquered wood for the stationery rack and blotter cover. Gesso and barbola work on gilded or silvered white-wood articles would be most attractive in a prettily furnished sitting-room, while leather in a bright or rich colour would be suitable for most of the articles on a man's desk.

A whitewood set painted in soft colouring, and adapting an old Cashmere design, is illustrated in Plate 59, and executed in poster colours on a brush lacquer foundation. Also shown is a group of inexpensive accessories ready for painting, which can be bought covered with imitation parchment and decorated with coloured prints, with stencilled designs, or by painting them with water-proof inks. When decorated the accessories should be varnished with clear white varnish. If these imitation parchment articles seem too greasy to be easily painted, this can be remedied by rubbing the surface with tissue paper and also by stroking the paintbrush lightly on a piece of damp yellow soap before dipping the brush into the ink.

10/4 C. Hack.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