

The surgeon's practical guide in dressing, and in the methodic application of bandages / by Thomas Cutler.

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MEDICAL CLINIC;

OR,

REPORTS OF MEDICAL CASES:

BY G. ANDRAL,

PROFESSOR OF THE FACULTY OF MEDICINE OF PARIS, MEMBER OF THE ROYAL
ACADEMY OF MEDICINE, ETC., ETC.

Condensed and Translated,

WITH OBSERVATIONS EXTRACTED FROM THE WRITINGS OF THE
MOST DISTINGUISHED MEDICAL AUTHORS:

BY

D. SPILLAN, M.D.

FELLOW OF THE KING AND QUEEN'S COLLEGE OF PHYSICIANS IN IRELAND, MEMBER
OF THE ASSOCIATION OF THE FELLOWS AND LICENTIATES
OF THE COLLEGE OF PHYSICIANS,
AND FORMERLY PHYSICIAN TO THE DUBLIN GENERAL DISPENSARY.

CONTAINING

DISEASES OF THE ENCEPHALON,

WITH EXTRACTS FROM

OLLIVIER'S WORK ON DISEASES OF THE SPINAL CORD AND ITS
MEMBRANES.

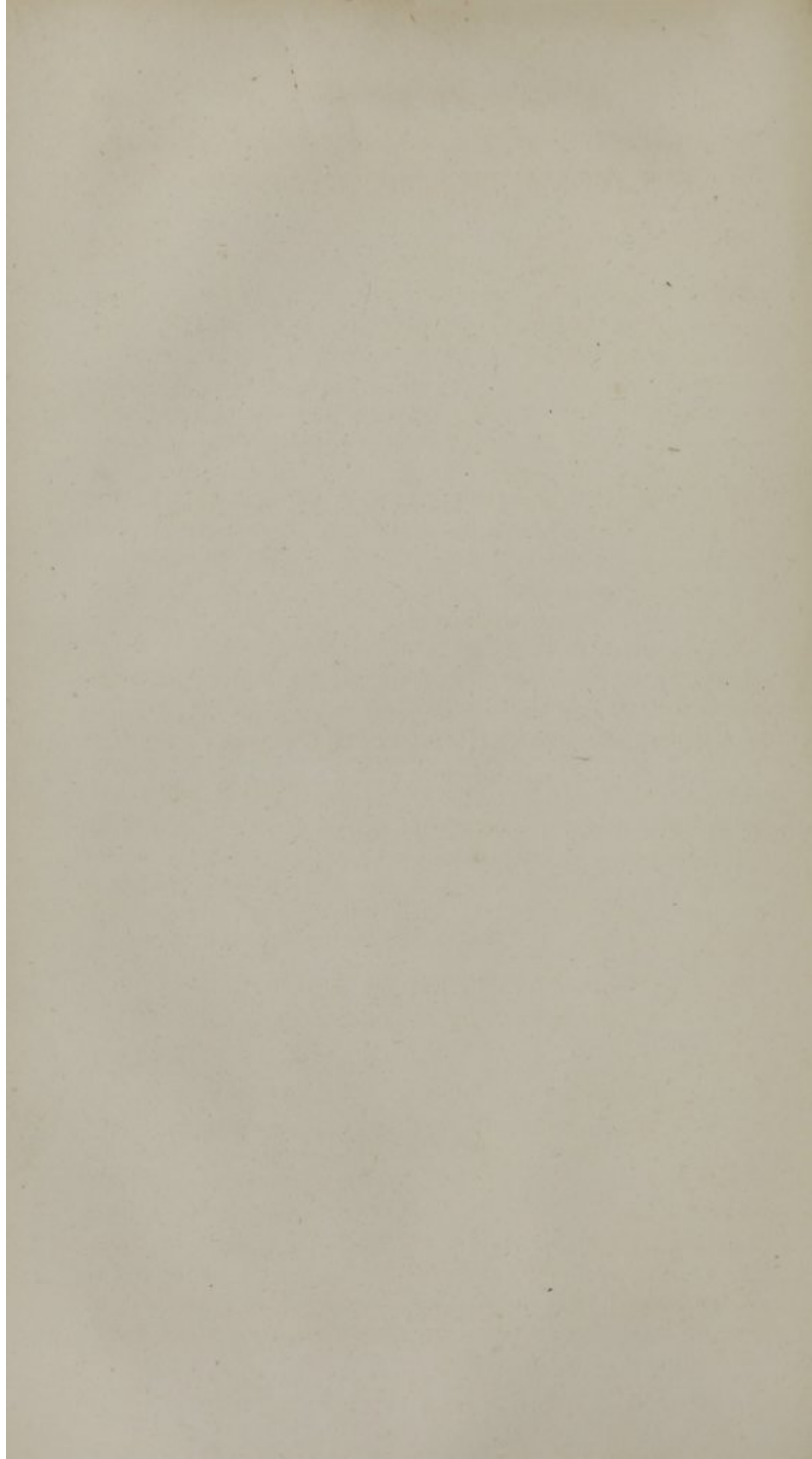
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1838.

Given to Philosophical Society from Dr John Bell.

1500



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THE
SURGEON'S PRACTICAL GUIDE
IN
DRESSING,
AND
IN THE METHODIC APPLICATION OF BANDAGES.

ILLUSTRATED BY ONE HUNDRED ENGRAVINGS.

BY THOMAS CUTLER, M.D.
LATE STAFF-SURGEON IN THE BELGIAN ARMY.

PHILADELPHIA :
HASWELL, BARRINGTON, AND HASWELL.

1838.

THE

STUDENT'S PRACTICAL GUIDE

TO THE

TECHNIQUE OF THE

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PREFACE.

A MANUAL, calculated to improve a department of Surgery which, unfortunately, has been too long neglected in this country, and spare the Practitioner the sacrifice of much valuable time, cannot but be deemed a great desideratum. How far the Author may be likely to succeed in accomplishing these important objects, will be seen in the perusal of the following pages.

The work is divided into two parts: the first treating of Dressings and Bandages in general, and the principles of their application; the second, of Bandages in particular, classed according to the regions of the body, under the respective heads of Bandages of the Head and Neck, of the Trunk, of the Upper, and of the Lower Extremities. Each Bandage is moreover subdivided into its Composition, its Application, and its Use, particular observations being added as occasion may have required.

Throughout the whole work, which is illustrated in various parts by wood-cuts carefully executed by a competent artist,* the Author has endeavoured to render the details as brief as possible, without the sacrifice of either clearness or exactitude. He has drawn the materials necessary to its execution from practice, from personal observation in the British and Continental Hospitals, and

* Mr. Neville Johnson of Philadelphia.

from the works of the most distinguished writers upon Surgery generally, or upon this department in particular of the science; introducing nothing but what has appeared to him decidedly useful, he has still allowed for cases of great consequence an ample choice of means.

To conclude, he has studied to render the Work equally valuable to the Army and Navy Surgeon, the general Practitioner, and Student. His whole and sole aim has been utility, and should the event prove that he has not been mistaken in his views, the conviction of having done some service in the field of British Surgery, will adequately repay him for his pains.

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THE
SURGEON'S PRACTICAL GUIDE.

PART THE FIRST.

UPON DRESSINGS AND BANDAGES IN GENERAL, AND THE PRINCIPLES OF THEIR APPLICATION.

DRESSING may be defined to be the application, upon operated or diseased parts, of certain apparatus, designed for facilitating the reunion of solutions of continuity, for protecting them likewise from the contact of exterior bodies, and from the injurious influence of deleterious emanations, for bearing such remedies as are calculated to place them in the most favourable condition for the accomplishment of their cure, and in fine for preventing the neighbouring parts from becoming foul, through the exudation of purulent discharge, &c.

The objects which constitute these apparatus, are lint, charpie, compresses, rollers, adhesive plaster, setons, protective bandelettes, cushions, splints, pallettes, soles or foot-boards, and the fracture box and bridge.

Lint is a tissue so well known, that it needs no description here.

Charpie is a name given by the French to a collection of filaments separated from morsels of old linen rag four or five inches square, and of loose texture, which they use in lieu of lint, and to which they give a decided preference; it may be used in all cases where the employment of lint is indicated, and will be found to absorb much better. It is divided into two kinds, the *charpie brute* and the *charpie râpée*. The *brute* is either fine or coarse according to the linen employed in its fabrication; the first sort is placed in immediate contact with the surfaces of wounds, on account of its softness and absorbing qualities; the second is employed as an upper stratum for reasons of economy. The *râpée* is made by scraping fine linen rag or long charpie with the back of a knife: it appears to be more irritating than the first kind, and absorbs the pus with greater promptitude. According to the manner in which the French arrange the fibres of the first kind of charpie, it takes the name of *plumasseau*, *bourdonnet*, *tente*, *mèche*, *tampon*, or *pelote*.



The *Plumasseau* is a mass of charpie, the filaments of which are laid parallel to each other, the ends being folded under and flattened between the palms of the hands. Plumasseaux take different sizes and forms to adapt themselves to the parts upon which they are to be applied. They should neither be so thick as to surcharge the part, nor so thin as to become too quickly penetrated by the pus; neither should they be insufficient to maintain a proper quantity of medicamentous matter.



The *Bourdonnet* is a little mass of charpie, rolled into an oblong form between the hands. It is usually tied in the middle: it serves for absorbing the pus in a deep wound, and preventing a premature union of the edges of the division.

The *Tente* differs only in size from the bourdonnet; it is, however, usually rolled tighter. It is employed in diseases of the anus, and in those cases generally in which it is required to dilate an opening or canal. The bourdonnet is sometimes made of prepared sponge or of gentian root.



The *Mèche* is an assemblage of filaments of charpie ranged parallel to each other, and doubled at the centre: it is introduced into fistulous openings, &c. upon the point of the probe, and effects their obliteration gradually from below upwards.



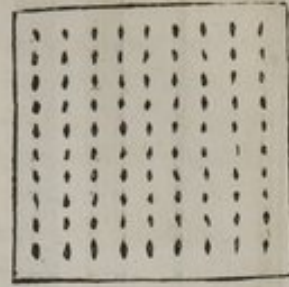
The *Tampon* is a mass of charpie varying in size, rolled between the hands into the shape of a ball: it serves for cleansing ulcerated surfaces and for stopping hemorrhage. For the latter indication the tampon is frequently made of the boletus igniarius, or puff ball.

The *Pelote* is a large tampon surrounded by a morsel of soft rag, the edges of the latter being brought together and firmly tied: it is occasionally made use of in the treatment of hernia, and in the compression of large vessels, in operations, accidents, &c.

Compresses are pieces of linen used for confining dressings of charpie or lint in their proper situation, preserving wounds from the action of the air, equalizing the surface of members, compressing the soft parts, &c. The linen made use of should be moderately fine, and free from darns or hems. Compresses are folded or otherwise arranged, in various manners, to fulfil these several indications. They are either square or oblong: of the first variety are

The *Common Square Compress*, cut or rent sometimes of an oblong form, and then doubled so as to form a perfect square.

The *Cribriform Compress* (syn. *Com-
presse Fenêtrée*, Fr.), a square piece of fine
linen rag pierced with a considerable number
of small holes ; when applied, its under surface
is smeared with a little of any simple ointment.
It is employed to cover a large suppurating
surface, and allow of the easier displacement
of dressings which would become otherwise
adherent.



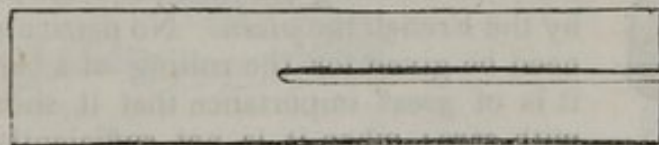
The *Maltese Cross*, formed from the com-
mon square compress by splitting it to a cer-
tain distance from the angles toward the centre ;
it is applied over the stump of a member after
amputation, in order to confine the dressings.
Of the second variety are



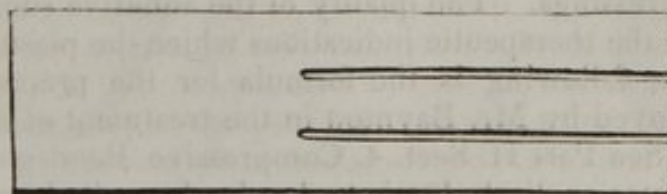
The *Common Oblong Compress*, which is
usually four times as long as it is wide ; it
serves to surround the trunk, or a member, for a variety
of purposes.

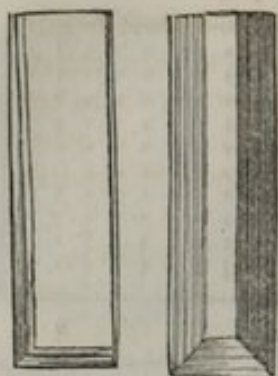


The *Single Split Compress*; an oblong piece of
linen split in the manner represented in the cut ; it is
applied over the stump of a limb in the process of
amputation of the arm or thigh, the tails passing one on
each side of the bone to protect the soft parts from the
teeth of the saw.



The *Double Split Compress* differs only from the preceding in
being split into three heads ; it is employed with the same intention
in amputations of the fore-arm and leg.





The *Common Graduated Compress* ; a piece of linen folded several times upon itself; these folds ought to cover each other entirely: the manner of its construction will be seen in the description of the

Graduated Pyramidal Compress ; to form this compress the surgeon takes a strip of linen about a foot long, and of a breadth proportionate to the extent of the parts to be submitted to its action; he begins by folding it backwards and forwards from one end to the other, each fold

diminishing in breadth until the last bears a resemblance to the summit of a pyramid.

The two last are compressive and expellent.

Rollers are of linen, calico, or flannel; those of linen and calico are indifferently employed in all ordinary cases in which a roller is indicated; in some cases, however, flannel rollers are to be preferred; they afford greater warmth; they possess the quality of absorbing moisture freely; and their elasticity renders them peculiarly adapted to the treatment of rheumatismal and œdematous swellings, and even to fractures and dislocations, when they are followed by much tumefaction. There is an excellent elastic cotton roller made by Churton, No. 90, Oxford-street, possessing considerable lightness, which in many instances would advantageously replace the flannel roller. They are long bands rolled up into one or two heads; hence the terms, single and double-headed roller. The parts of a single-



headed roller are, the *head*, of *cylindrical* form, the *initial* end, or free extremity, and the *end*, properly so called, which remains concealed in the cylinder, and eventually terminates the bandage: the parts of a double-headed roller are, the heads (containing the ends), and the centre, called by the French the *plein*. No particular directions need be given for the rolling of a band, although it is of great importance that it should be done with care; when it is not sufficiently tight, it is

unsteady in the surgeon's hands, often slips through the fingers, and is difficult to apply; on the contrary, when it is rolled firmly, it can be applied with the utmost promptitude and precision.

Adhesive Plasters are plastic substances spread on calico, linen, or silk; they are cut into a great variety of forms and sizes, and are used for uniting divided parts, and sometimes for confining certain portions of dressings. The quality of the adhesive substance differs, according to the therapeutic indications which the plaster is intended to fulfil: the following is the formula for the preparation of the plaster employed by Mr. Baynton in the treatment of chronic ulcers of the legs (See Part II. Sect. 4. Compressive Bandage of the leg). Litharge plaster or diachylon is to be slowly melted in an iron ladle with a small quantity of resin, in the proportion of half a drachm of

the latter to an ounce of the former ; it should be stirred till it begins to cool, and then extended thinly over slips of smooth porous calico, of a convenient length and breadth, by sweeping it quickly from the end held by the left hand of the person who spreads it, to the other held by another person, with the common elastic spatula of apothecaries.

Plasters are occasionally applied to soften indolent tumors, to procure their resolution, or accelerate their suppuration ; in these cases the angles of the plasters should be divided, in order that they may be made to fix more accurately upon the part.

The *Seton* is a narrow strip of soft linen rag, a few of the longitudinal fibres of which are drawn out from each side, leaving a rough or jagged border, or a skein of silk or thread, or better still, as it is much more cleanly, a slip of elastic gum about four inches long ; it is used for exciting inflammation and suppuration, by being pushed through a fold of the skin, in a needle made for the purpose.

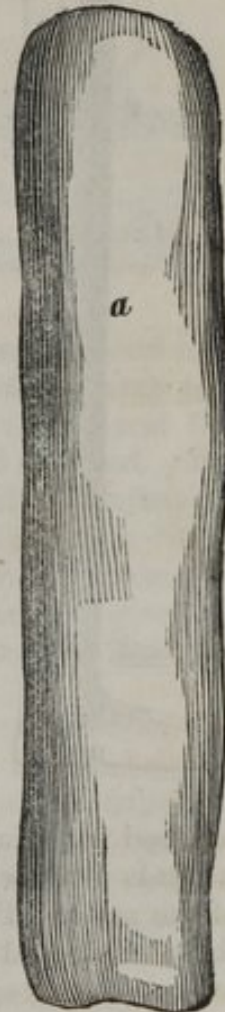
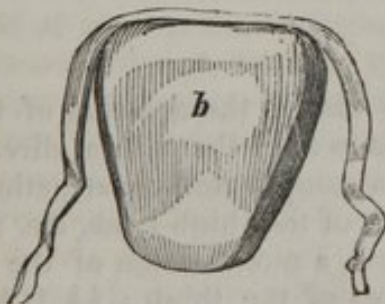


The *Protective Bandelette* (syn. *Bandelette decoupee*, Fr.) is a very narrow strip of fine linen rag smeared over with simple ointment, and snipped along one border with a pair of scissors in the way represented in the wood-cut (1). The use of this is to surround a wound or ulcer, in order to protect its edges from the dressings which cover it, and which by their adherence would frequently disturb the process of cicatrization.

(1)



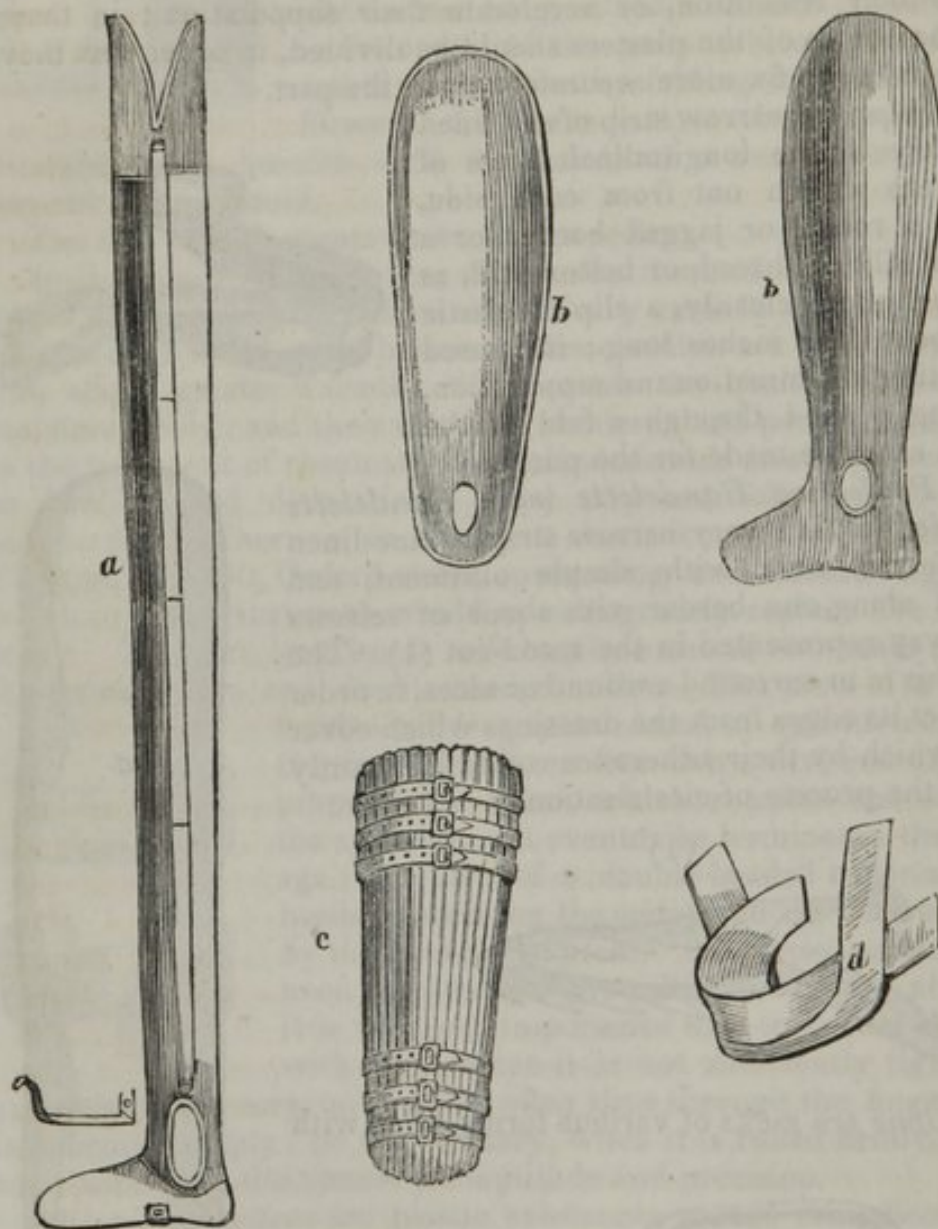
Cushions are sacks of various forms, filled with



oat-chaff or any other appropriate material : those employed in fractures are filled about three-quarters full, and should be a little longer

and wider than the splints ; they are made use of also to support the extremities in cases of wounds and fractures, and are to be met with in the shops, for this purpose, made of an impervious tissue distended with air ; *a*, cushion for splints in fractures of the lower extremities ; *b*, Dessault's cushion, employed in fractures of the clavicle, &c.

Splints are thin pieces of wood or pasteboard, of various forms, used in the treatment of fractures and luxations, for maintaining the



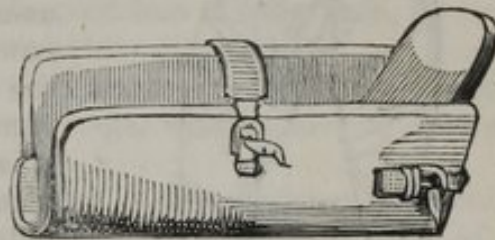
reduced parts in their natural position ; also in the dressing of those wounds in which the cicatrization tends to alter the natural direction of the parts. They are sometimes of a complicated construction, as those employed in fractures of the neck of the thigh-bone, &c. ; the ones represented by the wood-cuts are, *a*, a modification of the long splint (Dessault's) employed in fractures of the thigh ; *bb*, (Cline's splints) they are wooden splints hollowed in such a manner as to be able to accommodate themselves to the form of the leg, with holes

to receive the malleoli ; *c*, a splint made of a very thin piece of wood, to the inside of which is glued a piece of soft leather of the same size ; the wood is afterwards split into several strips, it is thus rendered capable of adapting itself with tolerable accuracy to the arm, where it is most usually applied ; *d*, a pasteboard splint for fracture of the lower jaw-bone. See the various kinds of apparatus for fractures in the second part of the work.

Pallettes.—A pallette, or hand splint, is a thin flat piece of any light wood shaped out to the form of the hand and fingers, which it is employed to sustain in injuries of these parts.

Soles are similar pieces of wood cut in the form of the sole of a shoe ; they are pierced at the sides with two holes called mortises : their use is to sustain the foot, and prevent its extension and change of position in fractures of the lower extremities : they may in general be replaced by a band, the centre of which is to be applied to the sole of the foot, one circular turn being effected with it round the foot ; the extremities are then crossed at the bend of the instep, and afterwards secured one on each side to some part of the lower portion of the apparatus. Soles form a part of certain compound apparatus, and are sometimes made of iron.

Hospital Fracture Box.—The sides and foot-board move upon hinges, which connect them with its floor : the entire of its inner surface is lined with flat cushions, and the footboard padded ; over these a sheet of oil-skin is thrown to protect them from the moisture



of the applications ; the leg is gently deposited on the middle cushion, and the sides of the box raised and kept fast by a cross strap and buckle ; a band is then applied round the ankle and instep, and the ends are brought through the fissures of the foot-board and tied. By this means a moderate extension may be kept up ; a further extension can be easily made by drawing the whole box downwards a little, and tightening the cross strap, its weight alone being sufficient to maintain it in its proper situation. When it is required to give the limb a semiflexed position, a pillow should be introduced beneath the upper end of the box, where the ham rests.

This is a convenient machine, and may be readily constructed : it admits of applications being made immediately upon the limb without disconcerting it, from the upper surface of the limb lying exposed.

Fracture Bridge.—Two pieces of wood an inch and a-half square, and from twenty to twenty-four inches in length, are each perforated on one of their faces to a certain depth with four holes, into which are introduced the ends of four slender iron rods bent over to connect them ; these last are bound together by a bit of wire which runs along the upper part. It serves to protect the injured limb from the pressure of the bed-clothes. Broad thin strips of wood may be conveniently substituted for the iron rods.

BANDAGING is understood to be the confinement in their proper situation of dressings and other surgical remedies ; and also of those parts of the body, which, from a previous state of displacement, the surgeon has restored to their natural position. It is effected by one or more rollers, linen, &c. or certain mechanical contrivances.

Bandages are called *simple*, which result from the application of the roller only, as the compressive bandage for ulcers on the leg, that for the suppression of hemorrhage from the temporal artery, the capeline, &c. ; and *compound* when they bear a complex form of preparation, such as the T, the split-cloth, the eighteen-tailed bandage, &c. and the herniary or other mechanical apparatus. They have received particular appellations from their direction or form, and uses : hence they assume from the first the names of circular, spiral, reversed, and spica ; and from the second, those of uniting, dividing, compressing, expelling, and retaining.



Of the first kind, that called the *circular (a)*, is formed of horizontal circumvolutions, which almost entirely overlap each other. The *Spiral Bandage* bears its definition in the name ; it is called by the French *rampant (b)*, where the borders of the roller barely touch, and the circumvolutions are not very numerous : it is said by them to be in *doloires (c)*, where the turns, somewhat less elevated, and consequently more numerous, overlap each other by about two-thirds of the entire width of the band. In some cases, as in applying, for instance, a roller to the leg, the turns cannot be laid down flatly, as the upper border will compress the salient part of the limb, while the lower one hangs loose. This inconvenience is obviated by reversing it at every turn,

so that the superior border becomes the inferior, and the external face the internal : the hand should press lightly over each reverse to flatten and equalize it. This is the *Reversed Bandage (d)*.

Two things are to be observed in applying the reversed bandage ; one is not to unroll, in making the angle, more of the band than is absolutely necessary ; the other, to carry the angles upwards in a perpendicular line, and always far from the part affected.

When the turns of the roller cross each other in the form of the Greek *lambda*, and leave the band about one-third discovered, the Λ 's being applied upon each other, the bandage receives the name of *Spica (e)* : it is said to be ascendent when the doloires are directed towards the superior part of the member, and descendent when they regard inferiorly.

Of the second kind, the *Uniting Bandage* is that which is used in incised wounds ; it should be adapted to their direction according as they affect a longitudinal or transverse course more or less complete : for longitudinal wounds it is constructed with a double-headed roller, the breadth of which ought to correspond to the length of the wound : a longitudinal slit is to be made in the middle, in order to allow the surgeon, when applying the bandage, to pass through it the head of the roller, and bring together the edges of the wound ; this bandage takes the form of the *spica descendens*. Or it may be made for such wounds with a single-headed roller, by dividing it at one end to a convenient distance into three tails, and making a little way beyond the termination of these, three longitudinal openings to receive them. The uniting bandage for transverse wounds consists of two strong linen bands of the width of the wound, and as long as the member ; one of these is to be split to about half its length into two or three tails or *bandelettes*, and the other perforated in the middle with three corresponding longitudinal openings. See Part II. Sec. 4. Bandages for longitudinal and transverse wounds of the thigh.

The *Dividing Bandage* is that which is used in the treatment of burns, and of wounds attended with great loss of substance, for preventing the formation of seams or unsightly cicatrices.

The *Compressing Bandage* is that employed for exerting compression in sprains, œdematous swellings, callous ulcers, varices, aneurisms, erectile tumours, &c.

The *Expelling Bandage* is employed in the treatment of ulcers, deep-seated abscesses, contused wounds, &c. It is composed of a roller applied over graduated compresses, upon the region wherein the pus or blood is lodged, to which it is desired to give issue : it prevents these fluids from insinuating themselves along the interstices of the muscles, detaching the skin from its adherence to the subjacent parts, and forming sinuses.

Retaining Bandages are those which serve to confine dressings and displaced parts in their proper situation. Into this class enter herniary bandages, and those for fractures and dislocations.

A general rule to observe, in applying a common roller in the construction of these bandages, is to take the cylindrical part of it in the right hand, and hold the initial end between the thumb and finger of the left ; then applying the external face of the latter upon some point of the circumference of the part, and retaining it there for an instant under pressure of the fingers of the same hand, to unrol the head and pass a few circulars about it, of moderate tightness, in order to fix it. The head in being unrolled should be held between the thumb and two first fingers, or between the thumb and index finger alone, so that it may turn upon its axis, and in this way it is much less liable to escape than when held in the palm : each time it changes hands, the one that receives it should unrol so much only as will allow of its arriving at the point at which it should pass into the other. A bandage is useless which does not give the

most perfect support to the parts, maintain them in the position necessary to ensure the fulfilment of the indication proposed, and exert on the member an equable compression : for this, they require sometimes to be moistened, which will occasion them to sit more firmly. When applied too tight, or when the compression is not uniform, very serious consequences arise, such as œdematous swellings, and even mortification : they should always be terminated opposite to the affected part.

In the department of surgery which constitutes the subject of the present work, more perhaps than in any other, is the practitioner's reputation exposed to the severity of criticism ; and on the degree of knowledge and dexterity which he evinces in this, to be attested by the greater or less acuteness of the patient's sufferings, the duration of the treatment, and the issue of the case, will be found to depend the favourable or unfavourable general opinion of his talents : the majority of people can only appreciate what is palpable to the senses in the practice of the healing art, and therefore it is not surprising that they exercise their privilege of criticism to its utmost limits here.

In commencing a dressing, the first care of the surgeon, when it *can* be done, should be to place himself on that side of the patient upon which he is to act. His movements ought to be entirely unrestrained : he begins by cleansing the parts with a sponge or dossil of lint, employing when necessary warm water or some appropriate lotion ; if there be any hairs near the edges of the affected part they are to be carefully shaved off : the dressings should be laid on very lightly in all cases where compression is not indicated. That done, he places the patient in the position the least likely to fatigue him ; and in certain cases, such as fractures, protects the limb from the pressure of the bed-clothes by some mechanical contrivance, as the fracture box. In the next dressing, his own position and that of the patient being attended to as above, he proceeds to uncover the parts, moistening first of all the applications where they adhere to them, in consequence of the pus or blood becoming dried ; when the same roller is to serve for the second or a subsequent dressing, he should unwind it from the part and re-form it at the same time. Should he have employed charpie, he is to take off the non-adherent couch with a pair of dressing forceps, and separate the rest in the process of cleansing the wound : this and the neighbouring parts being at length in a fit state to receive the dressings, he proceeds to their application in attending to the rule just laid down. As it is of importance not to expose a wound longer than is absolutely necessary to the action of the air, which may be considered in most instances injurious, it is always better for the surgeon to prepare beforehand the objects of which the dressing is to be composed, in order that he may be able to apply them in quick and regular succession.

No means ought to be neglected for protecting the nascent cicatrices ; the albuminous couch which covers the granulations, and the pellicle which extends from the edges of the solution of continuity

to the centre, should be always left intact, as they are the first products of the process of cicatrization.

The necessary interval of time that should elapse between each dressing is wholly dependent upon circumstances, such for instance as an abundant purulent discharge, the nature of the applications, and in some cases, even the state of the atmosphere ; some time is necessary after certain operations, as amputation, extirpation of tumours, &c. for the local inflammation to subside, which generally happens about the second day, when the dressings may be changed ; but whenever pain, inflammation, mortification, or other serious accidents supervene, the dressings must be attended to immediately. Bandages upon fractures, luxations, and herniæ, usually remain for a considerable time without derangement. The circumstances which demand the more frequent application of dressings, are putrid exhalations from suppurating surfaces during warm weather, the employment of medicated liquids containing aromatics, alcohol, &c. ; of remedies which become rancid, as oils, ointments, &c., and those whose degree of action is relative to the duration of their contact, such as caustics.

When a wound or ulcer is in full progress of cicatrization it should not be disturbed oftener than is absolutely necessary. The surgeon, to use the words of La Faye, being only the minister of nature, ought ever to lend his aid at her demand, but be extremely cautious of disturbing her in her operations, by rashness, or an inconsiderate zeal.

It is necessary now to enter into some details upon the principles on which dislocations, fractures, and herniæ are reduced and treated ; the author will do this as fully as the nature of the work permits, and proceed at once to the description, application, and uses of bandages in particular.

1. *Dislocations*.—There are certain conditions necessary to the coaptation of the ends of displaced bones, the muscles which offer resistance to the reduction by their contractile powers, must be put into a complete state of relaxation ; and when this can be done by merely affecting the position of the parts, the difficulty is at once ended, but most frequently it requires the application of an extending and counter-extending force ; and even this requires, in certain cases, to be seconded by therapeutic agents, such as are calculated to diminish the great muscular strength of the patient ; all attempts at reduction will prove fruitless, unless the bone with which the dislocated head is naturally articulated be kept in a permanently fixed position by means of the counter-extending force ; the extending force should always be in relation to the degree of muscular resistance, but always more powerful. It is important to take into consideration the causes of the displacement, in order to be guided in the direction in which extension should be exercised ; it is found that the head of the bone becomes more readily disengaged from its new situation, and returned to the articular cavity, in being made to follow the same course which it took in quitting it.

With respect to the part of the member upon which the extending force is to be applied, a great difference of opinion prevails ; the ancients as well as many modern surgeons of great eminence, to cite only Pott in our own country, and J. L. Petit in France, preferred applying it to the luxated bone itself ; but the French, in general, make extension from the most distant point possible of the bone with which it rests articulated ; and Sir A. Cooper even sanctions the latter method in the reduction of a dislocated humerus ; two great advantages they believe accrue from this : first, the reduction is not impeded by the spasmodic contractions occasioned by a compression of the muscles which surround the dislocated bone ; and, secondly, by making use, as in this case, of a longer lever, the extending force is rendered more considerable.

The fixed point with which the counter-extending force is connected, must at all times be sufficient to resist the traction between these two powers, and the extension may be operated by means of multiplied pulleys, or a sheet or towel applied round the limb, and pulled by a sufficient number of assistants ; both forces may in less difficult cases be exercised by assistants only : however the extension be employed, it should always at first act in the direction that the luxated bone actually presents, and then by little and little in its natural direction ; if effected according to the first of the above methods, it is recommended to place the member in a state of demiflexion ; the extension should be effected gradually, beginning with the smallest, and increasing to the highest degree of power necessary ; as well as gradual it should be continual, for if done by shocks the greatest difficulties will supervene from spasmodic muscular contraction. Pressure ought never to be made either upon the articulated cavity or upon any point between this and the head of the bone ; the extending force should act upon a broad surface, so as not to excoriate the skin, and it is well in many cases to apply about the part acted on, a quantity of tow or other soft material.

The therapeutic agents employed in cases of great difficulty are bleeding, the warm-bath, antispasmodics, and the tartrate of antimony and potash. The state of intoxication has been found also favourable to the reduction. Mr. Samuel Cooper states the greatest advantages to have been derived from the employment of the emetic-tartar, and the author's own experience has tended to confirm him of its efficacy. It is not easy to assign a period after which attempts at reduction become useless and even dangerous ; this is particularly the case when sufficient time has elapsed to allow of the torn fibrous capsule to become consolidated, the articular cavity to become nearly or entirely obliterated, the ligaments and cartilages to become so enlarged as to fill the space formerly occupied by the end of the displaced bone, and lastly, when it has permitted the latter to become so adherent to the parts in its new situation as to be confined by a new bony socket. Spontaneous dislocation, which originates in ulceration or suppuration of the joint, is irreducible, from the ligaments being destroyed, and the brim of the acetabulum annihi-

lated ; but it is not so when it is owing to an extraordinary degree of looseness of the ligaments, although a recurrence of the dislocation is liable to happen from the slightest causes. Certain it is, that the ginglymoid articulations cease to become reducible sooner than the anarthrotic ; much, however, seems to depend upon the patient's age, and the more or less relaxed state of the muscular fibre. Sir Astley Cooper allots usually the term of three months to the attempt at reduction of a luxated humerus, but of two only in dislocations of the hip.

If it is remembered that a dislocation can only happen when the bone is surprised by some external violence at the instant when the axis of its body or extremity may have taken an oblique direction relatively to the surface with which it is articulated ; it will appear evident, that when the luxated bone is reduced, all that remains to be done is to keep it in a state of immobility : the means to be employed for this will be mentioned in the second part of the work, in treating of bandages in particular.

2. *Fractures*.—Little need be said of the reduction of fractures after having spoken of the means to be employed in that of dislocations, the general principles are the same ; the French apply the extending force to that part of the limb which is articulated with the lower end of the bone, and the counter-extending force to that which is articulated with the upper ; the object which the French have in view in not applying these forces upon the fractured bone, is to avoid an irritation of the muscles, that might cause a spasmodic contraction and impede the efforts at reduction ; thus in fractures of the thigh the means of extension act upon the lower part of the leg, and those of counter-extension upon the pelvis.

The doctrines taught in our own schools, inculcate as a leading principle the necessity of putting the limb in a position capable of relaxing the more powerful muscles connected with the fractured bone, and of employing the extending and counter-extending forces to act upon the bone itself ; this, however, being found defective in the reduction of a broken thigh, preference is given here to the former method ; there are other exceptions also to this plan of reduction, where, for instance, the application of the reductive means at a distance from the effected part, is necessitated by the peculiar disposition of the part itself ; thus in fractures of the clavicle, the extension must be practised upon the arm and shoulder, and the counter-extension upon the trunk : neither is the French mode, above mentioned, capable of universal application, as is seen in fractures of the lower jaw ; extension in these cases can only be operated upon the bone itself, in order to put the fragments into contact. There are fractures in which coaptation alone suffices, the displacement being due to the external cause which produced the accident ; such are, for example, those of the bones of the head, the nasal bones, the ribs, &c.

The direction in which extension is to be employed is relative to that affected by the displaced fragment itself ; thus in oblique fractures of the humerus, if the lower fragment mounts on the inside, the

extension should be made obliquely downwards and outwards, then downwards, in order to restore it to its natural position. The degree of force necessary to be employed is no more appreciable, *à priori*, in fractures, than in dislocations; it must always be in relation to the kind of displacement and to the resistance of the muscles of the part. When sufficient extension has been made, the broken ends of the bones are to be placed in their natural situation, or, as is said, coapted; the surgeon proceeds in fractures of the limbs by acting upon the lower fragment, to regulate their contact, and should he deem it indispensably necessary to apply his fingers directly on the fracture, he should do it as lightly as possible, to avoid pressing the soft parts against the splinters.

With respect to the means of keeping fractures reduced, it is to be first observed that a multiplicity of causes would disconcert the coaptation of the fragments, were not effectual means resorted to by the surgeon for rendering them immobile by the use of appropriate apparatus. Nor is the position of the part and even of the whole body a thing of small importance. "The most favourable position," says Mr. S. Cooper, "for a fractured limb, is that in which all the muscles passing over the fracture, and extending either to the lower fragment or to that part of the limb which is articulated with it are equally relaxed; the injured limb should also have a firm support at every point, and its position ought to be so regulated, that not only this object be carefully fulfilled, but at the same time the chance of displacement from the action of the muscles, or the weight of the body or part itself, may be diminished as much as possible." The bed on which a patient ought to be placed, who is labouring under a fracture, should be narrow, so as to allow of the surgeon getting conveniently at the limb: the patient should repose upon a mattress, and never on a feather-bed. Baron Boyer recommended as the best pillow for supporting a broken limb, one stuffed with oat chaff; he considers it also less heating than a pillow of feathers, and less apt to soil.

Dessault and Baron Boyer recommended, in fractures of the thigh-bone, keeping the limb in a straight posture; and of the various apparatus invented for the purpose, that of the last of these distinguished surgeons is perhaps of all others the best calculated to fulfil the indications proposed by this method of treatment. Pott considered the best position, to be that in which the limb is laid upon its outside with the knee bent, the fractured bone resting on the great trochanter, while the leg and foot are supported by smooth pillows, and slightly elevated. Considerable objection has of late years been made to Pott's method, principally on account of its leaving the lower part of the limb too movable and unsupported, and imperfectly fulfilling the proposed indication, namely, of preventing disturbance of the coapted fragments. Sir Charles Bell prefers placing the patient upon his back, and supporting the limb upon a double inclined plane; a machine is constructed for this purpose, which consists of boards ten or eleven inches in breadth, one reaching from the heel to the ham,

and the other from the ham to the tuberosity of the ischium; they are united at an angle at the knee joint, and their lower ends are united together by a horizontal board; cushions are placed on this, and upon all, the limb in a bent position. After the fracture has been reduced, a long splint is applied from the hip to the knee, and another along the inside of the thigh: the lower part of the apparatus is furnished with a foot-board for preventing the foot from being turned outwards, and keeping the limb steady.

Each of these methods has its partisans, but the general opinion appears to be fast growing in favour of the latter, both here and on the Continent.

A means of preserving the immobility necessary to the favourable progress of reduced fractures, greatly occupies at present the attention of practitioners, namely, by plaster of Paris; the limb is embedded in this substance to a certain extent, which, as it becomes hard, renders all motion of the fragments impracticable. This method appears best indicated in fractures of the middle and inferior parts of the lower extremities, where the patient is unmanageable, and there is no inflammation of the parts; its practice seems to have been hitherto attended with success, and may at all times serve as an adjuvant to the ordinary methods of treatment.

A difference of opinion prevails in the profession as to the real advantages derived from the compression of the limb by means of bandages; the French greatly inculcate its necessity, but Assalini disapproves altogether of the employment of tight bandages, and of covering the whole of a broken limb with splints: he treated at Paris a transverse fracture of the patella, by placing the limb upon a concave splint, the shape of the latter being adapted to the under surface of the leg and thigh. No bandage was employed in this case; two leather straps were crossed upon the knee and included the fractured bone: he afterwards treated fractures of the thigh and leg upon the same principle, employing in cases of the former, a hollow splint to receive the thigh, with two lateral branches going from it along the leg. The apparatus has a kind of sole also, for the support of the foot; it is simply fastened with a few straps. The advantages of this method are, that the practitioner has the whole front of the limb in view, and may apply the dressings readily in cases of compound fracture.

An admirable and very simple contrivance has been invented by a distinguished surgeon, Dr. Sauter, of Constance, for treating fractures of the lower extremities, &c. without the use at all of splints, announced by that gentleman some years ago,* and afterwards modified by Dr. M. Mayor, of Lausanne,† a short time after his translating into French M. Sauter's work. "Dr. Sauter, convinced that position

* *Instruction pour traiter sûrement, commodement, et sans attelles les fractures des extrémités, &c.*, par le Docteur Sauter, &c. Constance, 1812.

† *Mémoire sur l'Hyponarthésie, ou sur le traitement des fractures par la planchette, &c.*; par Matthias Mayor, Docteur-Médecin, Chirurgien de l'Hôpital du Canton de Vaud, &c. Genève, 1827.

and immobility are the two essential conditions of the cure of a fractured limb, proposed to himself the following problem. To treat a broken limb, presenting even the most serious complications, simply by position, and without any splint, and at the same time to permit the limb to accommodate itself to the movements of the trunk with perfect ease and security." (*Bulletin Général de Thérapeutique, Médicale et Chirurgicale*, 15 Janvier, 1832.)

He appears to have resolved it successfully, and the modifications of M. Mayor have brought the plan to a high degree of perfection. An account of the apparatus, as modified by M. Mayor, with the method of treating fractures by its means, together with the advantages to be derived from its employment, translated from the *Bulletin de Thérapeutique*, will be found detailed in an Appendix to this volume.

3. *Herniæ*.—The only herniæ to be made mention of here, in what relates to their reduction, are those of the abdomen.

To operate the reduction of a hernia, it sometimes suffices to cause the patient to lie upon his back, and exercise a gentle pressure upon the tumour; but in general recourse must be had to the *taxis*, which is performed in the following manner:—The patient ought to be so placed that the muscles of the abdomen may be relaxed in the greatest possible degree; for this reason he is made to repose upon his back, his head elevated by pillows, and consequently inclined upon the chest; his legs are to be flexed, his pelvis raised a little higher than the belly, and inclined a little to the side opposed to the hernia; he should remain motionless, and make the least considerable efforts of respiration possible. The surgeon, placing himself on the side corresponding to the tumour, lays hold of it with one hand by its base, and, directing it in the axis of the aperture, exercises on it a gentle and continued pressure, as if he were engaged in emptying it; then with the thumb and the three first fingers of the other hand, taking hold of it by the pedicle, he pushes the parts of the tumour nearest the aperture inside, and the rest by little and little, taking care, however, not to allow them to escape as they are gradually thrust within. When the tumour is very voluminous, the surgeon employs both his hands upon the pedicle, while an assistant makes compression upon the base. Difficulty is occasionally met with in returning the intestine, and then it will be found requisite to press it in different manners to free it of the fæcal matter which it generally contains in these cases in large quantity. Sir Astley Cooper recommends compression, if necessary, to be continued for the space of a quarter of an hour, when the parts will in most instances be found to yield.

The means employed in maintaining reduced herniæ consist in keeping up an uninterrupted pressure upon the parts by means of bandages, which vary according to their seat, their number, the age of the patient, &c. More particulars relating to the after-treatment of reduced herniæ will be found in the second part of the work, in the description of Herniary apparatus.

PART THE SECOND.

ON BANDAGES IN PARTICULAR.

SECTION I.

BANDAGES OF THE HEAD AND NECK.

1. HEAD-BAND.

(Syn. Bandeau, Fr.)

Composition.—A piece of linen a yard long and a quarter of a yard wide, folded lengthways in four.

Application.—The centre of the head-band is placed upon the median line of the forehead, and the extremities, after being conducted to, and crossed at, the nape of the neck, are returned and pinned over one of the temples.

Use.—To confine dressings upon the forehead, the temples, or the eyes.

2. TRIANGULAR BANDAGE OF THE HEAD.

(Syn. Couvre-chef en triangle, Fr.)

Composition.—A handkerchief, or piece of linen of the same form, folded triangularly.

Application.—Being held by the middle, the fingers of each hand placed beneath, and the thumb above, it is applied to the median line of the forehead; the two lateral angles are conducted over the eyebrows and above the ears as far as the occiput, where they are made to pass over the posterior angle, they are returned from thence to the forehead, and are either pinned or fastened by a bow.

Use.—To confine a dressing upon the head.

3. FOUR-TAILED BANDAGE OF THE HEAD.

(Syn. Fronde, Fr.)

Composition.—A strip of cloth a yard long and six inches broad, split at each end to within three fingers' breadth of the centre.



Application.—When the wound is on the forehead, the unsplit portion is applied there, and the two upper tails, carried posteriorly, are fixed at the back of the head; the lower tails are then fastened either upon the vertex or beneath the chin, as the surgeon may consider it more convenient. To confine a dressing upon the summit of the head, the posterior tails, *a*, are brought down and secured beneath the chin; the anterior tails, *b b*, after being carried to the nape of the neck and crossed, are fixed before the throat. In applying it to the nape of the neck, the upper tails are conducted over the forehead, from whence, after being made

to cross each other, they are returned, and fastened at the occiput; the lower tails pass round the neck.

Use.—This bandage, a very simple and convenient one, is of great utility in wounds of the head, as it can be applied over every point of this part, by merely changing its direction.

4. SIX-TAILED BANDAGE.

(Syn. Bandage of Galien.)

Composition.—A piece of linen a yard long and a quarter of a yard wide, split at each end, to within three fingers' breadth of the centre, into three portions, the central being somewhat broader than the others.



Application.—The surgeon first reverses the posterior tails upon the central, and the anterior upon the posterior; placing the bandage upon the summit of the head, he takes the central tails, *a a a*, between the thumb and fingers of each hand, and passing them along the ears, secures them underneath the chin *b*, observing, however, to fold the edges of each tail inwards so as to give it a triangular form, the base corresponding to the unsplit portion; the frontal tails are to be directed from the anterior to the posterior part of the head, where they should overlap each other; and the occipital tails at length brought forward and secured upon the brow.

Use.—The same as the preceding, but it has the double advantage of not being liable to displacement, and of confining a larger dressing.

5. CAPELINA.

(Syn. Capeline, Fr. ; Reflex Capitis, Lat. ; Bandage of Hippocrates.)

Composition.—A double-headed roller.

Application.—The centre of the roller is placed upon the occiput. After two or three circles the rollers intersect each other upon the forehead and occiput ; one of these being then reflected over the vertex to the forehead, the other is continued in a circular course. They next cross each other upon the forehead, when the first head is carried obliquely backwards to the occiput, and reflected by the side of the other. The last, *a a*, is continued in a circular direction, but the first, *b*, is again brought over the head, and carried in this way backwards and forwards in doloires till the head is entirely covered.



Use.—This elegant bandage serves to confine dressings upon the head, but is rarely now employed ; the ancients exerted, by its means, compression on the heads of hydrocephalic patients.

6. T BANDAGE OF THE HEAD.

Composition.—A band two yards long and two inches wide, upon which, at about one-third of the entire length, a bandelette half a yard long and of the same width, is stitched at right angles. The band is rolled up into two heads of different sizes.

Application.—Placing himself before the patient, the surgeon applies it to the middle of the forehead, the uppermost edge being that which corresponds to the vertical portion, *a*, of the bandage, in order that the latter, after traversing the vertex, may hang loosely upon the nape of the neck ; he now unfolds the heads in passing them along the temples to the occipital region, where they cross the bandelette, which should be immediately reflected upwards, *b*, and secured upon the brow by a few turns of the larger head, *c*. A double T may be formed by simply stitching a second bandelette upon the transverse portion, at a convenient distance from the first.



Use.—Like all the foregoing, it is a retaining bandage ; in the choice of these the surgeon must of necessity be guided by circumstances.

7. NODOSE BANDAGE.

(Syn. Scapha, Lat.; Nœud d'Emballeur, Fr.)

Composition.—A simple band four yards long and two fingers' breadth wide, rolled up into two heads of unequal size.

Application.—The unrolled portion being applied over the graduated compresses, *a*, that cover the wounded artery, the surgeon conducts the two heads before and behind, to the opposite temple, where he crosses them in order to return to the point of departure; he now gives them a turn or twist, *b*, which enables him to carry one over the summit of the head, and the other underneath the chin, *c d*, to the sound side, where they meet and cross as in the first instance; from thence they are conducted in the same course, *e e*, to the point of departure, and a second twist being effected, they are conducted for the third time to the opposite temple, and for the third time also returned horizontally and knotted:

being conducted finally, the one head over the vertex, and the other underneath the chin, the bandage is terminated by a few circulars of the long head.

Use.—For stopping hemorrhage of the temporal artery, or of any of its branches; it may be conveniently replaced by a graduated compress and a single-headed roller, a few circulars of moderate tightness being all that is in general required to arrest the flow of blood.

8. DOUBLE T BANDAGE OF THE NOSE.

Composition.—A narrow band about a yard long and half an inch broad, upon the middle of which are stitched at right angles, and about three-fourths of an inch apart, two others of the same breadth, and of about one half the length of the first.

Application.—The middle of the transverse band, *a*, is placed upon the upper lip, the two others being directed upwards; the extremities of the first are then conducted below the ears as far as the nape of the neck, where they are fastened by a bow; the vertical bands, *b b*, crossed at the root of the nose, are diverged upon the brow, and carried along the parietal bones to the transverse portion of the bandage, under which they are made to pass, and are reflected upwards and secured.

Use.—Simply to confine a dressing upon the nose.



9. ANOTHER BANDAGE FOR THE NOSE.

(Epervier, Fr.)

Composition.—A piece of linen is cut into a triangular form, of sufficient size to cover the nose, with two holes perforated near the inferior angles to correspond with the nostrils; a triangular portion is cut out from the superior angle of this, the apex of which looks downwards on the median line; the divided edges are sewed together; a sort of bag is formed in this way, capable of lodging the nose exactly; to the lower part of the bag is stitched a narrow band half a yard long and half an inch wide, and to the summit a second band of like dimensions.

Application.—The bag is adapted to the nose; the surgeon lays hold of the inferior tails, and passing them beneath the ears, ties them in a bow upon the nape of the neck: he then conducts the superior tail along the sagittal suture as far as the transverse band, under which he passes it, reflecting the end upward to secure it to the descending portion.

Use.—The same as the foregoing.

10. MONOCLE.

Composition.—A single-headed roller four or five yards long and two fingers' breadth wide.

Application.—Two horizontal turns are first made round the forehead; the head of the roller upon reaching, for the second time, the nape of the neck, is carried under the ear of the affected side and obliquely upward to the eye, inclined towards its internal angle; pursuing the same direction, it crosses the forehead over the sound eye near the temple of the same side, to arrive again at the nape. Two or three more oblique turns being made in a similar manner in the form of doloires open inferiorly, *a a a*, the bandage is terminated by a few horizontal circulars about the brow, *b b*.



Use.—To confine a dressing upon the eye.

Observations.—This bandage, extremely elegant, has the disadvantage, however, of being easily deranged; to prevent this as much as possible, the head should be covered with a night-cap. It is not, at present, much employed, being generally replaced by the Head-band, page 25.

11. BANDAGE FOR THE HARE-LIP OPERATION.

Composition.—Two small pledgets to be placed under the extremities of the needles, *a a*;—a moderate-sized roller;—a double-headed roller three yards long and a finger's breadth wide;—a bandelette four feet long;—two graduated compresses of sufficient thickness to prevent the uniting bandage when applied upon the

cheeks from touching the needles ;—lastly a four-tailed bandage, page 25.

Application.—The patient's head being covered with a night-cap, *b*, which is fixed by a few circulars of the single-headed roller,

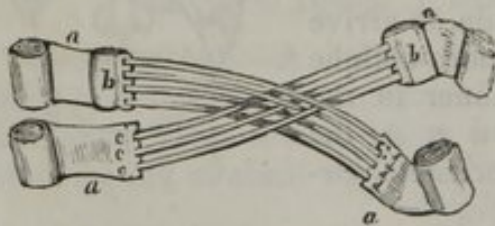


c c, the centre, *d*, of the bandelette is applied upon the vertex, and the extremities allowed to hang down on each side of the face ; an assistant covers these with the graduated compresses, *e e*, which he places opposite to the commissures of the lips, at the same time that he pushes the cheeks forward. That done, the centre of the double-headed roller is applied upon the forehead ; its heads are directed toward the nape of the neck, crossed, brought forward horizontally, first over the compresses, then the lips, where they are crossed anew, and returned successively to the occiput and forehead, *f f f f*. They are made to continue this course until they are entirely exhausted, and the ends

are fastened to the cap with pins : the extremities of the bandelettes are now reflected upward and pinned upon the top of the head, *g g*, and the whole apparatus is secured with the four-tailed bandage of the chin, page 31.

12. M. THILLAYE'S BANDAGE FOR THE SAME.

Composition.—Four pieces of tape are required, each about two feet in length and broad in proportion to the depth of the lip, *a a a a* ;



to the extremities of two of these bands, which may be denominated posterior, are stitched two small linen pledgets or cushions, *b b*, about three-quarters of an inch square ; while the two extremities of the others, or anterior tapes, are folded under to have more solidity. Upon the

extremity of one of these, are stitched three strips of extremely narrow riband, *c c c*, three inches and a half long, to connect it with one of the pledgets, to which also they are to be in like manner fastened, with a small space left on the free edges : four strips of riband, *d d d d*, similar to the first, are stitched to the extremity of the anterior tape of the opposite side, which, after being passed through the intervals of the first set, are fixed to the other pledget. By this disposition the bandelettes attached to either of the anterior tapes will be found attached to the pledget of the opposite side ; the free extremities of the tapes are then rolled up and pinned.—Two small graduated compresses, eight lines long by six wide ;—two cushions large enough to occupy the space comprehended between

the zygomatic arch on each side, and the inferior maxillary bone ;— a single-headed roller of moderate size ;—and two bandelettes, one a foot, and the other a foot and a half long.

Application.—The single-headed roller is first of all passed horizontally round the patient's head, to afford points for the fixing of certain parts of the apparatus ; after which, an assistant applies at the distance of half an inch from the incised part, the graduated compresses, *ee*, which he retains in place while the surgeon applies the central portion of the quadruple-headed roller upon the lip ; the latter then carries the heads of the posterior bands to which the pledgets are attached in a horizontal direction, over the cushions, *ff*, placed between the zygomatic arch and the lower edge of the inferior maxillary bone, as far as the nape of the neck ; from hence, after crossing each other in changing hands, they are made to ascend obliquely to the forehead, where the ends, *gg*, are pinned to the circles of the roller. Laying now hold of the anterior bands, he pulls them in opposite directions, and brings, by the aid of the pledgets, the edges of the wound into contact ; the heads of these two bands pursue the same course as those of the preceding, and the ends are fixed in like manner to the circles of the roller.



The bandelettes serve to render the apparatus more secure ; the first, *h*, passes along the sagittal suture, being attached before and behind to the circumvolutions of the roller ; and the second being applied by its middle, *i*, to the chin, passes upward to the temples, where it is fixed to the same circumvolutions ; a few stitches, *kk*, are inserted to connect it with the cushions, and the whole is retained by the four-tailed bandage of the chin.

13. FOUR-TAILED BANDAGE OF THE CHIN.

(Syn. Fronde du Menton, Fr.)

Composition.—See Four-tailed Bandage of the Head, page 25.

Application.—The middle part is placed upon the chin ; the two upper tails, *aa*, are carried simultaneously toward the nape of the neck, whence, after changing hands, they are conducted obliquely upward and forward to the forehead and pinned ; the lower tails, *bb*, are then directed upward, passing before the ears, and are crossed at the summit of the head, from whence they are returned and fixed beneath the chin.

Use.—To fix the apparatus of the Hare-lip operation ; it forms part also of the apparatus for fracture of the lower jaw, and is used to retain a reduced luxation of the condyles of that bone.



14. CHEVASTER.

Composition.—A single-headed roller five yards long and three fingers' breadth wide.



Application.—The initial end of the roller is applied upon the nape of the neck, and fixed by a few horizontal turns about the head; the head of the roller is next carried beneath the ear opposed to the affected side, then beneath the chin, and finally upon the fractured side of the maxillary bone; from hence it is made to ascend, *a*, along the face and pass obliquely over the vertex to arrive behind the ear of the sound side; it pursues twice or thrice the same circular course in forming *doloires*, *b b b*, open toward the median line of the face; it is then conducted round the neck in

order to embrace the anterior part of the chin, *c*; still conducted onward, but more obliquely in order to surround the neck, *d*, it gathers up the plaits of the first turn, and after being made once more to describe a vertical circular, it exhausts itself in horizontal turns about the head.

Use.—In fractures of the neck of the inferior maxillary bone.

Observation.—Some graduated compresses are previously placed behind the angle of the jaw, in order that the turns of the bandage may determine a greater pressure, and consequently push the lower fragment forward.

15. BANDAGE FOR FRACTURE OF THE LOWER JAW, WITH SPLINT.

Composition.—An oblong piece of thick pasteboard divided at each end to within an inch of the middle;—a four-tailed bandage;—some compresses.

Application.—The pasteboard is previously wetted and softened with vinegar, and afterwards adapted to the outside of the lower jaw, both along its side and under its basis; over this the four-tailed bandage is applied, the centre being placed upon the patient's chin, while the lower tails are pinned to the front of the night-cap, and the upper ones to a part of the same farther back. When the pasteboard has become dry it will be found to have taken the exact form of the parts, page 14, and a piece of soap-plaster being now applied to the skin underneath, any ill effects which might arise from the hardness or pressure of the pasteboard will be prevented.

Observations.—In recommending this bandage Mr. S. Cooper remarks, Surg. Dict. p. 507, that "In order to keep the middle portion of the bone from being drawn downwards and backwards toward the larynx, it is frequently necessary to apply tolerably thick compresses just under and behind the chin." "When the condyle is

fractured, as it is incessantly drawn forward by the action of the pterygoideus externus, and on account of its deep situation cannot be pressed back, the lower portion must be pushed into contact with it. For this purpose the bandage must be made to operate particularly on the angle of the jaw, where a thick compress should be placed."

16. MR. LONSDALE'S APPARATUS FOR FRACTURE OF THE LOWER JAW.

Composition.—A small plate of metal, *a*, fig. 1, grooved to fit on the teeth, is made to screw on a thin rod of steel, *b*, passing downward, and long enough to extend from two to three inches below the level of the chin; this rod is curved at its upper part, to prevent pressure on the lower lip. Upon the rod is made to pass up and down a plate of wood, *c*, shaped to the base of the jaw against which it rests, by means of a slide, *d*; the chin-piece is raised or depressed by means of a screw, which passes through a small bar projecting backward from the lower end of the vertical rod, *e, f*, and turned by a key, *g*, made to take off, to prevent pressure on the chest when the head is inclined forward, and also to guard against the patient loosening the instrument himself. Pressure is made laterally by two small plates, one on either side, *h*, fixed to a small bar, *i*, moving on a pivot by means of a small screw, *k*, underneath, and projecting from the inner part of the plate of wood upon which the chin rests; this bar stands out about three-quarters of an inch, and is then bent upwards at a right angle for an inch or more in length. Through this, at the upper part, a screw, *l*, passes, and is attached to the plate, which it can move backwards or forwards, and make to press laterally upon the jaw, more or less, according to the degree in which it is turned. The plate is steadied by a small bar fixed to it, sliding through the bar through which the above screw passes.

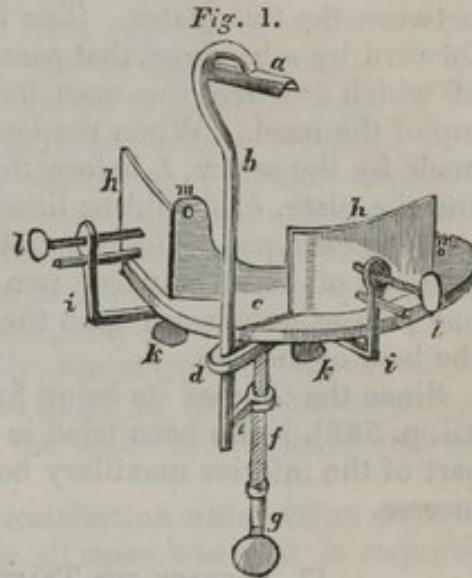


Fig. 2, represents a curved plate, grooved, to be screwed on the rod, *b*, when the fracture is on the left side of the symphysis.

Fig. 2.



Fig. 3.



Fig. 4.



Fig. 3, a plate curved for fracture on the right side of the symphysis, screwing to the rod, *b*.

Fig. 4, double-curved plate in cases of double fracture, to be fixed on the rod, *b*.

The teeth-plates should be washed with silver to preserve the saliva from acting on the steel, and producing a disagreeable secretion in the mouth.

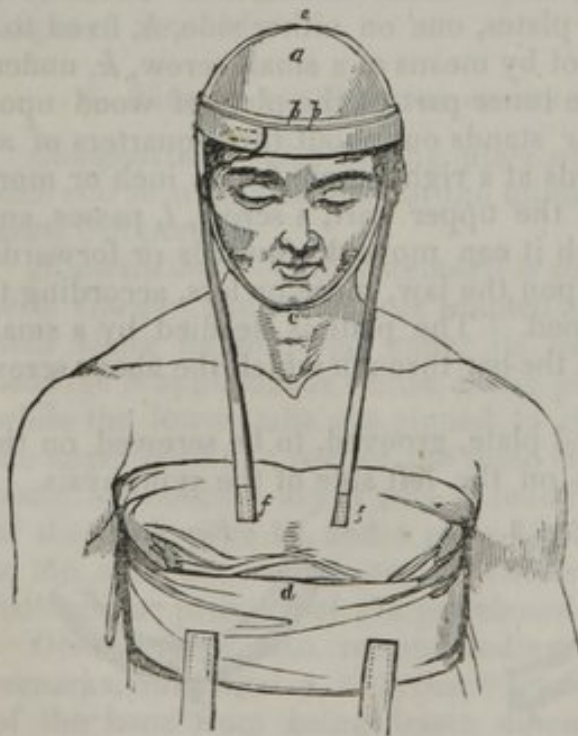
Application.—After having padded the plate that rests on the teeth with lint, or leather, as well as the chin-plate, and the portions of bone being brought into as close apposition as possible, the plate, *a*, is placed on the teeth, and the plate, *c*, beneath the base of the jaw, the screw, *f*, is then turned until the portions of bone are fixed between the two plates. The instrument is prevented from slipping forward by a bandage that passes through the holes, *m m*, the ends of which are tied, the ones behind the neck, and the others at the top of the head. When the lateral pressure is required, it should be made by the screw, *l*, before the pressure is completed on the teeth, and the plate, *h*, should be lined by a pad of lint.

Observations.—The principle of the instrument, is to confine the portions of bone between two parallel forces, so applied, that the one presses downward upon the teeth, and the other upward, beneath the base of the jaw.

Since the time of its being first announced (Medical Gazette, vol. xii. p. 565), it has been tried in many cases of fracture of the lower part of the inferior maxillary bone, and in all of them with complete success.

17. BANDAGE FOR TRANSVERSE WOUNDS OF THE NECK.

(Syn. Bandage flechisseur de la tête, Fr.)



Composition.—A single-headed roller four yards long:—a band a foot long and three fingers' breadth wide;—a body bandage with thigh-straps; and a compress a yard and a half long by eight inches wide, folded lengthwise in four.

Application.—A night-cap, *a*, is fixed upon the patient's head by a few horizontal turns, *bb*, of the roller, which are made to fix at the same time the extremities of the band, *c*, placed by its centre upon the inferior part of the chin. The body bandage, *d*, is applied round

the chest and pinned. The centre, *e*, of the compress being lastly applied upon the upper and back part of the head, and secured by a

few more horizontal turns of the roller, its pendent extremities are firmly fastened to the fore part of the body bandage, *ff*.

18. BANDAGE FOR BURNS ON THE FORE PART OF THE NECK.

(Syn. Bandage Divisif du Cou, Fr.)

Composition.—A double-headed roller six yards long and three fingers' breadth wide;—a band a yard long and of the same breadth as the roller;—some soft compresses.

Application.—The band is placed on the summit of the head, its extremities hanging down in front of and behind the neck. The centre of the double-headed roller is next applied over the median line of the forehead, so as to cover the anterior extremity of the band, while the heads, conducted backward as far as the nape of the neck, are made to engage, in crossing, its posterior extremity; from hence they are conducted before the shoulders and under the axilla (where the compresses should be previously placed), to the patient's back, where they again intersect each other, and are returned to the forehead. Crossing anew at the forehead, they are made to descend, a second time, to the nape of the neck, and pursue twice or thrice more the course just described: lastly, the anterior extremity of the band is reflected over the vertex and fixed to the posterior part of the apparatus, and what remains of the roller is exhausted in horizontal turns about the head.

Use.—To prevent the unsightly cicatrization which often succeeds to these accidents; it may be used in all cases where it is required to keep the head at a certain distance from the chest.

19. BANDAGE FOR BLEEDING AT THE JUGULAR VEIN.

Composition.—A ligature a yard and a half long;—a graduated compress;—a single-headed roller five or six yards in length and three fingers' breadth wide.

Application.—The patient's head being inclined to the side opposite to that on which the operation is to be performed, the graduated compress is laid upon the jugular vein at the lower part of the neck; the surgeon then applies the centre of the ligature upon the compress, and conducts the extremities one before and the other behind the chest, to the opposite axilla, where he ties them in a bow.

The operation ended, he passes lightly round the patient's neck a few horizontal turns, *a a*, of the roller, to con-



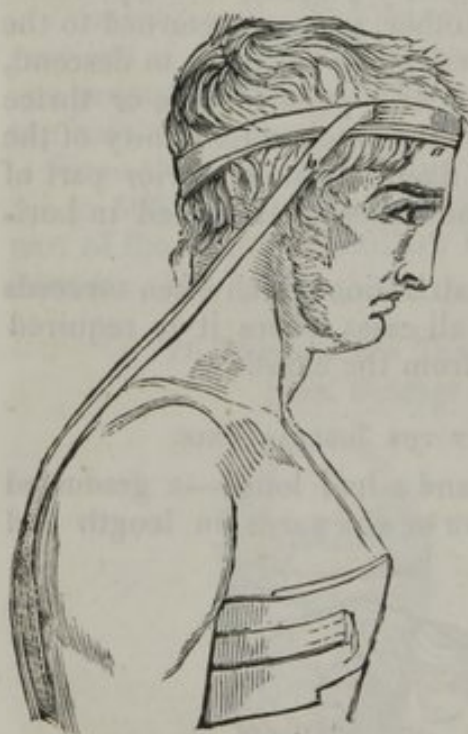
fine the dressing ; or a few such turns and three oblique circulars, *b b b*, carried underneath the opposite axilla, terminating always by one or two circulars about the neck.

Observations.—To avoid the ill consequences that might by possibility arise from the passage of air into the jugular vein, Baron Larrey recommends compression to be kept up until the wound is healed.

20. BANDAGE FOR WRY-NECK.

(Syn. Bandage de Winslow, Bandage rotatoire de la tête, Fr.)

Composition.—A single-headed roller three yards long and an inch and a half wide ;—some soft compresses or a cushion to protect the axilla against the pressure of the roller ; a napkin to surround the trunk.



Application.—The initial extremity, *a*, of the roller being directed toward the affected side, is placed upon the middle of the forehead and fixed by a few horizontal circulars ; these should be secured with pins. The remainder, *b*, of the roller is then carried behind the shoulder opposed to the side affected, and under the axilla, where the cushion ought to be previously placed, to the fore part of the napkin, to which it should be firmly stitched ; care being taken, however, to pull it with sufficient force to restore the head to its natural position.

Use.—In cases of spasm or paralysis of the sterno-cleido-mastoïdean and platysma-myoïdean muscles. It raises the head, brings round the face forward, and when

the affected parts have been operated on, opposes itself to the contractile efforts of the antagonist muscles.

21. PROFESSOR JÖRG'S APPARATUS FOR THE SAME.

This apparatus consists of a pair of leather stays, and of a band or fillet for the head ; on the centre of the fore part of the stays is a sort of pulley or groove, which can be turned round with a key, in one direction, but becomes fixed in the other, through the means of a spring ; a band passes obliquely upwards from the pulley to the fillet, to which it is attached behind the ear ; when the band is



drawn downwards by the pulley, it lowers the mastoid process and approaches it to the sternum; it counteracts in this way the antagonist muscles, and restores the head to its natural position.

SECTION II.

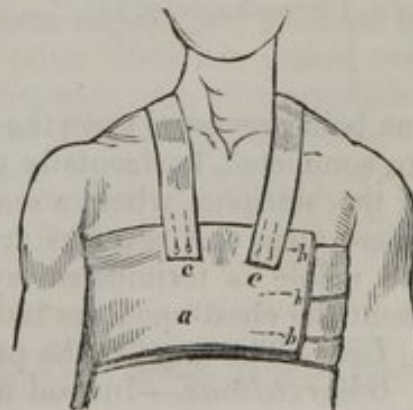
BANDAGES OF THE TRUNK.

1. BODY-BANDAGE OF THE THORAX WITH SCAPULARY.

Composition.—A napkin, or large compress of the same form, folded lengthwise in three;—a band two feet long, split nearly to the end.

Application.—The napkin, *a*, is passed under the body, and the two extremities brought upward to the chest, upon which they are made to overlap each other; they are then pinned, *b*; the unsplit extremity of the band being next fastened to the posterior part of the body-bandage, the tails are brought forward one over each shoulder, and secured in front, *c c*, to form the scapulary.

Use.—To confine dressings upon the chest; to furnish points for the



attachment of parts of several other bandages : in dislocations of the head of the humerus it is made to embrace the limb and fix it against the thorax : the fore-arm in such cases should be suspended in a sling.

2. BANDAGE FOR FRACTURE OF THE RIBS.

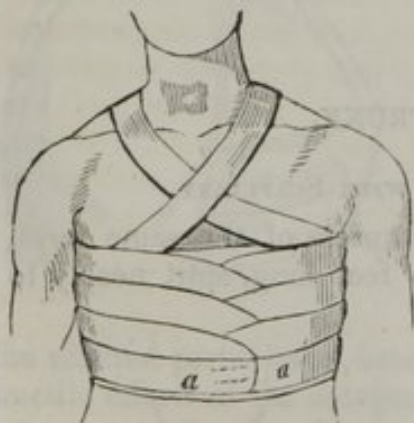
Composition.—A single-headed roller ten yards long and three fingers' breadth wide.

Application.—The initial end is applied to the anterior part of one of the axillæ, which we will suppose to be the left ; the head is conducted from hence obliquely upward, in front of the chest, to regain in passing over the right shoulder the point of departure ; another and similar turn being effected, the head of the roller, instead of being carried upward, is directed transversely to the right axilla, and two more oblique turns are carried over the left shoulder, which intersect the first behind and in front of the chest ; the remainder of the roller is employed in forming transverse doloires from above downwards.

Use.—In fractures of the ribs and sternum, care being taken to apply compresses to the anterior and posterior extremities of the former, if the fragments project inward ; but if outward, upon the fractured parts themselves.

3. THE QUADRIGA ; OR CROSSED BANDAGE OF THE THORAX.

Composition.—A double-headed roller ten yards long and three fingers' breadth wide.



Application.—The centre of the roller is applied to the sternum ; the two heads are carried, one under each axilla, to the back, where they are made to cross ; returned from thence to the fore part of the chest, they change hands and are carried obliquely to the shoulders, intersecting each other in the form of X : from the shoulders they are made to descend obliquely behind the back, each to the opposite axilla, and form a second X ; they are now brought forward horizontally, and crossed upon the sternum, the upper

one being reversed upon the lower, to avoid wrinkles ; that done, they are conducted horizontally to the spine, crossed, and returned again to the sternum, where a second reverse is made in a similar way. These turns and reverses are repeated till the chest is covered, and the whole is terminated by one or two plain circles, *a a*, carried about the chest upon the last reverse.

Use.—The same as the preceding.

Observations.—Instead of the above bandages, which are liable to slacken, many surgeons employ a lacing body-bandage.

4. SUSPENSORY FOR THE BREAST.

Composition.—A piece of linen, ten inches square, being accurately doubled, two triangular portions are cut away, at the expense of the folded border; the first comprehending one half of the length of this, and the second, the half of what remains; the divided edges are sewed together, and in this manner is obtained a sort of bag capable of receiving the breast. To the lower edge of the bag is stitched a band two yards long and three fingers' breadth wide, and to the upper edge are attached in like manner two bandelettes, each three-quarters of a yard long.

Application.—The diseased breast being engaged in the bag, the lower part of the latter is fixed by two horizontal turns of the band, carried round the trunk, and its upper part, by the bandelettes, conducted over the shoulders, crossed behind the neck, and brought forward under the axilla to the upper part of the breast, where they are to be secured.

Use.—It serves to confine dressings upon the breast, and to sustain it in cases where its weight is productive of pain or inconvenience.

5. APPARATUS OF M. RECAMIER FOR THE TREATMENT OF CANCEROUS TUMOURS OF THE BREAST.

Composition.—Single-headed rollers two and three fingers' breadth wide and eight yards long;—disks of agaric,* varying from the size of a sixpence to that of a crown-piece.

Application.—Dependent upon the number and the volume of the engorgements. Should the person be young, or one whose breasts are but slightly developed, a few horizontal circulars of the broadest of the above-mentioned rollers usually suffice;† a disk or two of agaric being previously applied to the tumour in order that the bandage may exercise a more perfect compression on the part. When, however, the mammæ are voluminous and soft, it is necessary to give them such a degree of solidity, that the engorged point be incapable of escaping from beneath the compressing body; this is effected by the broad roller, which is made to form a figure of 8 about the breasts; each of the branches will tend to elevate the inferior part of one breast and depress the superior part of the other; a disk of agaric is to be placed upon each of these organs, and confined by a horizontal turn of the narrow roller; other disks are placed over this, diminishing in size, and interposed between each circumvolution of the bandage, until the cone has acquired a sufficient projection.

When the compression is only required to be effected upon one breast, a compressive sling may be formed with the broad roller, by directing its head obliquely from the shoulder of the sound side,

* *Boletus igniarius.*

† A laced body-bandage would answer the same end, and is, by many practitioners, preferred.

behind the back and under the diseased breast, and then from below upwards to the same shoulder; a sufficient number of *doloires* should be thus made to cover the lower half of the breast: the head of the roller being now directed under the axilla of the sound side, a certain number of horizontal *doloires* are to be affected in order to enclose the breast entirely. The rest of the bandage consists of alternate oblique and horizontal circulars, between each of which is interposed a disk of agaric.

Observations.—The manner of applying this bandage must of course vary according to circumstances, but in every case the compression which is required to be exerted should be equal upon every point of the tumour, and moderately strong. The apparatus should be removed and re-applied once at least every twenty-four hours, in order that its action be constantly the same, a thing of great importance as regards the result of the treatment.

6. COMPRESSIVE BANDAGE AFTER EXTIRPATION OF A DISEASED BREAST.

Composition.—A double-headed roller eight or ten yards long, and four fingers' breadth wide.

Application.—The dressings being applied, the centre of the roller is placed under the axilla of the sound side, while the heads are carried obliquely, one before and the other behind the chest, to cover them: after changing hands they are conducted from thence round the body in such a manner as to engage the remaining breast between the turns, and arrive for the second time upon the dressings. One head of the roller is now employed in making horizontal, and the other oblique turns, the latter passing over the shoulder of the sound side, till the bandage is exhausted.

Observation.—The equal and efficient pressure exerted by this bandage renders it greatly preferable to the body-bandage used sometimes in these cases.

7. THE STRAIT-JACKET.

(Syn. Camisole, Fr.)

The strait-jacket is a garment of strong cloth or ticking applied upon persons in furious delirium. This dress extends from the lower part of the neck to a little below the last ribs; it closes behind with tapes sewed upon the borders at intervals of six fingers' breadth, the fore part being a continuation of the cloth; the sleeves are united at their extremities to prevent the patient from using his hands; sometimes they are crossed upon the chest, and tied behind, at other times a cord is fastened to them in front, and fixed to the foot of the bed. A loop is generally fastened to the garment over each shoulder to allow of the passage of a band employed to maintain the upper part of the body in complete immobility, and in the seam corresponding to the fore-arm is left an opening, through which the medical attendant introduces his hand to investigate the state of the pulse.

8. BODY-BANDAGE OF THE ABDOMEN, WITH THIGH STRAPS.

Composition.—A napkin, or piece of linen of the same form, folded in three, to one of the borders of which are stitched, near the centre, two narrow bands half a yard long to serve for thigh straps; they should be attached sufficiently apart to correspond with the great trochanters.

Application.—The middle of the napkin is applied upon the loins, the extremities are brought up to the abdomen, upon which they are overlapped and pinned; the bandelettes are then conducted from behind forwards, crossed under the perineum, and fixed upon the fore-part of the apparatus.

Use.—To retain a surgical application upon the abdomen, to exert compression on this part after the operation of paracentesis, and to furnish points for the attachment of parts of other apparatus.

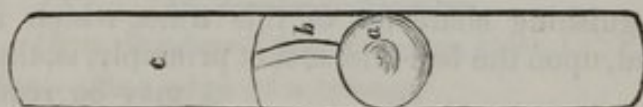
9. BANDAGE FOR THE UMBILICAL HERNIA OF INFANTS.

Composition.—A morsel of soft rag to apply to the hollow of the navel when the parts are reduced;—a spherical *pelote*, formed from a piece of cork, the size of a marble; or half a nutmeg;—some adhesive plaster;—one or two graduated compresses, and a linen belt about five fingers' breadth wide at the centre, diminishing gradually to the breadth of two fingers at the extremities.

Application.—The *pelote* is placed over the rag in the hollow of the navel, and confined there by means of the adhesive plaster; upon this the compresses are applied; the whole apparatus is maintained by the belt, which is applied by its middle upon the navel, while the extremities are carried round the abdomen, and brought forward and tied in front.

10. WEISS'S IMPROVED TRUSS FOR UMBILICAL HERNIA IN FEMALES.

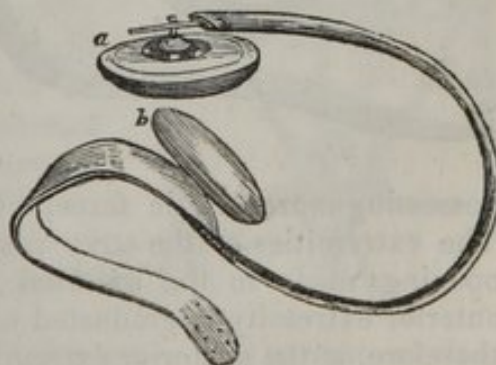
It consists simply of a pad, *a*, fixed by means of a spring, *b* in the



busk of a stay, *c*: the anterior face of the pad presents a small eminence, adapted to the hollow of the navel.

11. SALMON AND ODY'S TRUSS FOR UMBILICAL HERNIA.

The front cushion of this truss acts upon the ball-and-socket principle; the front and back cushions, *a b*, are connected by a strap, which prevents their displacement. An increased power of compression is given when required to this and other trusses of Salmon and Ody, by means of a second spring, slid along the outside of the first or main-spring, under the external covering.



12. SALMON AND ODY'S TRUSS FOR INGUINAL OR SCROTAL HERNIA.



This truss is called opposite-sided, from the spring being applied to the opposite side to that on which the complaint is situated; thus, if the complaint is situated in the left groin, the spring is placed on the right hip, and the front cushion, *a*, fig. 1, brought across the median line of the abdomen to be placed upon the affected part; the back

cushion rests immediately upon the last dorsal vertebra: should the complaint be at the right groin, the same truss will equally apply, the spring, which moves round the stem of the back cushion, *b*, being brought round the left hip.

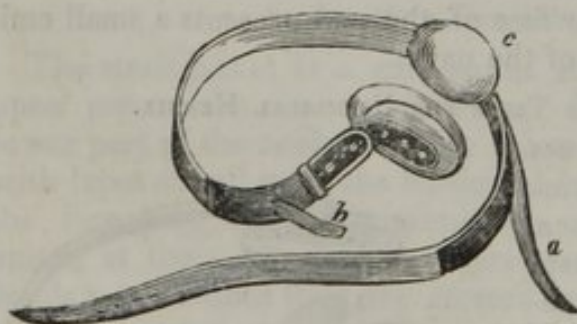
The front pad is connected to the spring by means of a ball-and-socket joint, the mobility of which allows it to conform itself to the movements of the muscles of the abdomen.

Fig. 2 represents a double inguinal herniary truss.



13. ADAMS'S GRADUATED PRESSURE TRUSS FOR INGUINAL HERNIA.

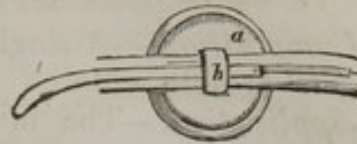
The distinguishing character of this truss, which is made also, when required, upon the ball-and-socket principle, is, that the pressure



may be readily increased or diminished to the necessary extent, without removing it. A groove is made along the centre of the main-spring of the truss, and two rivets furnished each with a small shield, connect this with a leather strap, and a second and shorter spring,

possessing more elastic force, which move along its external face. The extremities of the strap project to some distance through two openings made in the external leather covering of the truss; the anterior extremity is graduated to regulate the pressure; by pulling, therefore, at the posterior extremity, *a*, fig. 1, the compression is increased, and may be again diminished by pulling at the anterior one, *b*.

Fig. 2 represents a moveable pad, *a*, (fig. 1, *c*,) with a loop, *b*, through which the band of the truss passes. The use of this pad is to relieve the pressure of the truss upon the back.



Graduated pressure trusses are made also upon the same principles for femoral and umbilical herniæ.

14. SALMON AND ODY'S TRUSS FOR FEMORAL HERNIA.

The principle of this truss is the same as that of their inguinal and umbilical herniary trusses; it is applied, however, upon the same side as the complaint.

Observations upon Herniary Bandages.—They act in exciting a degree of inflammation, necessary to the obliteration of the mouth of the peritoneal process; unless, therefore, as well as entirely preventing the issue of the parts from the abdomen, they exert a due compression, they are useless.

Great attention should be given to the form and consistence of the pad; when this is too convex it is liable, firstly, to press the external soft parts into the opening; secondly, to separate the tendinous fibres near the ring, and thus facilitate a second protrusion; and thirdly, to allow of the passage of the parts from the sides. A pad of too large diameter in inguinal hernia produces an extreme inconvenience from its pressure upon the spermatic chord. So also, when a pad is too soft, it exerts an insufficient pressure, and when too hard, it is liable to injure the soft parts.

A case should be made for the truss of calico or soft linen, which should be changed daily, to preserve it from the perspiration.

15. INGUINAL BANDAGE.

(Syn. Bandage Triangulaire des Aines, Fr.)

Composition.—One edge of a triangular piece of linen of convenient dimensions is rounded off to correspond to the upper and internal part of the thigh, *a*; to the base of this is sewed a band, *b*, of about a yard and a half in length, and to its summit a bandelette, *c*, two feet long.

Application.—The extremities of the band are carried round the pelvis on either side as far as the sacrum, whence they are returned and tied in a bow, *d*, above the pubes, while the bandelette, passing downward between the thigh and scrotum, is attached behind to the transverse portion of the bandage.



Use.—To retain dressings upon the groin of a patient confined in bed.

16. SPICA FOR THE GROIN.

Composition.—A single-headed roller, seven yards long and two fingers' breadth wide.

Application.—The initial extremity is applied upon the sound side of the pelvis, midway between the superior and inferior iliac crests, and is fixed by a couple of horizontal turns carried from before backward. After the second turn of the roller, the head is conducted obliquely downward over the groin of the affected side, and between the thigh and the genital organs; winding round the posterior part of the thigh it crosses the groin again, and is made to pass over the pubic region to the point of commencement; a third horizontal turn being effected, the roller is carried obliquely round the thigh, as in the first instance, and then for the fourth time round the pelvis: the course thus described being once or twice more repeated, the bandage is terminated by a circular or two about the pelvis, see page 16.

Use.—To exert compression in venereal ulcers, &c. situated at the groin. It may be used, also, until a truss can be procured for the maintenance of a reduced inguinal hernia.

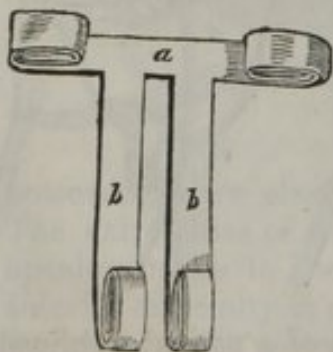
17. SPICA FOR BOTH GROINS.

Composition.—A single-headed roller, ten yards long and two fingers' breadth wide.

Application.—Two horizontal turns are first made about the pelvis, going, for example, from right to left, and from before backward: upon arriving at the second turn, near the left groin, the head of the roller is made to pass obliquely downwards along the outer side of the thigh, and ascend along the inner side to cross the first descending turn; it is next conducted round the pelvis as far as the right groin; passing from hence along the inner side of the thigh, and remounting on the outer side, it is carried again round the pelvis: the head of the roller is made to pursue the track just described, until only a sufficient quantity remain to terminate the bandage by two more horizontal circulars.

Use.—See Bandage, No. 16.

18. DOUBLE T BANDAGE OF THE PELVIS.



Composition.—A roller, *a*, of sufficient length to pass twice or three times round the pelvis, and three fingers' breadth wide; —two bandelettes, *b b*, each half a yard in length, and an inch in breadth: the bandelettes are stitched to the roller at right angles, at about one-fourth of its entire length.

Application.—The transverse portion of the bandage is glided under the loins, that the vertical bandelettes may correspond to the median line of the posterior face of the

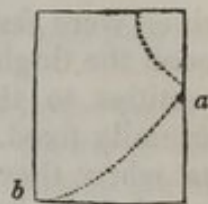
pelvis; its extremities being passed round the body, are fixed with pins; the bandelettes are then brought under the perineum, crossed, and directed upwards and outwards to be fastened to the anterior part of the roller.

Use.—To maintain a dressing or surgical apparatus applied to the perineum, anus, or vagina.

Observation.—It is sometimes necessary to fix a scapulary to this bandage, to prevent it from becoming displaced.

19. SUSPENSORY, OR BAG-TRUSS OF THE SCROTUM.

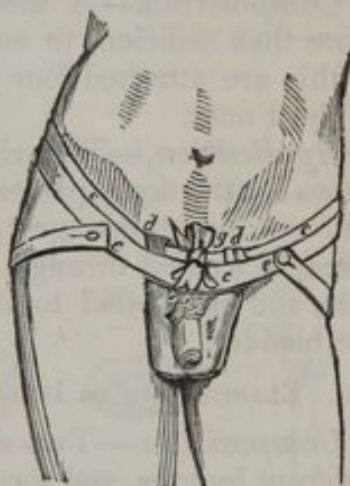
Composition.—The size of the bag can only be determined by the volume of the scrotum, to which it should be proportioned. It is ordinarily made from two pieces of linen or soft drilled duck, six fingers' breadth long and four wide: the pieces being laid together with exactness, two portions are cut out curvilinearly, as shown in the wood-cut by the dotted lines: the divided edges from *a* to *b* being sewed together, a sort of bag is formed, which presents at the middle of its upper part an opening, *f*, through which the penis passes. A belt, *c*, two



fingers' breadth wide, and rather longer than is necessary to describe the circle of the body twice, is then sewed along the upper edges of the bag: to the superior border of this belt, at about two fingers' breadth each way from the centre, are attached two small loops of tape or riband, *dd*, and about as far again from the centre two mould-buttons, *ee*.

Two bandelettes are, in the next place, fastened to the lower angle of the bag, each of about half a yard in length, with two button-holes near their free extremities.

Application.—The penis being engaged in the triangular opening, *f*, of the bag, and the scrotum perfectly enveloped, the belt is carried round the pelvis, and being returned through the loops, *dd*, tied above the pubes, *g*; the two bandelettes are then made to ascend from the perineum along the inferior borders of the glutei muscles, to be buttoned to the belt in front, *ee*.



Use.—To support and confine dressings upon the scrotum; to serve also for points of attachment to other apparatus. It is chiefly employed in swelled testicle, hydrocele, and irreducible scrotal hernia.

20. MR. HUNTER'S APPARATUS FOR RETAINING A CATHETER IN THE URETHRA.

Composition.—A bag-truss, with two small rings, *aa*, attached to the fore part, immediately above the ears of the bag;—two small tapes.

Application.—The tapes are fixed by their centre, one to each ring of the catheter ; the latter is then introduced into the bladder ; after which one of the loose extremities of each tape is passed through the corresponding ring of the belt, and tied to its fellow in a bow, *b b*.



Observations.—Mr. Hunter sometimes modified the apparatus in the following manner. When the catheter was introduced, he inclined the outer end downwards so as to be nearly in a line with the body ; he kept it in this position by means of the belt of a common bag-truss, to

which were fastened two thigh-straps: bringing the latter forwards round the thighs and alongside of the scrotum, he fastened their extremities to the belt at the part where the ears of the bag are generally fixed. The straps were each furnished with a small ring, just where they passed the root of the penis, and to these he connected the end of the catheter by a small piece of tape.

21. THE METALLIC RING APPARATUS FOR THE SAME.

Composition.—A metallic ring, the circumference of which is more than sufficient to encircle the penis, is covered with cloth, and to this are attached four long pieces of tape, with the same number of short ones.

Application.—The ring enclosing the penis is fixed against the pubes by the long pieces of tape, which, surrounding the pelvis in different directions, meet, and are tied posteriorly. One of the short pieces is carried through the ring or groove of the catheter, on each side, and being tied to its fellow, fixes the instrument securely in the bladder.

22. ELASTIC-GUM, OR INDIA-RUBBER APPARATUS OF THE FRENCH SURGEONS.

Composition.—Two small strips of this substance are first cut of different lengths, and formed into rings, by means of a few fine silk stitches ; one of these should be of sufficient size to adapt itself to the circumference of the penis, and the other to that of the catheter. Four more strips are then cut of the same material, of sufficient length to extend from the middle of the penis to about half-an-inch beyond the orifice of the urethra, and are attached by their extremities to the two rings.



Application.—The outer end of the catheter, *a*, is engaged in the smallest of the two rings, *b* ; the catheter is then introduced into the bladder, while the large ring, *c*, is made to embrace the body of the penis. In order to prevent the catheter from slipping outwards through the ring, the four longitudinal strips are bound to it firmly near the latter, with a bit of waxed thread or silk.

Observations.—This apparatus may be conveniently modified, by employing only one ring

and a small piece of narrow riband, thus: the surgeon ties the centre of the riband to the outer end of the bougie or catheter, and introduces the instrument into the urethra; he applies the two bandelettes thus formed along the sides of the penis, and passes over these the gum-elastic ring; reflecting now the bandelettes forward, he fixes them to the extremity of the instrument by a bit of waxed thread. The India-rubber apparatus is preferable to all others, as well on account of its simplicity, as for the perfect manner with which it retains the instrument in the urethra; and not the least advantage of this apparatus is, that its elasticity allows it to accommodate itself to the penis in erection.

23. APPARATUS FOR FIXING THE CATHETER IN THE URETHRA OF THE FEMALE.

Composition.—A double T bandage;—a piece of tape;—some fine compresses.

Application.—The double T bandage being applied in the manner described, page 44, the surgeon proceeds to fix the centre of the tape to the outer end of the instrument; he then introduces the instrument into the bladder, and attaches the ends of the tape, one on either side, to the vertical tails of the bandage, taking care to place the compresses upon the sides of the labiæ externæ, to preserve them from excoriation.

24. PESSARIES.

Pessaries are instruments made of ivory, box-wood, or elastic-gum, which are introduced into the vagina, to sustain the parts in cases of prolapsus uteri, prolapsus vaginæ, &c.

They vary also in form; they are either annular, figs. 1 and 2; oval, fig. 3; in the form of a figure of 8; or on a stem, figs. 4 and 5.

The last kind, Mr. Duffin's modification of the *Pessaire à Bilboquet* of the French, is usually made of box-wood and ivory; the head and upper portion of the stem, *a b*, are of box-wood hollowed, the former being slightly concave upon the summit, where it is perforated with small holes.

The lower portion of the stem is of ivory, also hollowed; the upper end, *c*, of this last portion is turned spirally, in order to screw into the first; while the lower end, *d*, is in the form of a ball, which rests loosely in an ivory cup, let into a box-wood shield, *e f*.

The ball-and-socket joint allows the instrument to conform itself to the movements of the body, while the whole receives a steady support, from the shield being confined to the perineum by a T bandage. The screw in the stem of the pessary, allows

Fig. 1.



Fig. 2.



Fig. 3.



Fig. 4.



Fig. 5.



of the length of the instrument being adapted to that of the vagina.

Fig. 5, represents the under surface of the shield, *a*, with the opening of the canal of the pessary externally, *b*.

Application of Pessaries.—The bladder and rectum are, first of all, to be evacuated; the woman should then be placed near the edge of the bed, with the pelvis elevated by a pillow, and the thighs put sufficiently apart. The surgeon, having smeared over the pessary with a little pomatum or sweet oil, separates the labiæ externæ with the index and middle finger of the left hand, while with the right he gently introduces it into the vagina. In introducing an annular pessary, he directs it edgewise, and having fairly engaged it within the vagina, he introduces the index finger into its opening, to bring it to a horizontal position.

The oval pessary, fig. 3, is provided with a bit of narrow tape, to allow of its being easily removed.



25. WEISS'S ELASTIC BRACE FOR PROLAPSUS ANI.

Application.—A belt of webbing is first applied round the patient's body and buckled in front, and the protruded parts returned into the fundament; the sponge, *a*, (which is sometimes replaced by a smooth convex piece of ivory,) affixed to the central portion of the apparatus, after having been moistened with warm water, is then placed upon the anus; while the straps, *c c c*, are carried upward to be buckled to the belt, the first to its posterior, the two last to its interior part.

Observations.—This is a most efficient apparatus, but may be replaced upon emergency by the double T bandage, page 44; a piece of moistened sponge and a linen compress being interposed between it and the anus.

SECTION III.

BANDAGES OF THE UPPER EXTREMITIES.

1. FIGURE OF 8 OF THE SHOULDER AND AXILLA.

Composition.—A single-headed roller seven or eight yards long and three fingers' breadth wide.

Application.—Two circulars are first made round the arm of the affected side, passing from without to within, and from before backward. The head of the roller is then carried behind and above the shoulder, and conducted obliquely downwards before the chest to the axilla of the opposite side, from whence it passes first behind the back, then over the shoulder, to cross the above descending turn and regain the point of departure ; several turns of the roller are made in this way, to form a sort of figure of 8, and the whole bandage is terminated by a few circulars round the upper part of the arm.

Use.—To confine dressings applied to the shoulder or to the axilla : it is made to exert compression in the axillary space, by means of graduated compresses.

2. FIGURE OF 8 FOR FRACTURE OF THE CLAVICLE.

Composition.—A single-headed roller eight yards long and four fingers' breadth wide.

Application.—The shoulders being held back by an assistant, in order to allow of the fragments of the bone being placed and maintained in contact, the surgeon fixes the initial extremity of the roller, by making a couple of circulars round the upper part of the arm of the affected side ; he then carries the head backwards to the opposite shoulder, around which he passes it, to return to the first, which he surrounds in a similar manner ; these turns of the roller are applied alternately about each shoulder, and the end pinned, or secured by a few stitches.

Observation.—This is an exceedingly defective bandage ; but as it is still much employed in this country, the author has thought proper to describe it.

3. DESSAULT'S BANDAGE FOR FRACTURE OF THE CLAVICLE.

Composition.—Two single-headed rollers, each from seven to eight yards long and three fingers' breadth wide ;—a wedge-shaped cushion, formed of a piece of soft linen rag, filled with tow or oat-chaff ; the cushion should be nearly as long as the humerus, and four or five inches wide at the base ; its thickness is usually about two inches and a half, see page 13, fig. *b* ;—lastly, a few compresses.

Application.—The fracture being reduced, the cushion is placed, with its base uppermost, under the axilla, and the fore-arm flexed. The surgeon lays hold of the elbow, and carries it forward, upward, and inward, pressing it forcibly against the breast ; the arm is now confided to an assistant, who holds it firmly fixed in this position with one hand, while with the other he supports the fore-arm ; the ribands fixed to the base of the cushion, are carried one before, and the other behind the chest, obliquely upward, and tied upon the opposite shoulder, *c*.

The surgeon, in the next place, taking one of the rollers, applies its initial extremity under the axilla of the sound side, and fixes it by two horizontal turns about the body, which pass over the upper

part of the arm; he then descends with it, in forming doloires, *a*, which should be drawn tighter as they approach the elbow; this is to be entirely surrounded, and the end of the roller pinned.

The compresses, saturated with an appropriate lotion, are now placed upon the fractured bone, and the surgeon applying the initial end of the second roller, also, under the opposite axilla, attaches it to



the doloires of the first by a few stitches or a pin; the head of the roller is carried upward, and across the breast, *b*, to the compresses upon the fractured bone; from hence it is brought down behind the shoulder and arm, and being passed under the elbow, *d*, is conducted obliquely upward, *e*, to the point of departure: it is then carried obliquely upward over the posterior part of the chest to the compresses, and descends along and in front of the arm, *f*, to the elbow, which it embraces; from the elbow it ascends obliquely upward behind the

chest to the axilla, and sets out again, as in the first instance, before the chest, *g*, to traverse the fractured part, the shoulder, the posterior face of the arm, to embrace a third time the elbow, and be returned again before the chest, *h*, to the axilla; lastly, it passes obliquely upward behind the chest to the shoulder of the fractured side in front of the arm, *i*, under the elbow, behind the chest to the axilla, and is exhausted in horizontal doloires, *k*. A few stitches should be inserted in various parts of the bandage, to prevent the doloires from becoming displaced, and the fore-arm suspended by a sling.

Observations.—The principles upon which this bandage acts, namely, by converting the humerus into a lever, in carrying its lower extremity forward, inward, and upward, pushing the shoulder backward, upward, and outward, render it exceedingly well adapted to fractures of the clavicle. The cushion placed in the axilla serves for the fulcrum. One of its great advantages is, that it may be readily constructed. It is liable, however, to some objections; the compression, for instance, which it exerts about the chest, renders it ill adapted to patients of a delicate constitution, and it requires to be taken off and reapplied at least every two or three days, from the circumstance of its becoming easily displaced by the movements of the patient.

4. BARON BOYER'S BANDAGE FOR THE SAME.

Composition.—A wedged-shaped cushion for the axilla;—a belt of webbing or of linen quilted, about five inches wide, to surround the trunk, closing at the ends by means of straps and buckles; and a circlet for the arm, constructed of the same materials as the belt,

which laces in front. Four straps are attached to the circlet, two on each side, near the uniting edges, while, to correspond with these, four buckles are fastened upon the belt, two before and two behind the arm.

Application.—The cushion, *a*, is placed in the axilla, and the ribands, *b b*, carried one before and the other behind the chest to the opposite shoulder, and tied; the belt, *c*, is then passed round the body, beneath the cushion, and a little above the bend of the elbow, and buckled posteriorly. Next, the circlet, *d*, is laced upon the arm, which is confined to the trunk by means of the straps and buckles, *e e e e*, *f f f f*, of the same; a scapulary, *g*, is sometimes added. While the elbow is thus fixed firmly to the side, the cushion tends by its resistance to push the superior part of the arm upward and outward. The elbow may be moved either forward or backward by merely tightening the anterior or posterior straps.



Observations.—This bandage, acting upon the same principles as that of Dessault, is preferable to the latter, as well from the circumstance of its not being liable to become displaced, as from inflicting a more limited compression upon the chest; the compression is capable of being regulated by means of the straps and buckles which unite the ends of the belt.

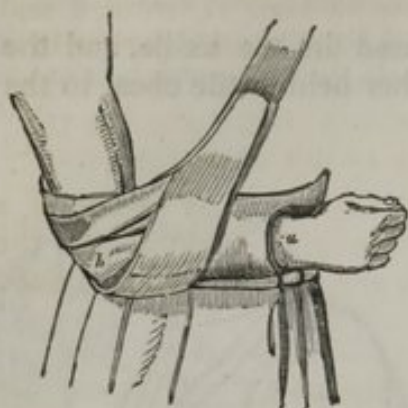
5. MODIFICATION OF MR. EARLE'S APPARATUS FOR THE SAME,
BY MR. CHAPMAN.

Composition.—A cushion, *a*, fig. 1, for the axilla, suspended by a cap, *b*, which crosses the shoulder of the affected side;—a long band of webbing, *c, d, e, f*, for supporting the arm, and retaining it in contact with the trunk; the two ends of this band are buckled in front and behind to a well-padded circlet, *g*, which is slipped over the opposite arm, and rests chiefly on the scapula. The circlet and cap are connected behind by a strap, *h*, buckled to the latter posteriorly, by means of which the shoulders are drawn back to the extent necessary.

Application.—The cushion is first placed in the axilla of the affected side, and fastened to the cap by tapes, and the circlet is then slipped over the opposite



arm to the shoulder; in the next place, the patient's hand is passed through the opening, *i*, *a*, figs. 1 and 2, of the band of webbing,



which is buckled to the back part of the circlet; the band being then drawn tightly round the waist, the elbow is adapted to the inner fissure, *k*; the elbow is then lodged in the outer fissure, *l*, and the shoulder elevated by buckling the remainder of the band, *f*, to the fore part of the circlet: *b*, fig. 2, represents the elbow lodged in the two fissures. Lastly, the transverse strap, *h*, is buckled to the necessary degree to throw the shoulder back.

Observations.—This bandage unites all the advantages of the bandages of

MM. Dessault and Boyer, while the objections raised against the former for compressing the chest too powerfully, and concealing the fractured parts, and against the latter for not exerting sufficient action upon the shoulders to draw them backward to the necessary extent, in cases of oblique fracture of the clavicle, are done away with. It has, besides, the merit of supporting the fore-arm and wrist in the most perfect manner, and permitting the weight of the injured member to rest in a great measure upon the scapula of the opposite side. It is adapted to fractures of either clavicle by reversing the band of webbing, and transferring the transverse strap, *h*, to the opposite sides of the cap and circlet, to which a second button and buckle, *m*, *n*, are fixed. The band is laced down the middle, *o*, which allows of its being accommodated to persons of different sizes.

6. BANDAGE FOR DISLOCATIONS OF THE CLAVICLE.

See bandages for fracture of this bone.

BANDAGES FOR FRACTURES OF THE SCAPULA.

7. FOR FRACTURE OF THE BODY OF THE BONE.

It consists simply of a body or rolled-bandage extending from the shoulder to the elbow, some compresses being placed between the arm and trunk to prevent excoriation of the skin.

8. FOR FRACTURE OF THE LOWER ANGLE.

In this case the fragment is drawn downward and forward by the serratus major anticus; the shoulder, therefore, must be lowered and directed toward the fragment in carrying the arm inward and forward; to maintain it in this situation, it is kept fixed against the trunk by a roller, the fragment being kept back as much as possible by means of compresses. The arm is to be supported in a sling.

9. FOR FRACTURE OF THE CORACOÏD PROCESS.

The muscles attached to this process are to be put into a state of relaxation by bringing the arm forward toward the breast, and confining it thus in a sling; the shoulder is to be kept downward and forward, and a compress confined just under the broken part with a roller.

10. FOR FRACTURE OF THE NECK OF THE BONE.

The head of the os humeri is to be kept outward by means of a thick cushion placed in the axilla, while the glenoïd cavity and the arm are pushed upward with a sling; the arm is then to be confined against the trunk by a roller.

11. FOR FRACTURE OF THE ACROMION.

The elbow is to be raised and kept rather backward, with a cushion placed between it and the trunk, in order to relax the deltoïd muscle; at the same time the scapula must be pressed downward to bring the fragments into contact. The bandage proper to maintain the parts in this position consist, first, of several horizontal circulars carried round the arm and trunk; secondly, of a few vertical ones passing round the injured shoulder and the elbow; thirdly, of a number of turns in the form of a figure of 8, the loops of which repose, the highest against the axilla of the sound side, the lowest under the opposite elbow; the intersection should correspond to the superior and internal part of the injured shoulder; fourthly, of some fresh horizontal circulars maintained, together with the other parts of the apparatus, by a body-bandage.

12. HANDKERCHIEF BANDAGE FOR FRACTURES OF THE CLAVICLE, THE ACROMION, AND THE NECK OF THE HUMERUS.

(Syn. Grande echarpe, Fr.)

Composition.—Two large handkerchiefs or pieces of strong linen of the same form;—a cushion for the axilla;—a soft pad for the opposite shoulder.

Application.—First, the cushion, *a*, is to be placed in the axilla, and the arm put into the proper position, with the fore-arm bent; the doubled edge of one of the handkerchiefs, *b*, folded cornerwise, is then made to envelop the elbow, while the corners support the hand; the posterior long extremity is carried up behind the back to the opposite shoulder, upon which the pad, *c*, is to be previously placed, and the anterior one brought up in front to meet it and be tied.

The second handkerchief serves to confine the elbow and fore-arm more securely



by being carried round the waist, and fastened upon the opposite side of the trunk.

Observations.—The bandage should be modified in the following manner when intended for fracture of the acromion: after the first handkerchief is applied, some compresses should be placed upon the injured shoulder, and a few vertical turns of a roller passed round the shoulder and elbow; after which the second handkerchief is to be applied as above; also the cushion under the axilla should be omitted, and a pad placed, before applying the first handkerchief, between the elbow and side.

13. BANDAGE FOR AMPUTATION AT THE SHOULDER JOINT.

Composition.—A band, eight yards long and three fingers' breadth wide, rolled up into heads of different sizes, the smallest containing but a yard and a half.

Application.—The surgeon commences by applying the smaller head upon the middle of the operated shoulder, directing the other obliquely before the chest, under the opposite axilla, and then obliquely upward, behind the back, to regain the point of departure, where it passes over and fixes the smaller head; next, directing the latter under the axilla, he passes the former over it to retain it, and reversing it from behind forward fixes it with the larger head, which he directs behind and upon the shoulder, across the chest, under the axilla and behind the back to the sound shoulder, upon which he effects a third reverse, which he fixes like the two first. These oblique turns, with the reverses, are repeated in the form of *doloires* directed from the anterior to the posterior, and from the posterior to the anterior parts of the stump, till the dressings are entirely covered.

14. BANDAGE FOR DISLOCATION OF THE HUMERUS.

It consists of a body or rolled-bandage, extending from the shoulder to the elbow, to confine the arm against the trunk; a few soft compresses should be previously introduced between them, to protect them from excoriation.

15. BANDAGE FOR FRACTURE OF THE NECK OF THE HUMERUS.

Composition.—Two long rollers;—three strong splints, between two and three inches broad;—a cushion, three or four inches thick at one end, terminating at the other in a narrow point, and long enough to reach from the axilla to the elbow;—a sling to support the fore-arm;—lastly, a towel to cover the whole apparatus.

Application.—The fracture being reduced, and maintained by the assistants, the surgeon fixes the initial extremity of one of the rollers, which has been previously saturated with a lotion, at the upper part of the fore-arm by two or three circulars, and winds it round the arm in *doloires*; taking care, however, when he arrives at the upper part of the limb, to make reverses, in order to prevent folds to which the inequality of the part would otherwise give rise; from hence he

carries the head of the roller twice round the opposite axilla, and confides it to one of the assistants, who retains it upon the top of the shoulder of the injured side. The first splint being placed in front, reaching from the bend of the arm as high as the acromion; the second, on the outside, from the external condyle to the same height; and the third, from the olecranon behind to the margin of the axilla; they are given to another assistant to hold: which he does by applying his hands near the bend of the arm, in order not to obstruct the application of the bandage.

The surgeon now takes the roller, and descends by moderately tight doloires to the upper part of the fore-arm, where he pins the end, and while the assistants still keep up the extension, he places the pillow between the arm and trunk, taking care to put the thick end upward, if the fracture be displaced inward; but downward, if this should be displaced outward; which is most commonly the case; fixing it with pins to the upper part of the roller: lastly, bringing the arm against the trunk, he confines it there, by means of the second roller, applied in horizontal circulars. The turns of the last roller should be rather tight below and slack above, if the fracture be displaced inward; but if outward, they should be slack below and tight above. The fore-arm is to be sustained by a sling, and the whole apparatus enveloped in the towel to prevent any displacement of the bandages.

Richerand employs in his practice, instead of the above bandage, which is very inconvenient to the patient, a sling made with a towel, which embraces at once the arm, fore-arm, and shoulder, and presses the arm strongly against the thorax. See handkerchief-bandage, page 53.

16. BANDAGE FOR FRACTURE OF THE BODY OF THE HUMERUS.

Composition.—A single-headed roller eight or nine yards long and three fingers' breadth wide;—a longitudinal compress made of soft linen rag;—four splints, not quite so long as the arm, nor so broad as to touch each other when applied;—lastly, some lint or charpie.

Application.—The surgeon, placing himself on the outer side of the limb, commences by passing a roller, carefully, round the hand and fore-arm, to prevent œdema of those parts; fixing its initial end by a few circulars made above the fingers, and having filled the hollow of the hand with cotton, carrying the head of the roller upward to the elbow in the form of doloires. His next care is to reduce the fracture; and being well assured that the arm has resumed its natural form and length, he continues the turns of the roller onward to the upper part of the limb, applying the compress, however, previously saturated with a lotion, over the fracture, and filling up with cotton or some other soft material the depression which corresponds to the insertion of the deltoïd muscle, in order to effect a uniform pressure. That done, he confides the head of the roller to an assistant, and places the splints, well padded, along the arm, at the extremities of its transverse and antero-posterior diameters.

Lastly, the assistant giving up the roller to the surgeon, and laying hold of the splints near the bend of the elbow, the latter proceeds to cover them from above downward, by spiral turns, and fastens the end of the bandage with a pin.

Observation.—This is all that is necessary to be done when the patient keeps his bed ; should he desire to walk about, the fore-arm is to be bent upon the chest, and fixed, together with the whole apparatus, by means of a sling.

17. BANDAGE FOR AMPUTATION OF THE HUMERUS.

Composition.—A roller six yards long and three fingers' breadth wide ;—lint or charpie, and a compress, (*the Maltese cross.*)

Application.—The operation being ended, and the vessels tied, the surgeon brings together the edges of the wound, and retains them thus by means of slips of adhesive plaster, allowing, however, the ligatures to hang out from the posterior angle of the wound ; over these strips he places the lint, or a *plumasseau* of charpie, which he confines by the Maltese cross ; he then applies the initial extremity of the roller under the axilla of the opposite side, and brings its head forward upon the shoulder of the amputated limb, round which he passes it, to return to the point of commencement over the posterior part of the thorax ; this course is to be pursued a second time to form a spica, and the remainder of the roller employed in forming *dolaires*, which should descend along the arm to cover the applications.

18. BANDAGE FOR FRACTURE OF THE LOWER EXTREMITY OF THE HUMERUS.

Composition.—A single-headed roller four or five yards long ;—two pasteboard splints to be applied when the arm is bent at right angles, one upon the side of flexion, and the other upon that of extension ;—each of the splints, previously softened with vinegar or water, should be divided to about one-fourth of the entire breadth on either side, the outer one at the part corresponding to the elbow, and the inner one at the bend of the arm.

Application.—The surgeon first surrounds the fore-arm and arm with a portion of the roller, and confides the head to an assistant ; flexing the fore-arm at right angles upon the arm, he applies the splints, and adapts them accurately to the bend of the elbow : the assistant then resigns the head of the roller to the surgeon, and lays hold of the splints to keep them in place, while the latter proceeds to cover them from above downward with the remainder of the bandage. The fore-arm should be maintained in the bent position by means of a sling.

19. SLING FOR THE FORE-ARM.

(Syn. *Moyene écharpe*, Fr.)

Composition.—A napkin or square handkerchief folded triangularly.

Application.—The handkerchief thus folded is passed between the patient's arm and chest, the doubled edge corresponding to the wrist, and the corners to the elbow, *a*: the ends are then carried upward, the anterior one, *b*, on the side opposite to the affected limb, and the posterior one, *c*, on that corresponding to the injury, to be tied in a knot or bow, *d*, behind the neck.

Observation.—This bandage, used in fractures, &c. of the upper extremities to support the fore-arm, is preferable to the handkerchief bandage in all cases where it is not deemed necessary to keep the arm fixed in a state of immobility against the chest.

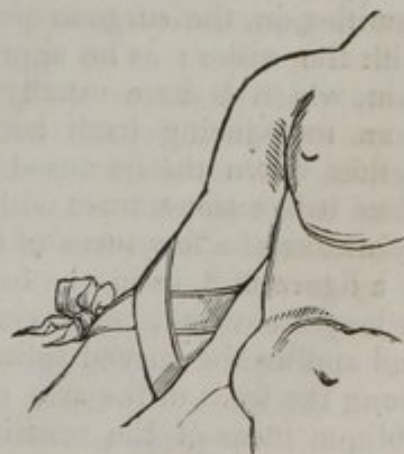


20. BANDAGE FOR PHLEBOTOMY.

Composition.—A ligature to be applied to the arm just above the elbow;—a roller two yards long and two fingers' breadth wide;—and a compress or pledget of soft linen rag.

Application.—In commencing the operation, the surgeon places the arm in a state of supination, and applies a ligature at the distance of three fingers' breadth above the elbow, which he ties on the outside of the arm in a single bow; the ligature should have sufficient tightness to intercept the passage of blood through the superficial veins, but not through the arteries, which would prevent the veins from becoming turgid.

The bleeding ended, the surgeon takes off the ligature, and, after wiping the arm, applies a compress over the orifice of the vein; then, placing the initial extremity of the roller upon the upper and outer part of the fore-arm, he carries the head obliquely upward (passing over the compress) above the internal tuberosity of the humerus, then along the posterior part of the arm above the olecranon to the internal tuberosity, whence he conducts it obliquely downward, passing again over the compress to carry it round the fore-arm to the point of departure: the turns just described are repeated three or four times more, and the end of the bandage fastened with a pin.



An unrolled band is usually substituted for the one just described, in the form also of a figure of 8, the ends being tied in a bow as represented in the cut.

BANDAGES FOR FRACTURE OF THE OLECRANON.

21. SIR ASTLEY COOPER'S.

Composition.—Two strips of linen, each about half a yard long;—two small rollers;—a roller of a larger size;—and a split deal splint, of a sufficient length to extend from the margin of the axilla to about half way down the fore-arm.

Application.—The patient's arm is to be put into extension, and the fragment pressed down until it touches the ulna; a strip of linen is next to be applied upon each side of the joint, and one of the small rollers passed round the limb above, and the other below the olecranon, to secure them, *b b*. The extremities of each slip being reflected and tied together, *a*, the rollers are drawn nearer to each other, and the fragment of the olecranon kept in the closest apposition possible with the ulna. Lastly, the split deal splint, *c*, well padded, is applied along the front of the arm, and secured with a bandage, *d d*, which is to be frequently wetted with an evaporating lotion.



22. M. DESSAULT'S.

Composition.—A strong paste-board splint, long enough to cover a part of the arm and fore-arm, and shaped so as to accommodate itself to the bend of the elbow, when the arm is in a demiflexed position;—a roller five or six yards long and three fingers' breadth wide;—and some compresses or lint.

Application.—The limb being maintained by two assistants in demiflexion, the surgeon proceeds to cover the hand and fore-arm with the roller; as he approaches the elbow an assistant draws the skin, which is here usually wrinkled, gently upward, to prevent it from introducing itself between the fragments: the surgeon now pushes down the fractured extremity of the olecranon, in order to place it in exact contact with the ulna, and confines it in this situation, by means of a few turns of the roller, carried round the joint in form of a figure of 8, as in the bandage for phlebotomy: the elbow being at length covered, he carries the roller spirally as far as the axilla, and applies the curved splint well padded with the lint or compresses along the front of the arm and fore-arm, fixing it by a succession of oblique turns of the remainder of the roller, carried down to the wrist.

Observation.—This bandage will serve equally well for disloca-

tion of the upper end of the ulna, when it accompanies fracture of the olecranon.

23. BANDAGE FOR FRACTURE OF THE RADIUS AND ULNA.

Preliminary Remarks.—When there is fracture of both bones, the patient is placed in a sitting posture, and the surgeon bends the arm and fore-arm, and places the hand in a middle state between pronation and supination. An assistant now lays hold of the hand and extends the fractured parts, while a second effects counter-extension, by fixing the humerus with his two hands just above the elbow. The surgeon restores the bones to their natural situation by applying the extremities of the four fingers of each hand upon the palmar face of the fore-arm, opposite the interosseous space, and by a gentle pressure exerted on both sides, pushes the soft parts into the interval, and effectually separates the fragments of the radius from those of the ulna.

In cases where one alone of the two bones is fractured, the extension required is but trifling; when it is the radius, the patient's hand should be inclined toward the cubital side of the member; and when the ulna, to the radial; in either case, pressure is to be exerted upon the muscles of the interosseous space to keep the bones sufficiently apart.

The following bandage will be found suitable for fractures of one, or both bones.

Composition.—A single-headed roller six yards long and three fingers' breadth wide;—two graduated longitudinal compresses nearly as long as the bones of the fore-arm, the thickness of which should be proportioned to the arm in such a way, that, when applied along its anterior and posterior sides, the extent of the antero-posterior diameter of the whole should be rather more considerable than that of the transverse;—lastly, two splints, one of which should be of sufficient length to extend from the bend of the elbow to the palm of the hand, and the other from the olecranon to the dorsal face of the metacarpus.

Application.—For fracture of both bones.—The compresses, saturated with an appropriate lotion, are first to be placed upon the dorsal and palmar face of the fore-arm, and over these, the splints, lined with compresses, wetted like the preceding; the splints are to be fixed by means of the roller, the turns of which should be particularly close, and should envelop the hand. The fore-arm is to be supported in a state of demiflexion, and between pronation and supination, by means of a sling.

For fracture of one alone of these bones.—Whichever be the injured bone, the application of the bandage differs only from the one described above, by the head of the roller being carried from without to within, or from within outward, according as it may be found requisite, to maintain the hand in a state of adduction or of abduction.

Observation.—In double fractures of the fore-arm, the best apparatus is perhaps that of Scultetus; see its description, sect. 4.

24. MR. AMESBURY'S SPLINTS AND BANDAGE FOR FRACTURES OF THE FORE-ARM BELOW THE OLECRANON.

Composition.—A narrow split deal splint of sufficient length to reach from the elbow to the tips of the fingers;—Mr. Amesbury's two convex splints;—cushions for the three;—lastly, a small band.

Fig. 1.

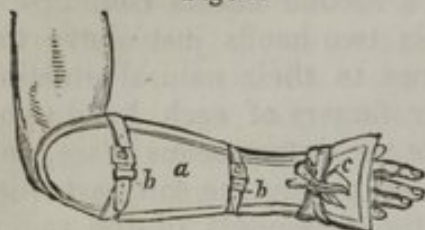
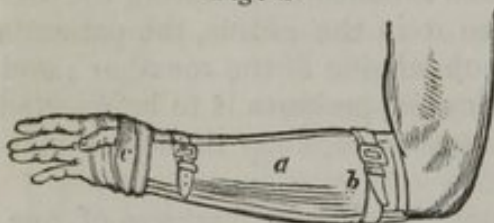


Fig. 2.



Application.—The arm is to be raised by an assistant, and turned so as to bring the bones in a proper line, and the hand in a position nearly supine. The surgeon then applies the long convex splint, *a*, fig. 1. upon the back of the fore-arm, with its most convex part opposite the space between the ulna and radius. The short convex splint, *a*, fig. 2, should be also placed in such a manner that the middle of its convexity be opposite the middle of the fore-arm. The assistant then holding these splints firmly upon the arm, the surgeon proceeds to place the

deal splint along the line of the ulna. The straps, *b b*, *b b*, figs. 1 and 2, fixed upon the convex splints, are then to be buckled round the limb, in order to secure the splints and produce a moderate degree of pressure. The hand is to be secured to the back splint by the band, *c c*, figs. 1 and 2, and the arm placed in a sling.

Observations.—During the union of the fracture, the straps are to be buckled a little tighter in proportion as the tumefaction subsides, and the soft parts yield to the pressure. Great care, says Mr. Amesbury, should be taken to make the sling press equally, or as much at the elbow as at any other part; and it should be left long enough to allow the fore-arm to hang at a right angle with the humerus.

25. BANDAGE FOR AMPUTATION OF THE FORE-ARM.

Composition.—A single-headed roller four yards long and three fingers' breadth wide;—lint or charpie;—some slips of adhesive plaster;—and a longitudinal compress.

Application.—When the vessels are tied, the flesh and integuments are to be brought together from before backward and from behind forward, over the extremities of the bones; the ligatures ought to be placed at the angles of the wound, and the edges of the latter maintained in apposition by means of the strapping. Over the extremity of the stump is then placed a pledget of lint or charpie, smeared with spermaceti ointment, another and dry pledget upon

this, and, lastly, a longitudinal compress. The whole of the dressing is to be confined by the roller, the initial end of which is to be placed upon the lower end of the arm, and fixed by a circular or two; the head of the roller is then to be carried about the bend of the elbow as in venesection, and continued onward to the verge of the wound.

BANDAGES FOR DISLOCATIONS OF THE UPPER EXTREMITIES OF THE RADIUS AND ULNA.

26. FOR DISLOCATION OF THE HUMERO-CUBITAL ARTICULATION.

Composition.—A single-headed roller of moderate size, and some lint or compresses.

Application.—The articulation is to be surrounded with the compresses saturated with cold water, and maintained by means of the roller applied rather tightly in the form of a figure of 8. The limb is to be supported in a due degree of flexion by means of a sling.

27. FOR DISLOCATION BACKWARD OF THE UPPER END OF THE RADIUS.

Composition.—A longitudinal compress;—a single-headed roller four or five yards long;—and a strong pasteboard splint, previously wetted and shaped to the inside of the arm, reaching from the lower third of the humerus to the palm of the hand.

Application.—The patient's hand being held, after the reduction, in the state of supination, the compress is to be placed along the palmar face of the joint, and maintained there by means of the roller, which should extend from the hand to above the elbow, passing round the latter in the form of a figure of 8; the splint, properly padded, is to be applied over these, and fixed by spiral turns, conducted from above downward, of the remainder of the roller.

28. FOR DISLOCATION FORWARD OF THE UPPER END OF THE RADIUS.

Composition.—A roller four or five yards long.

Application.—It should be applied from the hand to the lower part of the humerus; the limb is then to be bent at right angles, and the fore-arm and hand supported in a middle state, between pronation and supination, by means of a sling.

29. BANDAGE FOR DISLOCATION OF THE LOWER EXTREMITIES OF THE RADIUS AND ULNA, OR DISLOCATION OF THE WRIST.

Composition.—A single-headed roller four or five yards long;—four longitudinal compresses;—four splints; two of these should be rather longer than the others, and extend before and behind the limb to the phalango-metacarpal articulation;—the splints should be about an inch and a half broad.

Application.—When the reduction is effected, a few turns of the roller are to be applied about the hand, and the compresses placed forthwith upon the anterior and posterior faces, and upon the sides

of the fore-arm ; these are to be covered by the four splints, and the whole maintained by the remainder of the roller, which should be carried upward spirally, and form an 8 about the elbow ; the fore-arm ought then to be supported in a sling.

30. ANOTHER BANDAGE FOR THE SAME.

Composition.—A roller four yards long and two fingers' breadth wide ;—one or two longitudinal compresses ;—and, lastly, a palette or hand splint.

Application.—When the dislocation is reduced, the joint is to be surrounded with the compresses, wetted with a cold lotion ; the surgeon then applying the initial end of the roller upon the lower part of the fore-arm, fixes it by a few circulars, and descends with it by doloires to the wrist ; hence he directs the head obliquely over the back of the hand, and passing it between the thumb and index finger and across the palm, returns it to the dislocated part ; when the roller has pursued twice or thrice more the course just described, about the hand and wrist, these last are to be placed upon the palette, well cushioned with lint, and secured to it by the remainder of the roller.

Observation.—When the os magnum is displaced, the apparatus requires the addition of a graduated compress and small splint to be placed over the reduced bone.

31. SLING FOR THE HAND OR WRIST.

Composition.—A piece of linen or silk half a yard long and a quarter of a yard wide, folded crosswise at the middle. The extremities are to be plaited, and a riband attached to each.

Application.—The hand and wrist are to be engaged in the middle portion of the sling, and the ribands brought upward to be tied to a button of the patient's coat, or fastened in any other convenient way to the dress.

32. BANDAGE FOR DISLOCATION OF THE METACARPAL BONES OR THE PHALANGES.

Composition and Application.—Narrow longitudinal compresses of sufficient thicknesses are applied upon the dorsal and palmar faces of the metacarpal bone and the corresponding finger, together with two long splints ; and the whole maintained in place by a narrow roller.

33. SPICA FOR THE THUMB.

Composition.—A roller three yards long and a finger's breadth wide.

Application.—The initial end is fixed upon the wrist by two or three circulars ; after the last turn, which should be terminated upon its radial side, the head of the roller is to be directed from the external to the internal side of the thumb, passing between this and the index finger, to return and cross its base, and be carried onward again about

the wrist ; these double circulars are repeated, to form a spica, till the whole of the bandage is exhausted.

Use.—Principally in dislocation of the first metacarpal bone. It may be used also for either of the fingers.

34. GAUNTLET.

Composition.—A single-headed roller eight yards long and an inch wide.

Application.—The initial end is fixed upon the wrist by two circulars ; the head is then directed obliquely from the cubital side of the same, across the back of the hand, to the space between the thumb and index, in order to embrace, by *dolaires*, the whole of the latter, from without to within, beginning at its lower part ; having arrived at the end of the finger, it is conducted downward, in two or three turns, to the back of the hand, and from thence to the wrist, around which another circular is passed : the other fingers are covered in the same manner, and the bandage is completed by a few circulars about the wrist.

Use.—In fractures and dislocations of the phalanges ; in burns, to prevent the fingers from uniting ; in diseases also of the carpus and metacarpus. It may be made, but less solidly, with a roller for each finger.

35. DEMI-GAUNTLET.

Composition.—A roller four or five yards long and an inch wide.

Application.—It is fixed, like the preceding, about the wrist ; it is then carried obliquely to the base of the index, which it embraces, and is reconducted diagonally to the wrist, which it again encircles. Having embraced successively, and in the same manner, the base of each finger, it is terminated by a few circulars about the wrist.

Use.—In dislocations of the first phalanx, with the metacarpal bones, and in diseases which have their seat upon the back of the hand.

SECTION IV.

BANDAGES OF THE LOWER EXTREMITIES.

1. BARON BOYER'S APPARATUS FOR FRACTURE OF THE NECK OF THE FEMUR.

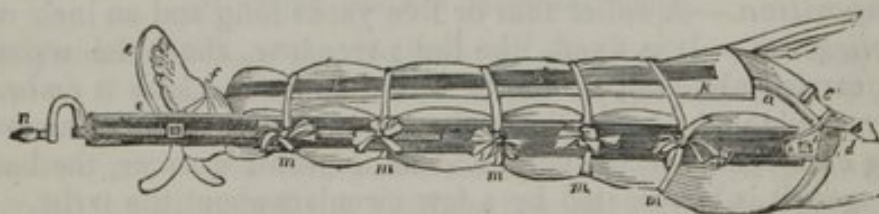
Composition.—A splint of particular construction for extending the limb ;—a foot-support ;—a kind of padded belt, which is buckled round the upper part of the thigh ;—two common flat splints of the length of the limb, one for the anterior and the other for the internal part of the thigh ;—and some cushions, tapes, and wadding.

The splint is about four feet long and three fingers' breadth wide. Along half the length of this splint runs a groove, about half-an-inch broad, the extremity of which is covered with iron ; to this groove a

screw is adapted, which occupies its whole length, one end of it being supported against the plate of iron covering the extremity of the groove, and the other made to fit a key by means of which it is to be turned. On the inside of this splint a contrivance for holding up the foot-support is fastened to the screw. The upper part of the splint is received in a sort of pouch or bag adapted to the external side of the thigh-belt. The sole or foot-support, which has two branches at its inferior part, is made of iron, and covered with soft leather. It is connected by means of a mechanical contrivance, as just mentioned, with the screw. To that part of the sole which is near the heel, is attached a broad piece of soft leather, which being split on each side into two straps serves for fixing the sole to the foot.

The thigh-belt is of strong leather, covered with the same material of a softer quality, and well stuffed with wool: near the place where its two ends are buckled together on the limb, a little leather pocket is sewed for receiving the upper end of the external splint.

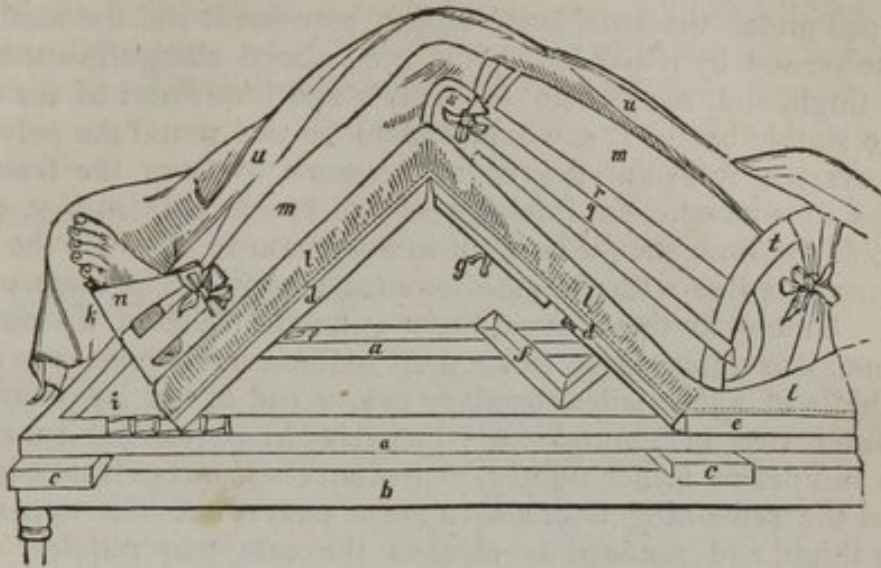
Application.—The patient being properly disposed upon the bed, a piece of linen of the length of the limb and about three-quarters of a yard broad, called *porte-attelle*, or splint-wrapper, is passed under the limb, lying upon the five ordinary tapes, *m m m m m*. In the next place, the thigh-belt is applied, the surgeon having previously surrounded the upper part of the limb obliquely with a cushion of wadding, four fingers' breadth wide, and the length of the thigh-belt,



in order to moderate the pressure of the latter, and render it more supportable, *a a, b, c, d*. The hollows of the sole of the foot and lower part of the leg are filled up with wadding or tow, and the foot-support, *e*, is fastened to the former by means of the soft leather straps attached to its under surface, which pass round the lower part of the leg; should, however, these straps appear insufficient to fix the iron sole to the foot firmly, an extra band, *f*, may be applied in the same manner, of calico or linen.

That done, the surgeon proceeds to the reduction of the fracture, and afterwards adapts the upper extremity of the splint to the pouch of the thigh-belt, *g, h, i*; the foot-support being connected with the splint, the cushions, and the anterior, *k*, and internal splints are to be applied, and the whole fixed by means of the tapes, as in the ordinary bandages for fractures of the thigh. Lastly, by turning the winch, *n*, the iron sole is lowered, drawing the foot, to which it is attached, along with it; the superior extremity of the splint is thus pushed upward, and the member elongated to the necessary extent.

2. MR. AMESBURY'S APPARATUS FOR FRACTURES OF THE UPPER PART OF THE FEMUR.



Composition.—Three pieces of board are to be procured of sufficient length to rest upon the sides of the bedstead, *b*, by which the apparatus itself is to be raised from the floor. One of these, *c c*, should be placed near the lower end of the frame, *a a*; the second near the lower end of the upper plane, *e*; and the third near the upper end of the frame. The middle and lower planes, *d d*, being raised to the proper degree of elevation, rest upon the rack, *i*, of the frame, and are covered by a hair mattress, which should extend the whole length also of the plane, *e*, as they lie connected together. The mattress should be provided with a hole at the part which corresponds to the middle plane of the apparatus. A blanket and sheet, with a hole in each, to correspond to the hole in the mattress, are to be applied over this, and stitched round the edge, *l l l*, and round the hole in the centre, placed opposite the trap-door, *f*, in order to prevent them from getting into folds and incommoding the patient.

Application.—The patient is to be placed upon the mattress with the perineum opposite the hole in the middle plane of the apparatus; and the lower limbs, *m m*, over the double inclined plane. The foot of the injured limb should then be fixed by means of a band, *n*, and a pad placed just below the external malleolus, to the foot-board, *k*, which will keep it upright, with the heel close down against the mattress. After which the middle plane, *d*, should be adapted to the length of the sound thigh, by the two portions of board of which it is composed being moved upon each other so as to elongate or shorten it as it may be found necessary; it is fixed by the screw *g*. The pelvis and limb may be thus kept perfectly quiet, and motion of the fragments totally prevented; continued extension may be made in the line of the thigh-bone and retraction of the limb prevented, while neither inversion nor eversion of the foot can possibly take place. When the *neck* of the thigh-bone is fractured, there are two

indications to be fulfilled, namely, to prevent the upper end of the femur from dropping from its natural line, and keep the fractured surfaces in perfect contact. The first is done by properly placing a small pad under the trochanter major, between it and the mattress; and the second by a padded splint, *q, r*, placed along the outer side of the thigh, and secured to the pelvis and lower part of the thigh by two simple bands, *t, s*, which should be tied round the pelvis, so as to exert a sufficient degree of pressure to keep the fractured surfaces in contact. In fractures of the *trochanter major above the neck*, the limb should be kept in a position to allow of the great toe being in a line with the anterior superior spinous process of the ilium. Unless, in these cases, there is fracture also of the neck of the bone, it is unnecessary to keep up extension; it suffices to apply the middle of a four-tailed bandage over a pad of lint just above the trochanter, two of the tails of which should be carried round the pelvis and drawn rather tightly, to prevent the bandage from slipping off, and the remaining two, also upon a pad, round the upper part of the thigh, and fastened as close as the case may require. The object of this bandage is to counteract the contraction of those muscles which have a tendency to separate the fractured surfaces. A splint should also be applied along the outer side of the thigh as in fracture of the neck; its object is to keep the trochanter in a proper line with the shaft of the bone. In fractures *between the trochanters, just below the neck*, the same position is necessary as in fractures of the neck of the bone; the trochanter prevented from dropping by a hard pillow being placed beneath it, and the upper and lower fragments kept in a proper line by means of the side splint lightly applied. In fractures *below the trochanter minor*, the limbs ought to be placed over the double inclined plane, fixed at a right angle, and the injured limb extended to its natural length by the elongation of the middle plane. A common splint, well padded, and long enough to reach from the tuberosity of the ischium to the ham, should be placed under the thigh upon some straps, another upon the outer side, another upon the inner, and a fourth upon the front of the thigh. They should keep up a pressure, judiciously regulated, upon the limb, by means of straps and buckles. *u u*, represent the bed-clothes thrown back.

3. M. DUPUYTREN'S BANDAGE FOR THE SAME.

Composition.—Several cushions of different sizes to form a double inclined plane;—a common sheet.

Application.—Three or four cushions, decreasing in size from below upward, are placed under the ham; the rest of the cushions are so disposed as to form a double inclined plane. The thigh is made to repose upon the plane which corresponds to it, while the leg in a state of flexion rests upon the other. The limb is maintained in this position by means of a sheet folded like a handkerchief, the

central part of which should embrace the foot, while the extremities are attached to the sides of the bed.

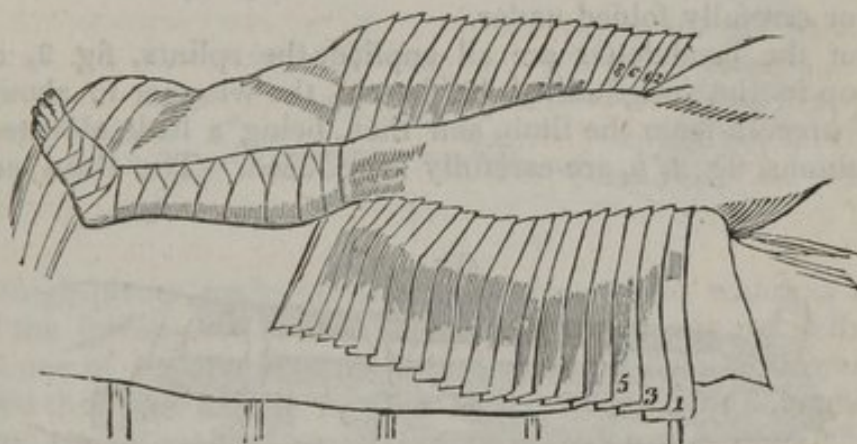
Observations.—This apparatus is similar to that employed by Sir A. Cooper in fractures of the neck of the thigh-bone within the capsular ligament; when the fracture is without, that gentleman prefers the double inclined plane of Sir Charles Bell, page 22.

4. BANDAGE OF SCULTETUS FOR FRACTURES OF THE BODY OF THE FEMUR.

(Syn. Many-tailed Bandage.—Bandage à bandelettes séparées, Fr.)

Composition.—Five bands or tapes a yard long and two fingers' breadth wide; to be placed, three under the thigh, and the remaining two under the leg, fig. 1.;—they should be lined along their middle

Fig. 1.



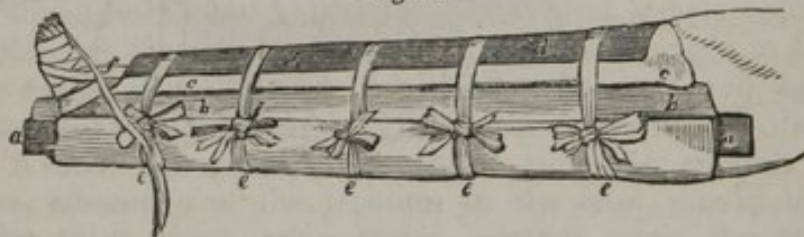
third, to prevent them when tied from becoming twisted;—a large piece of linen, to serve for splint-wrapper, a yard wide, and a little longer than the limb;—a quantity of bandelettes, three fingers' breadth wide, each long enough to make a circular and half about the limb, and sufficiently numerous to cover it in its entire length in overlapping each other by about half or two-thirds of their width, fig. 1. 2, 1, 3, 5, &c.;—two or three longitudinal compresses, several times folded, to surround lengthwise the injured limb: they should be saturated upon their application with an appropriate lotion; they serve also for preserving the bandelettes from the contact of pus or blood;—three splints: the external one should extend along the outside of the limb from the crest of the ilium to a little beyond the foot; the internal one, along the inside of the same, from a little below the pubes to the same distance; and the anterior one from the upper part of the groin nearly to the bend of the instep;—three cushions of oat-chaff, of the same length as the limb, to be interposed

between the splints and bandettes;—lastly, a roller a yard and a half long to cover the foot, and a band to support the same.

Application.—The several objects of which the apparatus is composed being placed over the pillow upon which the limb ought to rest, the patient should be carried to the bed, the fractured limb extended along the middle of the apparatus, and the reduction proceeded with forthwith. The limb having resumed its natural length, the assistants are still to continue the reductive efforts, while the roller is applied upon the foot, and the wetted compresses placed along the thigh. That done, the bandettes are applied, in succession, from the lower part of the leg to the upper part of the thigh; for which purpose the surgeon takes hold of the extremity nearest himself of the last bandalette, an assistant, opposite, fixing the other extremity, and extends it completely across the limb in the form of an oblique circular; taking next the extremity held by the assistant with one hand, while with the other he maintains the first firmly in position, he applies it in like manner obliquely round the limb, to intersect the first upon its fore part: the extremities should always be carried underneath the limb, and if too long, a portion should be cut off or carefully folded under.

When the bandettes are all applied, the splints, fig. 2, *a*, are rolled up in the longitudinal borders of the wrapper to about two fingers' breadth from the limb, and then, being a little elevated, the two cushions, fig. 2, *b*, are carefully introduced. The third cushion

Fig. 2.



is then applied along the fore part of the member, and above that the third splint, fig. 2, *c c, d d*. The assistant now embraces with both hands the entire apparatus, while the surgeon fastens the tapes, commencing by the one that corresponds to the middle of the thigh, knotting them on the outer side of the limb, fig. 2, *e e e e e*. Lastly, the middle of the band is applied upon the sole of the foot, and the extremities, after being crossed upon its fore part, are pinned to the lower part of the apparatus, fig. 2, *f*.

Observations.—This is an extremely simple and efficient apparatus for transverse fractures of the shaft of the femur, and may be readily passed underneath the limb without disturbing it: one great advantage that it possesses over the eighteen-tailed bandage is, that each bandalette, when it becomes soiled, may be removed without displacing the whole apparatus. It may be employed equally in fractures of the arm and leg.

5. EIGHTEEN-TAILED BANDAGE.

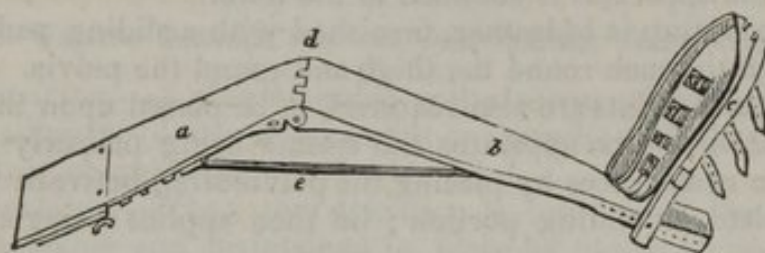
Composition.—To a strip of roller, four fingers' breadth wide, and as long as the limb, are stitched, crosswise, eighteen others of equal width, and sufficiently long each to make a turn and a half about the limb, from the upper part of the thigh down to the ankle. They ought to cover each other from above downwards by about two-thirds of their entire breadth, and have a slight degree of obliquity relatively to the longitudinal piece, to facilitate their application upon the limb.

Application and Use.—See bandage of Scultetus, page 67.

6. MR. AMESBURY'S APPARATUS FOR FRACTURE OF THE MIDDLE AND LOWER THIRDS OF THE FEMUR.

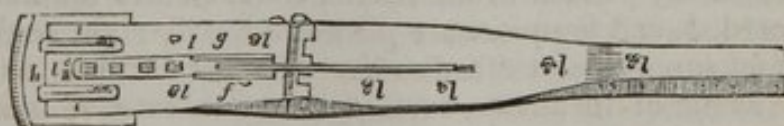
Composition.—The apparatus is divided into three portions, independent of splints and straps, one of which is for the thigh, fig. 1, *a*, another for the leg, *b*, and the third for the foot, *c*. There are

Fig. 1.



two thigh-pieces made to each apparatus, one of which is bevelled off at the lower end to the right and the other to the left, so that when one of them is fixed to the leg-piece, which is hollowed out to receive the back of the leg, the leg and thigh-piece together are adapted to the natural line of the right limb; and when the other thigh-piece is joined to the leg-piece, they are adapted to the natural line of the left limb; this arrangement Mr. Amesbury considers necessary, in order to preserve the figure of a perfectly formed limb, which is not straight, but turns inward a little at the knee. The leg and thigh portions are connected by means of a little steel or brass pin, *d*. Behind the apparatus is a steel bar, *e*, coated with brass, and fixed to the back of the leg-piece. To the upper end of this bar is fixed what M. Amesbury calls a brass foot, fig. 2, *f*, to which is attached

Fig. 2.



a bolt acted upon by a spring. There is a hole in the centre of this brass foot, which is traversed by the bolt in the transverse direction. At the back of each thigh-piece is a rack, *g*, with several projections, each having a hole bored through the middle, for the purpose of receiving the bolt attached to the brass foot-piece. The foot-piece

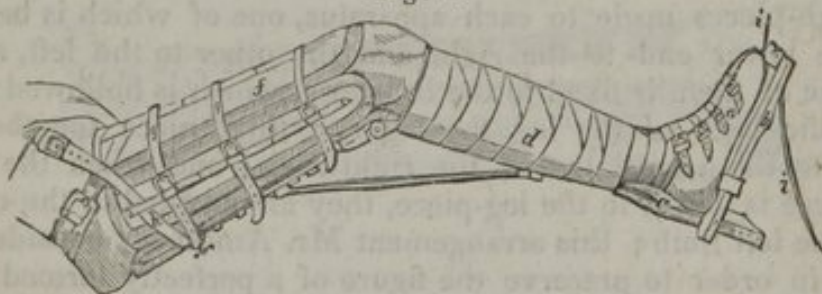
is connected with the steel bar in such a manner as to be easily fixed upon either of these projections. By being fixed upon either of these, except that nearest the leg-piece, the leg and thigh-pieces become fixed together so as to form a double inclined plane, see fig. 1; the angle of this may be varied at pleasure by altering the position of the brass foot-piece from one of the teeth or projections of the rack to another. At the upper end of the thigh-piece is a sliding brass plate, *h*, fig. 2, so adapted that it may be applied to either of the thigh-pieces at pleasure. This contrivance allows of the thigh part of the apparatus being adapted to thighs of various lengths. The upper end of this plate is turned off, so that, when it is properly padded, it may bear against the tuberosity of the ischium without injuring the integuments. At the back of the sliding plate are placed a couple of brass bars, *i i*, which answer the double purpose of rendering the sliding plate more secure when it is fixed upon the thigh-piece; and of preventing the pelvis-strap, to be noticed presently, from slipping from the apparatus. There are little studs, *l*, placed at the back of the apparatus, for the purpose of receiving the straps by which the apparatus is confined to the limb.

The pelvis-strap is of leather, furnished with a sliding pad, and is long enough to reach round the thigh and round the pelvis.

Three short splints are also required, to be placed upon the thigh.

Application.—The apparatus and splints being properly padded, the surgeon commences by placing the pelvis-strap between the bars and the plate or sliding portion; he then applies a single-headed

Fig. 3.



roller, *d*, fig. 3, spirally about the leg from the toes to the bend of the knee. In the next place, an assistant takes the small of the leg in one hand, and places the other under the knee to raise the limb, and at the same time to keep the knee bent while the surgeon places the apparatus under it. When the limb is properly placed, the shoe, *a*, previously padded in the inside, is buckled to the foot, while the foot-board, *b*, and leg-piece are placed at nearly right angles; this gives the foot support, and steadies it. The leg is to be supported along the whole of its under surface in order to give it an equal bearing upon every point of the apparatus, and this is done by means of tow or wadding, *c*, placed under the small of the leg, between the long pad and the leg-piece. The leg is fixed upon the apparatus by a roller carried spirally round both, from the ankle to the bend of the knee.

To confine the fractured parts in their natural position, the assistant takes the apparatus and the knee between his hands, and extends the thigh gradually in a line with the thigh-part of the apparatus, which the surgeon supports against the back of the thigh. When the surgeon has coapted the fragments of the bone, he applies the splints; the first, *e*, on the outer side of the thigh, from the great trochanter to the lower part of the outer condyle; the second on its inner side, reaching from the pubes to the lower part of the inner condyle; and the third, *f*, upon the fore part of the thigh, from a little below the superior anterior spinous process of the ilium, to the base of the patella. The splints are kept in place by the straps, *g g g*, fixed to the studs on the back part of the apparatus. Lastly, the pelvis-strap, *h*, is to be carried round the limb, under the strips of leather of the splints, and made to cross on the outer side, while the *buckle-end*, with the sliding pad, is carried round the pelvis and made to meet the other end in front, where it should be buckled. The tapes, *i i*, serve for fixing the lower part of the apparatus to the foot of the bed.

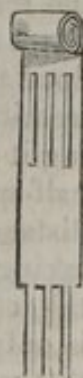
7. UNITING BANDAGE FOR THE COXO-FEMORAL AMPUTATION.

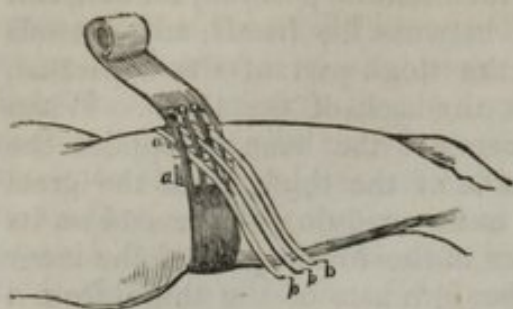
Composition.—A single-headed roller seven yards long;—some strips of adhesive plaster;—some lint or charpie;—and lastly, several longitudinal compresses.

Application.—When the operation is terminated, the flaps are brought together and maintained in place by means of the adhesive plaster, over which are properly applied the lint or charpie, and the longitudinal compresses; the dressing may be then confined by the “Spica of the Groin,” or a figure of 8 bandage, constructed in the following manner: two horizontal turns are first made round the pelvis, a little below the superior iliac crests, and the head of the roller being carried obliquely downward, and about the lower part of the nates, is returned across the groin to effect a third circular about the pelvis; a second oblique circular is then carried round the nates, and a fourth horizontal one about the pelvis; these oblique and horizontal turns are once or twice more repeated, and the bandage terminated by a few circulars about the pelvis.

8. UNITING BANDAGE FOR LONGITUDINAL WOUNDS OF THE THIGH.

Composition.—One end of a piece of linen, of sufficient length to make three or four circumvolutions round the member, and of a breadth correspondent to the length of the wound, is divided so as to form three bandelettes, about an inch broad, and long enough to embrace three-fourths of the circumference of the limb: at a convenient distance further on, are made three longitudinal perforations, opposite to, and of the same breadth as the bandelettes. The remainder of the band is then rolled up;—two common graduated compresses also are required.



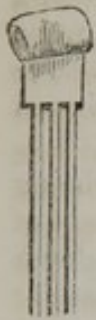


Application.—The undivided portion situated between the bandelettes and the perforations being applied upon that part of the limb which is exactly opposite the wound, the graduated compresses, *a a*, are placed one on each side of the latter, at the distance of about three fingers' breadth from its edges; the

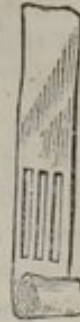
bandelettes, *b b b*, are next passed through the corresponding perforation, *c c c*, and the surgeon brings the edges of the wound in contact, by drawing the extremities of the band in contrary directions: the rest of the application consists in firmly securing the bandelettes by some circulars made with the remainder of the strip of linen.

Observations.—This bandage may be used in longitudinal wounds of the upper as well as of the lower extremities. It may generally be replaced, however, with advantage, by strips of adhesive plaster, over which a common dressing should be applied, and confined by a single-headed roller: the strips should be applied about a quarter of an inch apart, where great closeness is required, or otherwise they may be more distant; this is an extremely necessary precaution, as the confinement of blood, and still more of any extraneous body, would be liable to occasion the formation of an abscess, that would disunite the parts. The proper method of applying the adhesive plaster is this; when the wounded part is put into such a position that the skin and muscles are in a state of relaxation, the edges of the wound are brought together, and maintained in apposition by the thumb and finger of the left hand, unless it be extensive, and its edges widely separated; in this case, the charge should be confided to an assistant: taking hold then of the two extremities of a piece of strapping (previously warmed before the fire or a candle) between the thumb and index finger of each hand, the surgeon applies one of them upon the least movable lip of the wound, at the part where it is deepest or most difficult to close, and at a right angle to its direction. That done, the assistant confines this extremity, by applying upon it the points of his fingers, while the surgeon brings the most movable lip toward the other, and fixes it with the remainder of the strap; the rest of the pieces are laid side by side, according to the rule laid down above. When the strapping is to be lifted off, which is generally done the fourth or fifth day, the surgeon lays hold of one of the extremities of each piece in succession, and gently raises it in reflecting it upon the wound. When this extremity is detached to within half-an-inch of the latter, he detaches the other to about the same distance, and holding them together, lifts them perpendicularly, taking care at the same time to apply the thumb and index finger of the left hand upon the sides of the wound to protect the cicatrix. It is only then in particular cases and in certain parts, such as the limbs, that recourse need be had to the above or following bandage.

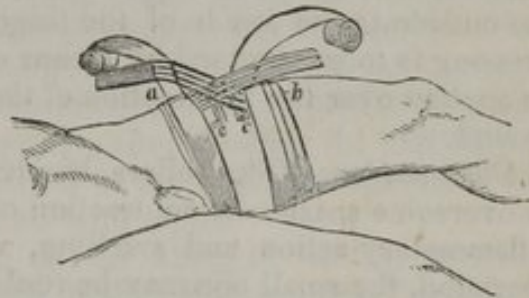
9. UNITING BANDAGE FOR TRANSVERSE WOUNDS OF THE THIGH.



Composition.—A piece of stout cloth of the same width as the wound, and as long as the member, is to be divided to nearly half its length into three tails or bandelettes; another and similar piece of cloth should be perforated in the middle with three corresponding longitudinal openings. The remainder of the objects consists of two common graduated compresses, and two single-headed rollers, one six and the other nine yards long, both three fingers' breadth wide.



Application.—The limb is put into complete extension; the surgeon applies the initial extremity of the longest roller upon the side of the pelvis corresponding to the wound, fixes it by two or three horizontal circulars, and conducts the head of the roller along the thigh in *dolaires*, *a*; that done, he extends the perforated band along the limb, observing to allow the upper extremity to pass a few inches beyond the last turn of the roller, and the openings to lie upon the wound; he fixes a portion of the upper extremity, by means of two or three circulars carried round the limb, at some distance above the solution of continuity, and reflecting what remains of it downward, secures it by a few more turns. Confiding now the head of the roller to an assistant, he takes the remaining roller, fixes its extremity below the knee by a few circulars, and carries the head spirally to the lower part of thigh, *b*: next, placing the split band along the limb, the tails directed toward the wound, beyond which they should extend by about three-fourths of their entire length, he fixes its lower or undivided portion, in the same manner as he had done the upper portion of the first band, and resigns the head to an assistant. Lastly, having applied the compresses, *cc*, one above, and the other below the wound, he engages the bandelettes in the corresponding perforations, and draws these free extremities of the bands in contrary directions, in order to approximate its edges: when he considers the edges of the wound to be sufficiently in contact, he extends the bands along the limb, and while the assistants maintain them firmly fixed, confines them with what remains of the two rollers.



Observations.—In cases where this bandage is insufficient to maintain the contact of the edges of the wound, in consequence of the movements of the patient, a splint ought to be placed along the limb on the side opposed to the injury. It may be employed in all similar wounds of the upper and lower extremities, in cases of fracture of the patella and os calcis, and of rupture of the tendo-Achillis.

10. BANDAGE FOR AMPUTATION IN THE CONTINUITY OF THE THIGH, WHEN THE WOUND IS TO BE HEALED BY THE FIRST INTENTION.

Composition.—A double-headed roller eight or ten yards long and three fingers' breadth wide ;—a single-headed roller of the same width, three yards long ;—two long and broad slips of adhesive plaster, and two narrower ones ;—some lint ;—and lastly, a broad band of about half a yard in length, or a Maltese cross.

Application.—About two-thirds of the double-headed roller being passed about the pelvis as a spica, previous to the commencement of the operation, the remainder is to be conducted about half-way down the stump, and pinned : the edges of the wound are now to be brought into contact, first by means of the broad strips of plaster, applied across the middle of the stump, about half an inch apart, and secondly by the narrow strips applied near the corners : the ligature should be allowed to hang down over the lower strip. That done, the lint lightly smeared with ointment should be applied with great accuracy upon the face of the stump, and covered by the band carried from the outside to the inside of the thigh, or by the Maltese cross ; the dressing is to be confined by means of the second roller, which is to be applied over the termination of the first, and brought down to the wound.

Observation.—The rollers, besides confining the dressings, tend to overcome spasmodic contraction of the muscles. In cases of great inflammatory action and swelling, which occasionally succeed the operation, the small one may be readily loosened, without disturbing the rest of the bandage.

11. BANDAGE FOR AMPUTATION IN THE CONTINUITY OF THE THIGH, WHEN THE WOUND IS INTENDED TO BE HEALED BY THE SECOND INTENTION.

Composition.—A band eight or ten yards long and three fingers' breadth wide, rolled up into two heads of different sizes ; a single-headed roller of the same width, about three yards long ;—some lint or charpie, and a cribriform compress ;—several strips of adhesive plaster ;—and lastly, five thin longitudinal compresses, one longer than the rest, and rather more than sufficient to surround the stump.

Application.—The double-headed roller is to be applied about the pelvis and brought half-way down the stump, in the form of a spica, and then as far as the border of the wound in simple circulars with what remains of the longest head. The surgeon now carefully applies a simple dressing upon the face of the stump, prepared either with the lint or with the charpie ; if the latter be employed, the cribriform compress smeared with a little simple ointment should be first applied upon it, and over this the charpie ; the dressing should be maintained by the strapping applied from within outward ; over the adhesive plaster should be applied a plumasseau of charpie, confined by means of the longitudinal compresses, two of which should extend from the external to the internal side, and two from before backward ; the extremities of these compresses are to be fixed by the longest of the five, carried transversely about the stump, and the

whole dressing secured by a *capelina*. To construct this, the surgeon takes the second roller, and fixes the extremity by a couple of circulars, applied at the middle of the stump; he next reverses the roller at one side or other of the limb, and places the thumb and two first fingers of the left hand upon the reverse in order to maintain it; directing now the head of the roller downward and across the lower part of the wound, he conducts it along the side opposite, to make a second reverse and a circular and half; re-commencing the two reverses in the manner just described, and the circular and half to fix them, he surrounds the face of the stump entirely from below upward, and terminates the bandage by doloires carried down to the border of the wound.

12. FIGURE OF 8 BANDAGE OF THE KNEE.

Composition.—A single-headed roller four yards long and three fingers' breadth wide.

Application.—Two circulars being made about the lower part of the thigh, in order to fix the initial extremity, the head of the roller is carried across the knee obliquely, to effect a circular at the upper part of the leg; from hence it mounts to the lower part of the thigh, which it again surrounds transversely, after crossing the first oblique turn upon the knee. The remainder of the roller is employed in the same manner, and the end fastened with a pin.

Use.—To exert compression on the knee, or confine dressings either upon or behind it, according as the roller is crossed anteriorly or posteriorly.

13. WEISS'S ELASTIC KNEE-CAP.

It is made of an elastic tissue linen with India-rubber, lacing at the side as seen in the drawing. It is much preferable to the common figure of 8 bandage, where compression is required.



14. SHOOLBRED AND RENWICK'S METALLIC ELASTIC KNEE-CAP,

Of which the same may be said in regard to its utility, has nearly the same form as the preceding. It is lighter than the one above, and is pervious to the transpiration.

Observations.—The two last bandages are particularly useful in cases of dislocation of the patella, when the ligaments are in so relaxed a state as to render a recurrence of the accident probable.

15. BANDAGE FOR TRANSVERSE FRACTURE OF THE PATELLA.

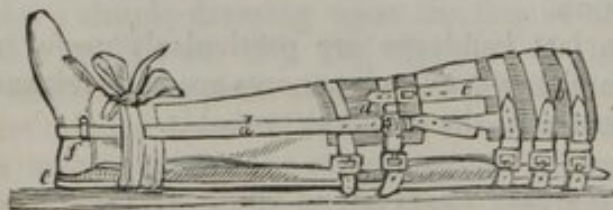
Composition.—Two single-headed rollers, each eight yards long and three fingers' breadth wide;—a band rather longer than the limb, and a little broader than the patella;—two longitudinal compresses;—lastly, a cushion and splint of the length of the limb.

Application.—The patient lying on his back, an assistant raises the limb by taking hold of the foot, and the surgeon places the band along the anterior face of the limb, fixing it at the ankle by a few circulars of one of the rollers. That done, he reflects upward the extremity which corresponds to the foot, confines it by a few more turns, and proceeds with the roller to a little below the knee, by passing it spirally about the leg: on arriving there, he resigns it to an assistant, and reflects the upper part of the band, downward, upon the leg: he now puts the fragments of the bone in apposition, and places the middle of one of the compresses immediately above the upper fragment, bringing the extremities obliquely backward and downward alongside the ham: he places in the same manner the second compress below the lower fragment, and conducts the extremities obliquely from below upward, and from before backward. Extending the band again along the thigh, he resumes the roller, passes a few turns in the form of 8 about the knee, and ascends by spiral circulars to the upper part of the limb; he then reflects downward the superior extremity of the band, and descends along this reverse by fresh circulars, to the exhaustion of the roller. Lastly, placing along the posterior part of the limb, from just below the nates to the heel, the cushion and the splint, he confines them by means of the second roller. See Uniting Bandage, page 73.

16. MR. AMESBURY'S APPARATUS FOR THE SAME.

Composition.—Two pads to be placed, one above and the other below the knee, each about six fingers' breadth wide, and long enough to pass half-way round the limb: the pads are connected by two short straps, and buckles;—five straps, with buckles, to pass round the limb, three above and two below the knee, in order to fix them;—a long strap, to pass from the upper pad, to which it should be fastened, along one side of the leg and under the foot to meet a buckle attached to the same pad on the other side;—a properly-padded straight splint to extend along the thigh and leg;—and lastly, a handkerchief, or a band about three-quarters of a yard long.

Application.—A shoe is first to be applied upon the patient's foot, furnished at the sides with two small loops, *ff*, and the leg extended upon the padded splint, *e*, after which the pads, *a*, *b*, are placed above and below the knee, and secured, together with the



splint, by means of the five straps mentioned above; the fragments are then to be brought into close contact by means of the short strap, *c*, and the long strap, *d*, which should

pass through the loops of the shoe. The lower part of the splint is maintained against the leg by means of the handkerchief or band.

The treatment of fractures of the patella is, in the generality of

cases, very simple ; it suffices merely to extend the limb upon an inclined plane made with pillows, the upper part of which should correspond to the heel, and the lower to the nates ; the fragments may then be kept in contact, as well as involuntary flexion of the knee prevented, by means of a sheet, folded as a handkerchief, applied transversely upon the lower part of the thigh, and secured at each end to the sides of the bed. In the French hospitals adhesive plasters made of Burgundy pitch have been employed to maintain the fragments in place, with considerable success. In cases only, therefore, in which the patient is unmanageable, is there occasion to resort to bandages like those described above.

17. SIR ASTLEY COOPER'S BANDAGE FOR DISLOCATION UPWARDS OF THE PATELLA.

Composition.—A long single-headed roller ;—a well-padded splint to be placed behind the knee ;—a leather strap and buckle to be applied about the lower part of the thigh : to this strap a buckle should be fastened to correspond with the outer side of the thigh, while one end of a second leather strap, long enough to extend from the first round the sole of the foot to meet the buckle, should be fastened to it at its inner side.

Application.—The roller is to be carefully applied upon the foot and leg, and the limb placed in full extension ; the padded splint being then applied behind the knee, the short strap is buckled round the lower part of the thigh, and the long one carried round the foot to be secured to the buckle fixed to the outer part of the first. The patient ought to wear a shoe having two bits of leather stitched to the sides for the purpose of giving passage to the long strap, and preventing it from sliding off the foot.

18. BANDAGES FOR FRACTURES OF THE LEG.

In cases of fracture of the tibia alone, or of the tibia and fibula together, the bandages of Scultetus, page 67, or of Boyer, page 63, may be employed, according as the fracture may be transverse or oblique ; the lateral splints, however, of the bandage of Scultetus should extend from the lower part of the thigh only, to the ordinary distance beyond the foot, and the anterior one from the patella to the instep. The following is the method of treatment employed by Mr. Amesbury.

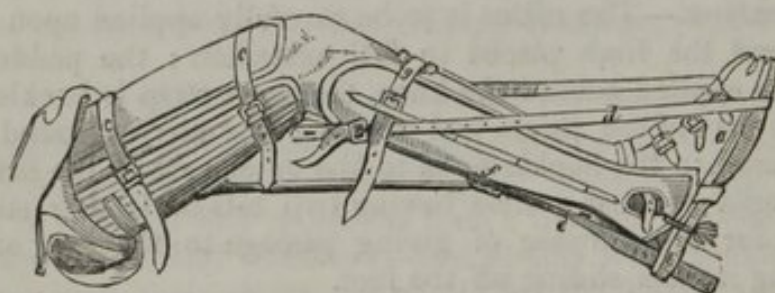
19. MR. AMESBURY'S APPARATUS FOR FRACTURES OF THE LEG.

Composition.—A thigh-piece, properly shaped to receive the back of the thigh, having a pair of lateral splints connected with it, and some studs for the retention of straps ;—a leg-piece, immovably connected to the thigh-piece at an angle, and hollowed out for the reception of the back of the leg ;—a foot-piece, which may be so shifted as to adapt the leg-piece to the length of the leg. The foot-piece should not rise higher than is necessary to form a right angle with the leg-piece when connected with it. There are some holes

in each side of this, and a strap is attached to it, bearing upon one end a buckle ;—a shoe, with a wooden sole, for the reception and retention of the foot, to which are attached two straps for connecting it with the foot-board ; the shoe is supported by a foot-strap, which, when in use, extends from one side of the thigh-piece round the lower part of the foot-board, where it is passed under a strip of leather placed there to keep it in its place, and then carried up to the opposite side of the thigh-piece, where it is buckled.

The apparatus ought to be adapted to the sound limb in cases of simple fracture of the leg, and well padded ; a small concave pad too should be placed on the inside of the heel of the shoe, and another pad upon the sole. Two side splints are required, the outer one extending from the foot-board to the upper part of the outer condyle of the femur, and the inner one from the foot-board to the inner condyle ;—also a split deal shin-splint ; and in cases of oblique fracture a thin pad to be applied upon the instep, covered with a piece of paste-board, a little wetted, which, when dry, serves to equalize the pressure and keep the instep easy.

Application—*In the first or Inflammatory stage.*—The shoe, *a*, containing the heel and sole-pads, should be carefully placed upon



the foot ; the instep-pad should then be placed upon the instep, and the shoe closed over it, and closely confined to the foot by means of the buckles and straps attached to it for that purpose. An assistant should then place one hand under the knee, and, taking the foot in the other, raise the fractured limb, bringing it round so as to let it rest upon the heel. When the limb is raised, the surgeon places the apparatus under it, and brings the angle of the same opposite the bend of the knee, directing the assistant to lower the limb upon it.

The surgeon now fixes the shoe, *a*, to the foot-board, *b*, by means of the straps attached to the sole. By the aid of this shoe he is enabled to raise or lower the foot according to the length of the heel or thickness of the calf, so as to bring the lower portion of the fractured bones into a proper line with the upper, as far as respects any angular projection backward or forward. A padded splint should be placed upon the front of the thigh, and the whole of the thigh-part of the apparatus fixed to the thigh by means of the straps, *c*. That done, the foot-board should be raised nearly to a right angle with the leg-piece, and fixed in this position by the foot-strap, *d*, care being taken that the heel does not bear against the sole of the shoe. The fractured ends should next be noticed ; and if the foot requires to be raised or

lowered, it may be done by means of the strap which confines the shoe to the foot-board.

The part of the pad, *e*, which lies under the small of the leg, should be raised and supported in close contact with it by means of tow placed between the pad and this part of the apparatus, so that the whole length of the back of the leg may have an equal bearing upon the apparatus.

The lateral splints are next to be applied, the longest upon the outer side of the leg, and the shortest upon its inner side. The lower ends of these splints should be fastened to the foot-board by means of narrow tapes passed through the holes at the sides, and the upper end kept close to the leg by the circular strap, *g*, passed round the limb over the splints and the apparatus.

With respect to the position, the limb thus fixed should be placed with the apparatus resting upon the heel; the two planes should be connected, as seen in the wood-cut, by means of the steel bar, which forms part of the apparatus for fractures of the thigh, described page 69, and the whole steadied by tapes attached to the foot-board, and passing off from thence to the sides of the foot of the bed. Surgical applications may be made by unbuckling the circular leg-strap, and throwing back the side splints.

When the inflammation is subdued.—Some strips of soap-plaster, each about an inch and a half wide, should be applied with very moderate tightness round the limb, and sufficiently close; they should pass from the ankle to a considerable distance above the fracture. The ends should be crossed on the sides or front of the leg, and cut off, so as to be easily turned back, when it is necessary to observe the state of the skin. Some strips also, or a short roller, should be passed round the foot to prevent œdematous swelling in that part. When this is done, and the side-splints re-applied, the shin-splint should be properly adjusted, and the whole leg-part of the apparatus supported by three circular straps and buckles.

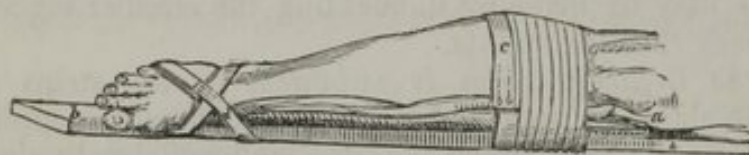
The cross bar may be now removed, and the apparatus furnished with a sling or thong of leather fixed to the lower end of the leg-part of the apparatus; by means of this the limb may be moved passively at pleasure: the patient may recline upon a sofa, or rest his leg upon the seat of a chair. He may walk, too, with the assistance of crutches, passing in this case the sling over the neck, as in the ordinary way; the movements of the limb, however, should be always passive, and never by the action of its own muscles. In a fortnight or three weeks' time, according to circumstances, the foot-board should be shifted a little higher up the leg-piece, to press the fractured ends together, and hasten their consolidation.

Oblique Fractures.—In these cases extension must be made in the following manner:—the thigh-piece of the apparatus must first of all be pressed up closely against the back of the thigh, and the foot-board shifted down, so as to make the space between the foot-board and the thigh-piece longer than the leg; an assistant then grasps the foot and ankle in his hands, and makes gentle extension in the natural

line of the bone, so as to bring the fractured parts into proper adaptation ; when this is done, the surgeon keeps up the extension by buckling the strap, which is fixed transversely to the shoe, round the foot-board. Great care must be taken that the broken extremities unite in the relative position which they naturally occupy ; for this purpose auxiliary pads and rollers must be judiciously applied, according to the bone affected and the nature of the obliquity. The fullest particulars relating to this part of the treatment will be found in Mr. Amesbury's "Practical Remarks on the Nature and Treatment of Fractures of the Trunk and Extremities," published in 1831.

20. M. DUPUYTREN'S BANDAGE FOR FRACTURES OF THE LOWER EXTREMITY OF THE FIBULA.

Composition.—A cushion about two-thirds filled with oat-chaff, and of sufficient length when doubled to extend from the malleolus internus to the knee ;—a strong splint two feet long and three fingers' breadth wide ;—and two single-headed rollers from four to five yards long.



Application.—As soon as the fracture is reduced, the wedge-shaped cushion, *e*, with the base directed downward, is to be applied along the inner side of the leg ; the splint, *b*, is next to be applied on this, and made to extend about four inches beyond the sole of the foot ; these two portions of the apparatus should be confined to the limb, *a*, above by one of the rollers passed in circulars round it, *c*, from just below the knee to about half-way down the leg, and below, by the second roller, carried round the foot and instep in the form of a figure of 8, *d*. Care should be taken in applying the second roller to draw the foot inward, toward the splint, and maintain it firmly in the state of adduction. The posterior part of the limb should repose, in a state of demi-flexion, upon pillows made to form an inclined plane.

21. COMMON ROLLED BANDAGE OF THE LEG.

Composition.—A single-headed roller, usually about six yards in length, and three fingers' breadth wide.

Application.—After having surrounded the toes with a couple of circulars to fix the initial end, the surgeon carries the roller round the foot, making two or three reverses there, if necessary, and effects a few double circulars about the foot and instep in the form of a figure of 8 ; that done, he proceeds to cover the leg, upward to the knee, in dolloires, making as many reverses as the inequality of the limb requires, in order that each turn of the bandage may rest per-

fectly flat, and finishes the application by two or three circulars below the knee. See page 16.

22. MR. BAYNTON'S COMPRESSIVE BANDAGE FOR ATONIC ULCERS OF THE LEG.

Composition.—Several strips of an adhesive plaster, the manner of preparing which has been already described in the first part of the volume, at page 12, about two inches in breadth, and sufficiently long to pass round the limb and leave an end of about four or five inches;—several longitudinal compresses made of soft calico; and a calico roller about three inches in breadth, and varying from four to six yards in length, according to the size of the limb.

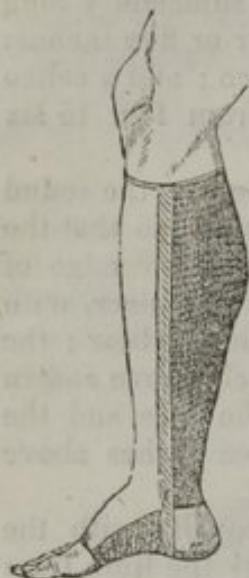
Application.—One of these strips is to be applied to the sound side of the limb, opposite the inferior part of the ulcer, so that the lower edge may be placed about an inch below the lower edge of the sore, and the ends drawn over the lower part of the ulcer, with as much gradual extension as the patient can conveniently bear; the other strips must be applied in the same manner, each above and in contact with the other, until the whole surface of the sore and the limb is covered from one inch below to two or three inches above the affected part.

The whole of the leg should then be covered equally with the longitudinal compresses, and the roller applied round the limb from the toes to the knee with as much firmness as the patient can support. One or two circulars of the roller should be first passed round the ankle-joint, then as many round the foot as will cover and support every part of it, except the toes, and the same continued up the limb as far as the knee; the roller should be carried from the ankle upwards in doloires, as many reverses being made as the parts require, in order that each turn may lie flat upon the limb. Should the parts be much inflamed or the suppuration very abundant, the applications are to be wetted frequently with cold spring-water. The patient may take exercise if he pleases, as this will be found to alleviate the pain and tend to accelerate the cure. The bandage ought to be daily applied soon after rising in the morning, when the parts are most free from tumefaction; and the force with which the ends of the plasters are drawn over the limb, gradually increased as the parts return to their natural state of ease and sensibility. When the cure is thus far accomplished, the roller should be applied with as much tightness as the calico will bear, or the surgeon's strength exert, more particularly if the limb be in that enlarged or compressible state denominated the scorbutic, or the edges of the wound wide apart.

This bandage is liable to produce excoriations of the limb, which are never serious except when they occur over the tendo-Achillis; to prevent these, or accelerate their disappearance, Mr. Baynton recommends the application of a small shred of soft leather under the adhesive plaster; the author usually applies a bit of lead-leaf in place of the shred of leather, having found it answer better.

23. COMMON LACED-STOCKING FOR COMPRESSION OF THE LEG.

This bandage is formed of two pieces of shamoy leather sewed together from above downward behind the leg, and under the foot; the anterior and open borders are provided with eyelet-holes and a lace; to the inside of one of these borders should be sewed a band of the same material, for the purpose of protecting the leg against the inconvenient pressure of the lace when the stocking is applied.



24. SHOOLBRED AND RENWICK'S METALLIC ELASTIC LACED-STOCKING.

It is employed like the last bandage, for the compression of varicose veins, and also for the support of tender and extensive cicatrices of these parts, being much preferable to the ordinary rolled-bandage; it accommodates itself perfectly to the form of the leg, exerts an equal compression throughout its whole extent, and is not liable to become deranged.

25. BANDAGE FOR RUPTURE OF THE TENDO-ACHILLIS.

Composition.—A bit of strong roller, three fingers' breadth wide, and of sufficient length to extend from four inches beyond the foot to the lower third of the thigh;—two single-headed rollers, five yards long and three fingers' breadth wide;—two graduated longitudinal compresses;—and a strong, well-padded, paste-board splint, moulded to the fore part of the foot and leg, and reaching from the roots of the toes to a certain distance above the knee.

Application.—The foot and leg are to be held by an assistant, the first in the most complete extension, and the second demi-flexed. Another assistant should be requested to support the thigh, laying hold of it at its middle third. The surgeon then proceeds to apply a dressing of lint or charpie to the wound, and extends the strip of roller along the sole of the foot, the back of the leg, and the lower and posterior part of the thigh. The band being maintained thus by the assistants, the surgeon equalizes the posterior part of the ankle-joint by means of some soft material, and applies the graduated compresses on each side of the tendo-Achillis. Next, taking one of the rollers, and fixing its initial end by a few circulars applied about the toes, which secures, at the same time, the lower portion of the band, he reflects the remainder of the latter backward, and covers the entire of the foot. He now passes several double circulars about the instep, in order to embrace the divided portions of the tendon, and maintain them in apposition, carries the roller to a short distance above the knee in doloires, and reflecting the upper part of the band downward, fixes it by a few horizontal circulars. In the last place, the padded splint is placed upon the fore part of the limb and con-

fined by the second roller, carried from the roots of the toes to the middle third of the thigh, and the limb extended over a pillow.

26. ANOTHER BANDAGE FOR THE SAME.

Composition.—A broad band of leather or webbing, lacing round the upper part of the calf, furnished on the back part with a buckle;—two soft, graduated, longitudinal compresses;—a soft flannel roller, from four to six yards long;—and lastly, a sock or slipper of double quilted ticking, from the heel of which a strap projects, of sufficient length to reach over the calf of the leg.

Application.—The band is laced round the upper part of the leg, the compresses applied one on each side of the tendon, and secured by the flannel roller, carried from the roots of the toes as far up as the band; the slipper being next placed upon the foot, the strap attached to its back is buckled to the belt, extending the foot as it is drawn tighter, and preventing any retraction of the upper portion of the tendon. When consolidation of the ruptured tendon has taken place, the patient should wear for a few weeks longer a very high-heeled shoe.

27. WEISS'S ELASTIC OR INDIA-RUBBER GAITER FOR SPRAINED ANKLE,

Or weakness of the ligaments of the lower part of the leg and foot.



28. BANDAGE FOR BLEEDING AT THE FOOT.

(Syn. Etrier, Fr.)

Composition.—An ordinary ligature;—a roller two yards long and two fingers' breadth wide; and a small compress several times folded.

Application.—The patient should be seated, and the foot plunged for a few minutes in a basin of warm water; the surgeon then sitting before him on a low chair, or kneeling on the side corresponding to the hand which should hold the lancet, lifts the foot from the basin, and applies its plantar face upon his knee, previously covered with a towel; after having applied the ligature about three inches above the malleoli, and made the incision in the vein, he introduces the foot a second time into the warm water. When enough blood has been withdrawn, he places the sole of the patient's foot again upon his knee, and taking off the ligature, applies the compress upon the incised part, which he confines by means of the roller, in the following manner: he places the initial end of the roller upon the side of the leg, opposite the incised part, allowing, however, four or five inches to hang down upon the malleolus externus, and fixes the compress by a couple of horizontal circulars; he then directs the head of the roller obliquely over the instep to the sole of the foot, and returns it from thence obliquely to the compress, crossing the descending turn upon the fore part of the joint; arrived at the lower part of the

leg, he makes a third circular, and effects the same course as that just described, terminating the bandage by a bow, made with the two ends of the roller, upon the outside of the foot.

29. BANDAGE FOR DISLOCATIONS OF THE ANKLE-JOINT.

The Many-tailed Bandage, or Bandage of Scultetus, described page 67, may be conveniently applied in these accidents ; the side-splints, however, should be furnished each with a foot-support.

30. BANDAGE FOR FRACTURE OF THE OS CALCIS.

Composition.—A uniting bandage, similar to that described, page 73, for transverse wounds ;—a splint and cushion, filled with oat-chaff, to extend along the front of the foot and leg ;—and a single-headed roller five yards long.

Application.—The foot should be placed in the most complete extension, and the leg slightly flexed : the upper fragment of the bone should be pressed downward, and maintained in contact with the other by means of the uniting bandage ; the cushion, and upon this the splint, should then be applied along the fore part of the leg and foot, and confined by means of the roller. After the consolidation of the fracture, the patient ought to wear a high-heeled shoe, the thickness of which should be gradually diminished as the patient recovers entire freedom of motion.

APPENDIX.

THE SUSPENSION APPARATUS OF M. SAUTER, FOR THE TREATMENT OF FRACTURE OF THE LOWER EXTREMITIES.

It consists of a straight board, furnished with a cushion, and suspended, something in the manner of a scale-beam, from the ceiling or top of the patient's bed, by means of cords ; its object is to give support to a fractured limb, and allow of lateral movement.

The only thing which distinguishes this from other apparatus, is the suspension. The first thing to be exposed, is the method of constructing it, and the advantages to be derived from its employment ; the next, its adaptation to the limb according to the nature of the injury.

A. CONSTRUCTION.

A thin board must be procured, proportioned in length and breadth to the size of the limb, fig. 2 ; it should be a trifling degree broader, and a few inches longer than the latter. Thus, for fractures of the leg it should extend from the bend of the knee to three or four inches beyond the heel. This board should be covered by a cushion, fig. 6, D, of its own magnitude, made of oat-chaff, bran, cotton, hair, tow, or in short of anything that could answer the same purpose, and be readily procured : the cushion should have sufficient firmness to afford a plane of some resistance to the limb, and yet be capable of

moulding itself exactly to its form. A hole should be pierced near each of the angles of this board for the passage of the suspension cord, fig. 2, *c*. Each end of the cord should be introduced through the corresponding holes at one extremity of the board from below upward, and after being drawn to the same length, passed from above downward through the holes of the other extremity, and firmly knotted. The cord will thus form two parallel bows of equal length, which, by being held at the middle, will suspend the board as a perfect plane, or allow of its receiving more or less inclination either way, according to the distance, on one side or other of the centre, upon which the point of support is made to act. The support here spoken of consists of another cord, one end of which should be carried through a staple driven into the ceiling, above the injured limb, and the other made to pass under the collected bows. By pulling, therefore, in contrary directions the extremities of this second cord, the board may be elevated to the necessary degree; and by knotting them, the elevation thus obtained steadily preserved.

Instead of the staple it would be better to employ a pulley, as seen in figs. 1 and 6, (A). A pulley would likewise be found more convenient for the connexion of the perpendicular and transverse cords, as seen in fig. 6, (B). The first of these pullies would afford greater facility in the elevation of the board, while the second would serve to give it the due degree of inclination, with but little effort, and without occasioning the slightest shock.

As the free sliding of the cords would be detrimental to the treatment of the case, from the circumstance of the board being liable to alter its position by the least movement of the patient, it is advisable to tie the two bows together near the pulley, and introduce between the latter and the ligature a small splinter of wood, which will naturally prevent the bows from retrograding.

These preliminary arrangements, with the exception of the introduction of the splinter, should be made before the limb is placed upon the board, in order that it may be immediately elevated when the former is applied upon the cushions. Care also should be taken to arrange before hand the patient's bed, by pressing it down at the part corresponding to the apparatus, in order that his horizontal movements be not interrupted. As soon as the limb has been elevated to a certain height, it is advisable to place a pillow underneath the board, which should remain there till the fracture is reduced, and the position, &c. of the limb conveniently arranged. The suspension apparatus when isolated, yields to the slightest impulse imparted by the patient in his movements, occasioning neither shock nor pain.

The facility which patients have of moving themselves in this way is so great, that, as M. Mayor has remarked, they may be seen changing their position with the utmost facility, obeying, through means of the common utensils, the calls of nature, and even gliding upon another bed of equal height.

Nevertheless, as may be readily conceived, it would be imprudent to permit them to indulge in any inconsiderate movements, as this would occasion and keep up in the osseous fragments a mobility that

would become an obstacle in the way of their consolidation. When it is found impossible to suppress the indulgence of such imprudent movements, the surgeon must have recourse to the bandage of Scultetus, with the aid of splints, or else the paste-board to be spoken of farther on.

It has been already said, that in fractures of the leg, in which the suspension apparatus presents the most advantages, a simple board sufficed, extending from the bend of the knee beyond the heel. A simple board arranged in the same manner, and which, departing from the tuberosity of the ischium, would pass also beyond the heel by a few inches, would be equally sufficient for a *fracture of the shaft of the femur*, if it was considered proper to place the limb extended upon its posterior face; but for those surgeons who prefer the demiflexion of the leg upon the thigh, and the latter upon the pelvis, the following apparatus becomes indispensably necessary. Two boards must be procured, the one precisely similar to that called *tibial*, of which mention has been already made, represented fig. 2; the other *femoral*, (*c*, fig. 1), extending from the ham to the ischiatic tuberosity, and articulating with the preceding, either by means of hinges (*e*, fig. 11), or simple ribands, which should pass through the corresponding holes with which the extremities of these boards are pierced, and be knotted underneath. The suspension of this double inclined plane is effected in the same manner as the simple tibial board, with this difference only, that the two bows are extended from the superior extremity, fig. 11, *f f*, of one of these boards, to the inferior extremity of the other. But in order to form the two inclined planes which are to support the limb in demiflexion, a small cord, *b b*, should be passed from below upward, through one of the holes of the upper extremity of the tibial board, fig. 1, across the point of support, and thence, from above downward through the other hole of the same extremity, under which the two ends should be knotted together. In this way the extremities of the two boards, which correspond to the bend of the knee, may be made to describe an angle, more or less acute, according as the limb is required to be placed in a greater or less degree of flexion.

When position alone is sufficient to maintain the fractured extremities of the bone in apposition, and it is indispensably requisite to exert continued extension, or, in short, when more solidity is required to be given to the apparatus, the femoral board should be shaped out at its internal and superior angle, in the manner represented in fig. 11, and furnished with a belt, which will be spoken of farther on.

The boards thus arranged, are not only useful in fractures of the shaft of the femur, but also in the treatment of fractures of the neck of that bone; they fulfil perfectly, in presenting two inclined planes for the flexion of the thigh and leg, the indication of the pillows of Sir Astley Cooper, which are often inefficient, and the machines of Sir Charles Bell, Earle, and Delpech, which have the inconvenience of being much more complicated, and consequently of less easy and general application, particularly in places distant from large towns. In short, one of the advantages for which the suspension apparatus

is deserving of being made known, is its simplicity, and its possibility of being constructed at all times, and in all places. "In country practice," says M. Mayor, "in isolated districts, every portion of this apparatus may be readily procured without occasioning the least embarrassment to the surgeon."

"For myself, I may say," continues this gentleman, "I have never experienced the slightest difficulty. I have sometimes substituted any common bands, when the proper cords failed me; I have nailed these to the board when I have had no instrument to bore the ordinary holes; I have employed nails for screws, and to form the directing bands, (*bandes de direction*), tow, wool, or rags; these last materials, as also bran, sawdust, moss, and even soft hay, have served me in constructing my cushions for the boards; the bark of a tree, moistened leather, the binding of an old book, have supplied the place of pasteboard; rope-ends, skin, or strong cloth, have not unfrequently replaced the metallic hinges."

The double-boarded apparatus, it may be observed, will be found extremely useful in the case of fracture of the leg, with tendency to displacement, more especially when this occurs near the knee-joint, from the impossibility of applying the garter, (*jarretière*), one of the directing bands of which mention will be made farther on.

A simple tibial board, shaped out at the superior and internal angle, would suffice for cases of fracture of the arm and fore-arm, when the injury is of so grave a nature as to require the patient to keep his bed; for in ordinary cases, the common sling, alone or supporting a convenient board, would answer better, inasmuch as the patient would be at liberty to walk about.

Although particularly applicable to fractures of the limbs, the suspension apparatus of M. Mayor may, under other circumstances, be of important use. It will readily be conceived how great might be its utility in any painful diseases seated upon one or other of the limbs, as well as in certain white-swellings, in arthritic and rheumatic tumefactions of the foot, or in any other serious affections of the knee, or of the articulation of the foot and leg. Its use might be extended to the treatment of transverse wounds of the thigh, or of the tendo-Achillis, for which the most perfect immobility is indispensable. There cannot be a better means, so long as the immobility of the fractured part is insured, of allowing the patient to vary his position in bed.

B. ADAPTATION.

It is not sufficient, although assertions of this kind have constantly been made, to place a fractured limb, after its reduction, upon an immovable plane, in order to effect the cure. If this were true, for very simple cases, which would be but exceptions, if, for instance, in the majority of cases of simple fracture of the femur, a convenient position and a retentive bandage might be made to replace all those complicated machines, which do more honour to the mechanical knowledge of their inventors, than to their knowledge of physiology; it is not the less certain, that other means are required also, to

maintain the fractured extremities of a bone in perfect contact, to overcome the involuntary as well as the spasmodic contractile efforts of the muscles, and the indocility of the patient. But between these indications, and the necessity of violently extending in contrary ways the two extremities of a limb, by mechanical powers which resemble only the rack of the inquisition, there is as wide a distance, as between the *glossocôme* of the ancients and the simple pillows of Sir Astley Cooper: the surgeon who does not dare to expose himself to the dangers of the first, or to the insufficiency of the second, has recourse in some cases to the extension apparatus of Dessault and others, which are not, however, free from inconvenience, but more often to the simple directing bands of M. Mayor, to which the only real objection that can be made is, that they are *sometimes* insufficient.

In the greater number of cases of fractured limbs, the fragments face each other; whence the necessity, of exerting pressure in the direction of their diameter, if the displacement exist in relation only to the axis of the body of the bone, or of pulling at the same time at the lower fragment, if the displacement is longitudinal, or in other words, if the broken ends overlap, in order to effect their coaptation. The hands alone of the surgeon and assistant are sufficient to fulfil effectually these indications; but as they are only temporary means, recourse must be had, in order to render the effects permanent during the whole time necessary to the consolidation, to the aid of an intelligent machine, if such an expression may be used, which in accomplishing this end, will in no respect inconvenience the patient.

Let the fracture of a leg be taken as an instance; if it be of such a nature as not to exact the continued extension of the limb, and position alone suffices to maintain the broken ends in apposition, the surgeon has only to confine himself to the application, below the knee, of a tie or *garter*, the central portion of which has merely to be applied upon the anterior, or one of the lateral faces of the limb, and its ends attached either separately on each side, or together, on the outside or inside of the board. (Fig. 6, F. and fig. 9, A.) The object here in view, as will be easily perceived, is to fix the limb upon the board and give a due direction to the superior osseous fragment. The garter, like all the other directing bands, may be made of a bit of common roller, or a longitudinal compress; but M. Mayor prefers those he ordinarily employs. These directing bands, the form of which may be seen, fig. 4, should be thick and quilted, in order to preserve their shape, and prevent them from exercising a painful pressure. They should be constructed of two pieces of linen cloth, from three to five fingers' breadth wide at the middle, with a layer of wadding, charpie, tow, or wool, interposed between them, *a*; to the two extremities of these bands should be sewed tapes of convenient dimensions, *b*, *c*. Figs. 8 and 9, indicate so clearly the manner of disposing them, that it is unnecessary to dwell upon them longer here: the place, however, they are to occupy upon the limb, will be spoken of by and bye.

When these simple bands are found insufficient to fix the limb solidly upon the board, or when it is necessary, in order to maintain

the fracture reduced, to exert continued traction on the limb, the following pieces must be added. To the inferior extremity of the board, fig. 2, a foot-support is to be adapted, of the shape of a ladder, fig. 3, by means of mortises, *a a*, pierced in the former to receive it; it should be from eight to ten inches high, and form with the board an angle of about eighty degrees.

The object of this foot-board is to fix the heel-strap (*la talonnière*), fig. 5, *a b c d*, which, on one hand, embraces accurately the instep, heel, and malleoli, fig. 1, *G*, and on the other, is attached by means of two tapes, fig. 5, *d d*, which terminate it, to one of the sides of the ladder, according to the direction desired to be given to the limb.

Thus, by means of the garter on one hand, and the foot-frame and heel-strap on the other, the elongation of the limb may be operated, and the overlapping of the fractured ends effectually prevented. The extension is produced and maintained by the heel-strap, and the counter-extension by the garter, without taking into account the weight of the body and the fixture of the limb upon the apparatus; while the heel-strap itself prevents rotation, inwards or outwards, of the lower fragment.

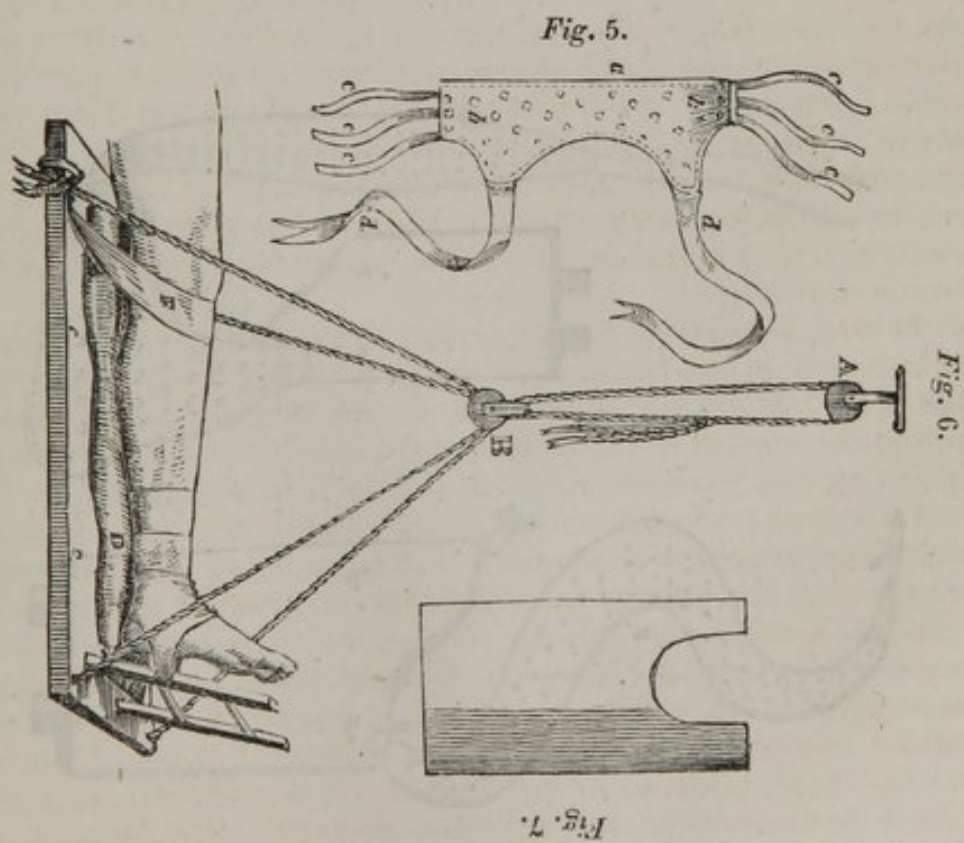
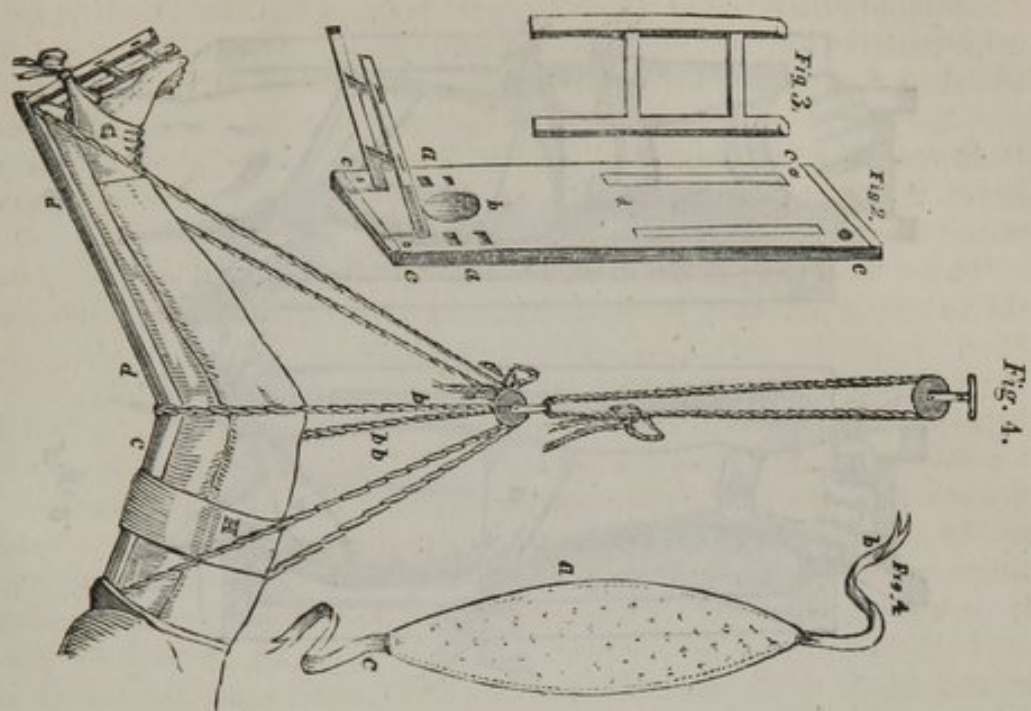
But that alone is not sufficient to restore the limb to its natural form when the fragments are displaced in respect to the diameter of the bone; and if the shortening of the bone has been provided against, nothing has yet been done to maintain the fractured ends in apposition. The following is the manner in which this indication is fulfilled; instead of recourse being had, as is generally the case, to the uniform pressure exerted by the eighteen-tailed bandage or that of Scultetus, with splints applied upon the soft parts that surround the ends of the bone, M. Mayor has recommended a means, without contradiction, more simple and more efficacious, and one which offers, besides, the advantage of not covering with any portion of apparatus the part of the limb at which the fracture is seated; of permitting the surgeon to visit it as often as he pleases, without the help of an assistant; and of remedying the displacement, if any such should have occurred, as well as dressing the wound, should one exist, without meddling with the apparatus. The means in question consists in placing upon the part of the limb toward which the end of the bone is directed, and where it makes projection, the centre of a directing band, fig. 9, *B*, and fastening the extremities to the opposite side of the board; care being taken, however, to see that the fracture is properly reduced. Two bands, which act in opposite directions, are occasionally necessary, but more frequently the desired effect is obtained by one alone. The middle of the band should be applied upon the most convex part of the deformed limb; one of its extremities is to be passed immediately under it, the other over, and both drawn with sufficient force and fastened to a peg inserted at the side of the board which corresponds to the concavity of the limb, or in default of this to a mortise pierced about this spot; they may be even nailed at once to the board.

The directing bands should not be placed until the heel-strap and garter are adapted, the latter being fixed to the board upon the opposite side to that toward which the neighbouring band is to be directed; without attending to this the two extremities of the limb would be found to yield to the inverse tractions of the bands. The disposition of these several pieces will be seen in figs. 8 and 9. In comminutive fractures with extreme tendency to displacement, a piece of paste-board, fig. 7, should be applied upon the anterior part of the limb, with the notch corresponding to the instep.

To fix the femoral board more solidly, the surgeon should apply the large quilted band, *d*, in fig. 11. This band should be of sufficient length to pass as a belt round the body, and terminate by a strap, *a*, to be attached to a strap and buckle, *b c*, fixed to the external and superior part of the board. This band serves at once as a body-bandage and thigh-strap; it passes first of all upon the groin of the injured side, then round the corresponding ilium and along the back, and is returned over the pubes to the upper part of the fractured thigh, where the buckle, fixed to the outer side of the board, receives it, or where, when this is wanting, it may be fastened to some other convenient point of attachment. This belt, which, as may be perceived, tends to fix securely the femoral board upon the pelvis, is employed with the notched portion of the board, against which the tuberosity of the ischium rests, to operate the counter-extension, or, in other words, the resistance necessary to meet the tractions of the heel-strap; while the latter acts at the same time upon the limb which it elongates, and upon the board which it pushes upward, first beneath the ham and then upon the ischiatic tuberosity. Lastly, it is this portion of the apparatus which performs the greatest part in the effort; but as it is aided firstly by the weight of the limb, which, placed upon an inclined plane, tends to descend, and secondly, by the effort itself which tends to elevate the bend of the knee, there can be no reasonable apprehension of the formation of sloughs or excoriations, such as the ordinary machines for continued extension too frequently produce.

This apparatus appears to unite all the qualities necessary for the reduction and consolidation of fractures of the neck of the femur, but MM. Mayor and Sauter have thought it sometimes necessary to add to the apparatus just described the piece represented by fig. 10, which may on most occasions be entirely dispensed with.

To resume; when it is required to maintain a reduced fracture of the femur, of whatever nature it may be, whether situated near the knee, or in the shaft or neck of the bone, whether simple or complicated, with or without obliquity of the fragments, the thigh and leg are to be extended over the inclined plane, well cushioned, the belt applied round the thigh and pelvis, and the foot attached to the ladder inserted in the lower end of the tibial board. The large quilted band, represented figs. 10 and 11, is made to embrace the whole apparatus to confine the limb upon the board, when there is no deformity; or the bands of direction, already described, made use of, when the limb is curved, or there is any tendency to curvature, in the manner shown by figures 8 and 9.



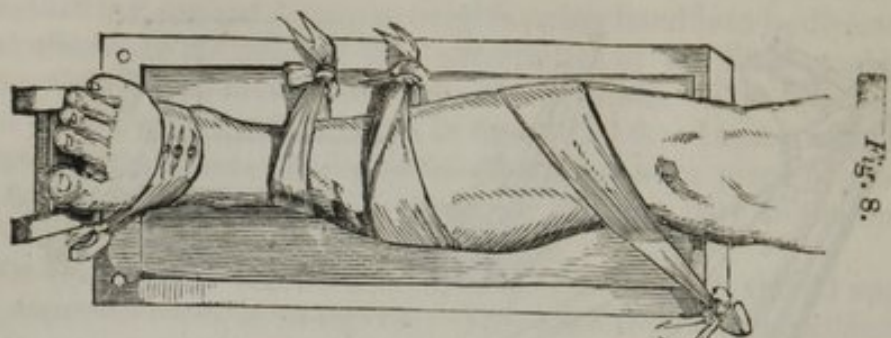


Fig. 8.

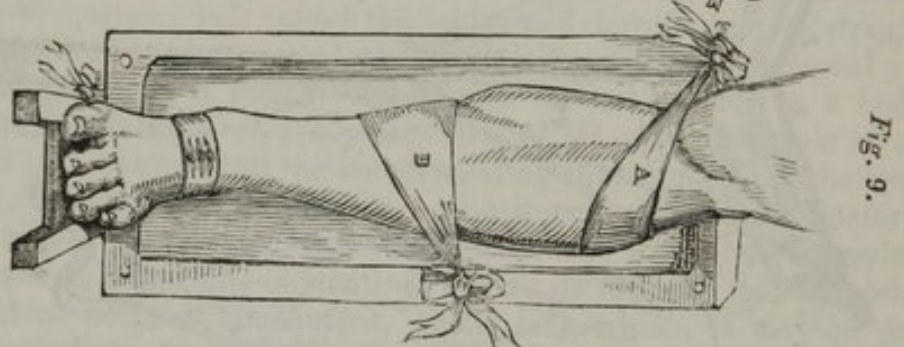


Fig. 9.

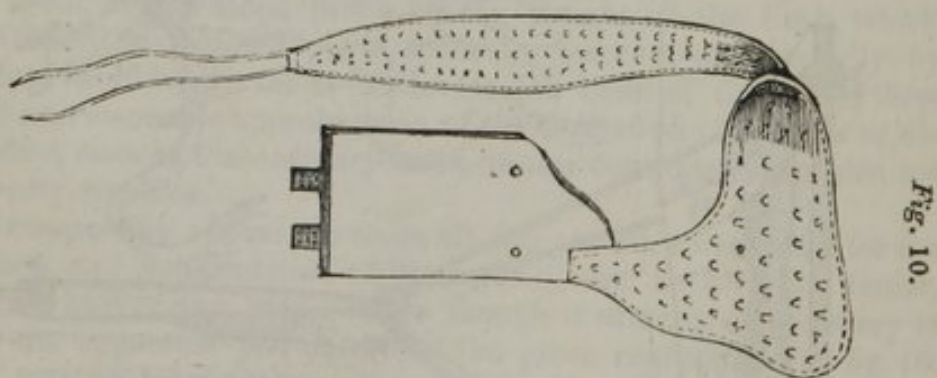


Fig. 10.

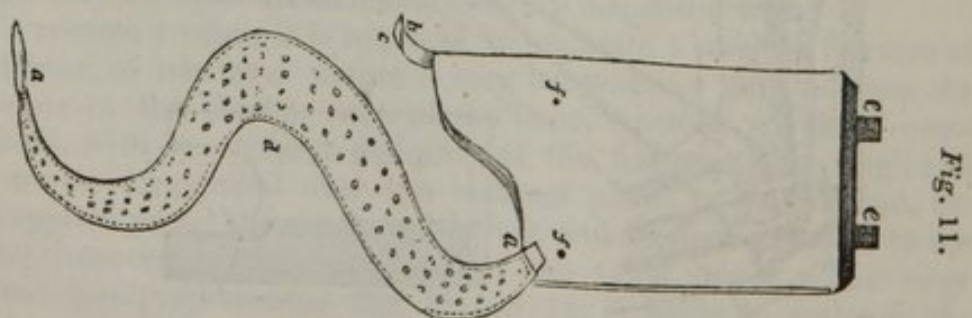


Fig. 11.

THE END.