

## **The principles and practice of bandaging : by Gwilym G. Davis.**

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THE  
PRINCIPLES AND PRACTICE  
OF  
BANDAGING

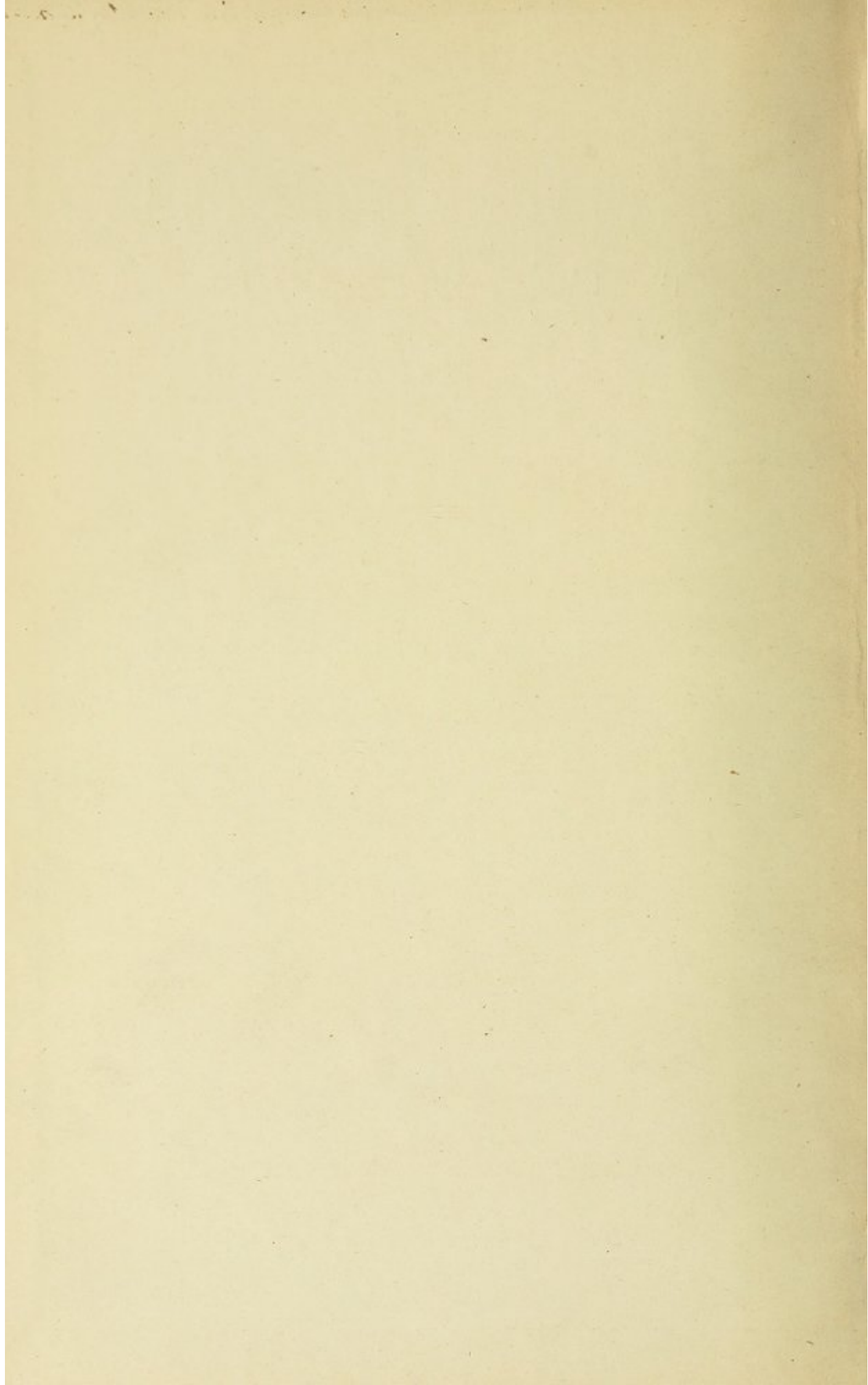
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GWILYM G. DAVIS, M. D.

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THE  
PRINCIPLES AND PRACTICE  
OF  
BANDAGING

BY  
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Hospital.*



1891.  
GEORGE S. DAVIS,  
DETROIT, MICH.



*23. M. 5.*

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GEORGE S. DAVIS.  
1892.

TO

MY TEACHERS,

D. HAYES AGNEW, M.D., LL.D.,

Emeritus Professor of Surgery,  
Univ. of Penna.,

AS A TRIBUTE TO HIS ABILITY AS A SURGEON AND OF THE  
LOVING ESTEEM IN WHICH HE IS HELD  
BY THE MEMBERS OF HIS  
PROFESSION,

AND

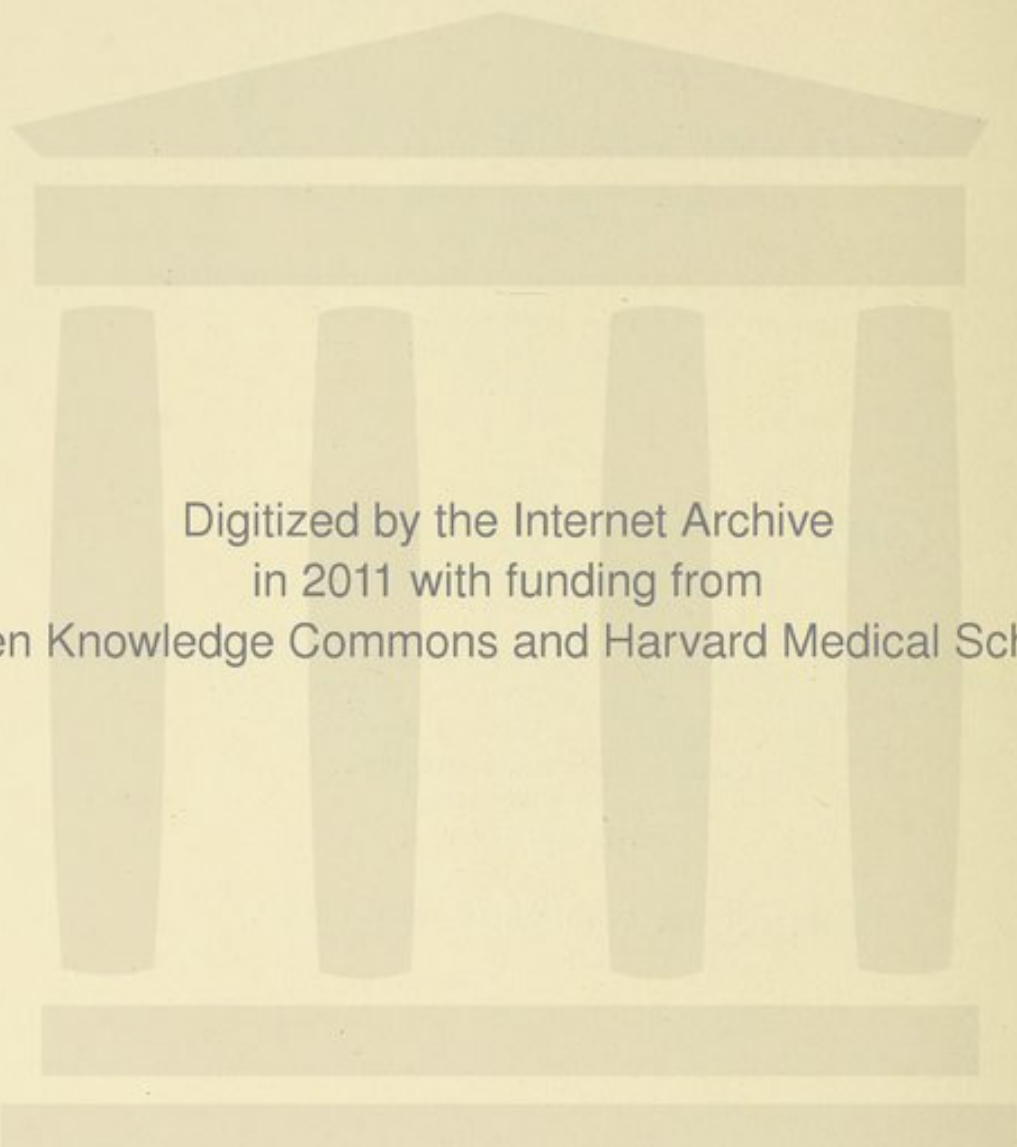
JOHN ASHHURST, JR., A.M., M.D.,

John Rhea Barton Professor of Surgery,  
Univ. of Penna.,

WHOSE WIDE KNOWLEDGE OF THE LITERATURE OF HIS PROFES-  
SION AND WHOSE EXACT ATTENTION TO THE MINUTEST  
DETAILS OF HIS CASES HAVE ALWAYS COM-  
MANDED MY SINCERE ADMIRATION  
AND EVER STIMULATED  
ME TO EMULATE,

THIS LITTLE VOLUME IS DEDICATED.





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## PREFACE.

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Bandaging, while not a science, is, nevertheless, governed by something more than mere empiricism, and it is one of the objects of this work to direct attention to the fundamental bandages and to the importance of first learning principles and then their application in the form of the various special bandages. The value of the care and exactness which Lister inaugurated in the treatment of wounds is spreading to other departments of surgery. That the abdominal surgeon already appreciates it is shown by the extreme care he bestows on the preparations for the operation; the precision, dexterity and celerity with which it is performed, and the jealous attention which he gives to the after treatment of the case. His course is justified by his results. The same is applicable to bandaging. Good results in fractures and efficacy in surgical dressings depend just as much on the attention given to the bandaging as do the results in abdominal surgery to the manipulations employed in them. The surgeon of to-day does not exhibit that same care in his bandaging that the ovariologist does in his manipulative procedures. The fact that there is less at stake does not justify this. Where there is one abdominal operation there are hundreds of fractures, and a bad surgeon can inflict more total misery by careless bandaging than he can by reckless operating. The number of bandages invented, precludes one from having a precise knowledge of them all, but everyone should know the fundamental principles and be able to apply them skilfully. To further this object, more space has been devoted to the elementary bandages than is usual. In regard to the special bandages, their

number is so large, and opinions concerning their relative merits so different, that some latitude must be allowed, therefore, in many cases, more than one way of accomplishing the desired object has been given, the preferred one being described first. In order to make the descriptions more easily understood, numerous illustrations have been given. Had these been made of high artistic merit, their cost would have necessitated a reduction in number. With the twofold desire of having an abundance of illustrations and increasing their accuracy, they were drawn by myself in the form of outlines, most of them being either from the patient direct or from photographs.

In order to make a suitable text book rather than to record any distinct advances, the tailed and handkerchief bandages were included. They are not nearly as well known as they deserve to be and it is hoped that a change for the better will soon be observed in this respect.

It was not deemed advisable to go deeply into the literature of bandaging, quotations only being made when necessary to elucidate the subject. Those interested in its history can refer to the classical work of Gerdy and to the bibliography given by E. Fischer in his *Allgemeine Verbandlehre*. Among the more common works on the subject are those of Hopkins on the Roller Bandage; Leonard, *Bandaging*; Agnew, *Surgery*, Vol. I.; Hunter; Ashhurst's *Int. Ency. of Surgery*, Vol. I.; Berkley Hill, *Essentials of Bandaging*, etc.; C. Heath, *Minor Surgery and Bandaging*; Mr. Pye, *Surgical Handicraft*; E. Fischer, *Allgemeine Verbandlehre*, and Jamain et Terrier, *Manuel de petite chirurgie*.

Several of the bandages described have been devised by myself, but no claim for originality has been made. The older works on the subject show such a degree of ingenuity and industry on the part of their authors as to confirm one in the belief that verily there is no new thing under the sun, and it is deemed safer to accept the award of those who, from lack of industry or opportunity, fail to find a previous account of them in former writings.

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# A TREATISE ON BANDAGING.

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## PART I.

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### THE ROLLER BANDAGES.

#### THEIR PREPARATION AND APPLICATION.

*The Roller Bandage* is a strip of muslin or other fabric, varying in length and width, wound on itself forming a compact roll (fig. 1).

*The Double Roller.*—When each extremity is wound towards the middle forming two cylinders, it is called a Double Roller or Double-headed Bandage (fig. 2).

*A Roller Bandage* is spoken of as having an upper and lower edge, an inner and outer surface, a body and two extremities, one being the initial extremity or beginning, and the other the terminal extremity or end.

*The Material* of which bandages are made depends on the uses for which they are intended. It may be of muslin, flannel, gauze or cheesecloth, crinoline and plaster or rubber.

*Rubber.*—If it is desired to render a limb bloodless by Esmarch's method, a rubber bandage is used. It is also employed in the treatment of leg ulcers, swellings, affections of the joints, etc.

*Gauze or Cheesecloth.*—In applying antiseptic dressings bandages made of gauze are used. They adapt themselves more neatly to the part and are less liable to displacement than the muslin bandage. When gauze is used Mr. Lister's carbolic is to be preferred. It contains resin, which gives a certain substance to the bandage, causing it to retain its shape better and making it easier to handle. It is also less liable to slip and become displaced.

The material commercially known as scrim, being somewhat heavier, makes an excellent bandage.

*Plaster Bandages* are those made of crinoline into the meshes of which plaster of paris has been rubbed.

*Flannel.*—Flannel bandages are used in certain important operations where expense is a secondary consideration and it is desirable to have a more elastic bandage than one made of muslin. They adapt themselves more readily to uneven surfaces, make a more equable compression and are less liable to displacement. The greatest objection to them is their expense. They are most often used in bandaging the eyes and in covering a part previous to the application of a plaster dressing.

*Muslin.*—The bandages most in use are those made of unbleached muslin. They are the cheapest and, all things considered, the most desirable.

#### PREPARATION OF BANDAGES.

In order to prepare a lot of bandages, a piece of unbleached muslin of medium quality, corresponding to the length of the bandages desired, is taken and, after the selvedge has been torn off, one extremity is divided into as many ends as it is desired to have bandages. If the stuff is one yard wide and it is desired to make it up into two-inch bandages the end is nicked with a pair of scissors at every two inches, dividing it into eighteen parts. Each two-inch strip is then torn down for about two feet. We now have one end of the piece torn into eighteen two-inch strips each about two feet long. The alternate strips are then separated, half on one side and half on the other. Those on one side are gathered together and held firmly by one person and those on the other by an assistant. Each now pulls strongly until the piece of muslin is torn completely through its entire length, making eighteen strips each the entire length of the piece and two inches wide. A few of the ravelings are now picked off, to prevent tangling, and the strips laid lengthwise on chairs and straightened out. They are now ready for rolling.

A whole piece of muslin may be divided into strips at one time by means of a machine which is used by wholesale clothing manufacturers.

## ROLLING OF BANDAGES.

*By Machine.*—To roll these strips into cylinders, if many are to be prepared, a machine called a bandage roller is used (fig. 3). It consists of a small winch held in place by two uprights and fastened to a table. The axis is not round, but square or hexagonal, and tapering, being thicker at the end near the handle. Two or more round pegs bind the sides together and serve to flatten out the bandage as it is wound on the axis. After being moistened with water from a sponge the end of one of the strips is passed between or around the pegs and wound around the thin end of the axis. It is then pushed towards the thick end until it is perfectly tight. The bandage is now guided by the left hand while the handle is turned with the right. The handle should be kept firmly pressed against the upright and not allowed to slide in and out, as that will make the bandage uneven. Some think they can wind the bandage more evenly if one edge is kept close up to the side of the machine.

When the bandage is nearly all wound, the roll is grasped with one hand while two or three additional turns are given; this makes it more firm and solid. To loosen the roller, grasp it firmly with one hand and reverse the crank two or three times and draw it completely out.

Dr. Hopkins has devised an instrument for rolling bandages which he calls a key. It consists of an ordinary key handle attached to which is a tapering octagonal shaft. The bandage having been fastened to the shaft is guided by the left hand while the handle is turned with the right. (See *The Roller Bandage*, by Dr. W. B. Hopkins.)

The ravelings having been pulled off, the end of the bandage is to be turned under and pinned.

If it is desired to place the pin lengthwise in the roller then the whole end should be folded under, but if crosswise then each corner should be turned under and the pin put in the apex so formed, care being taken that the point of the pin does not project.

Another way to fasten the end is to put a small strip of adhesive plaster about an inch long on it; still another is to moisten the end for two or three inches with water and then finish winding it. There is enough sizing in unbleached muslin to make the end stick without pinning.

When large numbers of bandages are to be rolled, as in hospitals, it is well to allow some of the patients to roll them up loosely and then have them re-rolled by an experienced hand.

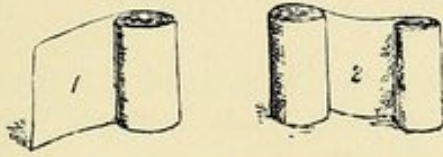
Bandages intended for ambulance or other outside use should be secured with a pin to be used in fastening it after its application.

*By Hand*.—A properly prepared bandage should be even on the edges and tightly rolled. It is difficult to apply satisfactorily a loosely rolled bandage. With a machine they can be rolled better and more quickly than by hand, yet it behooves all who use bandages to be able to roll them skilfully without it, as it will often be necessary for them to do so. To roll a bandage by hand proceed as follows: Two feet of the end of the bandage is folded repeatedly on itself until a firm compact mass is made. This is rolled first with the fingers and then on the thigh, the loose bandage being kept taut by the other hand, until a roll is formed sufficiently large to roll with both hands and not to bend when held between the finger and thumb as seen in fig. 4.

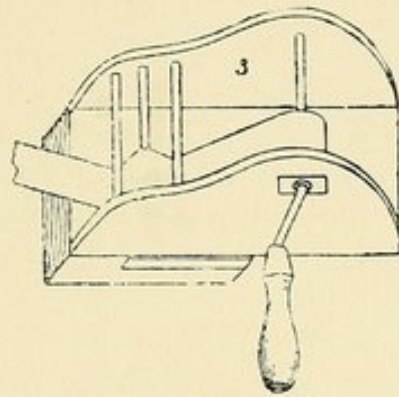
Grasp the roll between the thumb and index or first two fingers of the right hand, the body of the roller being underneath (fig. 4). Then place it in the left hand, the lower edge of the loose bandage touching the web of the thumb and index finger (fig. 5). The roll is now held by the thumb and finger of the right hand while the remaining part of the bandage lies between the thumb and extended index and middle fingers of the left (fig. 6). The bandage is rolled by pronating and supinating both hands at the same time, the hold on the roll by the right hand being released during each movement of pronation. The bandage is guided and made tense by pressure of the thumb and forefinger of the left hand as it passes between them.

#### PREPARING PLASTER BANDAGES.

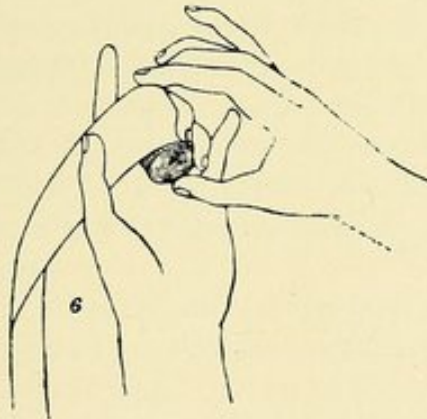
The gauze used in making plaster bandages is stiffened with sizing and is called crinoline or mosquito netting. It should have a mesh a little larger than that used for antiseptic dressings, but care should be taken that it is not too large or the plaster will fall out too readily. It is better to cut the gauze into strips of the required size instead of tearing as is done with muslin. Three yards will be found to be long enough. It is the length advised



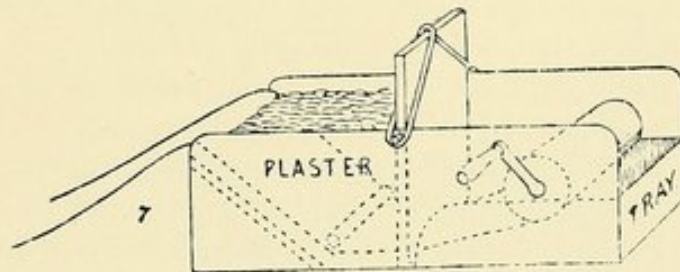
1 and 2.—Single and Double Roller Bandage.



3.—Machine for Winding Bandages.



4, 5 and 6.—Method of Rolling Bandages by Hand.



7.—Machine for Preparing Plaster Bandages.

PLATE I.



by Sayre. I prefer them two and a half inches broad. If only a small number are required they can readily be prepared by one person spreading the plaster on the bandage with a spatula and rubbing it in while another rolls it loosely up. When large numbers are required they may be prepared with a machine (fig. 7).

A trough is made composed of a bottom and two sides. It should be about 14 inches long, 4 inches high and 6 wide. At one end an incline is inserted beginning on the bottom 4 inches from the end and going up to the corner. At the bottom of this incline a round peg goes across from side to side about a half-inch distant from the incline and the bottom of the box. Near the middle of the box an upright board is placed in grooves. It is kept down by a rubber band passing over its top and fastened to either side of the box. Beneath it, nailed to the bottom of the box, is a small rounded strip of wood.

A winch is put in the remaining end of the box and a zinc tray placed beneath to catch any falling plaster.

The bandage is to be drawn over the edge of the incline, pushed beneath the round peg with a spatula, then beneath the upright board and fastened to the winch. The box, from the upright board to the incline, is then filled up to the top with plaster of paris in powder and the bandage wound around the winch. The surplus plaster is scraped off by the upright board and all plaster that falls off the bandage as it is wound on the winch is received in the tray beneath to be returned to the other end of the box.

In using this machine the plaster should possess no hard particles, otherwise they will catch on the upright board and disturb the bandage. It is preferable to pass the bandage through and fasten it on the winch while the box is empty, the plaster being put in afterwards. When a bandage is nearly done, its end may be pinned to the upper (not under) surface of a new bandage and drawn through, the upright board being slightly raised with the hand to allow the point of juncture to pass. The two ends are then unpinned and the completed bandage removed from the winch. Care should be taken to keep the groove in which the upright board slides clean and the box full of plaster nearly to the top. From time to time the tray beneath the winch may be removed and any plaster it contains dumped into the other end of the box.



The bandages should be cut and not torn. Mr. Owen advises boiling the bandages in water before impregnating them with plaster. This removes the sizing and the plaster is less liable to fall out. They will not however wind evenly, enough to permit of being prepared by the above machine.

In using plaster bandages they should be placed on end in a cup of warm water to which, if it is desired to have the plaster set quickly, a little salt has been added. The water should cover the bandage completely, and it should be allowed to remain immersed until the air bubbles cease coming to the surface. On removal, the bandage should not be squeezed, as that displaces too much of the plaster, but the surplus water should be allowed to drip off and the bandage applied while quite wet. Dry plaster may be dusted on from time to time as desired, from a tin box with a perforated lid.

#### APPLICATION OF THE ROLLER BANDAGE.

In applying a bandage perfection should be aimed at; slipshod, carelessly applied bandages should not be tolerated, albeit they are common enough.

It should never be forgotten that a well applied bandage is one that accomplishes the object with the expenditure of the least amount of material and that has the least liability to displacement. Useless turns should be avoided. They only consume additional bandage, heat the part more and will not atone for the faulty application of the previous part of the bandage.

A bandage should be applied firmly and evenly, but not tightly nor yet too loose. If too tight it will cause pain, inflammation and sloughing; if too loose it will soon become displaced.

*Security.*—Security is obtained by a careful application in the first place and not by promiscuous turns, wandering in all directions, laid on after the bandage proper is completed. If still greater security is desired than can be obtained by proper application and pinning, it can be had by the use of strips of adhesive plaster laid on across the turns, or by tacking with needle and thread the turns together. Bandaging, although more of an art than a science, is nevertheless governed by certain fundamental principles, the ignoring of which is followed by bad results. A certain amount of skill and dexterity is also requisite. Therefore practice is necessary, and proficiency is only acquired after repeated trials.

It is not necessary to devise special turns for every case that presents itself. The standard bandages, which have stood the test of time, were devised for just such cases as will be met with in actual practice, and a departure from them will almost always be a step in the wrong direction.

*Gaping.*—A bandage is said to lie flat when its under surface is in contact with the part to which it is applied. When, however, the direction of the bandage is such that only one of its edges comes in contact with the part, allowing a space to exist between the other edge and the surface beneath, then the bandage is said to gape, and forms what is known in French as the *godet*.

When a bandage is completed it should show little or no gaping of the turns, otherwise it is apt to be both inefficient and insecure. If the bandage were inelastic and the parts immobile then gapes would be frequent, but the elasticity of the bandage and mobility of the parts aid much in avoiding them.

*Dropping a Bandage.*—To drop a bandage while applying it is an unpardonable sin. If, however, the body of the bandage falls while the initial extremity is held by the opposite hand, it also should be released at once, so that the entire bandage drops together. By so doing the roll is not so liable to unwind itself as it otherwise would do.

*Removing a Bandage.*—In removing a bandage from a part, the turns, as they are unwound, should be gathered together and passed *en masse* from one hand to the other.

*Pinning.*—In pinning a bandage the pins should have the points down and well concealed in the folds of the bandage; if they are put in longitudinally the heads should be toward the terminal extremity of the bandage.

A pin should not be so placed that a prominence of the part beneath will make its point project. If this is liable to occur, shorten the bandage by doubling its end under and then pin it.

*Commencing a Bandage.*—In commencing a bandage the roller should be unwound for a few inches and grasped in the hand, the thumb being up and the fingers underneath, the loose portion of the bandage coming off from its under surface as shown in fig. 8.

The external surface of the initial extremity should then be placed on the part where it is proposed to commence and from one to two complete turns made, and then the bandage proceeded with.

If the part is oval it is better to commence by laying the initial extremity at the end of the oval instead of on one of its sides. This does not apply so much to the extremities as it does to the trunk.

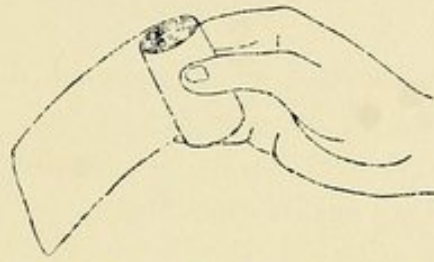
The tendency of a bandage being to become loose by sliding from the thicker to the thinner end of the part makes it necessary to begin it at the point of least diameter. Thus the wrist and ankle are the proper places to commence bandages of the extremities, and when a bandage is to involve both an extremity and the trunk it is usually considered preferable to begin it on the extremity.

If a simple circular bandage is to be placed on a cylindrical part, the initial extremity should be placed at right angles to its long axis, the turns going transversely around it (fig. 9).

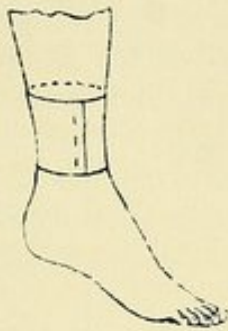
If, however, it is desired to simply fix a bandage and then proceed to bandage either above or below the point of fixation, as in covering the extremities, then the initial extremity should be placed where the parts are conical instead of cylindrical and it should be laid on obliquely.

Thus in commencing a bandage of the foot by fixing it around the ankle, the bandage should be placed obliquely in front of the joint (fig. 10). Here the swelling of the malleoli makes a short cone with the base down, and by putting the initial extremity obliquely on the part, at the completion of the turn it can be continued downwards without the formation of any gapes. If greater security is desired, two turns instead of one may be made around the part, as shown in fig. 11.

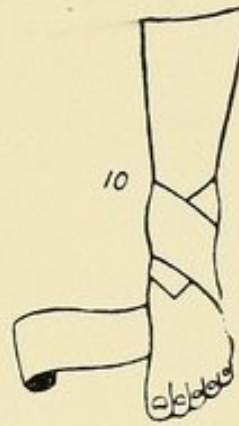
*Ending a Bandage.*—When the bandage proper has been completed, it may either be fastened and the surplus cut off, or else a few additional turns made until it is exhausted. If the terminal extremity comes over the injured part, the bandage should be shortened by turning its end under, thus removing it to a less sensitive place. It is also better not to end it on a bony prominence, as that will tend to make the point of the pin project. When it is not desired to pin the terminal extremity, it may be fastened by splitting it and tying the two ends around the part. This is often done with the finger bandages.



8.—How the bandage should be held when about to apply it.



9.—The initial extremity fixed by circular turns.



10.—The initial extremity fixed by a single oblique turn.



11.—The initial extremity fixed by two oblique turns.



12.—Circular Bandage.



## THE FUNDAMENTAL BANDAGES.

In analyzing the various special bandages as they are employed in surgery, we find that they are composed of a number of simple or elementary turns, which we may call the fundamental bandages. Every part of each and every special bandage is composed of one or more of these elementary turns or bandages, multiplied or arranged according to the part to which they are to be applied and the indications they are intended to fulfill.

These fundamental bandages, together with the methods of their construction and application, constitute the foundation on which all general bandaging is based.

A thorough knowledge of these principles should be acquired before taking up any of the special bandages. A surgeon may be pardoned for not remembering the peculiar turns of some of the many special bandages, but not for showing his ignorance of the great principles on which good surgery depends.

The fundamental bandages may be classified according to their construction, as follows: The circular, the spiral, and its various modifications, spiral reversed, figure eight, recurrent, twisted and knotted.

*The Circular Bandage.*—The circular bandage is applicable to cylindrical parts. While there are few parts of the body which are perfect cylinders, still, owing to the elasticity of the bandage and the softness of the structures, where the departure is not marked, they may be considered and treated as cylinders; thus an uneven or slightly conical part may be bandaged as though it were cylindrical.

The circular bandage consists of two or three turns transversely around a part, the initial extremity being placed at right angles to its long axis, and each turn covering exactly the preceding one. It is shown in fig. 12. It is applicable to almost every portion of the extremities and trunk. When a circular turn has been placed around one side of the neck and opposite axilla, it has been called by some authors an oblique bandage, but it is obvious that it does not differ in principle from a circular bandage of the neck or any other portion of the body.

*The Spiral Bandage.*—A spiral bandage is one which covers a part by turns, which encircle it in a spiral manner. The spiral bandage may be either a *slow spiral* or a *rapid spiral*. It may

be *ascending* or *descending*, and is also applicable to spherical parts.

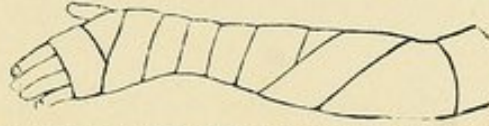
*The Slow Ascending Spiral.*—A slow spiral is applicable to a cylindrical part or to a cone, the size of which increases but slowly. It is applied as follows: Beginning with a circular turn the bandage is inclined slightly upwards and wound spirally around the part, each turn overlapping the preceding one one-half to two-thirds of its width. If so desired it may be finished by a circular turn. The three turns covering the wrist, in fig. 13, are slow spiral turns.

*Descending Slow Spiral.*—Sometimes it is desirable to cover a part from above downwards by slow spiral turns. When this is done it forms the descending slow spiral. If the part is cylindrical the turns will lie flat on its surface and an overlapping of half the width of the bandage will be sufficient, but if it is slightly conical the upper part of the bandage will touch while the lower part will gape. The amount of gaping will depend on the rapidity of decrease in the size of the part. (See fig. 14.) On account of this gaping the overlapping should be about two-thirds of the width of the bandage. When the bandage, thus applied, is finished, it presents a smooth appearance and shows no gaping.

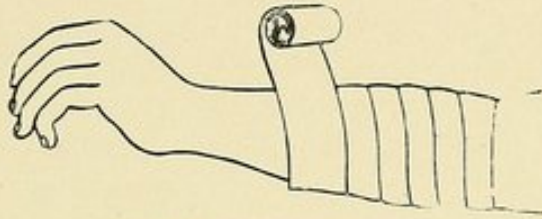
Some authorities advise the use of the spiral reverse bandage under these circumstances, the reverses being made while proceeding from the thick towards the thinner portion of the limb. This, however, makes such an insecure bandage that it is not to be recommended. The descending slow spiral is employed in the spiral bandage of the chest; in going from the point of greatest diameter of the calf of the leg to the knee; in bandaging some portions of the upper extremity and in the application of splints.

*The Rapid Spiral.*—A rapid spiral or *oblique* bandage is one which ascends a part in rapid spiral turns, leaving an interspace between them. It is employed to confine, loosely, dressings to the extremities, as in cases of burns or as a bandage for temporary use. (See figs. 13 and 15.)

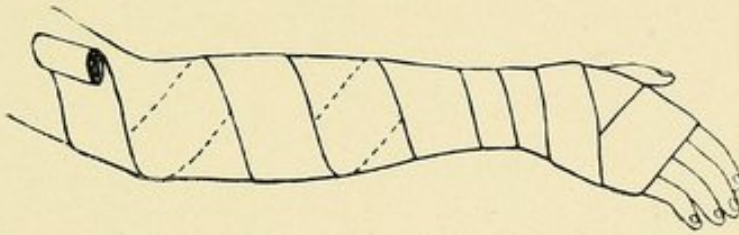
*The Spiral Principle as Applied to Spherical Parts.*—The spiral principle can also be employed in bandaging spherical parts, such as the skull. Here it should always be borne in mind that the most secure turn is a diameter of the part. Therefore whenever it is possible parallel turns should be avoided. The farther away they get from the diameter the more insecure they become. The



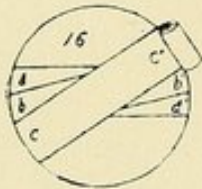
13.—The wrist covered with slow ascending spiral turns.



14.—The descending slow spiral.

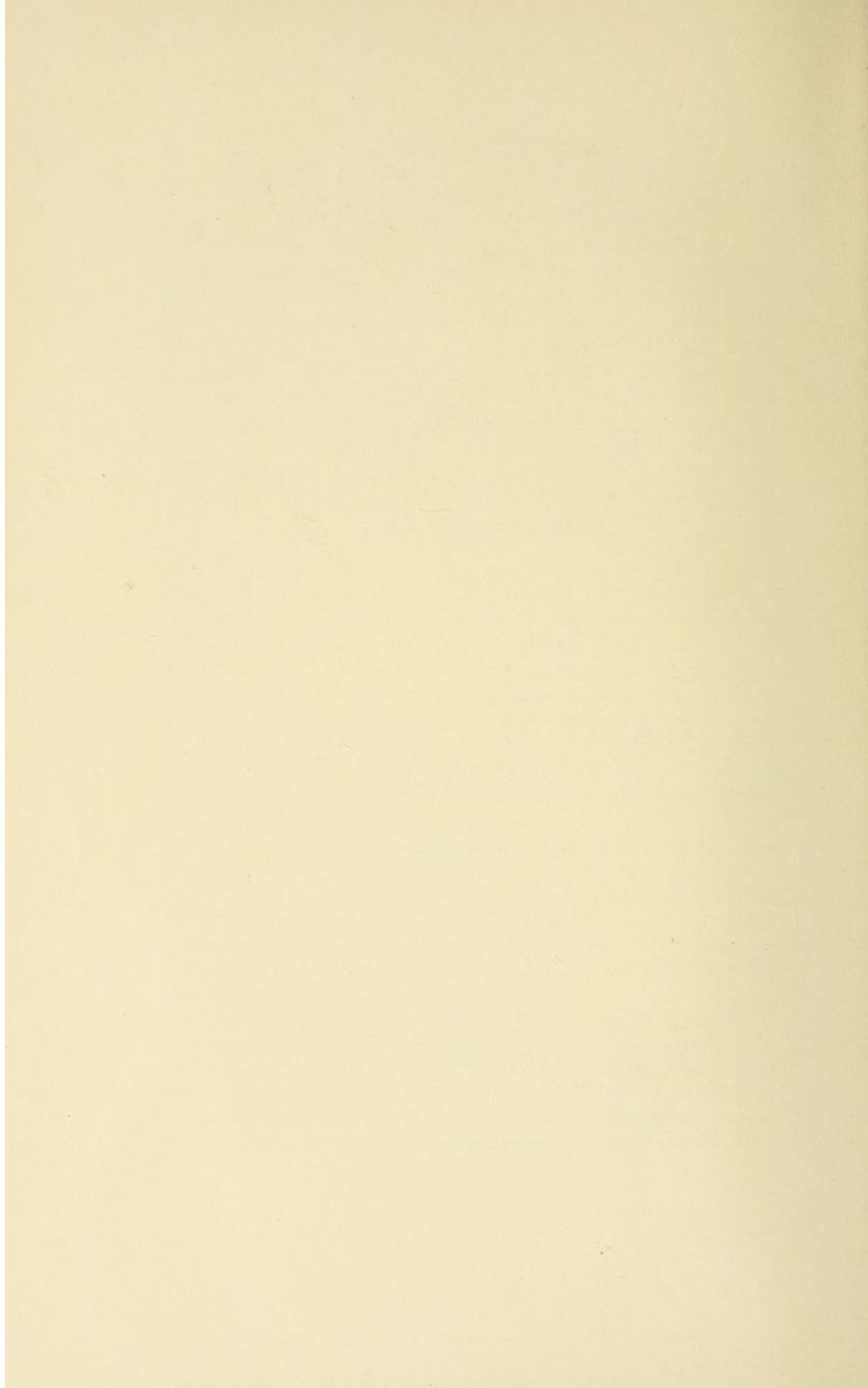


15.—Rapid spiral or oblique bandage.

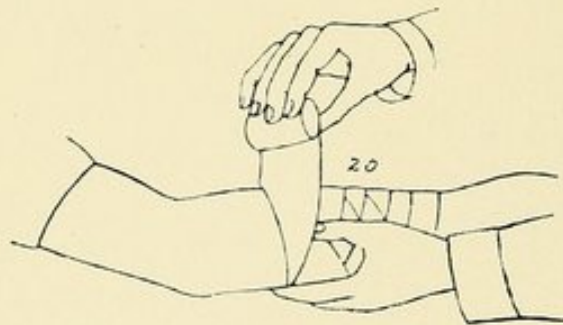
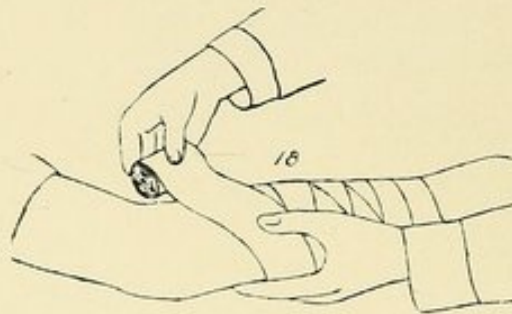
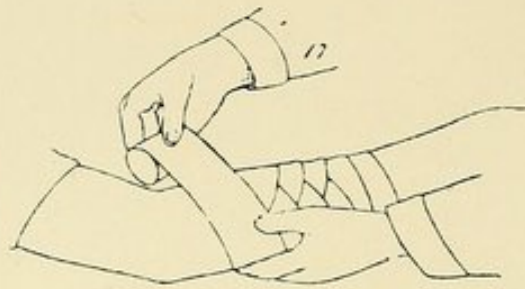


16.—Showing a sphere bandaged with spiral turns.









17, 18, 19 and 20.—Showing how to make a reverse.

turns being all diameters (more correctly great circles) of the sphere, radiate from a common center corresponding to its axis, and therefore make a double fan-like arrangement. This is shown in fig. 16. The first turn A A goes directly around the sphere. The second turn B B goes higher up on the right and lower down on the left. Each succeeding turn overlaps the preceding one half its width. The bandage can be continued in the same manner until the whole sphere is covered. It will be seen that these turns are analogous to those of the slow spiral, except that, being applied to a spherical instead of a cylindrical part, they progress around instead of ascending it.

This principle is applicable to bandages of the head, but is also useful in bandages to retain surgical dressings after operations, etc.

#### THE SPIRAL REVERSED BANDAGE.

In order to completely cover a part which has the shape of a rapidly increasing cone and still have the bandage lie flat, it is necessary to change the direction of the spiral turns frequently by what is known as a reverse. Hence the bandage is known as the spiral reversed. A reverse is necessary whenever it is desired to change abruptly the course of a bandage. This occurs in bandaging a conical part, when the size increases so rapidly as to cause the turns of the spiral to become separated.

The reverse is made as follows: The body of the bandage being held by the thumb and fingers of the right hand, and having not more than five inches of it unrolled, it is so inclined upward as to cause its outer surface to lie flat on the part beneath; traction being made, the thumb of the left hand (the fingers being on the under side of the limb) is pressed on the bandage to prevent its loosening on making the reverse. This position is shown in fig. 17.

The roller is then approached to the limb, thus loosening the bandage, as seen in fig. 18, and the right hand pronated, the bandage being turned over or reversed and carried at first directly down the limb, as shown in fig. 19, and then obliquely to the right until its lower edge is parallel to the lower edge of the preceding turn. (See fig. 20.) The reverse is to be settled by a couple of gentle pulls and the body of the roller passed around the limb and grasped by the fingers of the left hand. The thumb being removed

the bandage is drawn as firm as desired and brought up and passed into the right hand and the reverse repeated.

They should be continued as long as the limb increases in size, but when it is stationary or a decrease occurs, then the part can be covered by a slow spiral and no reverses should be made. Thus the reverses should cease in the leg when the point of greatest circumference of the calf is reached, and in the forearm before the elbow is reached.

In bandaging a conical part the reverse is always made towards the point of the cone. The conical parts of the extremities on which reverses are necessary are all pointed downward, so that the reverse is made *toward* the operator and while the bandage is proceeding from the point toward the base of the cone. A reverse made away from the operator and while the bandage is proceeding from the base towards the point of the cone is never allowable. It is taught by many, particularly the French, but the only descending cones we have in the body can be better bandaged by slow spiral turns.

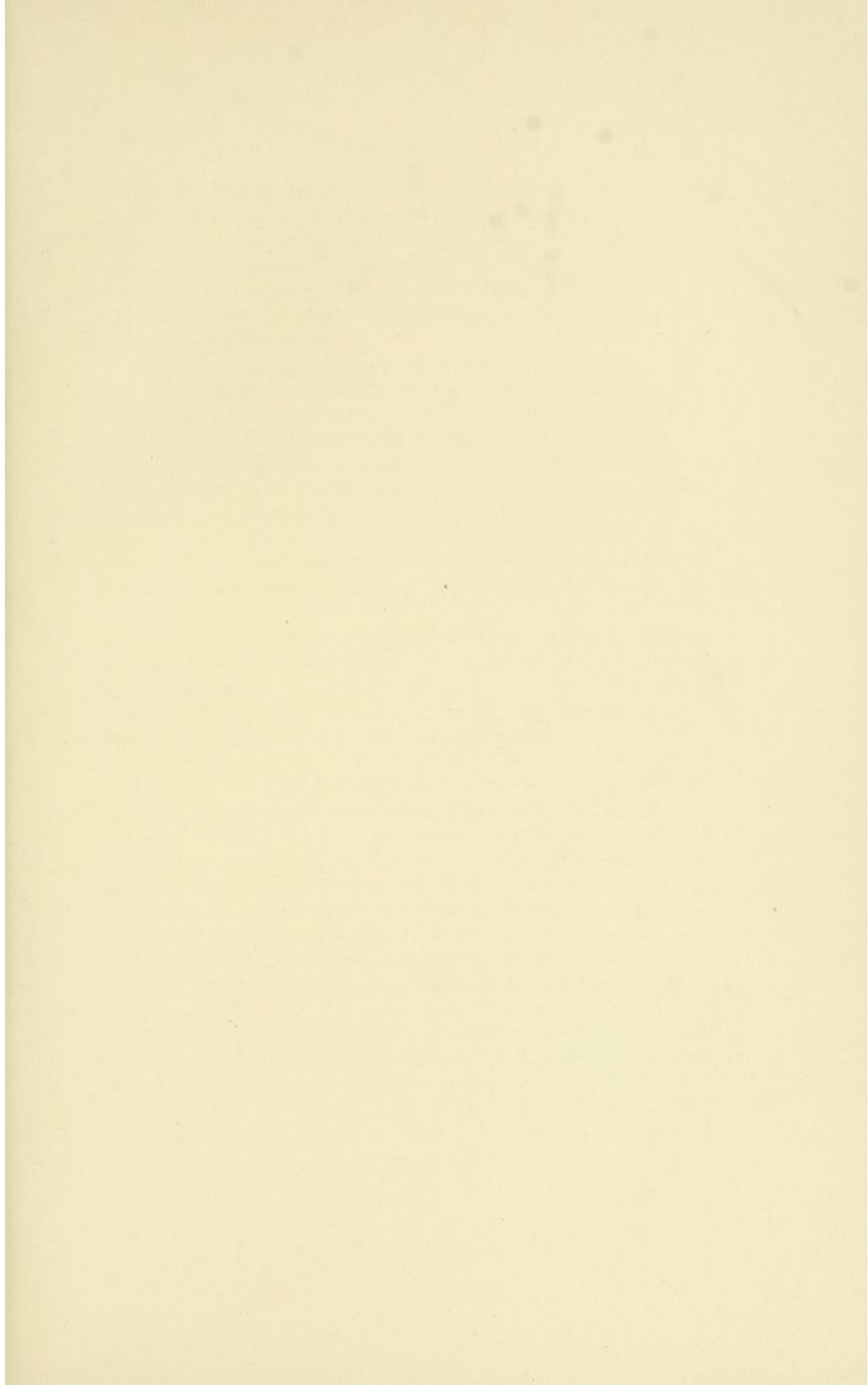
In applying gauze and plaster of paris bandages reverses should be avoided; figure 8 turns are preferable.

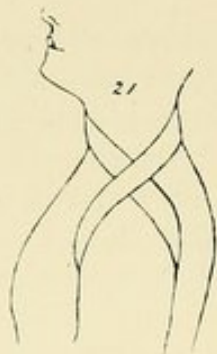
#### THE FIGURE 8 BANDAGE.

The figure eight principle is the one most used of any in bandaging. It consists of two loops of bandage made in the form of a figure 8. When a number of figure 8 turns are made, each a little higher than the preceding one, they form what is called, from its imbricated appearance or resemblance to a spike of barley, a *spica* bandage. (See fig. 22.)

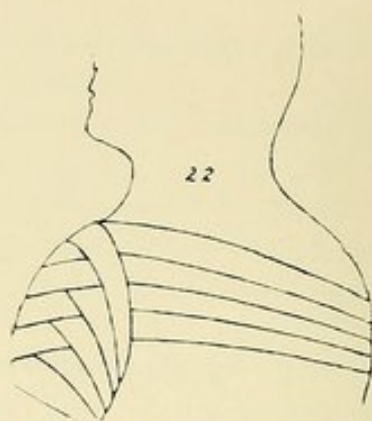
The figure 8 bandage is employed in three different ways: 1st. When one loop is used as the essential part, the other being accessory and made to support and hold it in position. 2d. When it is the point of crossing that is utilized, both loops being used as points of attachment. 3d. When both loops are utilized.

*First Method.*—An example of the first manner of employing the figure 8 principle is seen in the figure 8 bandage of the neck and axilla. (Fig. 21.) Supposing it is desired to retain an application in the axilla, this could readily be done by a single circular turn over the shoulder were it not that it would be too readily displaced. In order to prevent the turn under the axilla from slip-

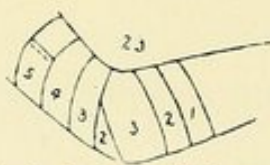




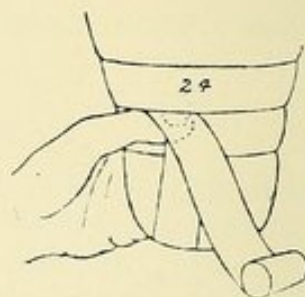
21.—Showing the lower loop of the FIG. 8 turn as the essential part



22.—Showing the point of crossing as the essential part.



23.—Showing both loops of the FIG. 8 turn being utilized.



24.—Recurrent bandage.



25.—Twisted bandage.



26.—Knotted bandage.

ping off the shoulder an additional turn is added around the neck, and so we have one of the loops acting as the essential part of the bandage while the other loop is simply used to prevent the first from becoming displaced. This method is frequently used in the application of bandages. When a turn is found to be insecure it is a common thing to take an additional turn around the part above to prevent its displacement.

*Second Method.*—An instance when the point of crossing is the part utilized is seen in the spica of the shoulder. (Fig. 22.) In this it is desired to cover the point of the shoulder with a dressing. The figure 8 turns cross over the shoulder and there confine the dressing; the two loops, one around the affected shoulder and the other under the opposite axilla, simply serve to hold the point of crossing of the bandage in position.

In the spica of the groin the same thing occurs. The point of crossing is the essential part of the bandage and it is kept in place by the two loops, one around the pelvis and the other around the thigh.

*Third Method.*—In the third way the whole bandage is utilized, as seen in the figure 8 turns used to cover the joints. The fact of the bandage crossing is only an incidental occurrence. It is made because it is convenient to so apply the bandage and not because the point of crossing is to be utilized. (See fig. 23.)

#### THE RECURRENT BANDAGE.

When it is desired to retain a dressing on the face of a stump, or on the top of the head, or to cover the end of a finger, then a bandage called the recurrent is used. It is applied as follows: After first fixing the initial extremity around the part, a reverse is made and the roller passed backwards and forwards over the end of the part until it is completely covered and then finished by a few circular turns. The first recurrent turn goes directly across the middle of the part and each alternate turn is made on either side of it. (See fig. 24.)

Owing to the fact that the recurrent turns are not firmly attached, this bandage is very liable to displacement and is not to be used except in cases of absolute necessity.



## THE TWISTED BANDAGE.

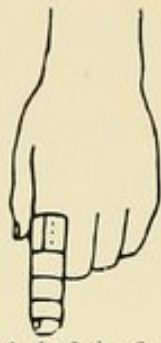
When it is desired to secure a turn over a projecting bony prominence or small dressing, it can be done by sharply twisting the bandage on itself a half turn. The edges are thus drawn in and it more closely embraces the part. Thus in children, where the frontal eminences are marked, by twisting the bandage, as seen in fig. 25, it grasps the occipital protuberance behind and the frontal eminences in front. This principle may be made use of in confining small dressings to the top of the head for scalp wounds, etc.

## THE KNOTTED BANDAGE.

This is made with a double roller. The middle portion of the bandage, that between the two rolls, is placed on a part, say one temple, and the bandage carried around to the opposite side. The two portions of the bandage pass each other and are continued around to the point of starting, where they are turned at right angles to their former course, thus forming a cross with a knot at the point of crossing. (Fig. 26.) They are then continued around to the opposite side, and there fastened or else carried on to form a second knot behind the first. The use of this bandage has usually been confined to the temporal region, but the same principle is applicable to other portions of the head. Thus the knot may be placed lower down and a good bandage made for covering both eyes, or still lower to cover the upper or lower lip.

*Gamgee's Method.*—Mr. Sampson Gamgee, of Birmingham, proposed a method of bandaging by means of "a succession of intersecting spirals or figures of 8" without reverses. He describes it as follows (Treatment of Wounds and Fractures, p. 308): "To bandage a left leg and foot, by way of illustration, begin just above the malleoli with a couple of circular turns, then over the instep, obliquely from left to right; make a circular turn at the root of the toes, and wind obliquely upward from the inner side of the foot, in front of the ankle, to the back, and thence up the front of the leg, with a long spiral to reach the knee joint; below this make a couple of circular turns; thence downwards and upwards, by long intersecting spirals or figures of 8, until every part, the heel included, is smoothly covered. This method is applicable, with trifling varieties of detail, to all parts of the body, so as to exercise the most equable and comfortable pressure, without ruck or reverse, and without danger of slipping." In my hands this method consumes such a large amount of bandage that I prefer using either the figure 8 of the lower extremity, shown in fig. 50, or the combined spiral reversed and bandage for the calf of the leg, shown in fig. 53.





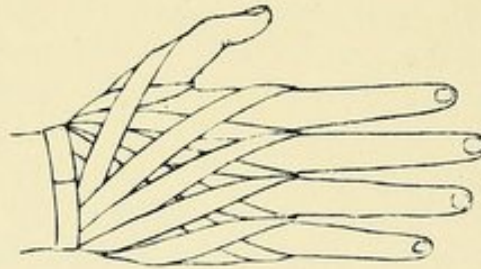
27.—Spiral of the finger.



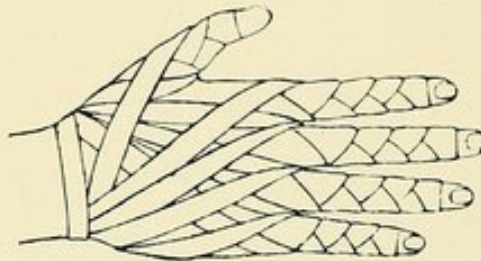
28.—Spiral reversed of  
the finger.



29.—Spica of the thumb.



30.—The demi-gauntlet.



31.—The gauntlet.

PLATE VI.

## THE SPECIAL ROLLER BANDAGES.

## BANDAGES OF THE UPPER EXTREMITY.

*Spiral of the Finger.* (Fig. 27.) To cover a finger which has been enveloped by a dressing a plain spiral bandage is usually best, but reverses are necessary if the bare finger is to be bandaged. Bandage, one inch wide.

The initial extremity being laid lengthwise on the dressing, one or two recurrent turns are made over the end of the finger. The bandage is then reversed and carried spirally up the finger from its extremity to the web, where it is either pinned as seen in fig. 27, or split and the two ends tied around the part.

If the injury does not extend above the distal phalanx, it is not necessary to carry the bandage beyond the root of the finger. When, however, the medial or proximal phalanx is injured, then it is better to prolong it up around the wrist as in the following bandage.

*Spiral Reversed of the Finger.* (Fig. 28.) Bandage, 3 yards x 1 inch.

Supposing the medial phalanx to be the injured part, the bandage is fixed by two circular turns around the wrist. It is then brought diagonally over the back of the hand to the root of the injured finger, descending by a rapid spiral turn to its tip, where a circular turn is made. The finger is then ascended by spiral reversed turns and the bandage finished by being carried across the back of the hand and fixed around the wrist. (See fig. 28.)

*Spica of the Thumb.* (Fig. 29.) Bandage, 3 yards x 1 inch.

The initial extremity having been fixed by one or two turns around the wrist, the bandage is carried downwards across the back of the hand and wound in a rapid spiral around the thumb until near its extremity. A circular and one or two slow spiral turns are then made and the bandage continued by successive ascending figure 8 turns overlapping each other half their width and made alternately around the thumb and around the hand. The thumb being covered, the bandage is ended around the wrist. (Fig. 29.)

The bandage should not extend farther forwards than the middle of the thumb nail, and the figure 8 turns should commence when the lower edge of the bandage arrives at about the middle of the proximal phalanx. It is not necessary to concentrate the figure 8 turns all at one point on the ulnar side of the wrist, but they may be made nearly or quite parallel as shown in the illustration.

*Demi Gauntlet.* (Fig. 30.) Bandage, 3 yards x 1 inch.

The initial extremity is fixed by a couple of circular turns around the wrist. Then if the left hand is to be bandaged, the roller is carried obliquely down across the back of the hand and a turn taken around the base of the little finger. The roller is next carried up around the ulnar side of the wrist. On arriving at its radial side the bandage is carried again across the back of the hand, then around the base of the ring finger and up around the wrist from the ulnar towards the radial side. These figure 8 turns are made alternately around the fingers and wrist until all are encircled and the back of the hand covered. The bandage is ended around the wrist.

*The Gauntlet.* (Fig. 31.) Bandage, 5 yards x 1 inch.

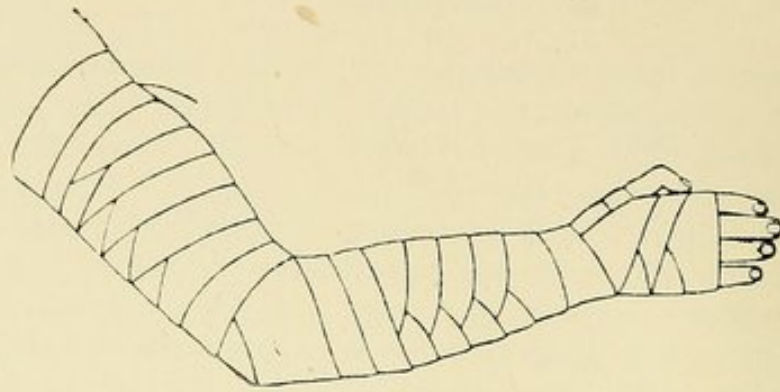
The initial extremity is fixed around the wrist and, if the left hand is to be bandaged, the roller is carried across the back of the hand to the base of the little finger. This is descended by a rapid spiral turn to its extremity, and the entire finger covered by spiral or reversed turns. When the web of the fingers is reached, the roller is carried back across the hand to its ulnar side and, a turn being made around the wrist, the bandage is brought from its radial side down across the back of the hand to bandage the ring finger in the same manner. The fingers and thumb are thus covered one after another, a figure 8 turn being made around the wrist for each finger. We thus have all the fingers covered by spiral or reversed turns and the back of the hand covered by the figure 8 turns, of which one loop encircles the root of the finger and is the accessory loop, while the other or principal one goes around the wrist.

Another method sometimes described as the Gauntlet consists in bandaging the fingers as already described and then covering the hand by slow spiral turns, from the web of the fingers to the wrist joint. Jamain et Terrier correctly call this bandage the spiral of the hand.

*Spiral Reversed of the Upper Extremity.* (Fig. 32.) Bandage, 6 yards x 2½ inches. To bandage the right extremity.

*Hand.*—The initial extremity is placed obliquely on the wrist and fixed by one or two turns, as shown for the leg in figures 10 and 11, according to the amount of security desired. The bandage is then carried over the back of the hand to the web of the thumb and index finger, thence to the outer side of the little finger, the

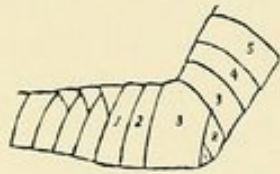




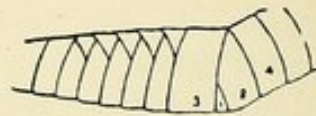
32.—The spiral reversed bandage of the upper extremity.



33, 34 and 35.—Showing the method of covering the hand.



36.—Bandaging the elbow when flexed.



37.—Bandaging the elbow when extended.

PLATE VII.

lower edge of the bandage crossing the hand at the level of the second joint of the ring finger. (See fig. 32.) A circular turn is made at this point (fig. 33), the bandage being carried around, and as it crosses the little finger for the second time, covering only one-half of the previous circular turn (fig. 34). It is then carried obliquely upwards across the back of the hand to the melacarpophalangeal joint of the thumb (fig. 34). Returning across the palmar surface again to the ulnar side, another turn is taken around the hand below the thumb, covering as it passes over the index finger one-half of the circular turn, and the bandage again brought to the ulnar side as seen in figure 35. Alternate turns are thus made around the hand above and below the thumb, until it is covered in by two or three figure 8 turns, each of which overlaps the preceding one-half of its width. The points of crossing should be near the middle of the hand and be kept as much as possible in the same straight line. The last turn below the thumb should fit well up between the thumb and forefinger, the bandage wrinkling at this point (fig. 32).

It is sometimes taught to cover the hand by two or three spiral reversed turns before proceeding to the figure 8 ones. As these reverses are easily displaced and are not absolutely necessary, it is better to dispense with them. Prof. H. H. Smith (Surgery, 1863), also taught to bandage the hand without them.

*Forearm.*—The bandage is then carried up the wrist and forearm by three or four slow spiral turns, and reverses made when the arm increases in size. These reverses are continued until within five inches of the elbow. They should then be discontinued, and, the forearm being flexed, the bandage carried directly over the point of the elbow, the point of the olecranon being in the middle of the bandage. From thence it is brought back to the forearm, covering in one-half of the last turn, and carried again around the lower portion of the arm, the lower edge of the bandage being level with the point of the olecranon, and therefore covering in one-half of the first turn. Another turn is taken around the forearm, covering in one-half of the previous turn. The upper edge of this turn will reach the point of the olecranon, and therefore cover in one-half of the first turn which proceeded over the point of the elbow (fig. 36).

*Arm.*—The bandage is then passed around the arm, ascending it in slow spiral or spiral reversed turns, as required.



When the elbow is not much flexed, three turns may be sufficient to cover it, as shown in figure 37, instead of five. In this case the first turn is made over the point of the olecranon, the second turn covering the upper half of the first, and the third its lower half; the bandage is then continued on up the arm.

It will be seen from this that the elbow is covered in by figure 8 turns, the upper loop in each being around the arm and the lower loop around the forearm, the point of crossing being the bend of the elbow. The turns which are lowest on the forearm are also lowest on the arm.

Another good method advised by Dr. Hopkins and also by Berkley Hill consists in fixing the initial extremity by two or three circular turns around the point of the elbow and then making successive figure 8 turns above and below the joint, receding from the point of the elbow up the arm and down the forearm.

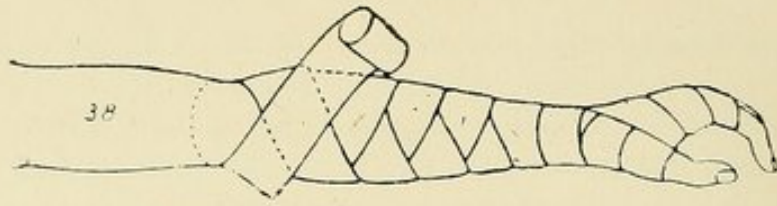
Some authors (E. Fischer, *Allgemeine Verbandlehre*; Leonard, *Bandaging*), advise using figure 8 turns which begin at a distance and approach the joint, the last turn (instead of the first) passing over the point of the olecranon. The turn of the bandage most liable to displacement is that which passes over the point of the olecranon process. As this is secured by other turns of the bandage in the previously mentioned methods they are to be preferred.

*Figure 8 of the Upper Extremity.* (Fig. 38.) Bandage, 8 or 9 yards x  $2\frac{1}{2}$  inches.

The hand and wrist having been covered in by figure 8 and slow spiral turns, as already described, the bandage is inclined up the arm and a turn taken around it. It is then brought downward and another turn taken around the part. Thus a figure 8 turn is made in which the lower loop is the principal one and must be made to lie flat on the part, while the upper one is the accessory loop and gapes at its lower edge as seen in figure 38. This gaping is concealed by the lower loop of the next figure 8 turn. Successive figure 8 turns are to be made, each overlapping the preceding one until the entire limb is covered, when the bandage is completed by one or two circular turns. If it is desired to avoid the gaping of the upper turn, a reverse may be made on the under side of the limb and both loops will then lie flat.

When a very secure bandage is desired this one may be used, but usually a slow spiral or spiral reversed bandage will prove satisfactory. On account of the arm being carried in a sling, there is not the same tendency for the bandage to become displaced that exists in the lower extremity. If it is desired to have the arm flexed, the bandage should be applied while it is in that position and not to be bandaged while straight and afterwards bent. By





38.—Figure 8 bandage of the upper extremity.



39.—Spica bandage of the shoulder.



40.—FIG. 8 bandage of the shoulder and axilla.

so doing the bandage is tightened at the flexure of the elbow and interference with the circulation results.

*Spica of the Shoulder. (Ascending fig. 39).* Bandage, 8 yards x  $2\frac{1}{2}$  inches.

The initial extremity is fixed around the humerus at the insertion of the deltoid muscle. One or two spiral or spiral reversed turns are made until the bandage reaches the axillary folds. It is then carried around the chest, through the opposite axilla and returned to the humerus where it crosses the previous turn on the outer side of the arm midway between the anterior and posterior surfaces. Another turn is made around the humerus and then again around the body. Several turns are thus made around the arm and through the opposite axilla, the points of crossing being in line with the tip of the acromion process. The successive turns rise higher and higher, overlapping each other one-half to two-thirds the width of the bandage, until the shoulder is entirely covered. (See fig. 39.)

If the turns around the body are begun before the axillary folds are reached, the arm will be unduly bound to the side. These turns all concentrate themselves at a single point in the sound axilla, radiating from it like a fan both on the front and back of the chest. In applying this bandage the operator should stand exactly at the side of the patient and neither towards the front nor back. If this is neglected the points of crossing of the turns over the affected shoulder are apt to be thrown too far forwards or backwards, thus making an insecure dressing. The bandage has a tendency to become displaced by the points of crossing slipping down either in front or behind the shoulder. It is to avoid this that they should always be made in the median line. When, instead of the figure 8 turns being begun below and made to ascend successively higher and higher, as in the ascending spica just described, they are commenced high up on the neck and made to descend, then the bandage is called the *Descending Spica*. It is preferred by some authors, but in this country the ascending is the more popular. Goffrés (*Précis iconographique des bandages*, Paris, 1854) prefers the descendent, as he claims it to be more solid and regular than the ascendent. The spica of the shoulder is an example of the second method of using the figure 8 turn, the point of crossing being the essential portion.

*Figure 8 of the Shoulder and Axilla. (Fig. 40.)* Bandage, 3 yards x  $2\frac{1}{2}$  inches.

The initial extremity being placed on top of the shoulder of the affected side, the bandage is carried under the affected axilla and up over the shoulder, crossing the initial extremity. From there it is carried under the axilla of the opposite side and back

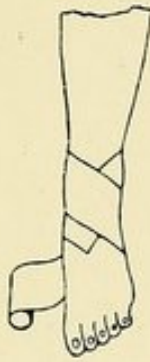
again to the affected shoulder. Two or three figure 8 turns composed of alternate loops under the two axillas and crossing on the shoulder of the affected side constitutes the bandage. The turns cover each other one-half to two-thirds of their width. (See fig. 40.)

If preferred, instead of carrying the bandage to the opposite axilla, it may be passed around the neck, making a *figure 8 bandage of the neck and axilla*. This bandage is an example of the first manner of employing the figure 8 principle; the loop under the affected shoulder is the principal one, and that under the opposite axilla the accessory one. It is a useful bandage to retain dressings in the axilla.

#### BANDAGES OF THE LOWER EXTREMITY.

*Spiral Reversed of the Lower Extremity.* (Fig. 43.) Bandage, two rollers, each 7 yards x  $2\frac{1}{2}$  inches.

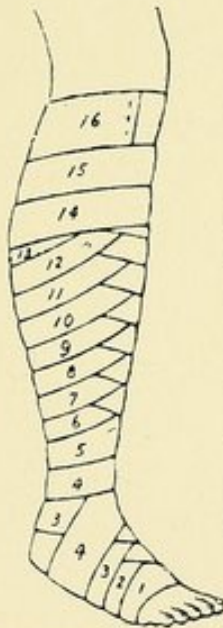
The initial extremity of the bandage is placed obliquely across the ankle joint and fixed by one or two turns as shown in figs. 41 and 42. The bandage is then carried (if on the right foot) down the inner side of the foot, obliquely across the sole to the distal extremity of the fifth metatarsal bone and over across the root of the toes but not encroaching on them (see turn 1, fig. 43); thence around the inner border of the foot and again across the sole to the outer side, covering in one-half to two-thirds of the previous turn. The bandage being carried on the instep a reverse is made (see turn 2, fig. 43.) If necessary, this is repeated and the next turn brought up around the ankles, encircling them low down, as seen in fig. 43, turn 3. From here it proceeds down around the foot and again up around the ankle (turn 4, fig. 43), whence it proceeds in slow spiral turns up the leg. We thus have the foot covered in by first a circular turn, then from one to three spiral reversed turns according to its length and the width of the bandage, and finally a couple of figure 8 turns around the ankle. After two or three slow spiral turns, the leg begins to increase in diameter and reverses are again necessary. These are made as long as the leg increases in size, but when the point of greatest circumference is reached the reverses are stopped and the bandage completed by slow spiral turns (see turns 14, 15, 16, fig. 43.) If it is desired to cover the knee and thigh also, the leg being in an extended position, when the lower border of the patella is reached, the bandage is passed directly across it. (Fig. 44.) The next turn is then



41.—Fixing the initial extremity with one turn.



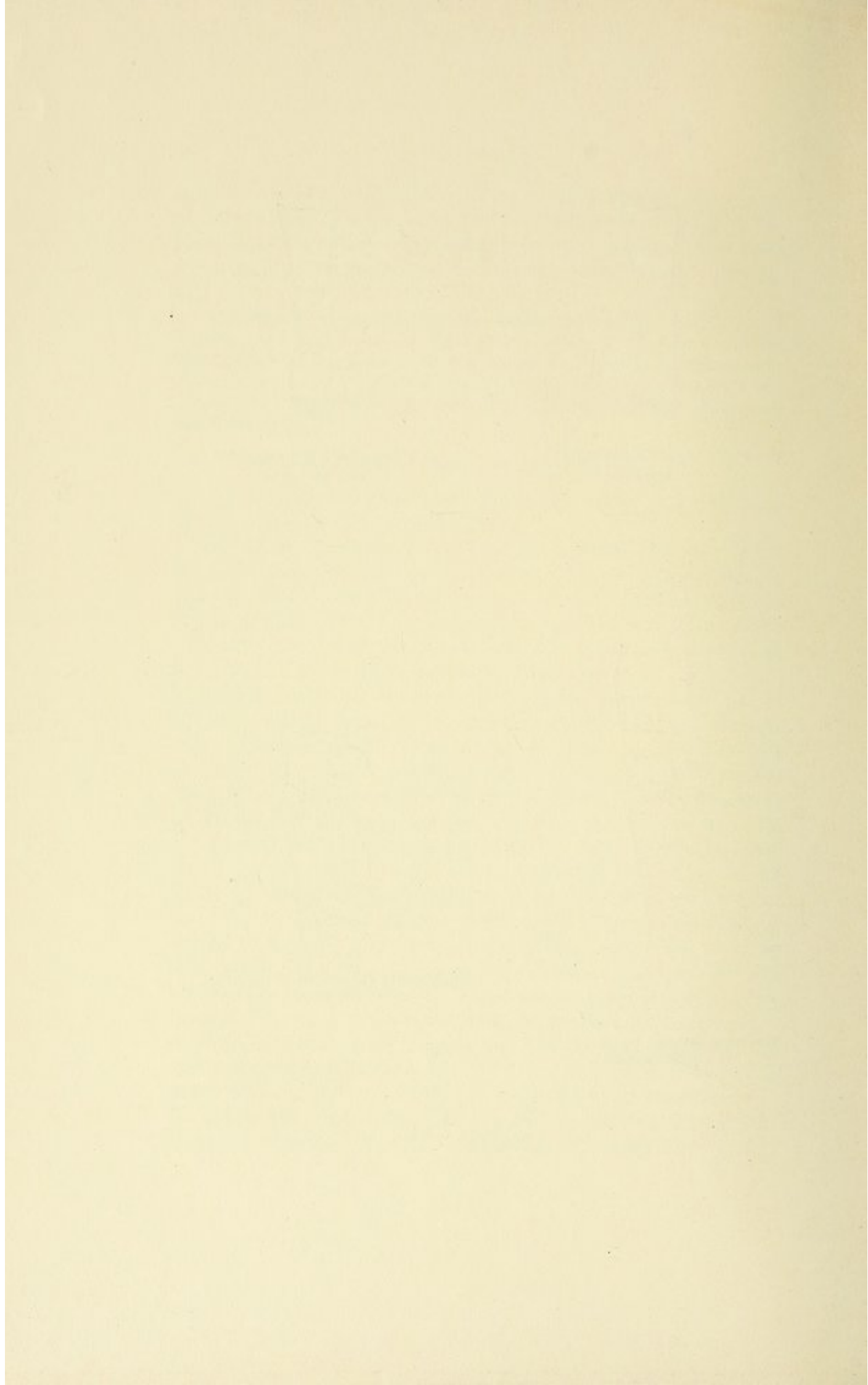
42.—Fixing the initial extremity with two turns.



43.—Spiral reversed bandage of the lower extremity.



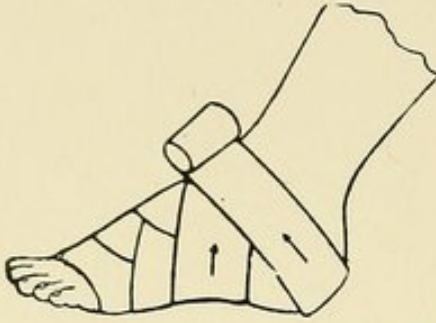
44.—Showing the method of covering the knee.







SPIRAL OF THE HEEL.



45.—Showing the turn over the point of the heel.

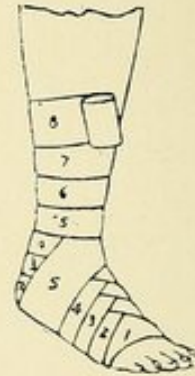
SPICA OF THE FOOT.



48.—Showing the first turn over the point of the heel.



46.—Showing the bandage returning from the back of the heel.



49.—The completed bandage.



47.—Showing the bandage passing transversely across the outer side of the heel.

made over the upper half of the patella, covering in one-half of the preceding turn, and then over the lower half, covering the remainder of the turn over the patella. The bandage is then carried up the thigh by regular spiral reversed turns.

When the foot is short or the bandage broad it is not necessary to make any reverses, and the figure 8 turns should be commenced immediately after the circular turn around the root of the toes has been made. The first figure 8 turn encircles the ankles low down, leaving the heel exposed; alternate turns are then taken around the foot and the ankle, those on the foot approaching the heel and those around the ankle ascending the leg, each being half the width of the bandage higher than the preceding one. As with the hand so with the foot, it is always better to dispense with reverses when possible.

*To Cover the Heel.*—If it is desired to cover the heel, either the spiral of the heel or spica of the foot can be used.

The former was called by the late Dr. Chas. T. Hunter the "American Spiral" (Ashhurst's International Encyclopedia of Surgery, Vol. I.). It was so named not because of its American origin, for the turn which is peculiar to it is seen in Galen and many of the older French works, and is also somewhat known in Great Britain, but because it is recognized and used more by the Americans than any others, also because it has been taught continuously here for more than twenty-five years, while even yet it is hardly ever mentioned in the foreign works on surgery. It is applied as follows, a bandage  $2\frac{1}{4}$  to  $2\frac{1}{2}$  inches wide being used:

*Spiral of the Heel.* (Figs. 45, 46 and 47.) To bandage the right foot.

The initial extremity having been fixed around the ankle, the bandage is carried under the sole of the foot to its outer side. A circular turn is then made, the lower edge of the bandage not coming farther forward than the root of the toes. The foot is ascended by one or two spiral reversed turns until the top of the instep is reached. From thence it is taken directly over the point of the heel, returning to the place of departure on the instep (see fig. 45); it is then carried down the inner side of the foot (fig. 46) to the sole and transversely across the outer surface of the heel (see fig. 47) behind the tendo achilles, and back again to the instep. (See figs. 46 and 47.) From the instep it is next carried down the outer side of the foot, under the sole, and transversely across the inner surface of the heel, behind the tendo achilles and up in front of the ankle joint, from whence it proceeds up the leg. A pin is then

inserted on each side of the heel where the transverse turns cross the turn going over the point.

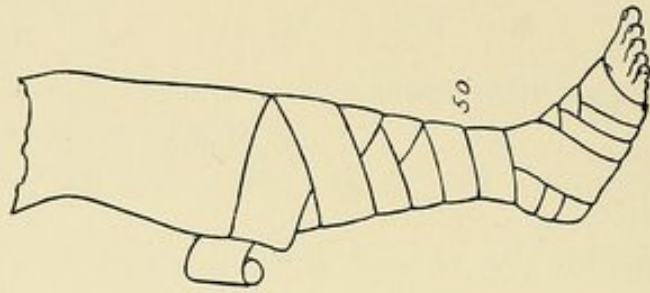
*Spica of the Foot.* (Figs. 48 and 49.) Bandage, 6 or 7 yards by 2 inches.

The initial extremity being fixed by two circular turns at the root of the toes, the bandage is inclined upwards and carried across the instep and directly over the point of the heel. From there it is brought back to the instep and carried around the foot, covering in two-thirds of the preceding turn. (See fig. 48.) Another turn is then made around the heel, covering two-thirds of the first turn over its point. Successive turns are then taken around the foot and around the back of the heel, those on the foot approaching the heel, and those back of the heel ascending the leg. (See fig. 49.)

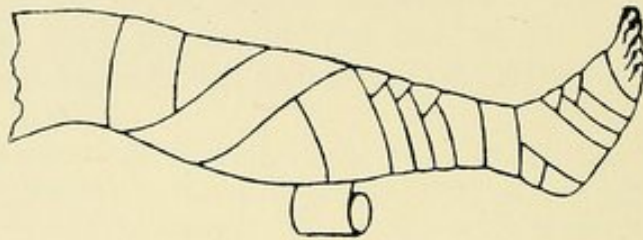
On account of the tendency of the turns over the heel to displace themselves by slipping up on the tendo achilles, it is best to apply padding at this point, also beneath the malleoli. By this means the turns are rendered more secure and the prominent malleoli are protected from pressure. It is usually impracticable to bring the turns around the foot so far up as to meet the first turn over the heel, therefore a small space is often left uncovered on the sole of the foot at this point. If properly applied with plenty of padding over the tendo achilles, this makes a neat and moderately secure bandage.

*Figure 8 of the Lower Extremity.* (Fig. 50.) The lower extremity can be covered without any reverses by employing the figure 8 bandage. The figure 8 turns are made wherever reverses would otherwise be used. This bandage is an example of the first manner of using the figure 8 turn, that is, one loop; in this case the lower is the one required to lie flat and be evenly applied, the upper gaping considerably. When the leg begins to increase in diameter so that the plain slow spiral turns no longer lie flat, then the bandage is inclined upward and a turn taken around the leg; the roller being brought down crosses the first turn a little external to the crest of the tibia. The upper and lower turns are separated on the back of the leg by an interspace, and each turn is made to cover the upper half of the previous one. (See fig. 50.) The lower loop applies itself flat on the surface of the part, while the upper one only touches it by its upper edge, the lower edge gaping widely as shown in figure 50. No attention is to be paid to the upper turn, as it is entirely covered by the succeeding lower ones. Continue these figure 8 turns until the leg ceases to increase in size, then

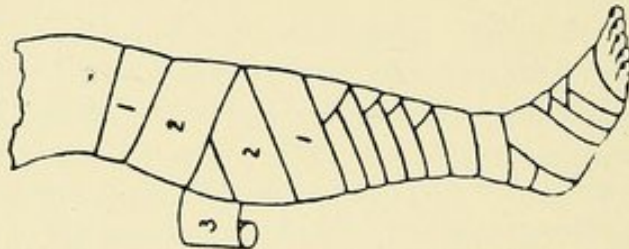




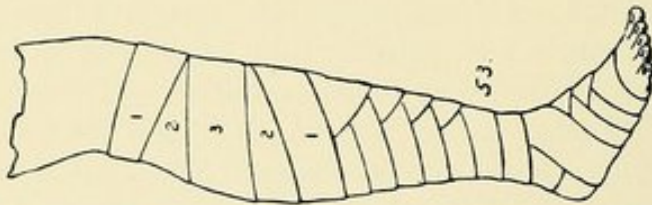
50.—Fig. 8 bandage of the lower extremity.



51.—First turn of the bandage for the calf of the leg.



52.—Second turn of the bandage of the calf of the leg.



53.—Completed bandage of the calf of the leg, sometimes called the spica of the calf.

ascend to the knee joint by two or three slow spiral turns. If desired, the knee can be covered by the same figure 8 turns as were applied to the leg, and the bandage continued in the same manner up the thigh.

This bandage is much admired and employed by some. Its chief advantage is its security from displacement, and when patients are compelled to use the limb much, it can be employed with advantage. Its disadvantages are that it requires a larger amount of bandage than the spiral reversed and covers the part with too many thicknesses of material. Thus, if the turns overlapped one-half, there would be four layers covering the part. It uses from fifty to one hundred per cent. more bandage than the spiral reversed, according to the amount of overlapping. In bandaging the leg up to the knee, as there are only five or six reverses made, using the figure 8 turns instead would only add a couple of yards to the total length of the bandage. In patients confined to bed the spiral reversed is usually secure enough. By making a reverse on the under side of the limb in the upper loop its gaping may be avoided.

*To Bandage the Calf of the Leg.*—The calf of the leg may be bandaged in three ways: by spiral reversed turns, as described under the spiral reversed of the lower extremity, by the figure 8 bandage as given above, and by a modified figure 8 bandage.

This last is probably the best bandage for this part of the body, and is applied as follows:

The usual two and a half inch bandage is used. After ascending the leg by a couple of slow spiral and three or four spiral reversed turns, the bandage is not reversed but carried in a rapid spiral up the leg and a circular turn made, the upper border of which lies on the tuberosity of the tibia. It is then carried under the leg and brought down in a rapid spiral, similar to the one made in going up, but on the opposite side of the leg. This is seen in figure 51. The bandage is then carried around the leg and a plain figure 8 turn made, the point of crossing being on the front of the leg. The lower loop covers the turn below it one-half of its width, and the upper loop covering the circular turn on the under side of the limb, also one-half of its width as shown in figure 52. From the point of crossing of this second turn on the top of the leg the bandage is carried firmly around the most prominent part of the calf to cover in that left uncovered by the two loops of the last figure 8 turn. This finishes the bandage. (See fig. 53.)

*To Bandage the Knee.*—The knee can be bandaged while in a straight position, either by the bandage described under the spiral

reversed of the lower extremity and shown in figure 44, or by that described under the figure 8 bandage of the lower extremity, preferably the former. When, however, it is desired to cover it while in a slightly flexed position, the following is a more secure bandage: The initial extremity is fixed below the knee, the upper edge of the bandage being just above the tuberosity of the tibia; the roller is then carried obliquely up over the patella, as shown by the dotted lines in the illustration (fig. 54) to the back of the thigh; then make a circular turn completely around the part and bring the bandage down obliquely across the patella as in the first turn. (See fig. 54.) We thus have the two oblique turns secured by the circular turn. A figure 8 turn is then made, the lower loop encircling the leg and covering in the upper one-half of the previous one, while the upper loop goes around the knee at the upper edge of the patella. Another turn around the lower part of the patella and front of the joint, followed by one around the thigh, completes the bandage. (See fig. 55.)

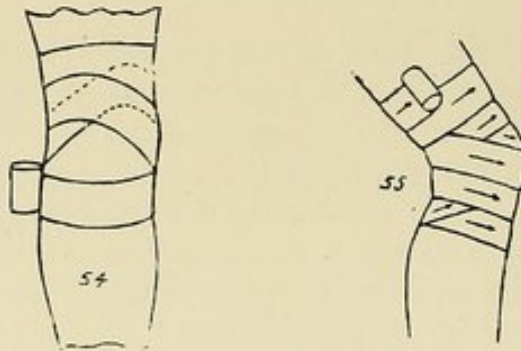
Thivet, Hopkins and Berkley Hill advise fixing the initial extremity over the patella and then making figure 8 turns alternately above and below, receding up the thigh and down the leg. Leonard and Fischer, on the contrary, begin at a distance from the patella and make the last turn directly over it.

*Spica of the Groin—Ascending.* (Fig. 56.) Bandage, 8 yards x  $2\frac{1}{2}$  or 3 inches.

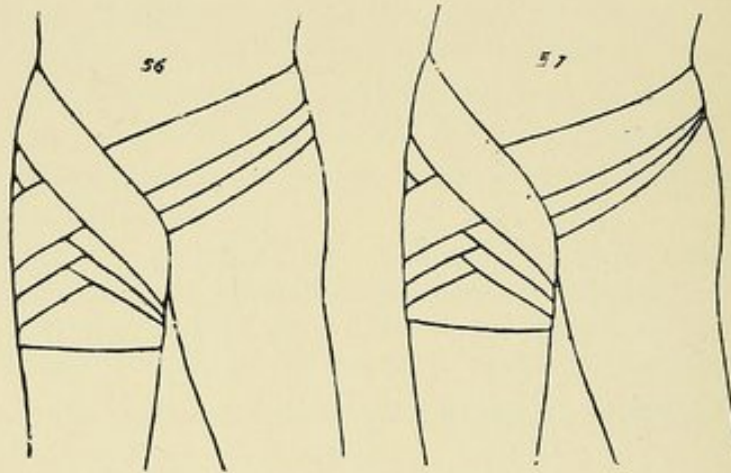
The initial extremity is fixed by two circular turns around the thigh, well up to the perineum. If the right groin is to be bandaged, on reaching the outer surface of the thigh, the roller is inclined obliquely upwards and carried across the pubes to the upper portion of the left trochanter major, thence horizontally across the back, around the upper edge of the right trochanter major and down parallel with pouparts ligament, crossing the first turn slightly to the inner side of the median line of the thigh, *taking care to leave no point uncovered between the circular and oblique turns.* It then passes around the thigh to its outer side, covering in one-half of the circular turn. Two more figure 8 turns are then made, each parallel to the first and covering the previous turns one-half. The last turn encircles the crest of the ilium, but does not pass entirely above it. (See fig. 56.) The above method is best when the patient is moderately well developed, but when thin it is better to have the turns around the left side of the pelvis all



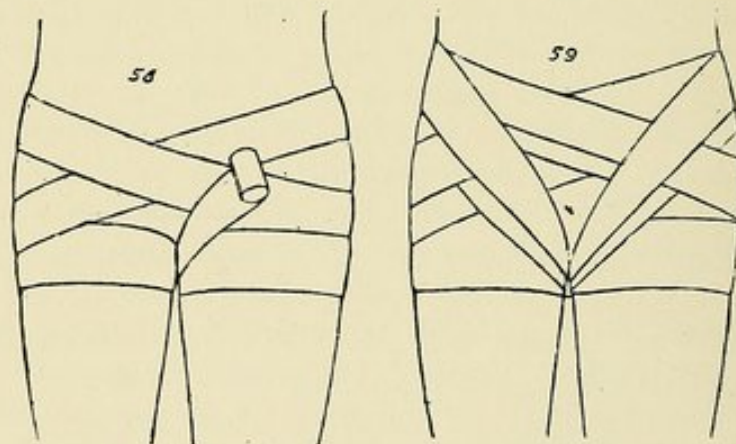




Bandage for the knee while in a semi-flexed position.



Two ways of applying the single spica of the groin.



The double spica of the groin.

meet at the same place, between the greater trochanter and the crest of the ilium, as shown in figure 57.

This bandage is an example of the second manner of using the figure 8 turn. The point of crossing being the essential part, care should be taken that it is not cast too far out, thus making a spica of the hip rather than a spica of the groin. The turns around the body should encircle the pelvis and not the abdomen above the iliac crests. The bandage is thus made independent of and unaffected by the motion which takes place between the pelvis and the vertebral column.

When the bandage is applied as above described, it is called the ascending spica, because the turns cover the part by ascending from below upwards. When, however, it is desired to cover the part by the *descending spica*, the first turn, instead of beginning low down, is passed high up and each succeeding one is made parallel to and beneath it until the bandage is completed.

Goffrés says he sees no reason to prefer one to the other. When a part or dressing is to be supported, it is better to do it with a turn which passes from below upwards rather than to use one from above downwards. For this reason it is more correct to make the spicas by carrying the bandage from the inner to the outer side of the limb. As this necessitates using the left hand instead of the right, an accomplishment possessed by few, the usual method has been described and illustrated.

*Double Spica of the Groin.*—(Figs. 58 and 59.) Bandage, two rollers, each 6 yards by  $2\frac{1}{2}$  inches. Fix the initial extremity by two circular turns around the right thigh well up to the perineum. Carry the bandage from the outer surface of the thigh obliquely upwards across the pubes to the hollow between the greater trochanter and the crest of the ilium of the opposite side. Thence across the back to the same place on the right side, then obliquely downward to the outer side of the left thigh, crossing the former turn in the median line of the body below the umbilicus. Take a circular turn around the thigh and, on the arrival of the bandage at its inner side for the second time, bring it obliquely upwards and outwards to the space between the trochanter and the crest of the ilium of the left side. (Fig. 58.) Thence following the preceding turn across the back above the right trochanter and obliquely downwards and inwards, around the right thigh to its outer surface; thence upwards towards the left side parallel and a half width of the bandage above the last turn, then around the body and down across the left groin and around the left thigh to its inner side; then up and out to the left side of the pelvis, around the body, down across the right groin and around the thigh, completing the bandage. (See fig. 59.)

In making the first oblique turn after fixing the initial extremity, care should be taken to keep it well down on the groin as otherwise a space will be left uncovered between the circular turn around the thigh and the two oblique turns immediately above it. The points of crossing over the groins should not be thrown too far out and that on the abdomen should be as near as possible in the median line of the body. If, in commencing the spica bandages of the groin, the initial extremity is fixed too low down, then the bandage should be carried up by spiral or spiral reversed turns until its upper edge nearly or quite touches the perineum. If this is not done the turns will, nevertheless, slip up to that point, thus loosening the bandage. The spicas of the groin can also be begun by fixing the initial extremity around the abdomen, but greater security is obtained by fixing it on the thigh. The double spica can also be made in a descending manner.

#### BANDAGES OF THE HEAD.

*The Monocle or Bandage for One Eye.*—(Figs. 60 and 61.)  
Bandage, five yards by two inches.

To bandage the right eye: Place the initial extremity on the right temple and fix, by a circular turn from right to left, around the head. On arriving for the second time above the left ear, the bandage should be carried down behind the occiput, under the right ear and malar prominence, and up in front of the right eye, the lower edge crossing the root of the nose. From there it is taken over the top of the parietal eminence and back again to the occiput. A second turn is made covering in the preceding one half the width of the bandage higher up on the cheek (see fig. 60) and lower down on the head. A third turn, still higher on the cheek and lower on the head, may be applied if thought desirable. The bandage is completed by one or two horizontal circular turns around the head. (Fig. 61.)

The tip of the ear on the bandaged side should be allowed to project, or if covered in should be protected from pressure by cotton.

The horizontal turns should rest on the cartilages of the ears and cover each other exactly.

If the left eye is to be bandaged the initial extremity should be placed on the left temple and the bandage carried from left to right around the forehead.

Among the various ways of bandaging the eyes the following may be mentioned: Instead of the oblique turns crossing at the root of the nose, they may all be made parallel to each other. This can only be done if the bandage is either very narrow or very elastic. Sometimes a circular turn is taken after each oblique one; this is unnecessary. The French have a way of covering

the eye by reversing the oblique turns on the forehead, instead of carrying them on over the scalp, but it is too insecure to be recommended.

*Binocle or Bandage for Both Eyes.*—When both eyes are to be bandaged it can be done with either a single or double roller.

*Binocle with a Single Roller.*—The initial extremity being fixed around the forehead, the right eye is bandaged as already described above. After the finishing circular turn has been made it is pinned at the back of the head and the roller brought upwards over the right parietal eminence, down across the root of the nose and over the uncovered left eye. This is covered by two or three radiating turns, precisely as was done to the right eye, only instead of the body of the bandage being carried upward from the face over the scalp, it is carried downwards from the parietal eminence over the eye. The bandage is completed by one or two horizontal circular turns.

*Binocle with a Double Roller.*—(Fig. 62.) The middle of the bandage is placed on the forehead and the two rolls carried around immediately above the ears, crossed at the back of the head and each brought forward under the corresponding ear, then up over the eyes, crossing at the root of the nose, over the parietal eminences, crossing again at the back of the head, then forward over the eyes covering one half the preceding turn, crossing again at the root of the nose, thence over the side of the head one half the width of the bandage lower than the preceding turn. On arriving at the occiput the bandage is directed horizontally around the head and finished by one or two circular turns made with the longer end. If the ears are to be covered they should be protected from pressure by cotton.

This bandage is more secure than that made with the single roller and on that account is to be preferred.

*Oblique of the Jaw.*—(Figs. 63 and 64.) Bandage, 5 yards x 2 inches.

To bandage the left side of the jaw: Place the initial extremity on the right temple and fix by one or two horizontal circular turns. On arriving above the left ear the bandage is directed downwards across the back of the neck (see fig. 63), under the jaw and up the left side of the face, the anterior edge of the bandage not projecting quite so far forwards as the external canthus. (See Fig. 64.)

From there it is carried over the head, down back of the right ear, again under the jaw and three or four similar vertical turns made, each overlapping the preceding on the affected side, one half to two thirds of its width; while on the sound side behind the ear they cover each other exactly. On the arrival of the last turn above the right ear, the bandage is pinned and reversed, to be finished by being carried once or twice around the head. Pins should be inserted at the points of crossing of the vertical and horizontal turns.

This is the old single chevestre or halter bandage of the French and is intended for fractures of the condyle of the lower jaw or for dressings applied to the ear or parotid region. The vertical turns may be carried farther forward or backward according to the necessities of the case. Some surgeons were accustomed to make turns over the front of the jaw, but Gerdy (*Traité des Bandages*, p. 215) advises against this as tending to displace the fragments backwards.

*Double Chevestre or Double Halter Bandage.*—(Fig. 65). This is best made with a double roller. The same turns may also be made with a single roller but it is not so secure as the former, although more convenient. Bandage, 7 yards x 2 inches.

Place the middle of the bandage on the forehead and carry both rollers to the nape of the neck. Cross at this point and bring them forward under (not on) the chin, cross again and proceed up the sides of the face, the anterior edge of the bandage coming as far forward as the external canthus of the eye. On arriving on top of the head, the bandage is again crossed and each roller returned to the nape of the neck. They are then again brought under the chin, up the sides of the face, crossed on top of the head and taken back to the nape of the neck. These turns may be repeated once or twice if desired. Each succeeding turn as it crosses the top of the head is slightly behind the one in front of it. The bandage should be finished by a circular turn around the forehead. (See fig. 65.)

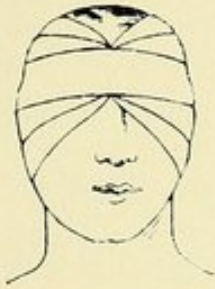
This is a good bandage to retain dressings to both sides of the face. Gerdy (*Loco. citat.*, p. 216) makes reverses on the top of the head in order to make it lie flat. This is hardly necessary. He also tied the ends at the back of the neck instead of pinning. Thillaye, "*Traité des bandages et appareils*," made it with a single roller.

*Recurrent of the Head.*—(Fig. 66.) Bandage, 5 yards x 2 inches.

Fix the bandage by two horizontal circular turns. On arriving



60 and 61.—Monocle or bandage for one eye.



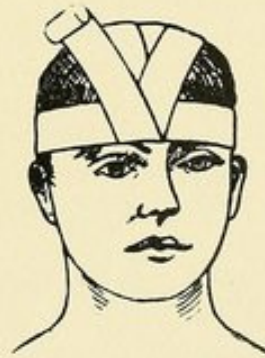
62.—Binocle.



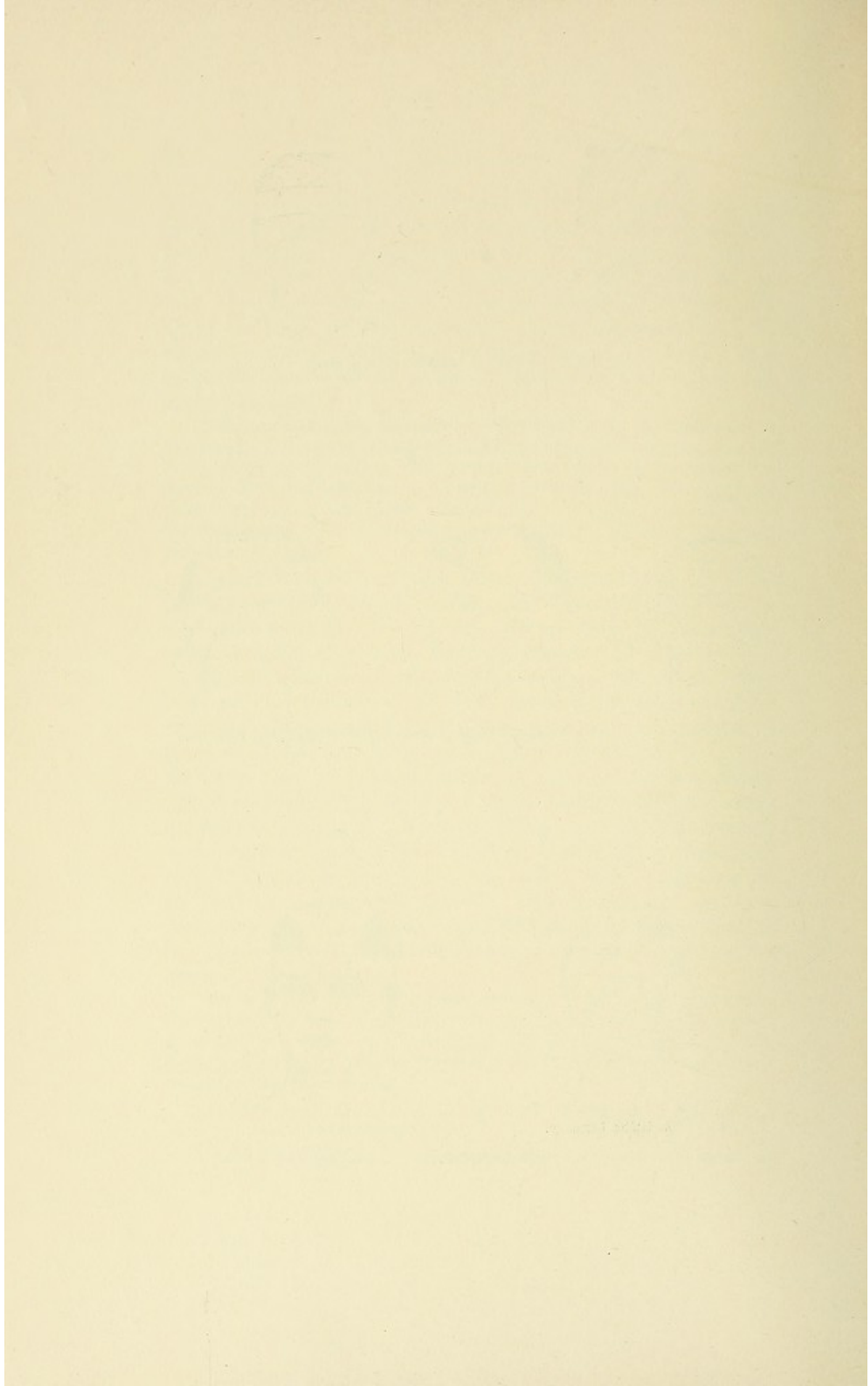
63 and 64.—Oblique of the jaw or single halter bandage.



65.—Double halter bandage.



66.—Recurrent of the head.



at the forehead, a pin is inserted and the bandage reversed and carried in the median line back to the occiput; here it is again pinned and brought forwards covering in one-half of the median turn. It is then carried backward and forward, first on one side and then on the other, until the scalp is covered. (See fig. 66.) The bandage is completed by one or two horizontal circular turns. Each antero-posterior turn may either be pinned as it is made, or held in place by an assistant until the bandage is completed. The former way is the better.

*Recurrent of Head with the Double Roller. Capeline bandage.* (Fig. 67).

This requires a double roller about 6 yards long, one roll being a little larger than the other. The center of the bandage is placed on the forehead and the two cylinders are carried to the occiput, the smaller being underneath. The smaller one is then reversed and carried around the side of the head covering one-half of the circular turn, the larger continuing its way circularly around the head. On arriving at the forehead, the smaller is again crossed by the larger cylinder and a second reverse is made, the bandage being carried around the opposite side of the head. (Fig. 67.) The shorter roller is then carried alternately from side to side over the scalp until it is all covered in, while the larger roller travels horizontally around it, binding in each antero-posterior turn as it arrives at the occiput and forehead. The bandage is completed by one or two circular turns around the forehead with the longer roller.

These two recurrent bandages of the head are so insecure that, in the rare cases where it is necessary to cover the entire scalp with a roller bandage, the transverse recurrent, given further on, is preferred. In applying the recurrent with a single roller it is sometimes taught to completely cover in one side of the scalp before proceeding to the other, instead of making the turns on alternate sides as advised above. It will be seen that in the recurrent with the single roller the scalp is covered from the top towards the sides while in the double roller it is covered from the sides to the top. The capeline is one of the oldest known bandages; it is said to have been found on the most ancient mummies ever discovered.

*Bandage for the front part of the Scalp.*—(Fig. 68.) Bandage, 2 yards x 2 inches.

When it is desired to retain a dressing in the neighborhood of the frontal eminences the following procedure may be adopted.



(Fig. 68.) The initial extremity is placed on one temple and fixed by one or two circular turns. If the bandage is carried across the forehead from the patient's right to his left side, on arriving behind the left ear on the second turn around, carry the roller downward around the occiput covering in at the median line one-half the circular turn, then go upwards over the brow, crossing the circular turn just above the right ear and covering at the median line half its breadth. Then proceed obliquely down across the side of the head to the occiput, covering in one-half of the last turn, then up, crossing just above the right ear, and proceed over the front of the head, overlapping one-half the previous turn and bringing the bandage down on the left side between the eye and the ear. It can either be pinned and ended here or else pinned and a reverse made and finished by a horizontal circular turn. A bandage similar to this is shown in Galen's work.

*The Transverse Recurrent of the Head.*—(Fig. 69.)—The front and back of the head is covered in by the bandage just described and, instead of ending at the sides of the head, the roller is then passed backward and forward transversely over the head, being pinned each time above the ears. When the scalp is entirely covered by these transverse turns the bandage is ended by one or two circular turns around the forehead. (See fig. 69.)

An adhesive strap placed in the median line from the forehead to the occiput will render the bandage more secure. I much prefer this bandage to the other recurrences, as I believe it to be less liable to displacement and capable of being more firmly applied.

*Bandage for the Side of the Head.*—(Fig. 70.)—If it is desired to retain a dressing on the side of the head about the height of the parietal eminences, it can be done as follows. (See fig. 70.) Bandage, 2 yards x 2 inches.

The extremity being fixed by one or two circular turns, on arriving at the forehead the bandage is inclined upwards half the width of the circular turn and then downwards until it is again level with it at the back. On arriving at the forehead again, a pin is inserted and a reverse made as shown in fig. 70, the bandage being carried still higher on the parietal region. On arriving at the back of the head it is again pinned and the bandage completed by a reverse and a circular turn.



67.—Capeline or double recurrent.



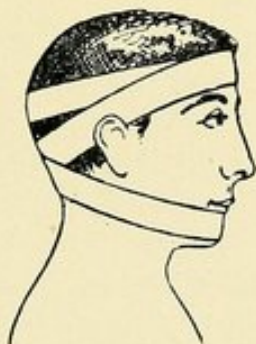
68.—Bandage for the front of the head.



69.—Transverse recurrent.



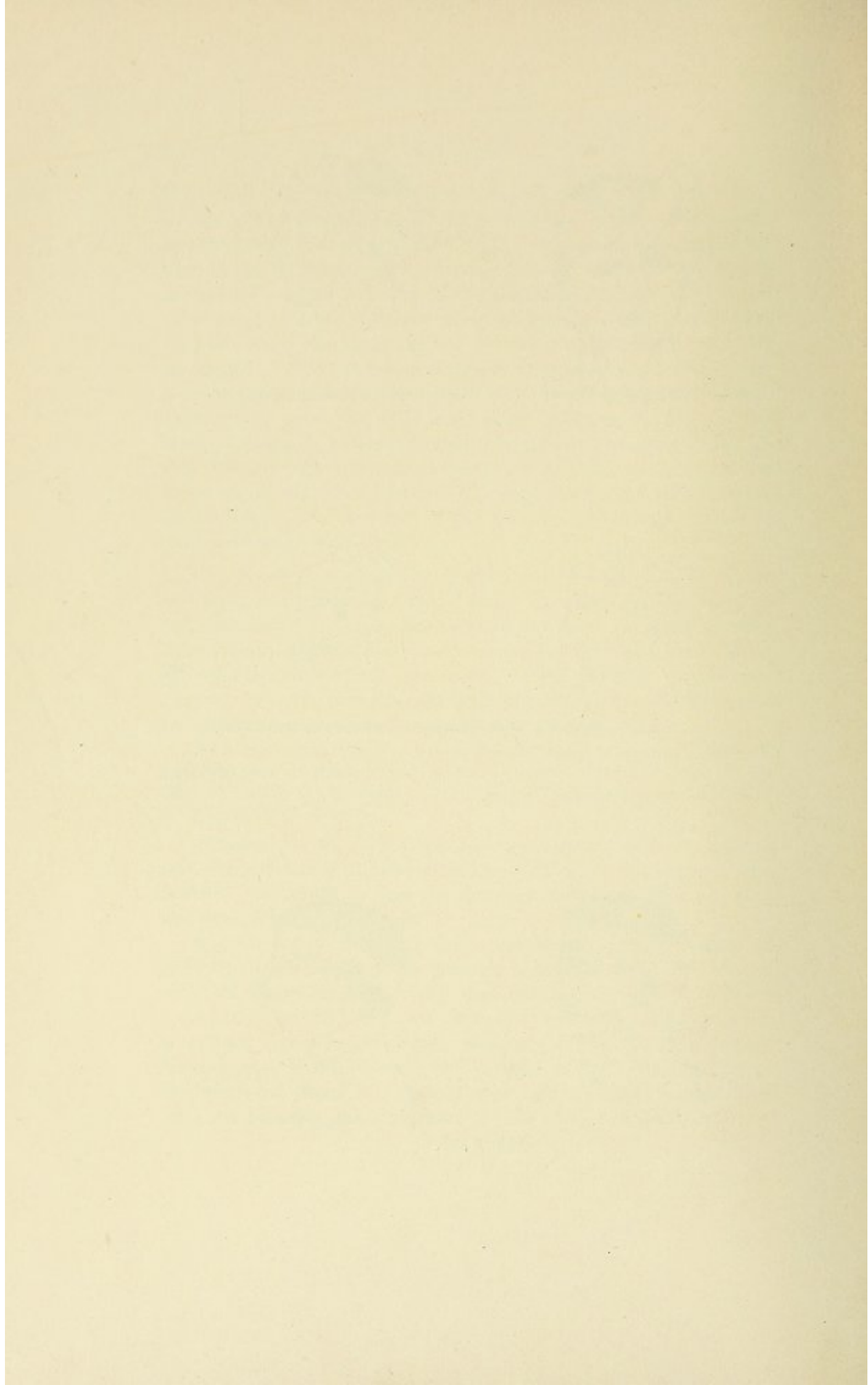
70.—Bandage for the side of the head.



71.—Figure 8 of the head and jaw.



72.—Figure 8 of the head and neck.



*Figure 8 of the Head and Jaw.*—Dr. Chas. T. Hunter's bandage. (Fig. 71.) Bandage, 3 yards long x  $1\frac{1}{2}$  inches wide.

The initial extremity being fixed by two horizontal circular turns around the head, the bandage is carried across the nape of the neck to the front of the lower jaw. From here it returns to the back of the neck from whence it again makes a turn around the head. Two or three figure 8 turns are thus made and the bandage finished by a circular turn around the forehead.

This bandage, devised by the late Dr. Chas. T. Hunter is a very useful one for affections of the lower lip and jaw in which it is not desired to prevent opening of the mouth. It allows the patient the use of his jaws.

*Figure 8 of the Head and Neck.*—(Fig. 72.) Bandage, 3 yards x 2 inches.

The initial extremity being fixed around the forehead and occiput, two or three figure 8 turns are made alternately around the forehead and around the neck.

This bandage, locally known as Dr. White's, is of service in retaining dressings to the back of the neck. Both this and the preceding bandage are made more secure by pinning it at the back and then carrying the bandage forward over the head and fastening it to the horizontal turn on the forehead. It is an old bandage and is described by both Goffrés and Thivet.

*The Occipito Facial Roller.*—Dr. Agnew's bandage. (Fig. 73.) Bandage, 4 yards x 2 or  $2\frac{1}{2}$  inches.

Place the initial extremity on one temple and make two or three vertical turns over the head and under the jaw. These being made, pin and reverse the bandage and carry it around the back of the head, to be fastened at the opposite temple as shown in fig. 73. This bandage is described by Prof. Agnew in Vol. I. of his Surgery.

*Barton's Bandage for Fracture of the Jaw.*—(Fig. 74.) Bandage, 5 yards x 2 inches.

Place the initial extremity on the nape of the neck just beneath the occipital protuberance, carry the roller up between the parietal eminence and the top of the ear, keeping as near to the ear as possible, thence obliquely over the skull, crossing the median line in front of the coronal suture and proceeding down along the temple and side of the face, under the chin, up along the side of the face and over the skull, crossing the previous turn in the median line. Then proceed obliquely downward and backward between the ear

and parietal eminence to the nape of the neck where the bandage crosses and fixes the initial extremity. From here it is carried forward around the front of the chin and back again to the nape of the neck from whence it proceeds up over the skull as before. Three complete turns covering each other exactly are thus made completing the bandage and pins inserted at the points of crossing on either side of the chin, on top of the head and at the nape of the neck. (See fig. 74.)

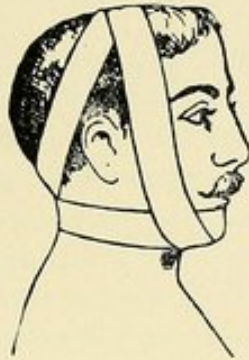
This bandage was devised by "that ingenious surgeon" Jno. Rhea Barton, and is beyond question the best of its kind. I am not aware that he ever published a description of it himself, the earliest printed account I have seen being by Sargent in his book on Minor Surgery, published in Philadelphia in 1848 and 1856. He gave the course, as did also Prof. H. H. Smith (Surgery Vol. I., p. 113), as going over the center of the parietal bone and the point of junction of the coronal and sagittal sutures. It will be found to be less liable to displacement if the roller is carried as above directed, in front of instead of over the parietal eminences. This will cause the point of crossing to fall slightly in front of the coronal suture and the highest point of the vault of the skull. It will thus be prevented from slipping backwards or upwards towards the median line. Prof. Agnew (Surgery, Vol. I., p. 702) gives its course as a little in advance of the parietal eminences. Care should be taken always to have the point of crossing on the top of the skull situated in the median line. Dr. Garretson (Oral Surgery) modifies this bandage by taking a long strip of bandage, placing the middle of it beneath the chin, and carrying the two ends up and crossing them on top of the head, then to the nape of the neck and forwards to the front of the chin, where they are fastened.

*Gibson's Bandage for Fracture of the Jaw.*—(Fig 75.) (Institutes and Practice of Surgery, 1824.) Bandage, 6 yards long x 1½ inches wide.

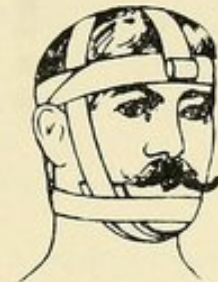
Place the initial extremity on the right temple and carry the roller directly over the top of the head, down in front of the left ear, under the jaw and up in front of the right ear to the point of starting. Repeat this turn twice. On arriving at the right temple for the third time, insert a pin and reverse the bandage, carrying it backwards around the occiput, along the side of the head just above the left ear, and around the forehead to the point of starting on the right temple. Repeat this turn twice. On arriving above the right ear for the third time, incline the bandage obliquely downward and carry it around the nape of the neck. From here it proceeds under the left ear along the left side of the face, in front of the lower jaw, under the right ear, to return to the point of starting at the nape of the neck. Repeat also this turn twice.



73.—Agnew's bandage.



74.—Barton's bandage.



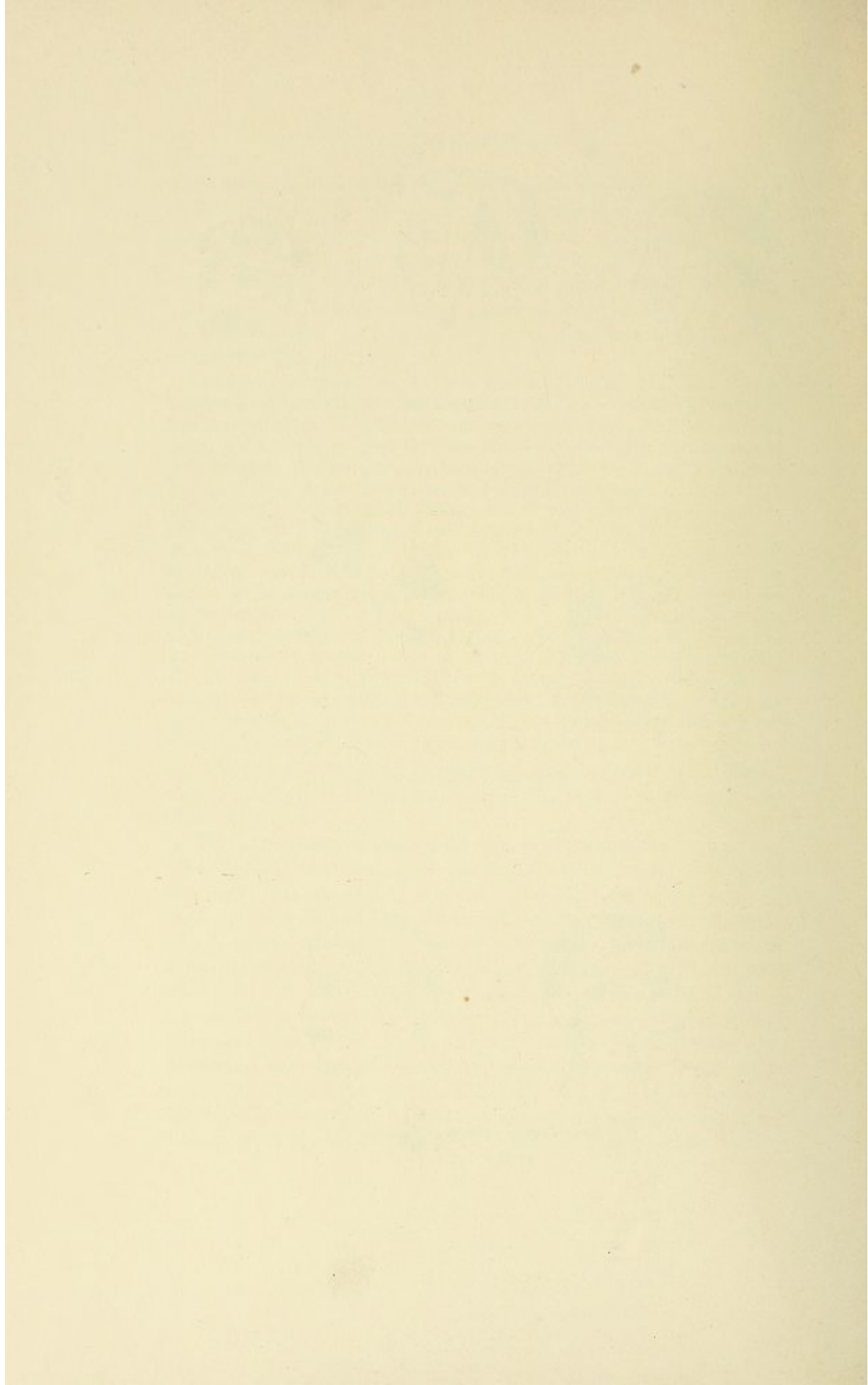
75.—Gibson's bandage.



76 and 77.—Transverse bandage of the scalp.



78 and 79.—Twisted bandage of the scalp.



On the arrival of the bandage at the nape of the neck for the third time, pin it and make a reverse and carry the roller over the top of the head in the median line, to be fastened to the turns around the forehead, as shown in the illustration (fig. 75). Pins are to be inserted at each point of crossing of this median with the transverse turns, and also where the vertical crosses the horizontal ones at each temple and on either side of the lower jaw.

Sédillot begins this bandage with the horizontal turns around the forehead. (Traité de Med. Op., 1865.)

*The Transverse Bandage of the Scalp.*—When it is desired to retain a dressing on the top of the head, as in scalp wounds, the following bandage is advised: A roller 2 inches wide and 2 yards long is required. Place the initial extremity above one ear and carry the roller twice around the head, inclining the bandage downward around the occiput, so that its upper edge is level with the occipital protuberance. On arriving at the starting point for the second time, a pin is inserted through all of the thicknesses of the bandage and the remaining portion carried over the dressing on the top of the head, down beneath the bandage on the opposite side, pulled firmly back up over the dressing again as seen in figure 76, to be ended and pinned at the point of starting. (See fig. 77.)

*The Twisted Bandage of the Scalp.*—When a single width of bandage is sufficient to retain the dressing, the following may be employed: A 2 inch roller being used, the initial extremity is placed above the right ear and the bandage carried around the forehead. On arriving above the left ear a reverse is made and the bandage carried around the back of the head beneath the occipital protuberance to above the right ear. Whilst the initial extremity is held with the left thumb and forefinger, the bandage is pulled tight and firm, a pin being inserted at this point to hold it, and the roller carried directly across the dressing on the top of the head. The bandage being kept taut, a sharp twist is made, and it is pinned above the left ear as seen in figures 78 and 79.

The turns of these two bandages can be multiplied in number and shifted backwards or forwards according to the position and character of the dressing, so as to be applicable to various parts of the scalp. The object of inclining the bandage downwards around the occiput in the first bandage and reversing it in the second, is to utilize the occipital protuberance as a means of preventing its upward displacement. The twisting of the transverse turn in the last



bandage is to draw it in at the sides, thus forming a sort of cup, which prevents the dressing from becoming displaced.

*The Knotted Bandage.*—(Fig. 80.) Bandage, 2 yards x 2 inches, wound as a double roller.

The middle of the bandage being placed on the wounded part (Gerdy), the two rolls are carried horizontally around the head, crossed and brought back to the point of starting. They are here crossed and carried at right angles to their former course, one going over the head and the other around under the jaw, to be fastened at the temporal region (fig. 80).

If desired, instead of ending the bandage at this point, the two rolls can be continued to the opposite side and another knot made behind the first one, the bandage being ended around the skull. As many knots as desired can thus be made, each being cast behind the preceding one. This bandage is used to confine dressings to the temporal region, particularly when pressure is desired.

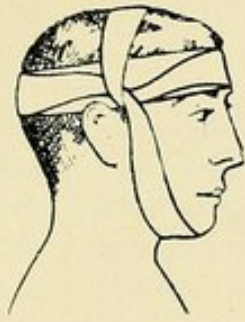
By making the knot further down, the bandage can be carried across the eyes, as seen in figure 81.

Making the knot still lower on the face, as seen in figures 82 and 83, enables the bandage to be used in confining dressings to the upper or lower lip, or the angle of the mouth. In these bandages, in order to prevent the turns from becoming displaced, it is well to connect them with a strip of bandage, going from the nape of the neck to the forehead in the median line, and pinned to the various turns.

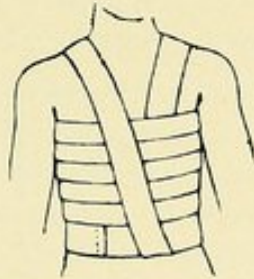
#### BANDAGES OF THE TRUNK.

*Spiral of the Chest.*—(Fig. 84.) Bandage, 8 yards x 3 inches.

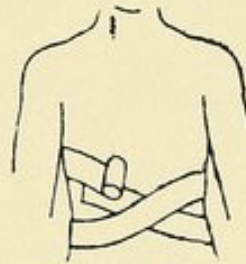
Unroll sufficient of the bandage to allow its initial extremity to hang from the left shoulder until it reaches below the knee. Pass the body of the bandage across the back to the right axilla, and encircle the chest by slow descending spiral turns, which pass over the pendant initial extremity, and cover each other half to two-thirds of their width. On reaching the lower portion of the chest, the terminal extremity is pinned. The initial extremity is then brought up in front of the chest and passed over the right shoulder to the lower border of the bandage on the back. A pin is inserted at each point where the vertical strip intersects the transverse turns (fig. 84).



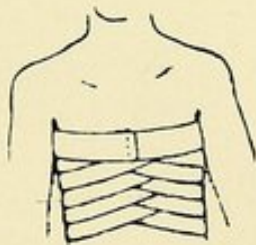
80, 81, 82 and 83.—The knotted bandage.



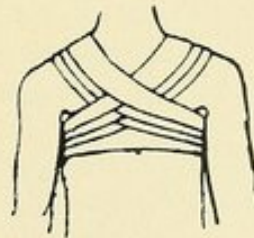
84.—Spiral of the chest.



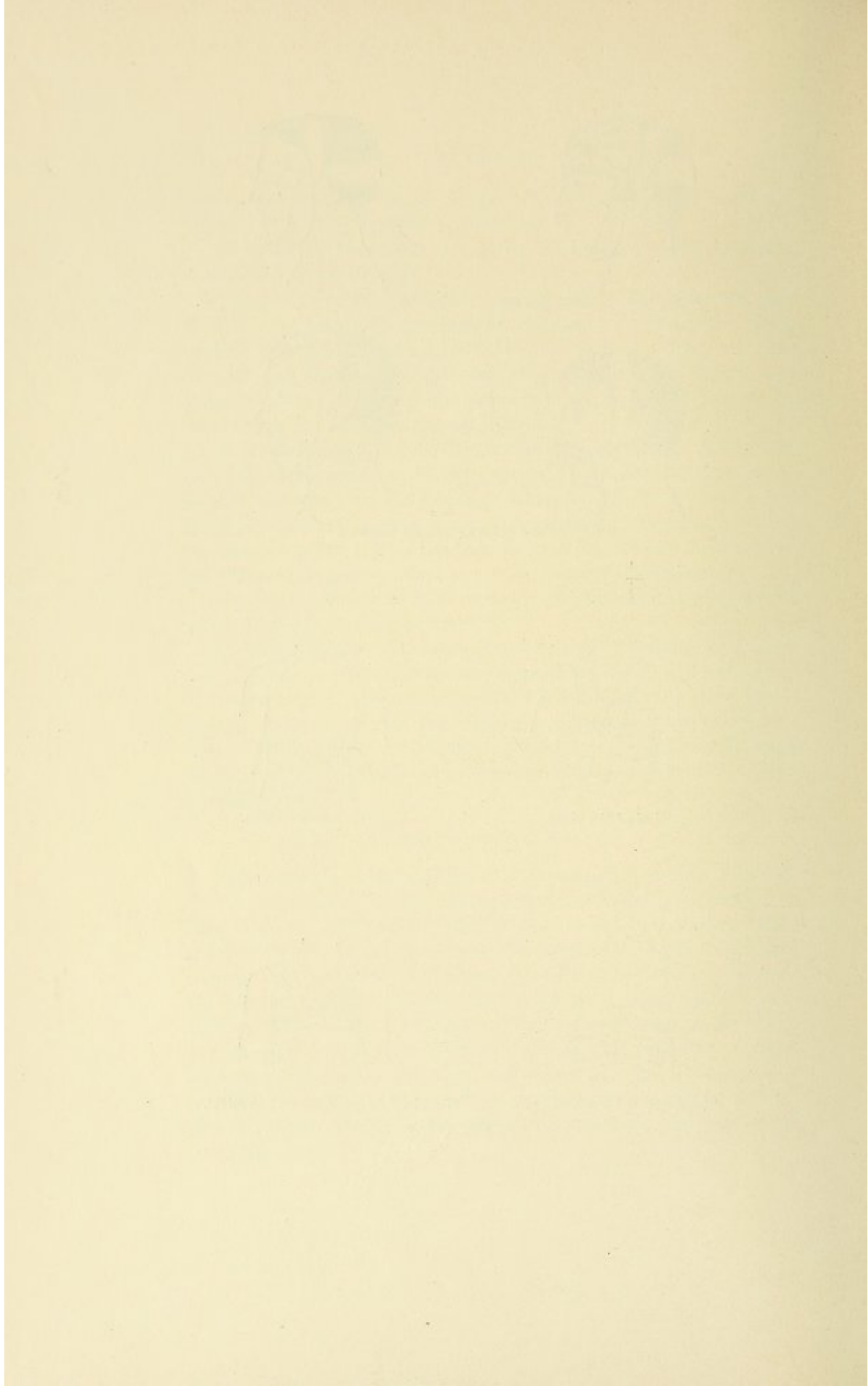
85.—Fig. 8 of the chest.



86.—Fig. 8 of the chest.



87.—Fig. 8 of the chest and shoulder.



*Figure 8 of the Chest.*—(Figs. 85 and 86.) Bandage, 2 rollers, each 6 yards x  $2\frac{1}{2}$  inches.

Place the initial extremity low down on the right side of the chest. Carry the roller slightly downwards and around the chest, the point of crossing of the lower border of the bandage being at or near the median line. It is then carried again around the chest, above the previous turn, completing the first figure 8. (See fig. 85.) Another turn is made below, covering in the upper half of the first turn, followed by another higher up. Successive figure 8 turns are thus made, ascending the chest until the axillary folds are reached, when the bandage is completed by one or two circular turns (fig. 86).

This bandage is similar to the figure 8 bandage of the upper and lower extremities, already described. It belongs to the first class of the figure 8 bandages, or that in which one loop, in this case the lower one, is the principal part of the bandage, and it should be carefully applied. Each lower loop of the figure 8 turns is covered in one-half by the succeeding one, while the upper loop is entirely covered in by the succeeding lower ones. Thus when the bandage is completed, the lower loops are the only ones visible.

This is the most secure roller bandage of the chest. Its greatest objection is the amount of bandage it consumes.

*Anterior Figure 8 of the Chest and Shoulders.*—(Fig. 87.) Bandage, 6 yards x  $2\frac{1}{2}$  inches.

A pad having been placed beneath each arm to protect the axillary folds from pressure, the initial extremity is placed in the axilla and fixed by a couple of circular turns around the chest. The roller is then carried obliquely upwards across the chest, over and down behind the shoulder, keeping well out towards the point, and through the axilla. From there it proceeds obliquely upwards across the chest and around the opposite shoulder to the point of starting. This completes one figure 8 turn. It should be repeated twice, each turn covering in two-thirds of the preceding one and rising higher towards the neck. The turns are spread out on the shoulders, but converge towards the axillæ, as shown in figure 87.

This is an example of the second method of employing the figure 8 principle. The point of crossing is the principal part, and care should be taken to place it at the desired point. It is often taught to commence this bandage by fixing the initial extremity around the arm, but I prefer the above.

*Posterior Figure 8 of the Chest and Shoulders.*—This is similar to the anterior figure 8, described above, except that the bandage

passes across the back, instead of the front of the chest. It is sometimes used in injuries to the clavicle to keep the shoulders back, but is more useful to retain dressings after the removal of tumors, etc.

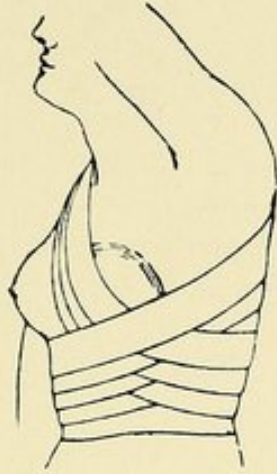
*Suspensory of the Breast.*—(Fig. 88.) Bandage, 6 yards x  $2\frac{1}{2}$  inches.

To bandage the left breast: Fix the initial extremity on the left side of the chest by two circular turns, carrying the bandage from left to right. On arriving beneath the breast, incline the bandage upward and carry it across the lower portion of the breast and over the opposite shoulder. From there it is brought down behind the back and again under the breast, crossing the previous turn. Continue it around the body and make alternate turns over the opposite shoulder and around the body. Each turn overlaps the preceding one one-half to two-thirds of its width. The points of crossing should be made in the same vertical line under the most pendant portion of the breast. The oblique turns overlap each other more as they pass over the shoulder than when they cross under the breast. (See fig. 88.)

This bandage is sometimes commenced, as advised by Gerdy in 1826, by suspending the breast by a couple of turns over the opposite shoulder and then continued by alternate oblique and circular ones.

*Suspensory Bandage of both Breasts.*—(Fig. 89.) Bandage, two rollers, each 6 yards x  $2\frac{1}{2}$  inches.

Place the initial extremity on the right side of the chest and fix by two circular turns. On arriving beneath the right breast, carry the bandage upward over the opposite shoulder, down behind the back and forwards under the right breast. It is then carried across the front of the chest, covering in one-half the circular turns, under the left breast, obliquely across the back and over the opposite shoulder to be brought down in front and under the left breast. From here it is carried transversely across the back, again across the right breast and over the opposite shoulder. Passing down the back and again under the right breast, it is carried directly across the front of the chest and under the left breast, to ascend the opposite shoulder as before. The two breasts are thus covered alternately until the bandage is completed, each turn covering one-half to two-thirds the preceding one. (See fig. 89.)



88.—Single suspensory of the breast.



89.—Double suspensory of the breast.

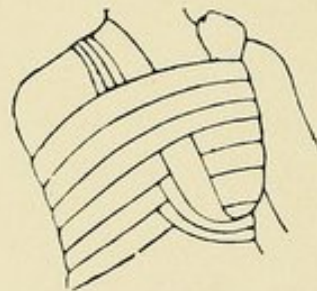








90.—Dr. E. Fischer's bandage for both breasts.



91.—Velpeau's bandage.

Some prefer to sling each breast by one or two oblique turns, as described under the suspensory of the breast, before commencing the bandage proper.

*Dr. E. Fischer's Method.*—(Allgemeine Verbandlehre.) When it is desired to firmly compress both breasts, the modification advised by Dr. Fischer is useful. After slinging both breasts by a couple of turns over the shoulders, he confines the breasts to the body by three or four circular turns, finishing by two or three figure 8 turns, as shown in figure 90. I have used this bandage with satisfaction in cases of chronic interstitial mammitis.

*Velpeau's Bandage for Fractured Clavicle—Modified.*—(Fig. 91.) Bandage, 8 yards x  $2\frac{1}{2}$  inches.

Place the arm in the Velpeau position by putting the hand of the affected side on the opposite shoulder and bringing the elbow opposite the point of the sternum, thus pushing the affected shoulder upwards, backwards and outwards. Put a pad over the seat of fracture. Place the initial extremity of the bandage in the axilla of the sound side and bring the body of the bandage up behind the back, well out over the affected shoulder and down across the humerus at the insertion of the deltoid muscle. Carry the bandage around underneath the arm and across the chest to the sound axilla, fastening the initial extremity. Make a second turn, covering the first exactly. On arriving beneath the arm of the affected side for the second time, the bandage should be directed horizontally around the chest. This turn goes transversely over the point of the elbow and is then directed upward beneath the sound axilla, across the back and again over the affected shoulder, covering in *two-thirds* of the preceding turn. From there it goes down beneath the arm through the sound axilla and again transversely around the chest, covering in *one-third* of the first transverse turn. Alternate vertical and transverse turns are made, the former advancing towards the point of the elbow and covering each other two-thirds of their width, and the latter rising on the chest and covering each other one-third of their width. When the vertical turns reach the point of the elbow, the bandage is completed by two or three successive circular turns around the chest, covering the forearm of the affected side nearly up to the wrist. (See Velpeau, *Nouv. elem. de Med. Oper.*, Paris, 1839.)

The turns may be secured by applying adhesive straps or tacking them

together with thread. Velpeau laid on an additional bandage which had been moistened with a solution of dextrine.

In commencing the bandage, he directed as follows: "Le chef de cette bande est d'abord appliqué sous l'aisselle du côté sain, ou en arrière comme dans le cataphraste," consequently it is sometimes taught to begin it in the axilla and sometimes (Dr. Hunter Int. Ency. Surgery, Vol. 1, p. 494) over the scapula of the sound side. The former is the more secure method.

Velpeau also completed all the vertical turns before making any transverse ones. After making three or four vertical turns, he began the transverse ones at the elbow and went up, finishing the bandage by one or two vertical turns.

It is generally preferred here to make the vertical and transverse turns alternate, until the former reach the point of the elbow when they cease, and the bandage is finished by two or three horizontal circular turns. The first vertical turn over the shoulder is the one farthest out, the succeeding ones rising towards the neck and advancing inwards on the arm to the point of the elbow.

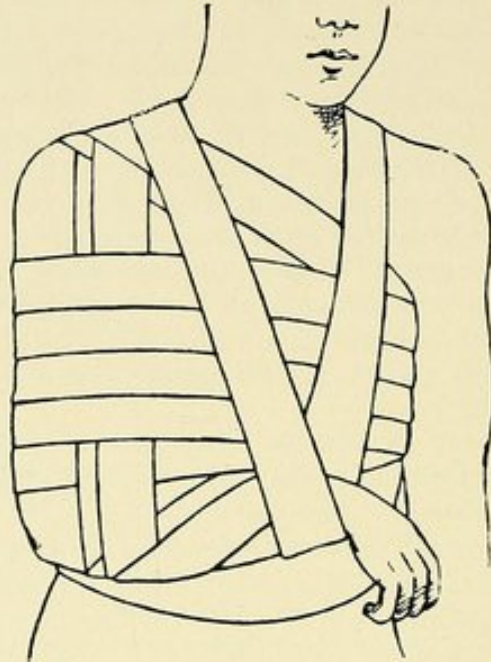
When the patient is very square shouldered, the vertical turns have a tendency to mass themselves together in the angle formed by the neck and the shoulder; but when the shoulders are sloping, this tendency is not seen and the turns remain on the affected shoulder as one broad band. In the former case the vertical turns have a fan shaped appearance as they descend from the shoulder and spread out on the arm, but in the latter they are all parallel. This appearance is caused by the peculiarities of the patient, and not by any special mode of application of the bandage.

*Desault's Bandage for Fractured Clavicle—Modified.*—(Fig. 92.) Two rollers, 7 yards x  $2\frac{1}{2}$  inches.

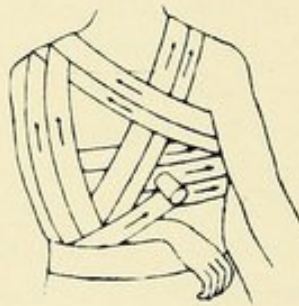
A pad having been placed in the axilla of the affected side, the arm is placed parallel with the body and the forearm flexed at a right angle. The initial extremity is placed in the axilla of the sound side and fixed by a circular turn. The arm is then bound to the side by successive descending slow spiral turns, covering each other half their width and reaching from near the shoulder to the elbow.

The initial extremity of the second roller is then placed in the sound axilla and the bandage carried behind the chest, over the affected shoulder, down in front of the arm, under the elbow and back again to the sound axilla. A similar turn is then made on the front of the chest, the bandage being carried from the axilla across to and over the opposite shoulder, down behind the arm, under the elbow and back again to the axilla. In going both behind and in front of the chest, the bandage always proceeds as follows, viz: From axilla to shoulder and then to elbow, and back





92.—Desault's bandage for fractured clavicle.



93.—Gerdy's bandage.

to axilla. A. S. E. These turns are repeated once or twice, each succeeding turn covering in two-thirds of the preceding one, and the bandage finished by a few circular turns. The hand is then suspended from the neck by a sling.

Desault (*Oeuvres Chirurgicales* par Xav. Bichat) used a pad three fingers' breadth in thickness, reaching from the arm-pit to the elbow. His bandage was composed of three rollers: The first roller was used to retain the pad to the side of the chest. The second passed circularly around the chest, from the shoulder to the elbow, confining the arm to the side. The third roller started in the sound axilla and made alternate loops in front and behind the chest, encircling the arm of the affected side and crossing in the opposite axilla. He made the first turn *in front* of the chest, but as this has a tendency to draw the shoulder in and increase the overlapping of the fragments, it is better to make the posterior turn first, as directed above. These axilla, shoulder, elbow turns did not cover each other exactly, but as he says only "en partie," and the bandage ended by a few horizontal circular turns. He suspended the hand by a short broad bandage, pinned to the turns on the front of the chest. As this bandage, in its original form, has been found to be too complicated, it is usually used in the simplified form given above.

*Dr. Hopkins' Bandage.*—Dr. Hopkins (*The Roller Bandage*) has made an excellent modification of the third roller of Desault, which he describes as follows: The initial extremity being placed in the sound axilla, "carry the roller obliquely across the front of the chest to the shoulder of the injured side, down behind the arm and parallel to it, and under the elbow as in Desault. From the elbow the roller ascends obliquely across the forearm and front of the chest to the summit of the shoulder of the sound side, and down obliquely across the back to the elbow of the injured side. Thence it ascends the arm to the shoulder of the injured side and returns across the back to the axilla of the injured side. Here it fixes the initial extremity, and two more similar turns are made which exactly repeat each other, when the terminal end is secured as in the original bandage. The anterior turns applied in this way lose to a great extent their power to draw the shoulder forwards."

It will be seen from this description that the arm of the injured side is suspended from both shoulders instead of only the injured one, as in the original Desault. It is an arrangement which I have frequently adopted with advantage.

*Gerdy's Bandage or the Crossed Bandage of the Chest and Arm.*—(Fig. 63.) *Traite des Bandages*, 1826. Fix a pad in the

axilla by tying with tapes over the shoulder. Push the elbow forwards under the nipple.

Place the initial extremity above the elbow of the injured side and make three or four circular turns around the trunk. Then under the elbow of the affected side and obliquely over the opposite shoulder twice, then up in front of the arm of the affected side, over the affected shoulder, beneath the healthy axilla, over the affected shoulder, down behind the arm, beneath the elbow of the same side, ascend in front of the arm, over the affected shoulder to the healthy axilla, then in front of the chest over the affected shoulder, behind the arm, beneath the elbow of the same side and continue to make figure 8 turns of the healthy axilla and affected arm, the point of crossing being on the external extremity of the clavicle. The bandage is ended by oblique or horizontal circular turns, whichever are thought best. (See fig. 93.)

Gerdy says he prefers the above bandage to the more complicated one of Desault for the treatment of fractured clavicle. Dr. Dulles (*Medical News*) has recently advocated the use of a portion of this bandage for the same affection. He employs the horizontal circular turns and those figure 8 turns which cross on top of the shoulder and embrace the shoulder and elbow in one loop and the shoulder and opposite axilla in the other, omitting the oblique turns. The greatest objection to Gerdy's bandage is that it does not prevent the elbow moving backwards and forwards, as do the turns of the third roller of Desault.

Figures 94 and 95 are two old forms of bandages for fractured clavicle, reproduced from Thivet. They explain themselves.



Fig. 94.

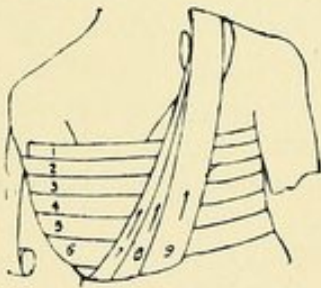
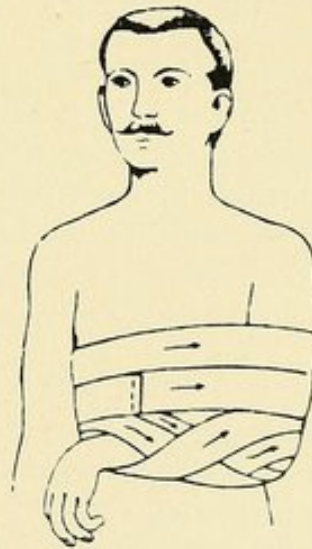


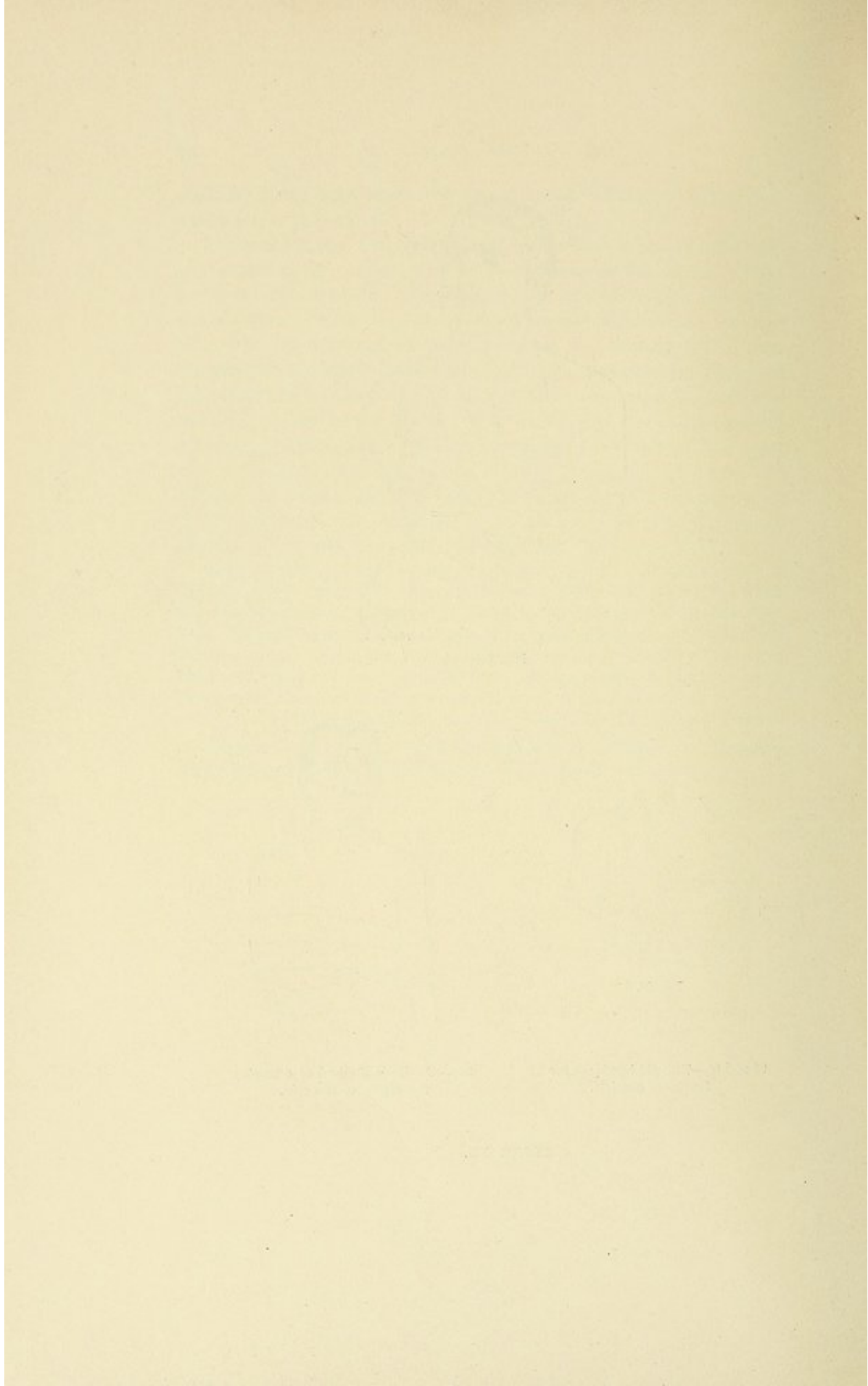
Fig. 95.



95a.—Author's method of confining the elbow to the side.

94 and 95.—Two old bandages for fractured clavicle.





## PART II.

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### THE TAILED BANDAGES.

The tailed bandages are so called because they consist of a strip or strips of material so fastened together or divided as to possess three or more extremities or tails. When these strips are fastened at right angles to one another in the shape of the letter T, they are called *T bandages*.

When there is only one transverse and one upright part, it is called a *single T* bandage, but when there are two upright pieces, it is called a *double T* bandage. When a single broad piece of bandage is torn from the ends nearly to the center, it sometimes receives the name of *sling*.

The ends are called tails and the part in the center remaining untorn is called the body.

In applying them, the body is first placed over the affected part and then the tails carried around the opposite side and fastened.

The tailed bandages can be multiplied indefinitely, and, with the exercise of a little ingenuity, can be applied to all parts of the body. Sufficient examples are given to show the manner of their construction and the principles of application. In many cases they are to be preferred to the roller bandage, particularly when the patient is confined to bed or the dressings require frequent changes. They are not, however, suitable for making pressure.

#### TAILED BANDAGES OF THE HEAD.

*The Four Tailed Bandage of the Head.* (Figs. 96, 97 and 98.)—A piece of material eight inches wide and long enough to go over the scalp and tie under the chin, is torn from either extremity to within three or four inches of the middle. The body of the bandage being placed on the top of the head, the two posterior tails are tied under the chin and the two anterior ones around the back

of the neck. (Fig. 96.) If it is desired to cover the back of the head, as in fig. 97, the body is placed farther back; the two posterior tails are then fastened around the forehead and the two anterior ones down under the jaw. If it is desired to cover the front of the head, the body of the bandage is placed at this point and the two anterior tails fastened at the back of the head and the two posterior ones down under the jaw. (Fig. 98.)

*The Six Tailed Bandage of Galen.*—The poor man's bandage. (Fig. 99.)—A piece of material is taken long enough to pass over the head and tie under the chin, and wide enough to reach from the root of the nose in front, to the nape of the neck behind. It is then torn lengthwise so as to form six tails, three at each end, the two middle ones being broader than those at the sides. In applying it, the body is placed on the head and the two broad tails brought down and tied under the chin. The two posterior tails are then brought forward and the two anterior tails carried backward around the head and fastened.

This is an excellent dressing when it is desired to cover the entire scalp, and may advantageously replace the recurrent bandages.

*The Four Tailed Slings of the Chin.* (Fig. 100.)—Place the body of the bandage on the point of the chin. The two upper tails are then to be fastened around the back of the neck, while the two lower ones are carried up and tied on the top of the head. A piece of bandage should connect the turn at the back of the neck with that on the top of the head, as seen in fig. 100. This prevents the latter from slipping forwards and thus becoming displaced. Instead of fastening the lower tails at the back of the neck they may be crossed at this point and continued forwards around the forehead and pinned there, but this does not make so secure a bandage as the former method.

*The Four Tailed Slings of the Neck.* (Fig. 101.)—Place the body of the bandage on the back of the neck and fasten the two upper tails around the forehead and the two lower ones around the neck, as shown in fig. 101.

*The Double T Bandage of the Nose.* (Fig. 102.)—A dressing having been applied over the nose the horizontal branch of the bandage is carried around the upper lip and tied at the back of the



PLATE XXI.



neck. The two vertical portions are then carried upwards, crossed at the root of the nose and fastened to the horizontal turn at the back of the neck. (See fig. 102.)

*The T Bandage of the Ear.* (Fig. 103.)—The horizontal branch is fastened around the head just above the ears and the vertical one carried under the jaw to be fastened to the horizontal branch on the opposite side. The vertical branch may be made wider at its point of attachment to the horizontal one if so desired, as shown in fig. 103. This will make it more suitable for retaining dressings over the ear or parotid region. If thought advisable a slit may be made to allow the ear to project through, thus avoiding pressure being made upon it.

*The T Bandage of the Eye.* (Figs. 104 and 105.)—A small triangular piece sufficiently large to cover the eye is sewn to the horizontal branch and the vertical strip is attached to its lower corner. The horizontal branch being fastened around the head, the vertical one is either carried around under the jaw and fastened on the opposite side, as shown in fig. 104, or else taken around to the back of the head and fastened there, as shown in fig. 105.

#### THE TAILED BANDAGES OF THE TRUNK.

*The Double T Bandage of the Chest.* (Fig. 106.)—A piece of material about eight inches wide and long enough to go one and a half times around the chest is obtained, and to its upper edge, near its middle, two strips, two inches wide by about fourteen long, are attached. These strips are placed six to eight inches apart.

This bandage can be used either to retain dressings on the chest or to support the breasts.

If used for the former purpose the middle of the bandage should be placed on the back and the ends overlapped and secured in front. The two vertical strips are then brought over the shoulders and attached to the bandage on the front of the chest. These prevent it from becoming displaced by slipping down. If it is desired to support the breasts, then the middle of the bandage should be placed on the front of the chest as shown in fig. 106, and the extremities fastened on the back. Slits should be cut for the nipples and the two vertical pieces passed over the shoulder and fastened on the back.

*The Double T Bandage of the Abdomen.*—This is similar to the double T of the chest, the ends being fastened in front and the two vertical strips passed from behind forwards between the thighs and fastened to the lower edge of the horizontal part. When the greater trochanters are prominent, by having the bandage come well below them, the vertical strips may be omitted. The bandage is then known as the BINDER.

*The Six Tailed Bandage of the Abdomen.* (Fig. 106.)—A piece of flannel is needed long enough to go one and a half times around the body and wide enough to reach from the lower ribs to below the trochanters. Each end is then divided for one third the length of the bandage into three tails, leaving the middle third intact. In applying it, the body of the bandage is placed behind and the tails overlapped alternately in front, from above downwards, in the order shown in fig. 106, the last tail being secured by a safety pin.

As this bandage has sometimes a tendency, particularly in fat people, and if the tails are torn too near to the middle of the bandage, to mass itself together into a cord above the crest of the ilium, the plain binder or double T bandage described above is sometimes preferred to it.

*The Double T Bandage of the Perineum.* (Fig. 107.)—The horizontal arm is to be long enough to allow of its being tied around the abdomen just above the iliac crests. The vertical arm should reach from the top of the sacrum behind down under the perineum and up to the umbilicus in front. This part is torn into two tails to within six or eight inches of the opposite extremity. It is to be attached by its undivided extremity to the middle of the horizontal strip. The horizontal arm having been fastened around the abdomen just above the iliac crests, the two vertical tails are brought under the perineum up on either side of the genitals and fastened to the horizontal arm around the abdomen. This is an effective and useful bandage in retaining dressings to the perineum as in cases of *Fistulæ*, etc.

If it is desired to use this bandage after operations on the scrotum or neighboring tissues, the vertical branch should be increased in width to six or eight inches, and enough left undivided to reach from the horizontal branch above to the perineal center below. The body of the bandage is placed in front, and the two ends of

the horizontal branch fastened behind. The vertical one is then carried down, passed between the thighs and the two ends fastened to the horizontal branch behind or at the sides. An opening is made in front for the penis. (See fig. 108.)

*The T Bandage of the Groin.* (Fig. 109.)—The horizontal arm should be long enough to fasten conveniently around the abdomen. To this is sewn, by its base, a triangle ten inches long and eight inches broad. To the apex, a strip long enough to go around the thigh is attached. The horizontal arm being fastened around the abdomen just above the iliac crests, the vertical arm is passed between the thighs, carried around the outside and fastened in front as shown in fig. 109.

*The T Bandage of the Buttock.* (Fig. 110.)—This is similar to that of the groin, except that the triangular portion is made slightly larger and is applied over the buttock instead of the groin. It is shown in fig. 110.

These two bandages are sometimes very useful as they can be made quite secure and permit of ready access to the parts beneath, more so than the roller bandages.

#### THE TAILED BANDAGES OF THE EXTREMITIES.

*The Four Tailed Sling of the Shoulder.* (Fig. 111.)—A square piece of material large enough to cover the shoulder, should have attached to its corners two long and two short tails. The body being applied over the shoulder the two short tails are tied around the arm and the two long tails in the opposite axilla as shown in fig. 111. By untying the upper tails and turning down the bandage, the dressing beneath is easily accessible.

*The Four Tailed Sling of the Axilla.* (Fig. 111.)—A square or rectangular piece of muslin, large enough to contain the application, has attached to its corners four tails. The body of the bandage being placed in the axilla, the two lower tails are tied around the chest and the two upper ones crossed on the shoulder of the same side and fastened in the opposite axilla. (See fig. 111.)

*The Four Tailed Sling of the Arm.* (Fig. 112.)—A piece of muslin ten or twelve inches wide and nearly two yards long is torn from either end to within four inches of its middle. A slit is made in the center to receive the point of the olecranon. The



body of the bandage being placed beneath the elbow, the two lower tails are fastened over the opposite shoulder, preferably by safety pins, and the two upper tails fastened around the chest. (See fig. 112.)

*The Perforated T Bandage of the Hand.*—(Figs. 113 and 114.) A piece of muslin is needed as wide as the palm of the hand and long enough to reach from the wrist to the web of the fingers and back again to the wrist. Transversely across the middle of this piece, four holes are made for the insertion of the fingers. At the corners of one end, two strips are attached long enough to allow of their being secured around the wrist. The prepared bandage is shown in fig. 113. It is used to retain applications to the back or palm of the hand. If desired to retain one to the dorsum, the fingers are thrust through the holes and the two tails fastened around the wrist as seen in fig. 114, the remaining portion is then brought up and pinned to the strips around the wrist.

If used to retain a dressing to the palm, then the part of the bandage with the tails attached is placed on the back of the hand and the loose portion brought over the dressing on the palm and fastened at the wrist. If so preferred this part of the bandage may be made long enough to allow of its being secured by the tails around the wrist instead of pinning.

*The Four Tailed Sling of the Knee.* (Fig. 115.)—A square piece of muslin large enough to cover the knee or the popliteal space has attached to its corners four tails. In applying it, the body of the bandage is placed over or under the knee as desired, and the two upper tails fastened around the thigh and the two lower ones around the leg just below the patella. (See fig. 115.)

*The Bandage of Scultetus.* (Fig. 116.)—A number of strips of bandage are made two or more inches in width and long enough to reach one and a half times around the leg. On account of its circumference increasing from the ankle upwards, the strips should be made proportionally longer as the limb is ascended. The number of strips to be employed, varies according to their width and the extent of the limb to be covered. If narrow strips are used and the whole leg is to be enveloped, twelve may be required, but if the width of the strips is increased to three or four inches and the leg is only to be partially covered, three, four or five may be sufficient.

The size and number of the strips having been decided on they are laid transversely on a towel or pillow or board, the top strip being laid first and each successive one covering the preceding piece one-third of its width. The limb is then raised from the bed, and the cloth or pillow on which the strips are lying is slid beneath it, see fig. 116. Another method is to roll the bandage from either side towards the center and then grasping a roll in either hand to place it beneath the limb. If so desired the strips on either side of the leg may be moistened with a sponge dipped in an evaporating lotion. Beginning with the lowest, the two ends of each strip are then brought forwards and crossed on the front of the leg, see the figure, the last being fastened by pinning, or, as preferred by Dr. Geo. W. Norris, tied.

This bandage allows the parts to be inspected without moving the limb. If any of the strips become soiled they can be readily replaced with clean ones by pinning the clean to the soiled strips and then pulling them through. Percival Pott attached the strips together by sewing them down the middle. This necessitates the removal of the whole bandage if it is desired to replace a soiled strip. This bandage forms the best means of retaining dressings in injuries of the leg when the fracture box is used, as its adjustment involves no disturbance of the member.

## PART III.

### THE HANDKERCHIEF BANDAGES.

Handkerchief bandages are those made of handkerchiefs or other material in the form of a square. They have been in use for centuries, but in 1832, Mayor, a surgeon of Lausanne, Switzerland, published a work entitled, "Un nouveau système de deligation chirurgicale." In this work he added many new bandages to those already existing, classified and named them, and advocated their use for all parts of the body. He enlarged and systematized the subject so well, that he has been regarded as the originator of a new system of surgical dressings, and it is spoken of as Mayor's System of Handkerchief Dressings.

In many cases these dressings are far superior to the roller bandages, particularly where support rather than pressure is desired, as in the handkerchiefs for the arm. Sometimes they can be well applied to places that it is very difficult to cover satisfactorily with a roller bandage, as the gluteal region.

When an application has been made to a part that requires frequent attention, the handkerchief bandage allows ready access to it; thus in contusions of the shoulder in which it is desired to apply an evaporating lotion, the triangular cap retains the dressing well, and at the same time by freeing and turning down the point of the triangle, the dressing can at once be inspected.

They are also useful as provisional dressings in war and cases of accident. The roller bandage is sometimes impossible to obtain, while the handkerchief is found everywhere, and a person possessing some knowledge of the subject, can with the exercise of a little ingenuity, adapt them to almost any form of injury.

*Materials.*—Handkerchief bandages are made with cotton, linen or silk squares, of various sizes, according to the parts to be covered.

The material used should be thin and pliable. If unbleached



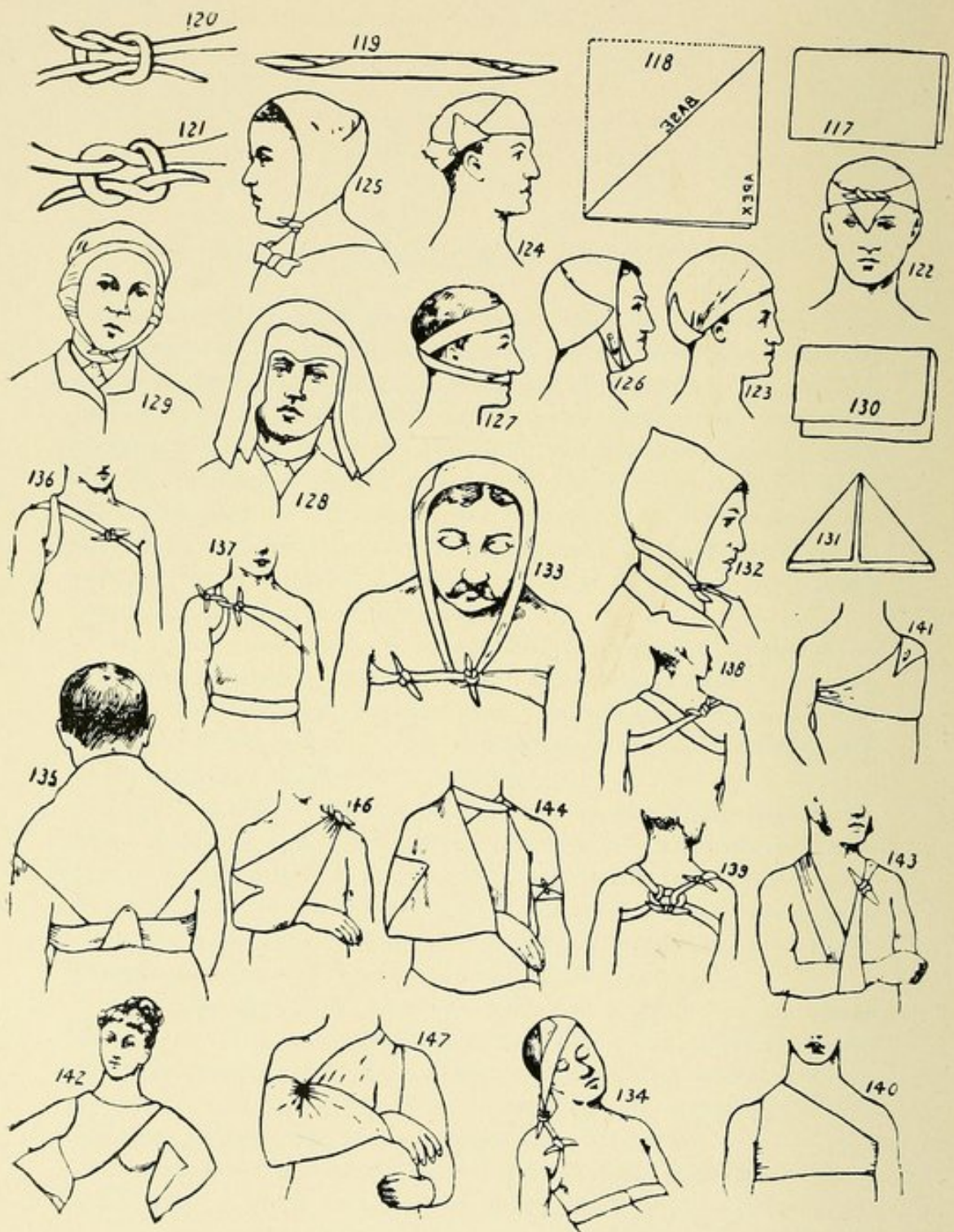


PLATE XXII.

muslin is employed, it should be the thinnest obtainable. Cheese-cloth often makes an excellent handkerchief, particularly when a large one is desired. Large linen or silk handkerchiefs are also good. The handkerchief is rarely employed in the form of a square, but is folded into various shapes, according to the use to which it is to be put.

When folded across its middle from side to side, it forms a *rectangle* or *oblong*, as seen in figure 117.

When folded diagonally across from corner to corner, as seen in figure 118, it forms the *triangle*.

The longest side of the triangle is its *base*.

The angles at each end of the base are called the *extremities* or *ends* of the triangle, and the angle opposite to the base is called its *apex* or *point*.

When a triangle is folded from side to side repeatedly, the apex being laid towards the base, it forms the *cravat*. (See fig. 119.)

A twisted cravat is called a *cord*. It is rarely used.

In naming the handkerchief bandages, the first portion of the name was intended to designate the part of the body to which the base of the handkerchief was to be applied, but this has not been carried out in all cases. The ends of a handkerchief may be fastened either by pinning or knotting. If pinned, a safety pin is the best to use. If knotted, a reef knot, as shown in figure 120, is the one to be employed, and not the Granny knot, as shown in figure 121; the latter is insecure and liable to slip. To avoid discomfort it should, when possible, not be made on a prominent bony part, and the parts beneath should be guarded by a wad of cotton.

## THE SPECIAL HANDKERCHIEF BANDAGES.

*Beginning at the Head and Proceeding Downwards.*

### 1. HANDKERCHIEF BANDAGES FOR THE HEAD.

*The Occipito Frontal Triangle.* (Fig. 122.)—Place the base of the triangle on the nape of the neck and bring the apex forward over the head, allowing it to hang down in front. Knot the extremities around the forehead, as seen in figure 122, and turn the apex up and pin it.

*The Fronto Occipital Triangle.* (Fig. 123.)—Place the base



on the forehead and allow the apex to hang down the back of the neck. Tie the extremities just below the occipital protuberance and bring the apex up and pin it, as seen in fig. 123.

On account of the knot being behind, it is apt to cause some inconvenience if the bandage is worn in bed. Under these circumstances the former bandage is more suitable.

*The Bi-Temporal Triangle.* (Fig. 124.)—Place the base on the side of the head just above one ear and allow the apex to hang down over the other ear. Carry the extremities around and knot them on the opposite side of the head. The apex should then be turned up and pinned, as shown in fig. 124.

*The Vertico Mental Triangle.*—(Fig. 125.) Place the base of the triangle on the top of the head, the apex being backward, and knot the two extremities under the chin. The apex is then brought around to one side and pinned, as seen in fig. 125.

*The Auriculo Occipital Triangle.*—(Fig. 126.) Place the base of the triangle on the side of the face in front of the ear, the apex pointing backwards. Carry the extremities to the opposite side and fasten them by pinning. Fold the apex around the back of the head and pin it to the extremities in front of the ear, as seen in fig. 126.

*The Fronto Occipito Labialis Cravat.* (Fig. 127.)—Place the body of the cravat on the forehead and carry the extremities around the back of the head, to be brought forward and crossed on the upper lip, when they are to be pinned, as seen in fig. 127.

It may be used to retain dressings to the upper lip. Mayor also made a triangle of the same name, using the handkerchief folded in the form of a triangle instead of a cravat.

*The Square Cap of the Head.* (Figs. 128 and 129.)—A handkerchief should be used possessing a side long enough to go over the top of the head and allow its corners to be easily tied under the chin. It is then folded across its middle and one side brought to within an inch or two of the opposite one, as seen in fig. 130. Place it transversely on the head, the folded edge being behind and the middle of the handkerchief being in the median line. The longer of the two sides should be next the scalp and the edge of the shorter side passing across the forehead. The four corners are allowed to hang down on the shoulders, two on either side. This arrangement is seen in fig. 128. The two outer corners are then

grasped and tied under the chin. The two inner corners are to be pulled out until the posterior edge and sides of the handkerchief lie as neatly and closely around the back of the neck as possible. This having been done, the edge which projects over the forehead is folded backwards and the ends are twisted and tied or pinned together at the back of the neck and all the folds neatly adjusted. The completed dressing is shown in fig. 129.

This dressing was used by the ancient surgeons in cases of trephining but it is now displaced by less cumbersome ones. It is commonly made with a much larger handkerchief than the one here advised, the under portion of the bandage being allowed to hang down to the end of the nose and the upper to the eye brows. When made in this manner, the portion of the handkerchief remaining projecting at the sides of the neck was turned up and pinned on either side of the head.

The two ends which are fastened around the back of the neck are called from their spreading form "Goose feet."

*The Triangular or Hunter's Cap of the Head.* (Fig. 132.)—This requires a handkerchief with a side long enough to pass over the head and fasten under the chin. It is first folded transversely across the middle until one side is within an inch of the opposite one, as seen in fig. 130. It is then reversed, the shorter side being placed underneath. Turn the two corners of the folded edge inwards, forming a triangle, as seen in fig. 131. The two extremities of this triangle should be taken in either hand and, while kept tense, twisted and rolled up to the extent of almost two inches. On lifting the handkerchief, the hands should be approached slightly to each other, thus causing the two sides to separate. It is then placed on the head, the thin edge coming down over the forehead and the rolled or thick edge going down around the back of the neck. Tie the two ends together under the chin and the bandage is completed, as seen in fig. 132.

This bandage is said to be used by the hunters in the Adirondack Mountains to protect themselves from the bites of insects. It requires less material than the square cap of the head and is less heating.

## 2. HANDKERCHIEFS FOR THE HEAD AND TRUNK.

*The Occipito Sternal Triangle.* (Fig. 133.)—A cravat is first to be fastened around the body just below the arms. The body of a triangle is then placed on the back of the head and the two extremities brought forwards and fastened to the cravat around



the body. The apex is then to be brought around to one side of the head and pinned, as seen in fig. 133.

It is designed to keep the head flexed on the body in cases of wounds of the neck, as cut-throat, etc.

*The Parieto Axillaris Triangle.* (Fig. 134.)—If it is desired to incline the head to one side instead of forwards, then the cravat should be placed around one shoulder and the body of the triangle over the parietal region of the opposite side. The extremities are then fastened to the cravat around the shoulder and the head drawn over as seen in fig. 134.

### 3. HANDKERCHIEFS FOR THE CHEST.

*The Dorso Bis-Axillary Triangle.* (The Breakfast Shawl, or Cervico-dorso-sternal Triangle of Mayor.) (Fig. 135.)—Fasten a cravat around the body beneath the arms. The base of a large triangle is then placed on the nape of the neck, the two extremities being brought down in front of the chest and fastened to the cravat around the body. The apex of the triangle is passed under the cravat on the back and pinned. (See fig. 135.)

It is intended to retain applications to the back.

*The Simple Figure 8 Cravat of the Shoulder, or the Simple Bis-Axillary Cravat.* (Fig. 136.)—The body of the cravat being placed in one axilla, the ends are crossed over the shoulder and tied in the opposite axilla. (See fig. 136.)

*The Compound Figure 8 Cravat of the Shoulder, or the Compound Bis-Axillary Cravat.* (Fig. 137.)—The body of a small cravat is placed in one axilla and the ends tied over the shoulder. The body of a larger cravat is then placed in the opposite axilla and its extremities carried across, one in front and the other behind the chest. The posterior extremity should be passed through the loop on the top of the shoulder formed by the small cravat and fastened to the anterior one in front of the chest as seen in fig. 137.

Both of these cravats are well adapted to retain dressings in the axilla.

*The Simple Figure 8 Cravat of the Back, or the Simple Dorso-Bis-Axillary Cravat.—Mayor.* (Fig. 138.) Sometimes called the Bis-Axillo-scapulary cravat.—The body of a long cravat is placed obliquely across the back, one extremity being carried around one

shoulder from above downwards and the other around the opposite shoulder from below upwards. The two ends are then brought across the back and fastened. (See fig. 138.)

*The Compound Figure 8 Cravat of the Back, or the Compound Dorso Bis-Axillary Cravat—Mayor.* (Fig. 139.)—A short cravat is tied around one shoulder. A long cravat is then passed around the opposite shoulder and tied in a single knot on the back. Pass one of the ends under the short cravat and fasten the two extremities, as seen in figure 139.

If it is desired to draw the shoulders back, as sometimes occurs in injuries of the clavicle, it can be well done with this bandage, as considerable force can be exerted by drawing on the two extremities of the longer cravat, previous to fastening.

*The Thoracico Dorsal Triangle.* (The Thoracico Scapulary Triangle of Mayor.) (Fig. 140.)—The base of a large triangle is placed on the front of the chest and the two extremities passed around under the arms and tied on the back. The apex is then carried over one of the shoulders and fastened to the part on the back. If the apex is not long enough to allow of its being fastened, it should be lengthened by attaching to it a cravat or piece of bandage. (Fig. 140.)

It is of service in retaining dressings on the front of the chest and mammary region.

*The Thoracico Lateral Triangle.* (Fig. 141.)—This bandage is intended for use in case of disarticulation at the shoulder joint. The base of the triangle is placed on the affected side of the chest, and the extremities fastened under the opposite arm. The apex should then be carried up and folded over the affected shoulder, being pinned in front, as seen in figure 141.

*The Triangular Cap or Suspensory of the Breast.* (Fig. 142.)—The base of a large triangle is placed under the affected breast, one end being carried beneath the axilla and the other around the opposite side of the neck, to be tied together on the back. The apex should then be brought up and passed over the shoulder of the affected side and fastened to the bandage behind. (See fig. 140.)

This is a convenient mode of slinging the breast in nursing women or other cases where simple support is desired. It is not suitable when pressure is wanted, the roller bandage being preferable in such cases.

## 4. HANDKERCHIEFS FOR SLINGING THE ARM.

*The Brachio-Cervical Cravat.* (Fig. 143.)—The forearm being flexed, the body of a cravat is placed beneath the wrist and its two ends carried around the neck and fastened in front and to one side, as seen in figure 143.

The knot should never be placed on the back of the neck, and if the pressure at this point is too great, cotton or other material should be placed beneath the handkerchief to prevent the cravat irritating the neck.

*The Simple Brachio-Cervical Triangle.* (Fig. 144.)—The forearm being flexed at a right angle, the base of a triangle is placed under the wrist and the two extremities tied around the neck, the knot being thrown to one side. The apex should then be brought around the elbow and pinned in front, as seen in figure 144.

In using this handkerchief for fractured clavicle, an additional cravat may be passed around the body, just above the forearm, thus confining the arm to the side.

*The Compound Brachio-Cervical Triangle.* (Fig. 145.)—A short cravat is tied loosely around the neck, the knot being placed in front. Place the base of the triangle under the wrist, the apex projecting beyond the point of the elbow. Bring the two extremities up and fasten them to the cravat around the neck. The apex should then be neatly folded around the elbow and pinned in front, as seen in figure 145.

The broad body of the cravat around the neck enables the patient to bear the pressure of the weight of the arm with less discomfort than when the simple triangle, shown in figure 144, is used; on this account it is to be preferred.

*The Oblique Triangle of the Arm and Chest—First Method.* (Fig. 146.)—The base of the triangle is placed beneath the wrist, the apex projecting beyond the elbow. The extremities are then carried one in front and the other behind the chest and fastened over the opposite shoulder. Bring the apex around the arm and pin it in front, as seen in fig. 146.

*Second Method.* (Fig. 147.)—Place the base of the triangle beneath the wrist, allowing the apex to project beyond the elbow. Carry the extremity which is next the chest over the opposite shoulder. Pass the extremity which is on the outer side of the forearm through the axilla of the injured side, and fasten it to that



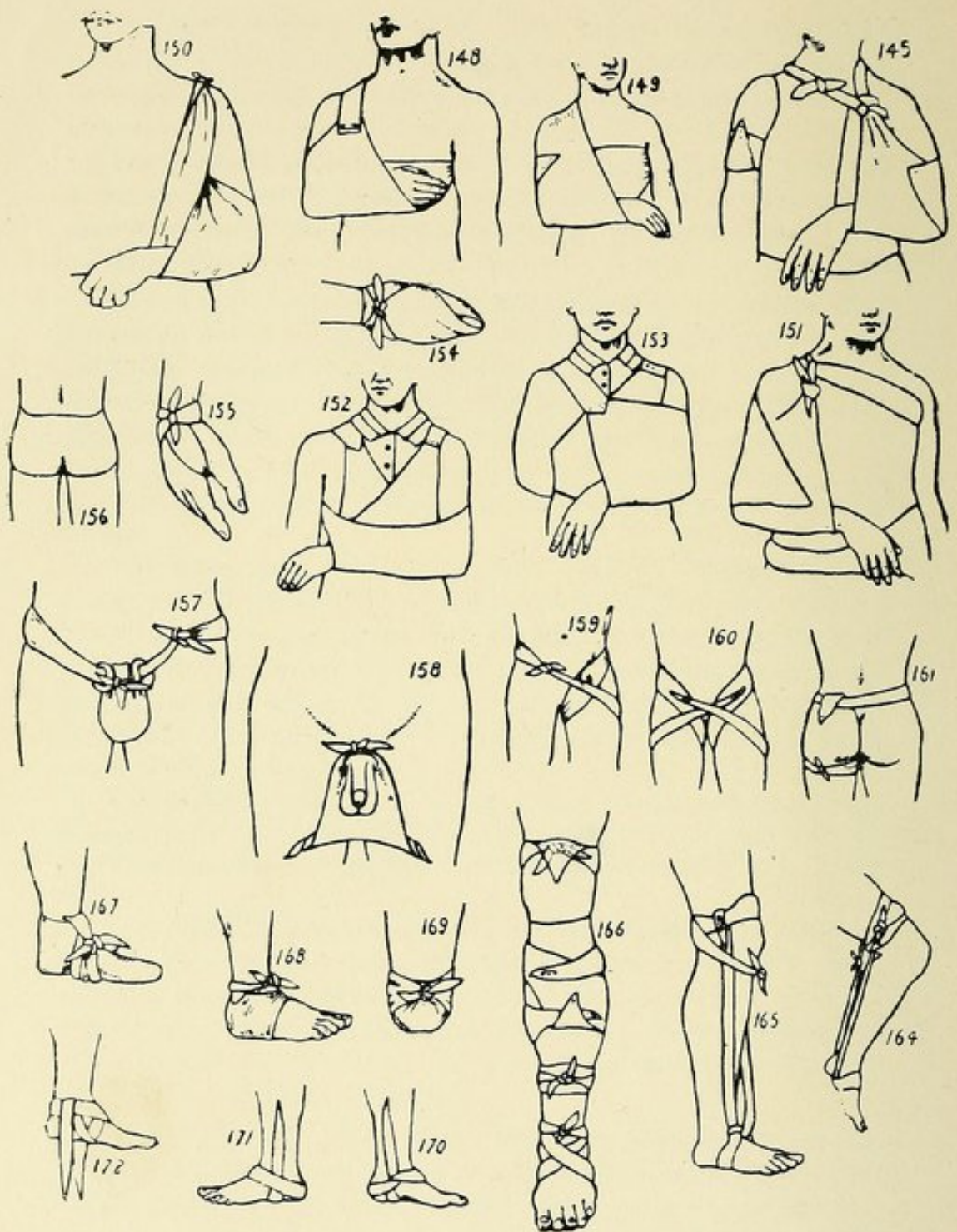


PLATE XXIII.

which was carried over the sound shoulder. The apex is then to be folded around backwards and tucked in beneath the arm. (See fig. 147.)

*Triangles for the Suspension of the Arm from the Injured Side—First Method.* (Fig. 148.)—Place the base of a triangle on the front of the chest apex downwards, and carry the extremities around the body and fasten them posteriorly on the sound side. Bring the apex up in front of the arm and connect it, by means of a strip of bandage, over the shoulder of the injured side, to the handkerchief on the back, as seen in fig. 148.

*Second Method.* (Fig. 149.)—Place the base of the triangle beneath the wrist, the apex projecting beyond the elbow. Carry the posterior extremity beneath the axilla of the sound side and the anterior one over the shoulder of the injured side. Tie them together on the back. The apex is then brought around the arm and pinned in front. (See fig. 149.)

*Third Method.* (Fig. 150.)—Place the base of the triangle beneath the wrist. The posterior extremity having been carried directly upwards in front of the shoulder, the anterior is passed through the axilla and around the back of the shoulder, to be fastened to the posterior extremity on top. The apex is tucked in under the arm. (Fig. 150.)

*Fourth Method.* (Fig. 151.)—In order to prevent the bandage from becoming displaced by slipping off the point of the shoulder, the following is suggested: A cravat is fastened over the shoulder of the injured side and around the opposite axilla. The base of the triangle is placed beneath the wrist, the apex projecting beyond the elbow. The anterior extremity having been carried up to the front of the shoulder, the posterior one is carried up behind the shoulder, passed beneath the cravat on top and fastened to the anterior extremity in front, as seen in fig. 151. The apex is folded around the arm and pinned in front.

*Mayor's Bandage for Fractured Clavicle.* (Fig. 152.)—The arm having been flexed at a right angle, it is confined to the side by a triangular handkerchief, the base being placed just above the forearm and the two extremities being fastened on the back. The apex is allowed to hang down in front. The two folds forming the apex are then carried up between the arm and the body, and the under one passed to the sound shoulder, while the upper one is car-

ried to the affected shoulder. A broad piece of bandage is fastened to one apex and carried down beneath the handkerchief at the back, to be brought up again and fastened to the other apex on the opposite shoulder, as seen in fig. 152.

*Gosselin's Modification of Mayor's Bandage.* (Fig. 153.)—The base of the triangle being placed on the chest, the two extremities are tied behind the back, the two folds forming the apex being allowed to hang down in front. The first fold is to be carried up *beneath* the arm to the affected shoulder. The second fold is brought up *over* the arm towards the sound shoulder. A broad strip of bandage is then fastened to it and carried over the sound shoulder, down beneath the handkerchief at the back and up over the affected shoulder, to be fastened to the apex of the first fold, as seen in fig. 153.

This is a convenient and effective dressing to use, especially in children, after the more solid dressings have been discarded. I prefer it to Mayor's original bandage, as given above.

#### 5. HANDKERCHIEFS FOR THE UPPER EXTREMITY.

*The Triangular Cap of the Shoulder.* (Fig. 144.)—A cravat is tied loosely around the neck. The base of a triangle being placed on the outer side of the arm near the shoulder, its two extremities should be carried around it and tied. The apex is then brought up over the shoulder, passed under the cravat around the neck and fastened with a pin. (See fig. 144.)

This is a very useful bandage to retain applications on the shoulder. By unpinning the apex of the triangle the handkerchief can be turned down and the parts beneath inspected.

*The Triangular Cap of the Shoulder—Agnew's Method.*—(Fig. 145.)—Prof. Agnew (Surgery, Vol. 1, p. 713) prefers applying the triangular cap of the shoulder by placing the base over the top of the shoulder and carrying the extremities down under the axilla and tying them around the arm. The apex is then turned up and pinned. (See fig. 145.)

*The Palmar Triangle.* (Fig. 154.)—The base of the triangle is placed at the wrist, and the apex folded up over the ends of the fingers. The two extremities are then carried around the hand, one on either side, and tied around the wrist as seen in fig. 154.

If the apex projects at the wrist above the base of the triangle, it may either be turned down and pinned or else confined by the knot. This is a convenient bandage to retain applications to the hand, particularly in burn cases or to cover a previously applied dressing to prevent its getting soiled.

*The Cravat for the Hand.* (Fig. 155.)—The body of the cravat is placed between the thumb and forefinger and its extremities carried up and fastened around the wrist. (See fig. 155.)

The cravat can be applied in many other ways both to the hand and various parts of the upper extremity according to the indications which it is desired to fulfil.

#### 6. HANDKERCHIEFS FOR THE PUBIC REGION.

*The Sacro Pubic Triangle.—Mayor.* (Fig. 156.)—Place the base of a large triangle over the sacrum and fasten its extremities around the body in front. Carry the apex down beneath the perineum and then up in front of the pubis and fasten it by a safety pin. (Fig. 156.)

A useful bandage to retain dressings to the sacrum or both buttocks.

*The Scrotal Triangle.* (Suspensory Bandage of the Scrotum.) (Fig. 157.)—A long cravat is first tied around the body just above the iliac crests. The base of a triangle is then placed beneath the scrotum and its two extremities brought up and passed around the cravat from above downward. They are then brought around the outer edges of the handkerchief and tied in front, as seen in fig. 157. Bring the apex up, carry it around the cravat from below upwards, and pass it beneath the knot formed by tying the extremities of the triangle.

This is a convenient dressing when the ordinary knit suspensory bandage of the shops is either unsuitable or cannot be obtained.

*The Scrotal Square.*—Devised by Dr. H. Beates. (Fig. 158.)—Place one side of a square handkerchief beneath the scrotum and tie its two corners over the root of the penis. The remaining corners are then taken one in either hand and twisted two or three times. (See fig. 158.) Then bring them up and pass them beneath the handkerchief at the root of the penis from above downwards bringing them out at the sides and tying them in front precisely as is shown in fig. 157 of the scrotal triangle.

It is not absolutely necessary to make this last knot, but if so desired, the ends may simply be left hanging, as the dressing is not liable to get loose if properly fastened around the root of the penis and scrotum. It is not a sus-



pensory bandage and should not be employed when the testicles are enlarged. They support the bandage and not the bandage them. It is useful in cases of troubles affecting the penis in which the testicles are not involved, as any discharge which exists can be provided for and prevented from soiling the patient's clothes.

#### 7. HANDKERCHIEFS FOR THE LOWER EXTREMITY AND TRUNK.

*The Ilio-Inguinal Cravat.*—(The Cruro-Pelvic Cravat of Mayor.) (Fig. 159.)—Place the body of a large cravat over the inguinal region. Carry the upper extremity around the body and the lower extremity around the thigh, knotting the two ends in front, as seen in fig. 159.

*The Double Ilio-Inguinal Cravat.*—(The Sacro Bi-crural Cravat of Mayor.) (Fig. 160.)—Place the body of the long cravat over the upper part of the sacrum, bringing its two extremities around the body, then down in front of each groin and around the thighs, to be fastened on the opposite side of the body, as seen in fig. 160.

These two bandages necessitate the use of such extremely long cravats, that they are seldom employed.

*The Ilio-Femoral Triangle.*—(The Sub-femoral Triangle of Mayor, or Triangular Cap of the Buttock.) (Fig. 161.)—A long cravat is fastened around the waist. The base of a triangle is then placed in the gluteo-femoral fold, and its extremities fastened around the thigh. Carry the apex up and pass it beneath the cravat around the waist, turning it down and pinning it to the body of the triangle. (See fig. 161.)

A most useful bandage for retaining applications to the region of the buttock, hip or even groin. By unpinning the apex and turning it down, ready access can be had to the dressing beneath, without disturbing the patient.

*The Tibio Cervical Sling.* (Fig. 162.)—Place the body of a long cravat on the shoulder of the sound side, and fasten its extremities together low down on the opposite side, thus forming a sort of sash. After flexing the leg on the thigh, place the base of a triangle near the foot, allowing its apex to project beyond the point of the knee. Carry the two extremities upwards, one on either side of the thigh, and tie them to the cravat above, as seen in fig. 162. The apex is then folded around the knee and pinned to its outer side.

It is used to support the leg after fracture, the patient being allowed to walk about on crutches without using the injured member.

*The Tarso-Pelvic Cravat.—Mayor.* (Fig. 163.)—Tie a long cravat around the waist and a short one around the tarsus. Connect these two with a third cravat, as seen in fig. 163, the knee being flexed nearly or quite at a right angle.

Uses the same as the tibio-cervical sling.

#### 8. THE HANDKERCHIEFS FOR THE LOWER EXTREMITY.

*The Tarso-Femoral Cravat.* (Fig. 164.)—Tie a cravat around the thigh a short distance above the patella. Place the body of a long cravat on the dorsum of the foot, and carry its extremities under the sole and up along the sides of the heel, to be fastened to the cravat around the thigh. (Fig. 164.)

It may be used in injuries of the back of the leg, either to keep the leg flexed on the thigh or the foot extended on the leg.

*The Tarso Patellar Cravat.* (Fig. 165.)—Place the body of a cravat on the front of the thigh, just above the patella. Carry its extremities around, crossing in the popliteal space, fastening them just below the patella. Place the body of a second cravat on the sole of the foot, and make a single knot on the instep, then carry the extremities upward on either side of the leg, and fasten them to the cravat around the lower part of the thigh, as seen in fig. 165.

It is intended as a temporary dressing in fracture of the patella, or for use after consolidation has taken place and the patient is walking around.

*The Triangular Cap of the Knee.* (Fig. 166.)—Place the base of the triangle below the patella, carrying its extremities around the popliteal space and fasten them above the patella. Bring the apex up over the front of the joint, pass it beneath the part around the thigh and turn it down, fastening it with a pin. (Fig. 166.)

This may be used instead of the roller bandage to retain applications to the knee.

*The Tibial Triangle.* (Fig. 166.)—Place the base of the triangle obliquely across the leg, the apex being downward. Carry the upper extremity around and pin it to the body of the triangle near its base. Bring the lower extremity around and fasten it lower down near the apex of the triangle. Then turn the apex up and pin it as seen in fig. 166.

*The Tibial Cravat.* (Fig. 166.)—Place the body of the cravat

on the leg transverse to its long axis. Carry the extremities around the limb, tying them in front, as seen in fig. 166.

*The Tarso Malleolar Cravat.* (Fig. 166.)—Place the body of the cravat on the sole of the foot and carry its extremities over the instep and fasten them around the ankles, as seen in fig. 166.

*The Malleolo Phalangeal Triangle.* (Fig. 167.)—Place the base of a triangle on the back of the leg above the heel and bring its apex up over the toes to the front of the ankle joint. Carry the two extremities down over the instep, around under the sole of the foot and back again to the instep, where they are to be tied, as seen in fig. 167. The apex is then to be turned down and pinned. Instead of fastening the extremities around the foot as just described, they may, if so preferred, be tied around the ankle.

This is a good bandage to retain applications to the foot, or to use as a cover to the dressing underneath to prevent its getting soiled.

*The Triangular Cap of the Heel.* (Fig. 168.)—Place the base of the triangle on the sole of the foot, beneath the instep, and carry its apex up the back of the leg. Bring the two extremities up over the instep and fasten them around the ankle, as seen in fig. 168. The apex should be turned down, and either pinned or held in place by the extremities, as shown in the illustration.

*The Triangular Cap for Stumps.* (Fig. 169.)—Place the base of the triangle near the end of the stump, and bring its apex up on the opposite side. Carry the two extremities around the part, over the apex, and fasten them either by pinning or tying. The apex should be turned down and pinned or included in the knot, as shown in fig. 169.

*Barton's Extension Cravat.* (Figs. 170 and 171.)—Fold a handkerchief into the form of a cravat, and double it so as to make one end twice as long as the other. Place the body of the cravat directly over the point of the heel, beneath the insertion of the tendo achilles, bringing the long end forwards under the external malleolus, and the short end forwards under the internal malleolus. Carry the long end over the instep and pass it first under and then around the short end from above downwards, as seen in fig. 170, then continue it beneath the sole of the foot and up under the bandage on the opposite side, as shown in fig. 171. It will now be seen that each end comes up the leg from *beneath* the

transverse portion of the bandage, and not from its outer side. The two ends are then turned down and knotted beneath the foot, the knot formed by the bandage on the inner border of the foot being adjusted so as to lie in the hollow of the sole.

*Gerdy's Extension Cravat.* (Fig. 172.)—Place the body of the cravat on the tendo achilles, and bring the two extremities forward, crossing them over the instep. Continue them down under the sole of the foot and up on either side, passing them beneath the turn around the ankles. They are then to be brought down and tied beneath the foot. (See fig. 172.)



