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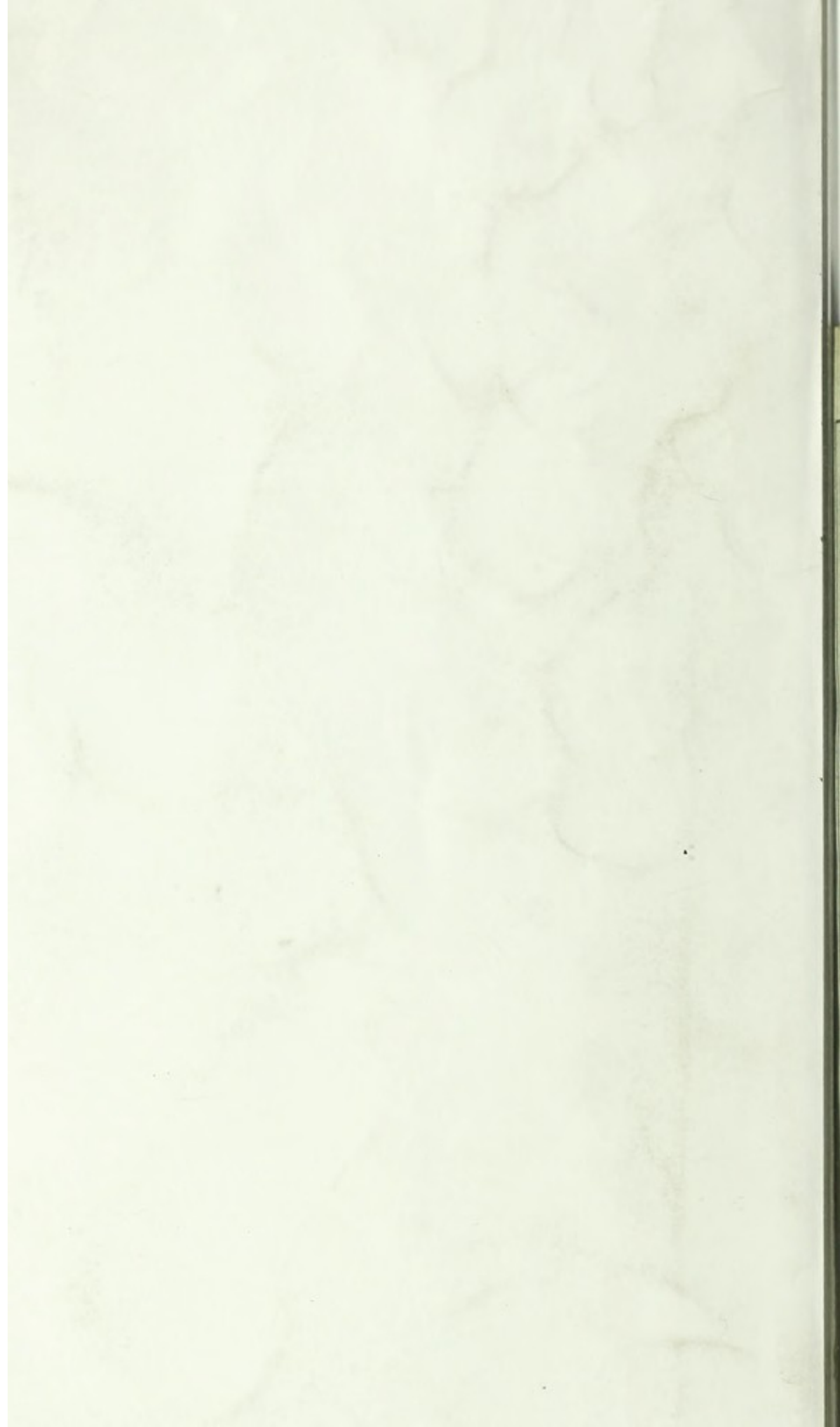
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Improved Appliances

FOR THE

MECHANICAL TREATMENT

JOINTS.

BY

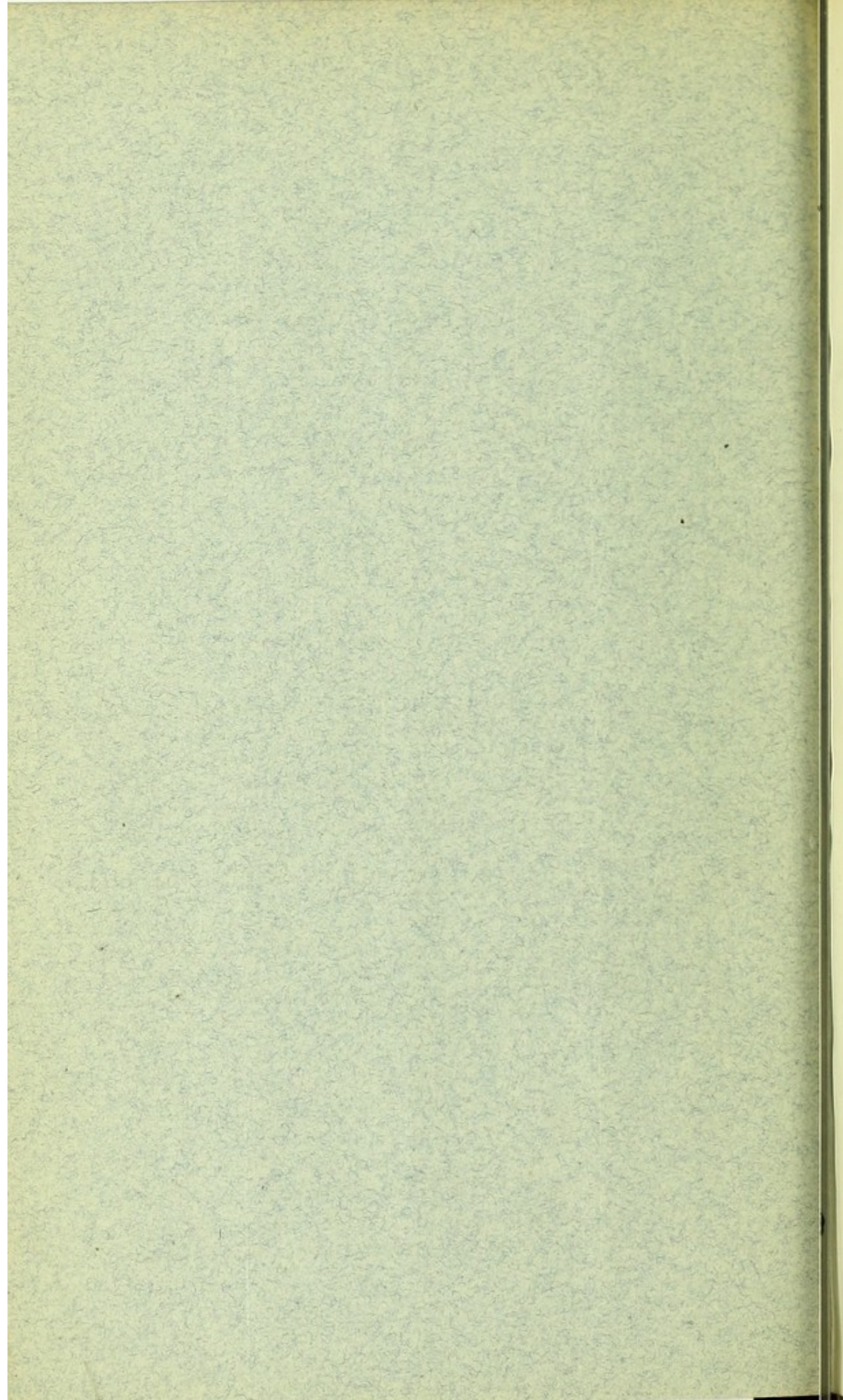
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New York:

GEORGE TIEMANN & CO., 67 CHATHAM STREET.

1878.



IMPROVED APPLIANCES FOR THE MECHANICAL TREATMENT OF JOINTS.

BY

CHAS. F. STILLMAN, M.D., of Plainfield, N. J.

For the successful treatment of injuries or diseases of the human frame, *immobility* has always been recognized as one of the chief requisites. But it often becomes necessary to supplement the immobility with *extension* or *retraction*, in order to overcome deformity or separate diseased surfaces from one another. Facilities for *inspection* of the diseased part may be added as a third condition. To combine these has been a problem engaging the ablest minds in Surgery for centuries.

Braces innumerable have been invented, and many immovable dressings devised; but each has been found to possess certain faults which renders it unfit for universal application and which prevents it from being universally employed.

It has been reserved for the year 1878, to bring forward a system of appliances for the mechanical treatment of abnormal conditions of the human frame, founded upon principles which allow of its application alike to all portions of the body, and yet so simple and inexpensive that it can be generally adopted.

Materials.

These consist in the combination of two factors, viz.: 1st. *Immovable dressings*, and 2d. *Adjustable brackets*.

I.—Immovable Dressings.

These are many in number, and are used to form the bases upon which the terminal plates of the brackets are to rest, and to secure them in position.

1st. **Plaster of Paris.**—This is placed first upon the list because of its ready procurability, and the fact that most surgeons are familiar with its use.

Its advantages are: 1st. Rapidity of solidification.

2d. Firmness.

Its disadvantages are: 1st. Weight.

2d. Uncleanliness in application.

3d. Change in bulk after application.

Coarsely woven and very light rolls of muslin bandage of various widths are selected, and their meshes filled with dry plaster of Paris well rubbed in. These, at the time of their employment, are to be soaked in water to which a quantity of table salt has been added, taken out after a few moments and applied rapidly.

It is always preferable to have the rolls filled with plaster on the day of their use, or, if this impracticable, they should be well covered with oil silk or paper and kept in an air-tight box.

It is also better to have but two or three bandages soaking at the same time, putting another in the basin when one is taken out, and each should not be more than three yards in length, otherwise they occupy too long a time in becoming thoroughly wet.

2d. **Starch.**—This is employed like plaster of Paris.

Its advantages are: 1st. Lightness.

2d. Firmness.

3d. Cleanliness.

4th. No change in bulk.

Its disadvantage, and in many cases an important one, is its slowness in solidifying.

For the sake of convenience, we will make use only of the term plaster of Paris in the following pages, it being understood that any of the immovable dressings may be substituted at will.

II.—Adjustable Brackets.

Zinc.—This is used in two forms. The first is short and broad (Fig. 1), of the thickness ordinarily used under stoves, &c., so punched that the jagged

FIG. 1.

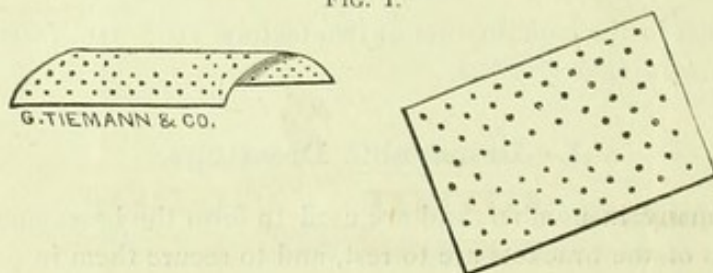
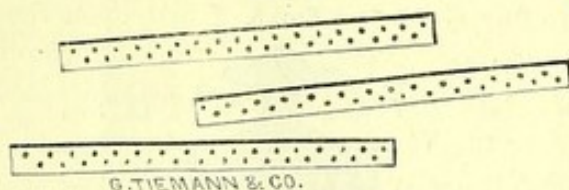


FIG. 2.



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edges of the perforations will be elevated above the surrounding surface, and thus allow the plastered bandage to hold it in place; and is used to form the terminal plates of the bracket, the special uses of which will be more fully detailed hereafter.

The second form consists of long narrow thin strips, perforated, and is used when greater strength is required, as they hold the bandage, and are in turn held by the bandage so securely as to prevent displacement (see Fig. 2).

2d. **Iron.**—Wrought iron is used in the form of flat strips, 1 to 2 inches in width by $\frac{1}{16}$ to $\frac{1}{4}$ inch in thickness. These, bent into various forms and strongly riveted, constitute the bridge connecting the two plates of perforated zinc used in the formation of the bracket.

It is *always preferable*, however, when they can be obtained, to use for the bridge either *hard rubber* (vulcanite), *papier maché*, or some light *firm wood*, either of which Messrs. TIEMANN & CO. are prepared to furnish on application.

By the employment of one of these three substances, the largest bracket need not exceed $\frac{1}{2}$ lb. in weight.

Rachets.

Either of two rachets may be inserted into the bridge for purposes of extension.

The more simple is that devised by the writer, and consists of two overriding flat strips, provided with slots down the middle, in which two thumb screws are placed to hold them together, as shown in Fig. 3. They can be so graduated as to indicate the amount of extension employed, and by the removal of one of the screws a false joint is produced, which may be placed at any point along the slot.

FIG. 3.



FIG. 4.

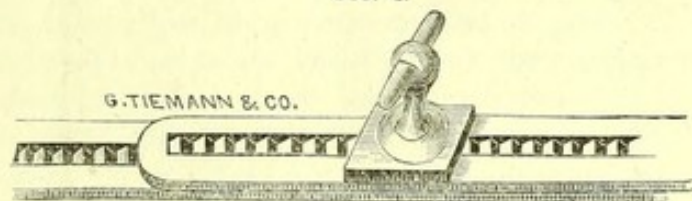
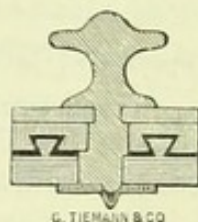


FIG. 5.



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The second ratchet was devised by Mr. F. A. Stohlmann, and is exact, without being complex. It consists of two overriding flat strips, each provided with graduated slots, one strip on one side of the slotted space being dentated and the other strip on the other. A screw, fitted with a cog sufficiently deep to engage both, is now placed in the centre, so that by simply turning the screw the bridge is either lengthened or shortened (see Fig. 4). The writer modified this by introducing a dove-tailed connection between the two strips, which allows them to slide easily upon each other and yet prevents displacement (see Fig. 5).

Preparation of the Limb.

A limb is prepared for the reception of the plastered bandage by one of four methods:

1st. The hair is carefully shaved off the entire limb and the surface well oiled. This is very convenient and satisfactory if the bandage be well applied, as the splint is certain to fit accurately and evenly. Its disadvantage is, that a rough plaster surface lies in contact with the skin.

2d. A covering of thin and, if possible, seamless gauze or flannel is drawn over the surface to which the bandage is to be applied. It must fit accurately and evenly, avoiding all wrinkles and creases, as otherwise discomfort will ensue for the patient. The thin gauze underwear, so much worn in summer, furnishes a very good article for this purpose.

3d. Rollers of thin soft muslin bandage may be applied.

4th. The surface may be sheathed in layers of cotton wadding.

We shall confine ourselves in this essay to discussing the *mechanical treatment* of abnormal conditions of the *joints*.

HIP-JOINT.

There are two indications which interest us in the mechanical treatment of this joint.

1st. When the diseased condition requires *immobility, extension and exposure* of the surface.

2d. When the diseased condition requires *extension, exposure of the surface, and allows a certain degree of motion in the joint.*

First Indication.

When the diseased condition requires *immobility, extension* and exposure of the surface.

This is accomplished by the use of plaster of Paris bandage and an adjustable bracket. The latter should be made very firm and strong. The zinc plates should be of good size and well perforated, not so thick but that they can be easily adjusted to the surface, and for an adult should be connected by a racheted bridge, $1\frac{1}{2}$ inches in width, $\frac{1}{4}$ inch in thickness, and of sufficient length to allow a riveted attachment of 4 inches to each zinc plate, and be raised in the centre over the uncovered portion of the limb about two inches. If *iron* be used for the bridge, it can be made very expeditiously in any hardware or machinist's store, and is very inexpensive.

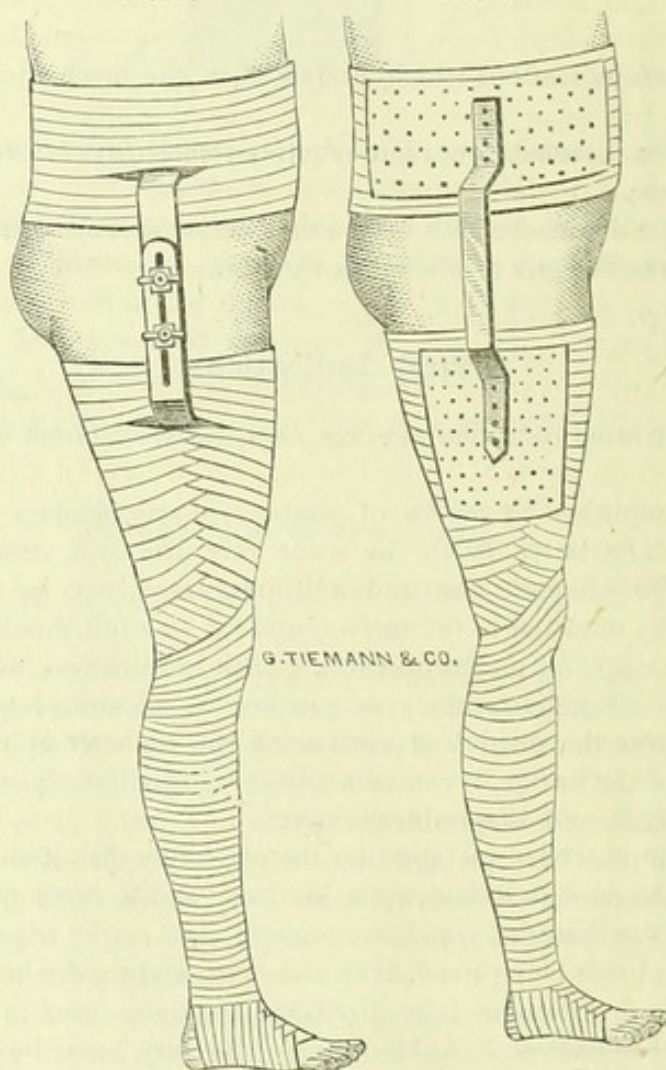
After the limb has been prepared for the plaster by one of the four methods already given, the patient is laid upon his back and a small wooden support placed beneath the buttocks, which are brought close to the edge of the table—the shoulders and foot being steadied by assistants, and the leg being in line with the body. If more extension is required, the apparatus used in Bellevue Hospital, and described in Prof. F. A. Hamilton's "Surgery," may be employed. Beginning at the foot, the limb is encased from the toes upward; the ankle and knee being strengthened by repeated figures of 8 or zinc strips, or both. The latter, wound in occasionally, increase the strength without materially adding to the weight. If the bandage is very thin, as it should be, it may be applied to the limb in the same manner as ordinary bandage. If thick, the scissors should be called into requisition, as turning must then be avoided. The plaster on the leg should not extend upwards so far as to chafe the groin.

The waist should now be also encircled with the plaster, and *sufficient time allowed to elapse for both to become solid*, usually from ten to fifteen minutes, otherwise the plates of the bracket will exert pressure upon the limb through the soft wet bandage. It would at first seem that an immovable plaster apparatus around the waist would be objectionable on account of weight and pressure.

Experience, however, proves to the contrary, as the plastered bandage adjusts itself as nicely to the surface of the skin as a well fitting glove does to the hand, and the weight is distributed. Every brace or immovable splint for the hips

FIG. 7.

FIG. 6.



is furnished with a waistband, and as these are more or less movable and press unequally upon the prominent points of the pelvis, they are much more objectionable than the firm dressing just described.

The limb being carefully steadied by assistants, the bracket is now applied, as shown in Fig. 6—the plates being previously underlaid with a piece of lint, saturated with plaster paste, the zinc being bent to fit its surface accurately. It is now secured by repeated turns of the plastered bandage over it.

The object should be to leave as smooth a surface as is compatible with strength and comfort, and a light dressing of plaster paste is usually necessary to secure this after the bandaging has been completed. This paste is made by mixing plaster and salt water until the consistency of cream is reached, and is

very rapidly rubbed over the limb, in the direction in which the bandages have been laid, until the required smooth surface is produced. When this has nearly "set," which it does very quickly, rollers of bleached muslin are applied, neatly and expeditiously, from the foot up. As the layer of plaster underneath is not quite dry, it holds the bandage firmly and yet does not permeate entirely through its texture, so that a clean, fresh, firm muslin covering is established over the entire plaster surface, preventing contact (see Fig. 7).

It would at first seem unnecessary to extend the plaster below the ankle, but by doing so the apparatus is entirely prevented from motion, the heel and pelvis being fixed points for counter-extension.

By means of the ratchet in the bridge the limb may be stretched or relaxed at pleasure and the changes in the bulk of the plaster obviated.

The *advantages* of this apparatus are :

- 1st. Complete immobility.
- 2d. Exposure of surface—of especial service in compound fractures of the head of the femur or hip-joint disease with sinuses.
- 3d. *Avoids the perineal band* of every other apparatus, with its attending chafing and discomfort.
- 4th. Comparative inexpense.
- 5th. Facilities for extension or relaxation.

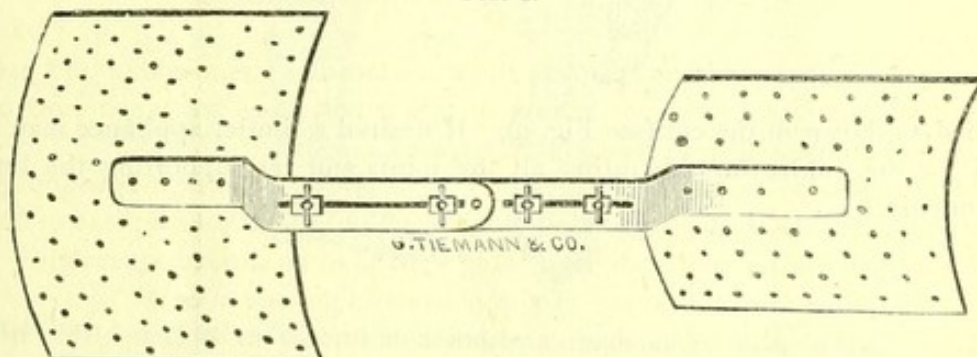
Second Indication.

When the diseased condition requires *extension*, *exposure* of the surface, and allows a certain degree of motion in the joint.

This is met by the use of plaster of Paris bandage and a bracket devised by the writer. This is composed, like the other, of thin zinc plates, perforated, connected together by a bridge, near the centre of which is a joint between two ratchets, as shown in Fig. 8.

For an adult, the bridge should be of the dimensions given in the preceding

FIG. 8.



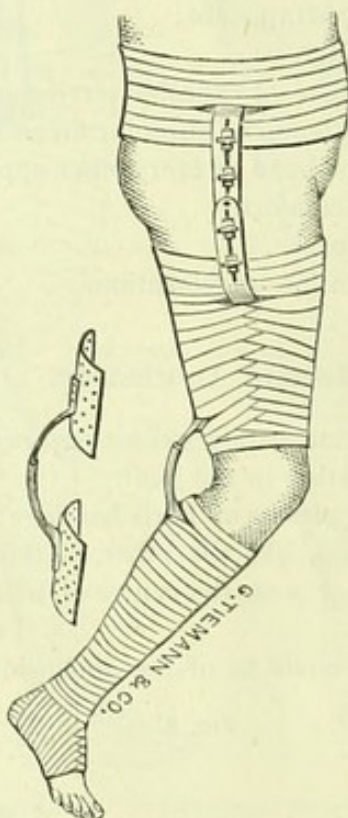
indication, and the measurements should be so made that the joint of the bridge should be over the hip-joint, at the junction of the axillary line and axis of the

thigh when the limb is flexed. The apparatus is applied as detailed in the foregoing indication, and after a few hours the splint will have become sufficiently solid to allow the bridge-joint to be regulated. This is done by means of the rachets above and below it.

In some cases a simple bracket, provided with the ratchet described on page 3, and depicted in Fig. 7, may be made to fulfill the indications by the removal of one of the thumb-screws and fastening the other opposite the joint.

It may seem inadvisable in many cases to maintain the limb constantly extended. For such a bracket may be made to allow motion in the knee and yet not seriously impair the usefulness of the hip-splint. It is composed of perforated zinc plates, connected by a bridge provided with a sliding joint, and is

FIG. 9.



applied as shown in the cut (see Fig. 9). If desired a similar appliance may be used for the ankle, thus liberating all the joints and yet supporting the limb thoroughly.

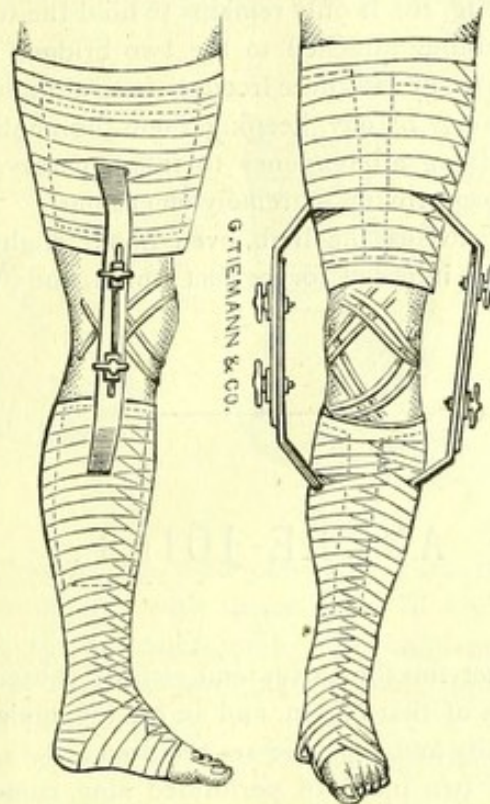
KNEE-JOINT.

To keep the parts immovable, obtain extension, and yet allow exposure of the surface for inspection and dressings, are the indications which we are to fulfill in the mechanical treatment of affections of this joint.

These are met by the employment of plaster of Paris above and below the joint, connected by two brackets.

They are each composed of two perforated zinc plates, connected by a racheted bridge, $1\frac{1}{4}$ inches in width, $\frac{1}{4}$ inch in thickness, of sufficient length to allow four copper rivets to be countersunk into each zinc plate, and so bent as to cause the bridge to be about two inches above the surface.

FIG. 10.



The limb being extended and steadied by an assistant, several thicknesses of the plastered bandage are applied, from the base of the great toe to a point as near the joint as practicable, taking care to render the ankle firm. The thigh is next enveloped, from the knee-joint nearly to the hip.

After waiting a sufficient time for the plaster to set, the brackets are applied, one on each side, and bound down by more of the plastered bandage—the whole smeared over with plaster paste and covered with dry bandage in the usual manner (see Fig. 10).

This splint is of great use in all inflammatory conditions of the knee or adjacent tissues—reducing motion in the joint to a minimum, and yet leaving the surface open for the necessary applications. After operations or injuries it is invaluable.

FRACTURE OF THE PATELLA.

In the treatment of this distressing accident the writer has been very successful. The plaster and brackets being applied as just described and as delineated in the cut (Fig. 10), it only remains to hold the fragments together by means of an elastic webbing attached to the two bridges, or by strips of adhesive plaster. Thus we ensure absolute freedom from motion, and yet are enabled to watch the fragments day by day, keeping them thoroughly in approximation, at the same time subduing all tendency to inflammatory action with external applications—the ice bag proving extremely efficacious.

As it is impossible to flex the limb, even in the slightest degree, the most favorable conditions are imposed for perfect union, and *yet the patient is not confined to bed.*

ANKLE-JOINT.

The form of bracket for the tarsus and vicinity is used to ensure rest after exsections of the bones of that region, and in all inflammatory conditions and injuries where immobility and exposure are required.

It is constructed of two plates of perforated zinc, connected by a racheted bridge, 1 inch in width, $\frac{1}{8}$ in thickness, strongly riveted, and bent in the form shown in Fig. 11.

The foot being held at a right angle by an assistant, it is carefully wound with plaster from the base of the nail of the great toe as far toward the ankle

as consistent with the diseased condition, and, beginning at a corresponding point above the ankle, the leg is encased almost to the knee. (Fig. 12.) After waiting a sufficient time for the plaster to set, a little plaster paste is smeared over the part where the bracket is to be placed, which has previously been accurately fitted to both foot and leg. The bracket is now placed in position and bound down by repeated turns of the plastered bandage, taking care that the foot is still at right angles; and after smearing the foot and leg with plaster paste, the whole is neatly covered with clean fresh bandage.

This apparatus maintains the ankle securely, yet leaves the whole surface open for inspection and dressings.

In the treatment of *Talipes Equinus*, after division of the necessary tendons, the enlarged joint at the base of the great toe often becomes very much inflamed from the change in relations which the opposing surfaces are forcibly obliged to undergo. If the least pressure be applied over this irritated surface, and the contrivance ordinarily used to retain the foot in proper position does not prevent this, deep sloughing ulcers are apt to be produced, which are extremely slow to heal and interfere greatly with the progress of the case.

FIG. 12.



FIG. 13.

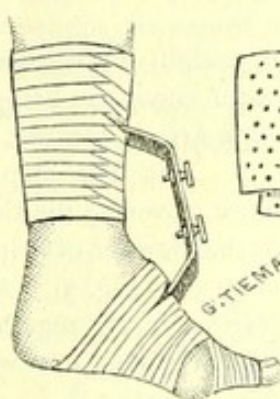


FIG. 11.



To avoid this, the writer has used plaster of Paris bandage and a bracket similar to that just described, with the addition of a cleft in the lower zinc plate corresponding to the deformed joint. The bandages should be very narrow, and so laid on as to avoid covering the joint. Otherwise the procedure is the same as just detailed (Fig. 13).

The ratchet in the bridge allows the foot to be extended or relaxed at will.

SHOULDER-JOINT.

In the mechanical treatment of this joint there are two indications to be studied.

1st. When the diseased condition requires immobility, without exposure over and about the joint.

2d. When the diseased condition requires both.

First Indication.

When the diseased condition requires immobility without exposure.

This is met by the employment of the "*cable splint*" devised by the writer in March, 1877, and published in the *N. Y. Medical Record* for October 20th, 1877.

The arm being at a right angle—the elbow being drawn down and held firmly by an assistant, the shoulders being in the same horizontal line, and the body erect and easy—the arm is encased, from the fingers to the axilla, with the plaster bandage (Fig. 1). The next step consists in placing folds of the same bandage around the chest, covering the side of the shoulder (Fig. 2). A shoulder cap of good thickness is then formed of strips of the same, bound down occasionally by transverse chest bands (see Fig. 3). At this stage of the process the cable which cements the various parts together is formed. A roller of plastered bandage from three to five inches in width, and of good length, is selected.

FIG. 1.

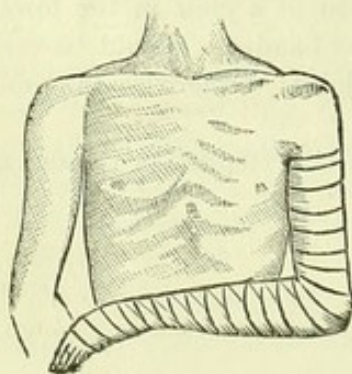
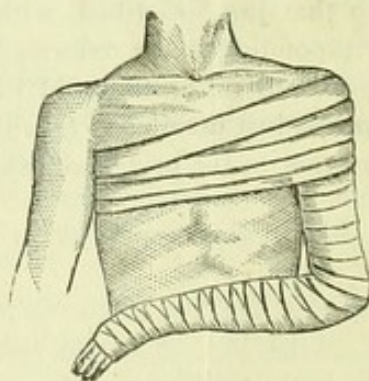


FIG. 2.



This is laid over the shoulder, as far back as the spine of the scapula, and brought forward and downward *behind* the wrist, around which it is wound several times to afford as broad a base as possible, and passed anteriorly back

FIG. 3.

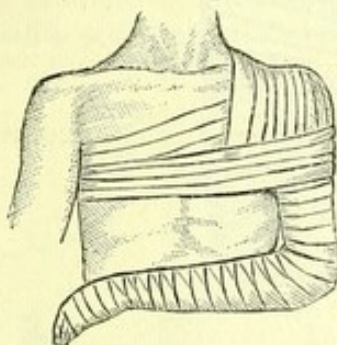
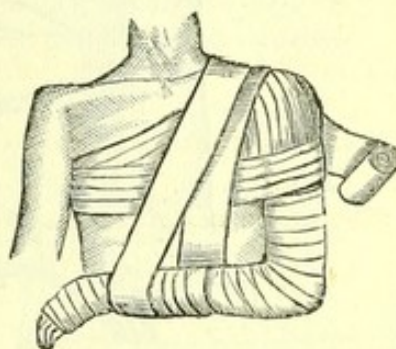


FIG. 4.



over the shoulder to the starting point, where it is bound down by a turn around the chest (see Fig. 4) and again brought forward to the *front* of the wrist, under which it passes. In returning to the shoulder it is wound lightly around the three slips already passed, thus forming the *nucleus* of the cable (see Fig. 5).

Upon reaching the chest-band, the bandage is passed around that, until the cable is again reached (see Fig. 6), which is once more wound to the wrist, after passing round which the bandage is returned to the shoulder in the same manner and again brought around to the cable, which is once more wound as before.

FIG. 5.

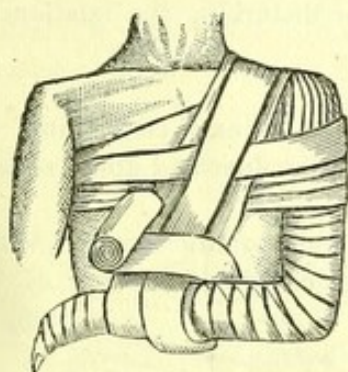
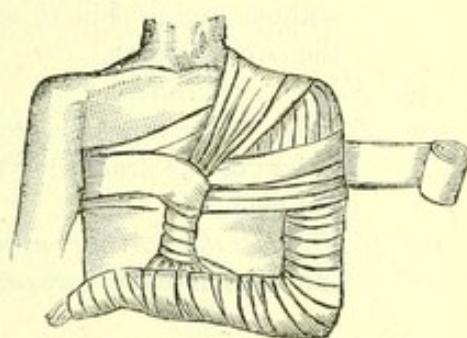
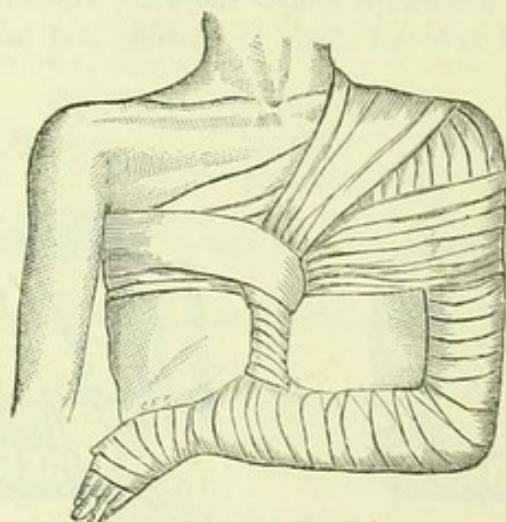


FIG. 6.



By repeating this winding process a number of times, a plaster cable is produced of great strength, and ultimately incorporated with all parts of the apparatus, building and cementing it in a manner which prevents disarrangement of the parts covered (see Fig. 7).

FIG. 7.



The whole splint after the plaster has set *becomes one piece*; no part of it can be moved without moving the whole, and it absolutely prevents all motion; and, if neatly applied, with the skin protected by gauze, there is no chafing or discomfort experienced by the patient.

So entirely is motion prevented, that the writer has obtained union in five weeks in extra-capsular fracture of the humerus which occurred in a patient over sixty years of age.

In fact, after wearing it a few days, patients usually pursue their ordinary occupations without other inconvenience than the rigid arm.

Its *advantages* are:

- 1st. *Absolute immobility.* The cable may be grasped and shaken rudely without giving pain to the patient or disturbing the relations of the parts beneath.
- 2d. *Ease of application.*
- 3d. *It does not constrict the neck*, as does the ordinary cloth sling, the weight of the arm being borne by the shoulder and upper zone of the neck.
- 4th. *It prevents the leverage outwards* of the arm upon the shoulder, which is not obviated by any other apparatus now in use.

Second Indication.

When the diseased condition requires both immobility and exposure of the surface.

This is met by a modification of the "*cable splint*," by which the arm is held securely and yet the shoulder is left bare.

It is constructed like the "*cable splint*," but the exterior portion of the shoulder-cap is omitted, without at all impairing the stability of the apparatus and yet leaving the surface open for inspection and dressings (see Figs. 8 and 9).

For the after-treatment of operations in this region, or injuries attended with a solution of continuity, or inflammatory conditions of any kind where immobility is desired, this apparatus will be found very serviceable.

FIG. 8.

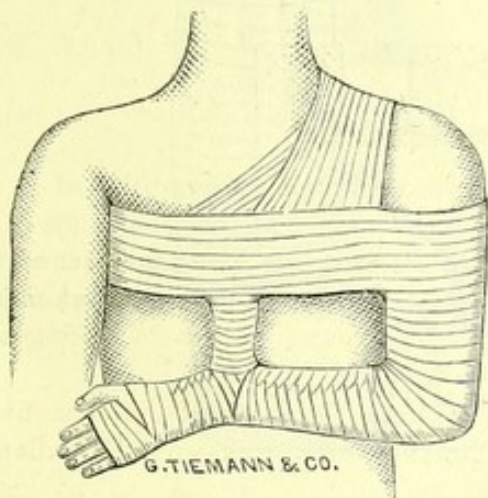
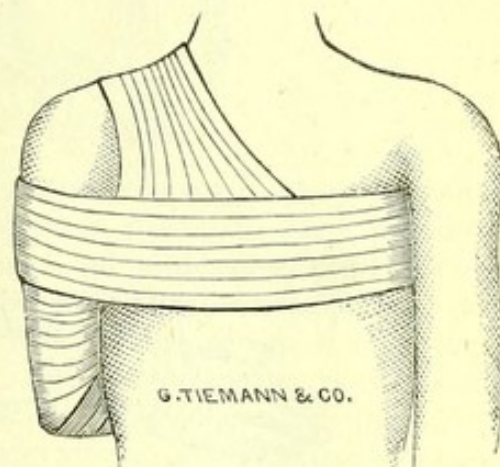


FIG. 9.



ELBOW-JOINT.

In the mechanical treatment of this joint there are two indications to be studied.

1st. When the diseased condition requires immobility without exposure of surface over and about the joint.

2d. When the diseased condition requires both.

First Indication.

When the diseased condition requires immobility without exposure.

This is met by the employment of the cable splint (*see First Indication, Shoulder*).

Second Indication.

When the diseased condition requires both immobility and exposure.

This may be met by either of two methods. The *first* consists in the use of a bracket similar to that used in diseased conditions of the ankle.

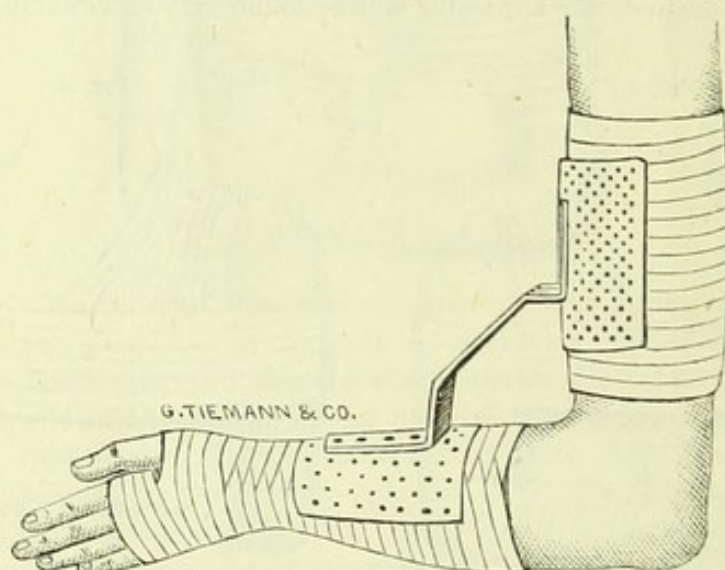


FIG. 10.

The arm being bent at a right angle with the forearm, the plaster is applied from the bases of the fingers to a point as near the joint as practicable, and again above the joint nearly to the axilla.

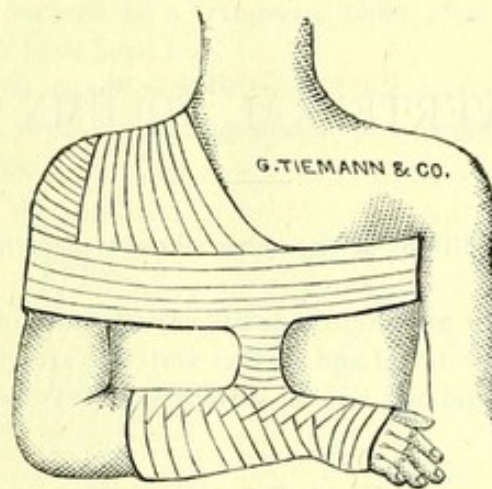
After it has almost solidified, the bracket is placed upon layers of plaster paste (*see Fig. 10*), and bound down by the other layers of bandage, which are then smeared over with the paste and covered by neat dry bandage in the manner already described. This ensures firm support in all cases where the arm is in a normal state above and below the joint, and yet allows complete exposure of the surface.

In many cases, however, there is, in addition to the joint trouble, more or less involvement of the tissues above and below.

It will then be found that a modification of the "*cable splint*" is of great advantage, securing the joint from motion and yet leaving the surface open for inspection and dressings.

The accompanying figure will serve as a guide to the construction of the splint, which should be made according to the instructions given under the head of *Shoulder Joint, First Indication*, with the exception that the plastered bandage should not extend up the arm further than shown in the engraving, and the cable should be on the side of the median line opposite the joint (*see Fig. 11*).

FIG. 11.



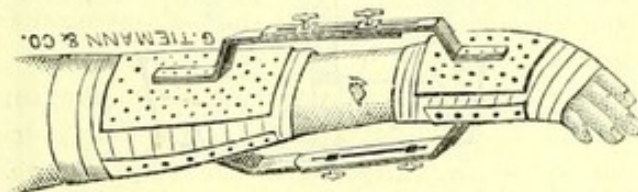
In the description of the construction of the "*cable splint*," it was omitted to state that, after the completion of the plaster bandaging, the entire surface should be smeared over with the plaster paste and neatly covered with dry fresh bandage, thus protecting the clothing, &c., from contact with the plaster.

WRIST.

By encircling the hand (except the fingers) and the forearm with plaster, and applying a bracket anteriorly and posteriorly, as shown in Fig. 12, we are enabled to retain the wrist in any desired shape, and yet keep up extension by means of the rachets.

In the treatment of Colle's fracture they will be found very valuable.

FIG. 12.



VERTEBRAL COLUMN.

There are three conditions of the spine whose treatment we are to consider viz.:

- 1st. When the upper and middle dorsal vertebræ are involved.
- 2d. When the lower dorsal and lumbar vertebræ are involved.
- 3d. When both dorsal and lumbar vertebræ are involved.

First Condition.

When the upper and middle and dorsal vertebræ are involved.

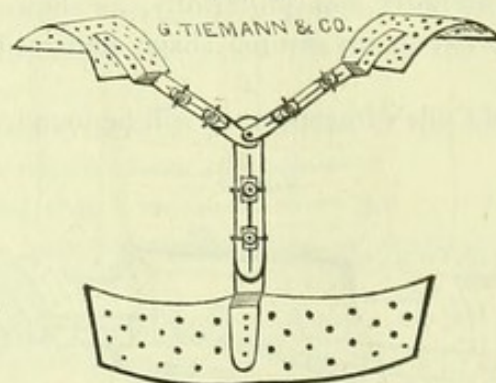
Requirements:

- 1st. Exposure of surface over affected portions.
- 2d. Immobility.
- 3d. Facilities for extension or retraction.
- 4th. Relieving the diseased portion from the weight of the head.

These are met by the employment of plaster of Paris bandage and a compound bracket devised by the writer.

The latter is formed of three flat strips, each provided with a ratchet, one extremity of each being riveted to the other strips in the form of a Y, the other extremities being firmly attached to perforated zinc plates, two of which are adapted in shape to the superior surface of each shoulder, and the third to the upper part of the waist, as shown in Fig. 13.

FIG. 13.



The body of the patient is first to be provided with a thin close-fitting gauze shirt. The upper zone of the waist should first be encircled several times, then the bandage passed anteriorly across the opposite shoulder and straight downward posteriorly until the waistband is reached, where it should be cut

by the scissors and secured by a transverse band, after a sufficient number of these shoulder-bands have been laid.

The other shoulder should now be treated in the same manner, and the process repeated until a firm, well fitting, plaster base is prepared for the reception

FIG. 15.

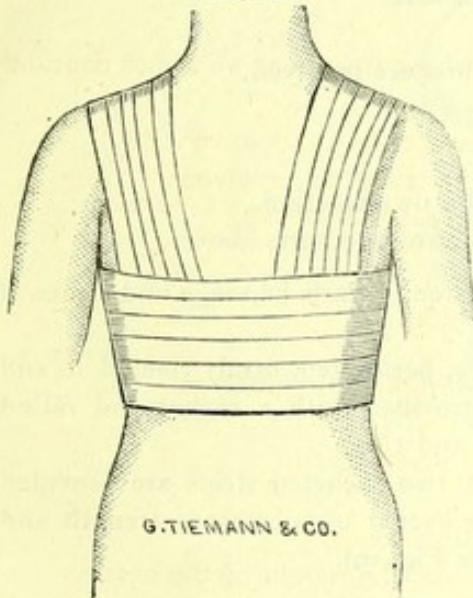
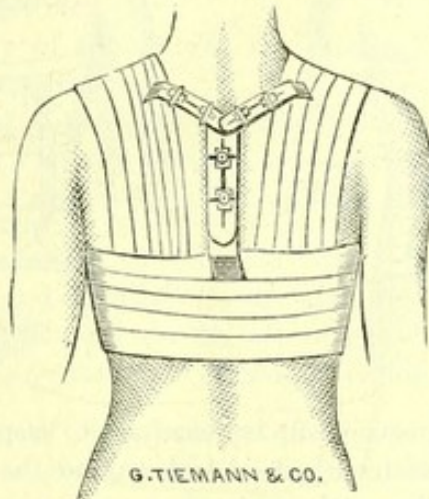


FIG. 14.



of the bracket (see Figs. 15 and 14). This is applied after the plaster has set, and afterwards accurately adjusted by means of the rachets. It is then bound down by more of the plastered bandage, and the whole apparatus, except the rachets, neatly covered with dry rollers (see Fig. 16).

FIG. 16.



In the majority of instances it is preferable to suspend the patient by an apparatus devised for the purpose by Prof. Lewis A. Sayre of New York during the application of the plaster base. After this has solidified, the bracket is applied and secured without the aid of the apparatus.

In case this can not be easily procured, one may readily improvise, using an ordinary whiffletree as a suspension bar, and strong cord well padded in the axillæ and above the neck, for straps.

Second Condition.

When the lower dorsal and lumbar vertebræ are involved.

Requirements: 1st. Exposure.

2d. Immobility,

3d. Facilities for extension or retraction.

4th. Relief from the weight of the parts above.

These are met by the employment of plaster of Paris bandage and either of two brackets devised by the writer.

The first is composed of two zinc plates, perforated, firmly riveted to and connected by a strong strip of vulcanite, provided with a ratchet and raised above the surface in the centre (see Figs. 17 and 18).

The second is like the first, except that two racheted strips are provided instead of one, and possesses the advantage over it of increased strength and the avoidance of the vertebral projection (see Fig. 19).

FIG. 17.

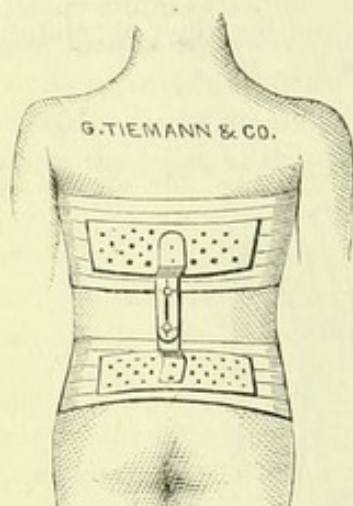
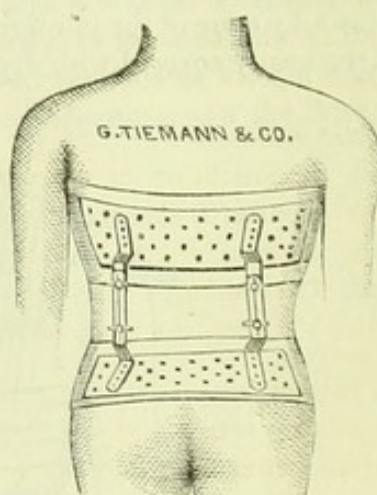


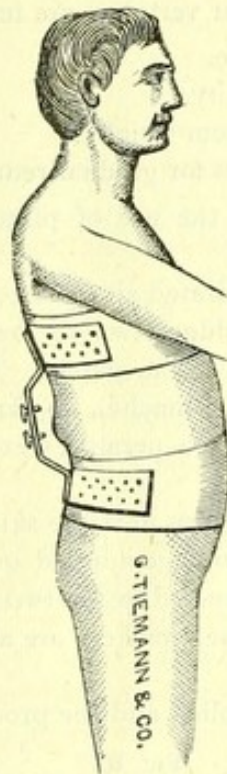
FIG. 19.



If the deformity is great, it will be necessary to suspend the patient during the application of the plaster which is laid around the chest above the site of the disease and around the pelvis below it.

When it has set, the bracket is applied, secured with fresh turns of the plastered bandage, and finally the whole surface is neatly covered with bleached muslin rollers, and the degree of extension adjusted by the rachets.

FIG. 18.



The practice of encasing the waist in plaster from the hips to the axillæ (well known as Sayre's method) is superior to most of the braces in use on account of its *immobility* and the *ease* with which it is carried by the patient even for a prolonged time, the weight being so well distributed.

Its *chief disadvantages* are:

- 1st. Impossibility of ascertaining the progress of the disease until the splint is removed.
- 2d. Impossibility of graduating the local pressure.
- 3d. The patient's form is obliged to remain in the position it assumed during the application of the plaster until the splint is removed.

The various braces, on the contrary, do not produce sufficient immobility without causing severe and unequal pressure upon some of the most prominent points of the trunk, but they possess the advantages of being *more easily regulated* and of allowing *inspection* of the diseased region.

By using the plaster of Paris bandage and the brackets originated by the writer, we are enabled to combine the advantages of the two, viz.:

- 1st. Immobility.
- 2d. Exposure.
- 3d. Facilities for extension or retraction, and yet avoid the disadvantages of each used singly.

Third Condition.

When both dorsal and lumbar vertebræ are involved.

Requirements: 1st. Exposure.

2d. Immobility.

3d. Relief from weight.

4th. Facilities for gradual reduction of deformity.

These are accomplished by the use of plaster of Paris and a compound bracket devised by the writer.

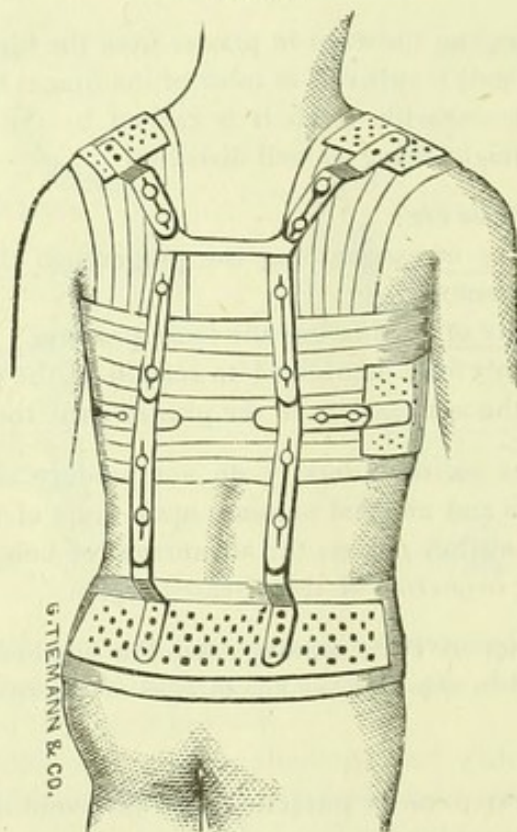
This is composed of five perforated zinc plates, two of which are adapted to the superior surface of the shoulders, two to the lateral surfaces of the chest, and one to the posterior surface of the pelvis. These are riveted to flat strips (preferably of vulcanite or papier maché), so arranged as to avoid the spine, and provided with eight rachets to permit extension or retraction in as many directions as possible (see Fig. 20).

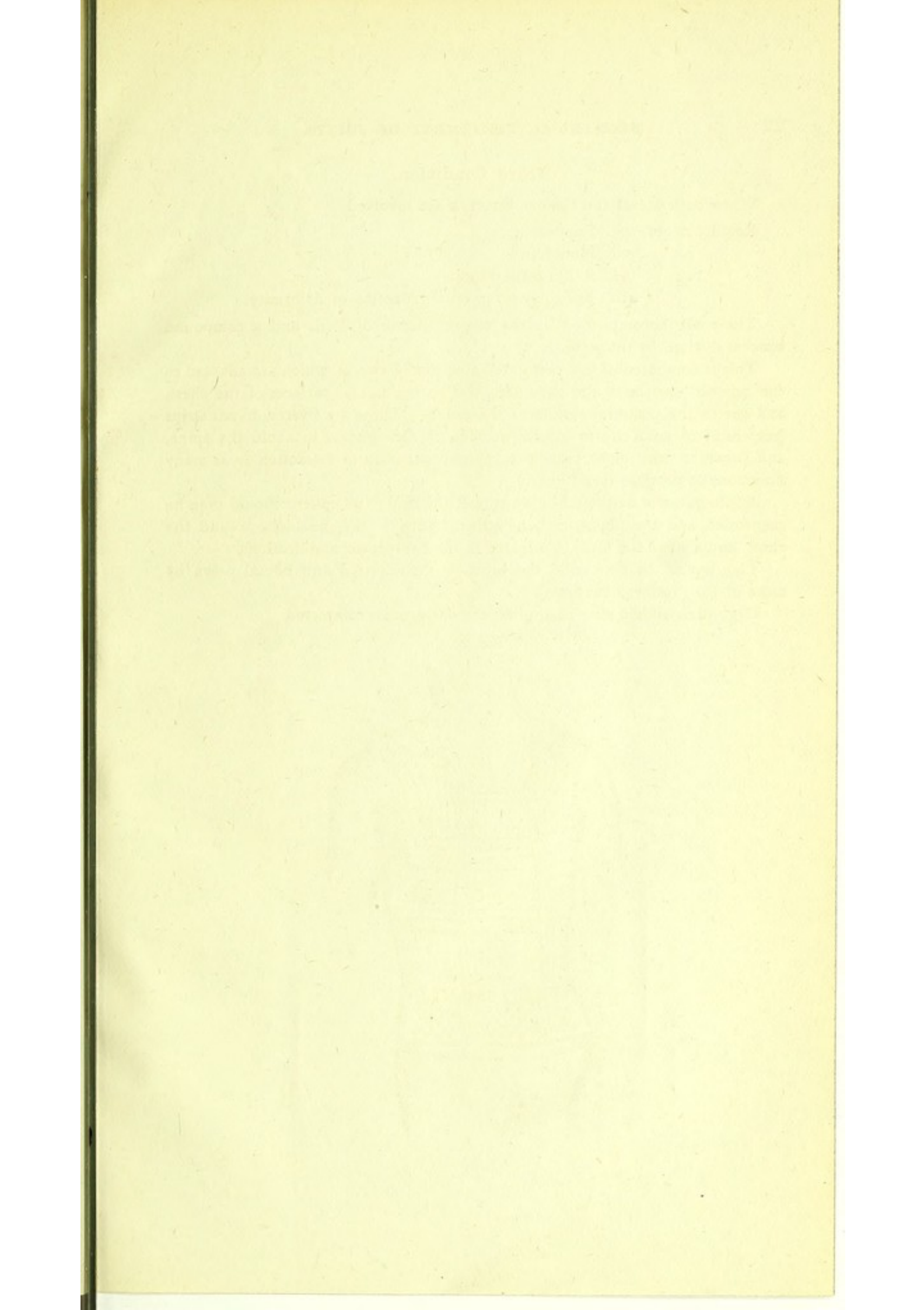
A thin gauze shirt should be worn next the skin; the patient should then be suspended, and the plastered bandage applied over the shoulders, around the chest, and around the hips, as directed in the two previous indications.

This having become solid the brackets are adjusted and bound down by more of the plastered bandage.

Dry rollers should now be applied and the process completed.

FIG. 20.



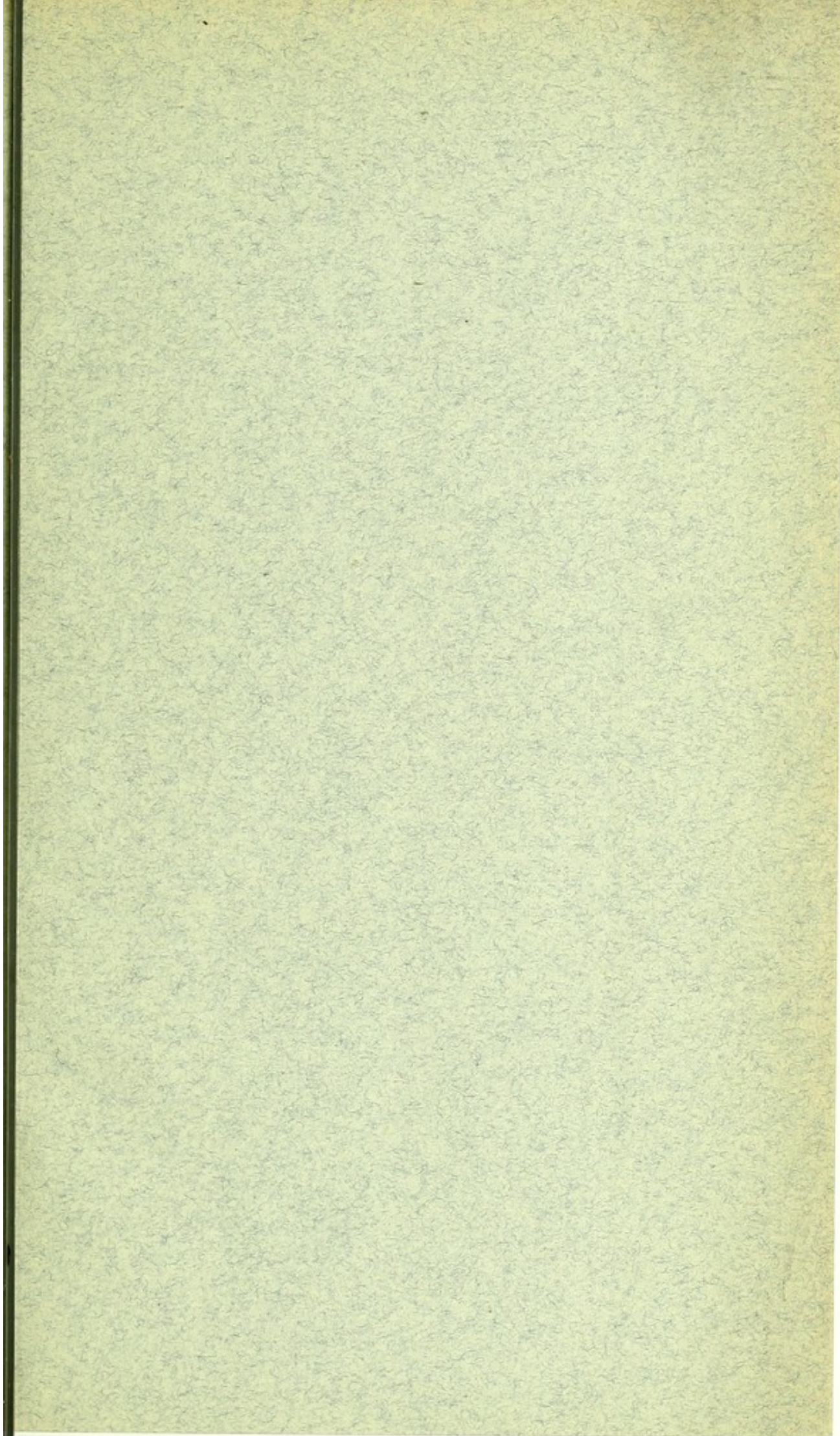


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