DOUBLE T OF THE TRUNK.

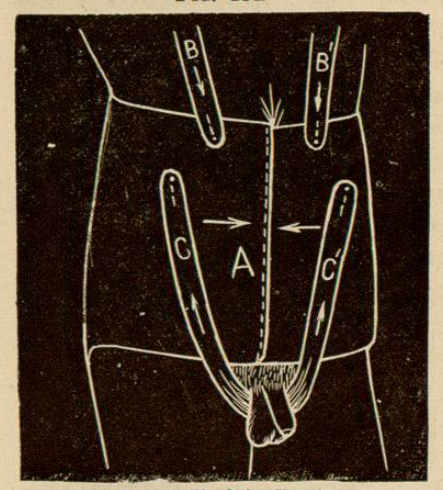
Description.—I. A large, quadrilateral portion of cloth to encircle the abdomen.

II Two strips, sufficiently long to pass over the shoulders, to act as "suspenders."

III. Two strips of the same length to be passed across the perinæum.

Application.—Having encircled the abdomino-lumbar regions with the broad quadrilateral portion of the bandage, pass the two portions, B, B′, of the bandage from the posterior to the anterior surface, and confine with pins to the main bandage. Then, pinning the remaining two strips to each lumbar region of the broad bandage, conduct them forwards, across the perinæum, and upwards to the abdomen, there to confine; having care to have crossed them upon the perinæum, so that the strip fastened upon the right of the patient, posteriorly, shall be fastened upon the left, anteriorly, etc.

FIG. 114.



Double T of the Trunk.

Uses.—As a dressing after paracentesis abdominis, or eviscerating wounds. Also, as a retainer of pubic and perinæal dressings.

NOTE.—For the *Spiral of the Abdomen*, see page 82 ; and for the *Circular-Quadrilateral of the Abdomen* (and *the Abdomen and Thorax*), *and the Dorsal Cervico-Sternal Triangle*, see page 83.

The *uses* of these bandages are similar to those for which the Double T of the Trunk is employed.

CHAPTER XI.

IMMOVABLE DRESSINGS.

This variety of surgical dressing has long been known to the profession. The Father of Medicine, Hippocrates, was quite conversant with the use of this apparatus, and used it in most cases of fractures. His teachings upon the subject seem to have been lost sight of, however, during the many centuries that have followed him, and so the introduction of this style of dressing, during our later years, has been accredited to the *reviver* as a new discovery. *Resurgam* is the epitaph of all things surgical, and the history of the succeeding ages is but the unfolding of the truthfulness of the prophecy. In other words, a modern inventor (so-called) can hardly hope to be anything further than a reviver of some forgotten principle.

The stiffening substance made use of by Hippocrates, was wax, rosin, and cerate, instead of the plaster-of-Paris, starch, dextrine, etc., made use of by the moderns. This was well rubbed into the bandage, and upon each succeeding turn of the applied roller, besides being applied to the compresses, packings, and even the limb itself.

Mr. Eaton, the English Consul at Bassora, introduced the knowledge of these hard plaster bandages to the English public in 1798, and Pirogoff, in 1854, during the Crimean war, used it very extensively.

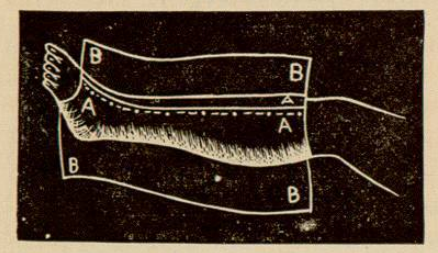
THE BAVARIAN PLASTER SPLINT.

Description.—Take two pieces of Canton flannel, of length sufficient for the injured member, and of width sufficient to overlap slightly when brought around the limb. Those for the leg would resemble the pieces of the leg of a stocking when it is cut vertically. The pieces should now be

stitched together at the back, one to the other, down the median line.

Application.—Spread the bandage out under the limb, so that the stitched portion will correspond to the back of it; carry, now, the upper piece about the limb, and fasten by stiches or pins, as you see in the wood-cut, Fig. 115, A, A, A. The member now being firmly held, an assistant mixes the plaster-of-Paris with about an equal bulk of water. This is then poured over the limb, when it is enwrapped with its covering, A, A, A, and evenly distributed over its surface. The edges B, B, B, B, of the other piece of flannel are then caught up and brought forwards around the limb, and confined by a suitable roller, or by straps. The plaster soon hardens, and then the edges of the bandage may be trimmed, the portion pinned or sewed can be unfastened, and you have then an excellent splint for a member. The stitching at the back plays the office of a hinge, thus facilitating its removal and application.

FIG. 115.



The Bavarian Plaster Splint.

Caution.—In this, and all other hard dressings intended to remain some time upon the limb, you must guard all unevennesses of the member, as the region of joints, etc., with abundant layers of cotton-wool, as the bandage is apt to contract slightly after its application, thus engendering gangrene. Generally it is best to wait three or four days after simple fractures, as of fibula or tibia, with no displacements, before the strictly immovable dressing is applied. In other cases ten or twelve days is the usual time recommended by authorities.

Uses.—As a support to a dislocated member, fractured bones, or separated cartilages; also in inflammation of joints when "absolute rest" is to be sought.

If there should be any undue swelling of the limb, or overmuch pain be caused by the pressure of the bandage, of course it should be at once removed. The following rules, from Hippocrates, are clear and decisive, and form an excellent guide for the surgeon in bandaging, either with the movable or immovable apparatus.

Quoting from *Περὶ Ἀγμῶν* § 5: "These are the signs if the patient has been properly bandaged: if you ask him if the limb feels tight, he says it does, but moderately so, especially about the seat of fracture. And these are the symptoms of a moderately tight bandage: for the first day and night the patient fancies the tightness does not diminish, but rather increases; on the next day there is a soft swelling [œdematous] in the hand, or foot, for this is a sign of moderate compression; but at the end of the second day the compression should feel less, and by the third day the bandage should seem loose. If any of these symptoms be wanting, you may conclude that the bandage is slacker than it should be; or, if any of them be in excess, you may infer the compression is more than moderate [*i. e.* hurtful]."

THE COMMON PLASTER DRESSING.

(*Pirogoff's Plaster Bandage.*)

Description and Application.—Having first well padded the limb with cotton-wool, envelop it with a flannel roller, neatly, evenly, and somewhat tightly. Then make your plaster ready, by getting it to the consistency of cream, by adding to it about an equal bulk of water (mixing up but one-half a teacup of it at a time); into this mixture dip the pieces of muslin (thin) that you have prepared, in suitable strips and squares, and begin laying them evenly around the limb. As soon as the plaster-mixture begins to harden in the dish, throw it out and mix up a new batch, continuing the application of the muslin strips, as before. You will find strips two to four inches in width, and long enough to go one and one-half times about the member, the most convenient size for applying, ex-

cept in the region of joints ; here squares, or oblong squares, are very serviceable. When you have the whole to the requisite thickness to furnish efficient support to the member, encase the whole dressing with a layer of the gypsum, by pouring a portion upon the limb enveloped with plaster-cloths, along its entire length.

The same cautions should be observed here as in the preceding variety, remembering this is a *permanent* dressing. The limb should be kept immovable during the application, and *very* quiet for some time afterwards, so that the plaster may not be cracked whilst hardening. After this, if the condition of the patient permits, the member can be swung in a "sling," and the patient permitted to walk or ride out, with little or no danger.

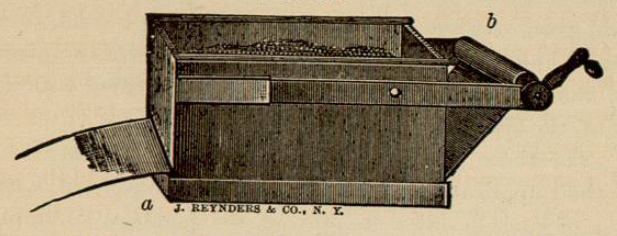
Uses.—These are similar to those just enumerated under the Bavarian bandage.

It might be well to notice that the *hardening* of the plaster can be *delayed* by the addition of a little stale beer, or size, to the mixture ; or it can be *accelerated* by the addition of sodic chloride (common salt), alum or by using warm water to "wet it up." It is best to paint the whole, after it is dry, with an application of glue, varnish or albumen, so as to prevent "chipping" of the exterior. This bandage is also made of of starch.

STARCH, OR PLASTER ROLLER.

Description.—Having a bandage (of the required length and width) of some meshy or loosely woven material, as cheese cloth, fill the meshes of it with the powdered gypsum, or starch, by rubbing it in, and then roll up firmly and evenly. A little machine has been invented for the purpose of facilitating the manufacture of this very useful form of dressing. This is shown in Fig. 116. It consists of a narrow box, with an opening in the end at *a*, through which the cloth is introduced, after the ravellings are carefully removed from the sides ; it then passes over a roller, so as to ensure an even dis-

FIG. 116.



tribution of the plaster overlying it, and out at the opposite end of the box to be wound upon the roller, *b*. A cover fits over the box when in use, and when not in use the outside roller and the crank can be detached, and the crank arms shoved back on the box, so as to make an easily portable apparatus. The plaster, in all these bandages, should be *fresh*, and *finely ground ;* otherwise there will be difficulty in their properly hardening. They can be rolled up in quantities, if you desire, if you will keep them excluded from the air, in a tight tin pail, and covered over with loose plaster-of-Paris.

In this form, the plaster rollers may be made five or more inches in width, and then cut to the desired width when wanted for use.

Application.—When you are ready for applying the rollers above described, dip them into a pail of warm alum water ; the alum increases the quick-setting, or hardening, of the plaster-of-Paris. There should be about an ounce of alum to the pint of warm water. The bandages should soak a while in this, then the water should be *thoroughly* squeezed out from the roll, when it is ready for application to the limb of the patient. Have the limb protected with a thin layer of cotton-wool, then apply the wetted bandage quickly, though smoothly and evenly about the member, just as you would a common "spiral," or reversed bandage, to the same member. It quickly hardens, and you have then quite a firm casing for your patient's limb. It is not quite so secure or firm as the Starch or Plaster Dressing just described, yet is very useful, as it is so much lighter.

Varieties.—The roller may be prepared as above, and on each succeeding turn of it about the member, it may be freely

brushed over with the plaster-cream, starch, gluten, silicate of potash, glue, or whatever hardening substance is used, as in the method employed by Hippocrates when using his compound of rosin, wax, and cerate; at last, brush the whole over with a thin layer of the substance made use of.

In all of these "hard" bandages, it is well, a day or two after their application, to give the whole a coating of varnish, gluten, or gum, in order to prevent the bandage "chipping." This form of *plaster* dressing was introduced in 1854 by the Dutch surgeon Maythysen.

The *Bandage of Scultet* has also been made use of to make the "immovable dressings;" but it is not secure enough to come into general use. It is the parallel strips seen at B, Fig. 99, and is to be similarly applied.

The Silica Bandage is now considerably used. It dries more readily than the gypsum, and possesses the advantage of being soluble in water, hence quite easily removed.

The Paraffin Bandage of Mr. Tait is recommended for open wounds, as it does not absorb the secretions as do the other varieties of dressings. The substance is kept melted by having its container in hot water. The roller is to be passed through it as it is applied.

FENESTRATED IMMOVABLE DRESSINGS.

Description.—Any of the preceding varieties of immovable bandages may have openings left in them through which the secretions may find ready exit.

It would be well to coat the margins of the fenestræ, for some distance around them, with paraffin, so as to prevent the absorption of the fluids by the dressing. If the paraffin should happen to crack, it can be easily mended by passing a hot spatula over it.

Dr. Pennington suggests, as a method for preventing the discharges from passing between the skin and the hard dressing, the application of a piece of oil-silk beneath the wound, causing it to adhere to the skin by the free use of ordinary

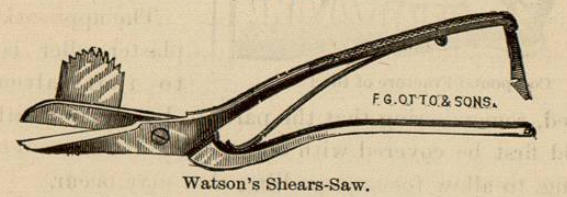
collodion. The oil-silk is then drawn out over the edges of the fenestræ, and so furnishes an easy egress for the fluids from the wound, at the same time protecting the bandage. The oil-silk is secured by first brushing over the skin the ordinary collodion, and then applying the oil-silk, and finished by applying another coat of collodion on the surface of the oil-silk.

Uses.—These are applied in cases of compound fractures, open or suppurating joint-troubles, where a discharging surface would otherwise be covered in by the dressing.

REMOVING "IMMOVABLE" DRESSINGS.

For assisting in the removal of these various hard dressings, shears, saws and knives, of sundry patterns, have been devised. Probably as handy a tool as any is *The Shears-saw*, designed by Dr. Watson, of Jersey City, and which is shown in Fig. 117. It consists of Henry's shears slightly modified, *i. e.*, made much lighter, less curved, and blades of equal length, with a convex saw-blade attached to the upper blade. As most of the sawing is done on the pull, the teeth are pointed backward. In using this instrument for removing plaster bandages, you make two parallel incisions with the saw about one-third of an inch apart, on any convenient aspect of the dressing, through the plaster to the muslin from end to end of the plaster. The strip of plaster between these incisions is easily removed by using the lower blade of the shears as an elevator, after which the muslin is readily cut through with the shears.

FIG. 117.



Watson's Shears-Saw.

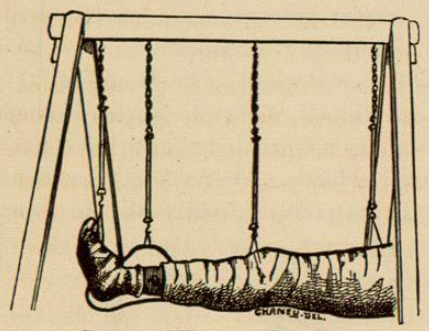
Nitric Acid.—Dr. F. H. Murdock, of Bradford, Pa., says a very convenient way to remove a plaster-of-Paris bandage is as follows: Take a strong solution of nitric acid, and by means of a camel's hair pencil paint a strip across the bandage at the

most desirable point for division. The acid will so soften the plaster that it may be readily divided by means of an ordinary jack-knife.

TREATING COMPOUND FRACTURES.*

Plaster-of-Paris is a valuable adjuvant in the treatment of compound fractures. The plaster cast, with fenestrated openings opposite the site of the wound, is a decided improvement over the movable splint; yet this has its disadvantages, owing to the fact that the discharges from the open wound soften the plaster and weaken its support, necessitating its re-application before the union of the bone takes place. This may be obviated by using paraffin or oil-silk, as just described, or by the device shown in Fig. 118.

Fig. 118.



Compound Fracture of the Leg.

The application of the plaster-roller is similar to that already described, remembering that the parts to be covered with plaster should first be covered with one or more thicknesses of cotton batting, to allow for any swelling that may occur.

The first step to be taken before the application of the plaster, should be a thorough examination of the conditions of the fracture (the patient being, of course, under the influence of an anæsthetic). We are now ready for the application of the plaster-bandage. It should, in case of injury of the lower extremity, extend well up above the knee, also on the foot, leaving that part where the wound exists perfectly free, as in Fig. 118. As soon as the plaster is solid, which will be almost immediately, you can, by the aid of your assistant, make proper extension and counter extension, with the splints, A and B, Fig. 119, which can be adjusted and fastened with a few turns of a narrow, wet plaster-bandage. The splints, you observe, consist of properly shaped iron bars of sufficient strength to support the weight of the leg, and not permit of bending. To each end is fastened a properly shaped piece of perforated tin, or zinc. Any blacksmith can make these splints from a model that you can make yourself by taking strips of tin and bending them to the shape to which you wish to apply them. You must allow for sufficient space between the iron bars and the leg to apply an antiseptic dressing.

* This is altered and condensed from a pamphlet by Professor H. O. Walker, M. D., of Detroit, upon the subject of Plaster Dressings.

Fig. 119.

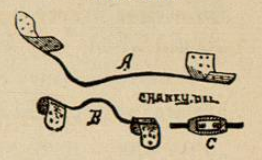


Fig. 118 gives a representation of the manner of suspension consisting of a light-made saw-horse; or, what may be much better, a piece of board of proper length, one inch in thickness and two in width, into which is fastened, at either end, a screw-hook and suspended to the ceiling. On its under surface three or more hooks should be screwed for the fastening of small chains, and these again fastened equably to fine wire hooks, which have been incorporated in the plaster. You will observe in the cut that rubber tubing has been used for the suspension; this adds very materially to the comfort of the patient.

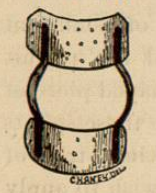
This apparatus makes an immovable dressing, which can remain on until the case is cured, giving comfort to the patient, allowing him to be moved from the bed to the chair if desired, and certainly reduces the labor of the surgeon to a minimum. If you desire to increase or decrease the amount of extension, this can be done by incorporating in the bars, above and below the joint, the extension screw C, Fig. 119.

In the Treatment of Hip-joint Disease, plaster-of-Paris proves of value, especially in the first stage where absolute rest is desirable, and is best applied while the patient is suspended by a Sayre's apparatus (see page 137), the well foot standing on a chair, and the other supported or extended by an assistant. The plaster extends from the ankle to the umbilicus,

and is made firm at the trochanter by interlacing perforated tin strips; or, what is still better, thin strips of hickory or any elastic wood, well soaked for a few hours before using.

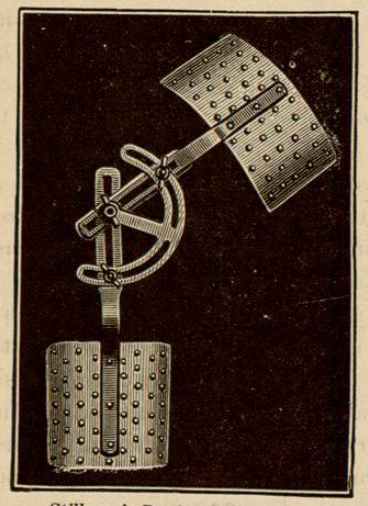
Where exposure or extension of the joint is necessary, the apparatus depicted in Fig. 120, which consists of curved bars of iron attached above and below to proper sized pieces of perforated tin, should be applied over the joint, and the whole held in place by a few turns of a wet plaster-bandage.

Fig. 120.



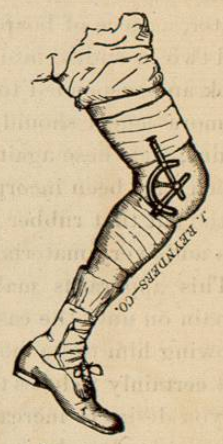
Where motion, as well as extension, is desired, the application of Stillman's "Sector Splint" serves a good purpose (see Figs. 121 and 122). It admits of the patient's walking about, and also allows: 1. Extension at any angle with motion. 2. Extension at any angle with fixation. 3. Fixation at any angle. 4. Motion, complete or limited, constant or occasional. 5. Exposure of surface about joint, admitting compression, elastic or otherwise, hot and cold applications, blisters, dressing and easy inspection. 6. Motion, extension, and elastic tension by the addition of appropriate rubber cords.

Fig. 121.



Stillman's Section Splint.

Fig. 122.



Same as Applied.

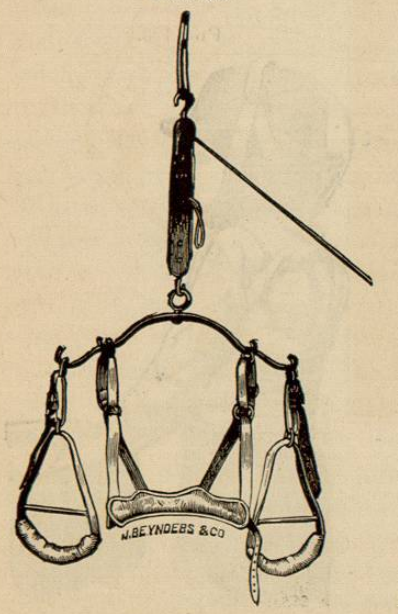
These "Sector Splints" may be applied to either the hip or knee, and devices of a similar character are applicable for the treatment of a majority of joint troubles having for their basis of attachment plaster-of-Paris.

SAYRE'S PLASTER BANDAGE FOR THE SPINE.

To Professor Lewis A. Sayre, M. D., of New York City, the medical profession is under more obligations than to any other man for the introduction of the use of plaster-of-Paris as a curative dressing for spinal and joint troubles. His method of application of the "Plaster-of-Paris Jacket" for spinal troubles is given herewith as condensed from the *Transactions of the American Medical Association.*

Description.—The patient is to be suspended by means of an apparatus, prepared for the purpose (see Fig. 123), consisting of a curved iron bar with hooks at either end, from which pass straps that are attached to pads that go through the axillæ, and also under the occiput and chin, and are capable of being made shorter or longer, according to the length of the patient's neck. The iron bar is suspended from the ceiling by means of a compound pulley, through which gradual extension can be made until the patient is drawn up so that the feet swing clear from the floor.

Fig. 123.

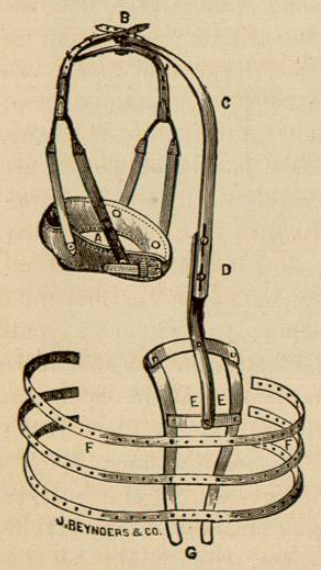


Previous to the suspension, however, a thin flexible leaden strip should be laid upon the spinous processes for the entire length of the spinal

column, and bent into all the sinuosities, so that it may take a perfect outline of the deformity. This strip is then laid upon paper and its outline marked with ink, and we have a perfect mathematical outline of the irregularities along the spinal column. After the patient has been suspended, the same leaden strip should again be applied along the spinous processes, as in the first instance, and another pattern made upon paper, by the side of the first. We thus have a means by which comparison can be made, and so are able to determine exactly what changes have taken place in the curve.

The shirt, which should be woven, or knit, without seams, and tightly fitting the body, is next pulled down, and an opening made in front and rear, through which a ribbon or piece of bandage is passed, for the purpose of holding in place a handkerchief placed in the perinæum, and at the same time making the shirt fit the hips exactly; for the tighter the shirt fits, the less number of wrinkles there will be in it.

FIG. 124.



"Jury Mast."

FIG. 125.

"Jury Mast" applied, lateral view.

Application.—With the roller bandages, previously prepared (see page 130) commence by applying one just around the smallest part of the body, going to the crest of the ilium, and a little below it, and lay it around the body smoothly, *but do not draw upon it at all*, having previously placed quite a thick layer of cotton-batting over the stomach, withdrawing the batting on the hardening of the whole. When applying, unroll the bandage with one hand, while the other follows and brings it into smooth, close contact with all the irregularities of the surface, over the ilium, and dipping into the groin, then over the abdomen again and dipping into the groin again, and so on, from below upwards, in a spiral direction, until the entire trunk has been inclosed from the pelvis to the axillæ. After one or two thicknesses of bandage have been laid around the body, in the manner described, narrow strips of perforated tin are to be placed, parallel with each other, upon either side of the spine, from two to three inches apart, and in numbers sufficient to surround the body, and another plaster roller carried around the body, covering them in the manner in which the first bandage was applied. These few strips strengthen the bandage, and obviate the necessity of increasing its weight by the application of a large amount of plaster.

If there are any very prominent spinous processes, which at the same time may have become inflamed, in consequence of pressure produced by instruments previously worn, or from lying in bed, it is well to guard such places by means of little pads of cotton, or cloth, or little glove fingers filled with wool, which is elastic, which are to be placed upon either side of them before applying the bandage.

Another suggestion, which I have found to be of practical value, is to take two or three thicknesses of roller bandage, three or four inches long, and place them over the anterior superior spinous process of each ilium. These little pads are to be removed just before the plaster has completely set, consequently leaving the bony part free from pressure after the soft parts have shrunken under the influence of the continued pressure produced by the plaster-dressing. It is also well, just

before the plaster has set completely, to place one hand in front of the ilium and the other over the buttocks, and squeeze the cast together, so as to increase this space over the bony prominences. In a very short time the plaster becomes sufficiently "set," so that the patient can be removed from the suspending apparatus and laid upon his face, or back, on an air-bed, there remaining until the hardening process is complete. A hair mattress answers a very good purpose, but the air-bed is preferable, especially if there is much projection of the spinous processes, or of the sternum. If, however, the plaster-rollers have been dipped in warm alum-water before applying, the cast will be usually solid enough, by the time you are done, to admit of the patient's walking about.

"JURY MAST."

Description.—In case of disease of the cervical and upper dorsal vertebræ, Dr. Sayre uses the head-suspension (shown in Figs. 124 and 125), or "Jury Mast." This consists of a steel rod, secured to two pieces of malleable steel which are placed on either side of the spine, and which can be bent so as to accurately fit any curve in the plaster-jacket that has already been applied to the entire trunk of the diseased patient, and retained accurately in position by having attached to them three narrow strips of perforated tin, which should be long enough to very nearly encircle the entire trunk, leaving only a central line of an inch or so in width, in front of the body, for the purpose of cutting or sawing down the plaster-jacket whenever it may become necessary to remove it. The central bar is attached, by two cross-bars, to the upper portion of this malleable framework, and is curved over the top of the head to the vertex; and to its extremity is attached a swivel bar, three to five inches in length, from which the head is suspended by adjustable straps secured under the chin and occiput. This upright bar is made in two pieces running into each other at the straight portion behind the neck, and capable of being extended to any desired length, and firmly secured in position by screws.

Application.—To apply the apparatus, the patient is suspended in the usual way, from the axillæ, chin, and occiput, and the plaster-bandage applied, as usual, over a tight-fitting knit or woven shirt. After the bandage has been accurately applied, and the plaster has hardened, or "set," the patient can be permitted to stand up, when the apparatus for suspending the head is to be applied in its proper position, over the back of the plaster-jacket, and the lower portion of it bent and moulded until it accurately fits all its various curves. The loose tin strips, being very flexible, can then be smoothly moulded around the jacket, which has already been applied to the trunk, and another plaster-bandage, having been wetted in alum-water, is to be carefully and tightly applied over the apparatus, and the jacket first applied, in sufficient number of layers to make it perfectly secure. The tin being rough and perforated, a sufficient amount of plaster will be incorporated into its holes and meshes to prevent any possibility of displacement. This makes a secure point of support from the pelvis and trunk from which the head can be sustained by properly adjusting the movable rod and securing it by screws.

Its practical application is seen in Fig. 125, and the ease and comfort to the patient, together with the perfect freedom of mobility to the head, make it a very satisfactory apparatus.

Variety.—Professor H. O. Walker, of Detroit, has made a modification of this "Jury Mast," that is detailed in the following description, condensed from an article in *Leonard's Illustrated Medical Journal.*

In the first place he directs the hair to be cropped short, and then applies a "Plaster Jacket." The plaster jacket in itself is of no benefit whatever save as it serves the purpose of a foundation for the superstructure to be built upon. After allowing the jacket to dry for a few minutes, the patient is seated on a stool, and the head suspended to a hook in the ceiling by a four-tailed bandage, somewhat after the manner of a Barton's fracture bandage for fractured jaw; that is, by first placing a bandage under the jaw, and allowing it to meet several inches above the head, and another in front

FIG. 126

Side View.

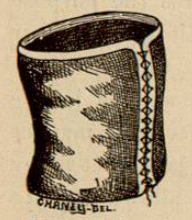
of the jaw, passing back to the occiput, where it is pinned or sewed, then passing the ends of the bandage up to meet those from the front and then up to the hook, using just enough of extension to keep the body erect and patient perfectly comfortable. The surgeon then winds around the neck and head one thickness of glazed sheet wadding, for protection against any irregularities in the plaster-bandage. (The bandages should be narrow, about one-and-a-half inches in width, as it is necessary to reverse quite frequently in this application).

After applying two or three thicknesses, he interlaces perforated zinc strips, half inch in width, extending around the head, down the back and in front, so that a firm support for the head is well attached to the jacket below. The only parts exposed are the top of the head and that portion of the face which you see exposed in Fig. 126.

THE "SILICA JACKET."

The Silica Jacket, as first proposed by Wolff, of Berlin, can be applied in a similar way to the plaster-of-Paris. Some prefer the silica for the jacket, as the silica is readily soluble in water, and chipping is more easily controlled.

FIG. 127.



"Silica Jacket."

After it has become thoroughly hardened, it may be divided over the sternum, as shown in Fig. 127. It is then removed with the shears-saw (Fig. 117), a row of eyelets punched down each divided border, the shell re-lined with cotton-wool, and then the whole re-applied to the patient's body, and laced up.

A layer of cloth wet with the silica should

be applied over the roughened edges of the jacket where it has been cut apart, so as to render the whole as smooth as possible.

This should also be done in all cases of the plaster casts of the limbs whenever they are cut apart, and preserved for a re-application.

Manila Paper Splints.—Dr. R. O. Cowling has suggested taking common manila paper, soaking it well in starch, then carefully moulding it to the parts when it is wet, as a substitute for the starch, plaster, or silica roller. It makes a more serviceable dressing, oftentimes, than pasteboard alone, or even the patent felt splint.

It is well to finish up *all* these various hard dressings with egg albumen, or varnish, so as to reduce the chances of chipping or crumbling to a minimum.