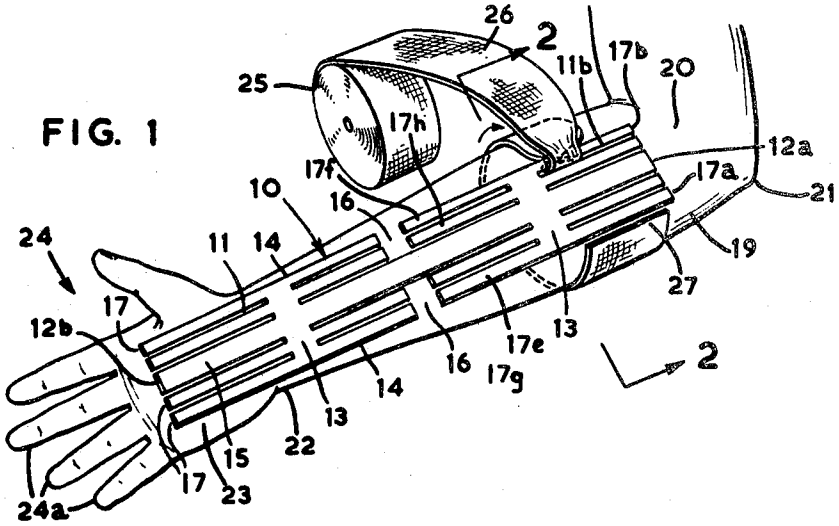
June 25, 1968 F. WHYTE 3,389,700

METHOD OF FORMING SURGICAL CAST, AND SPLINT THEREFOR

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FIG. 1



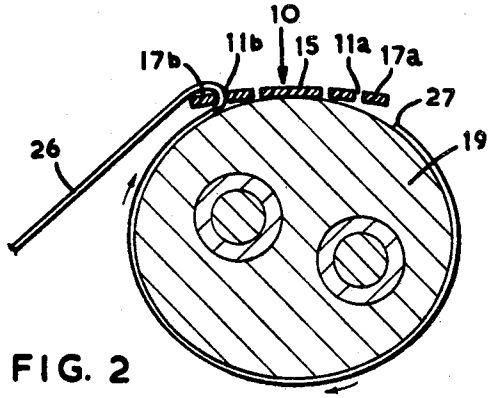


FIG. 2

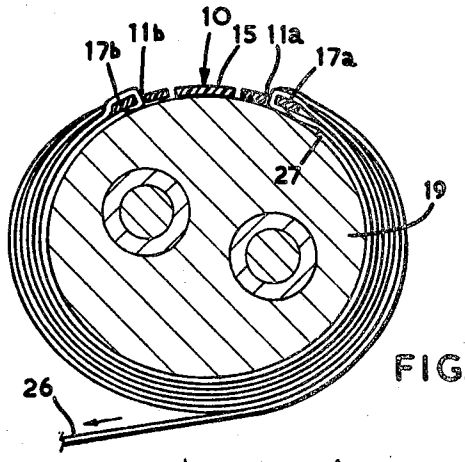
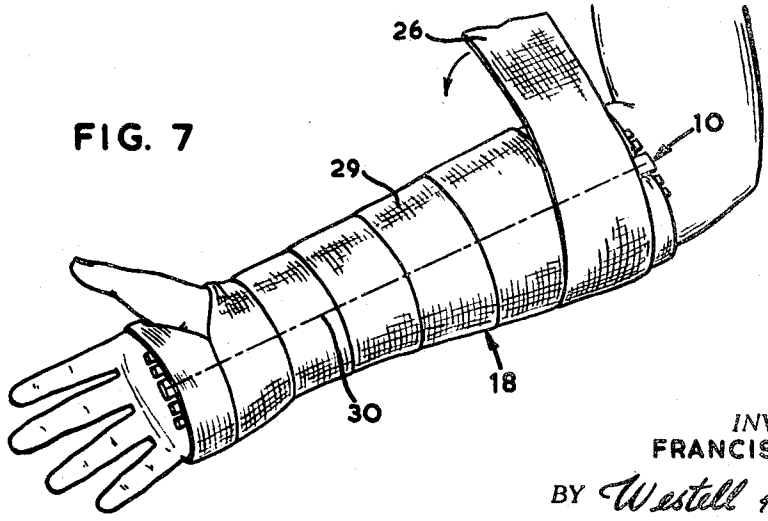


FIG. 3

FIG. 7



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METHOD OF FORMING SURGICAL CAST, AND SPLINT THEREFOR

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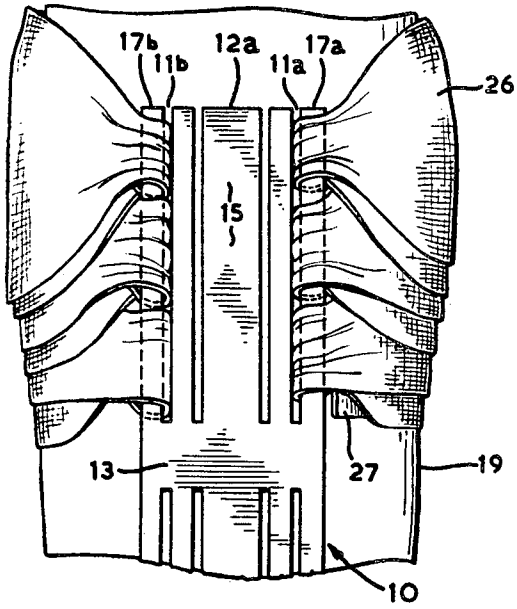


FIG. 4

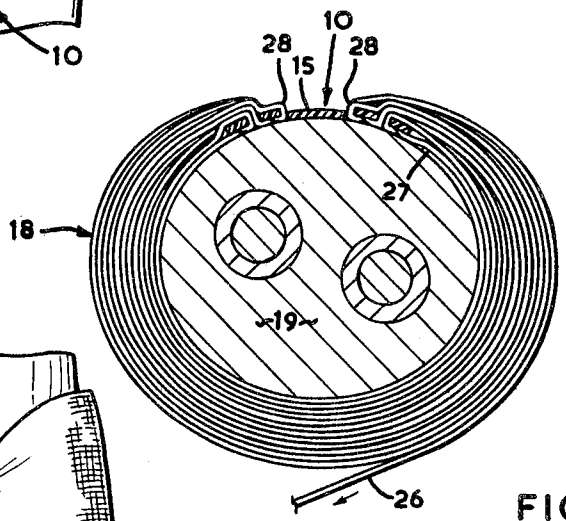


FIG. 5

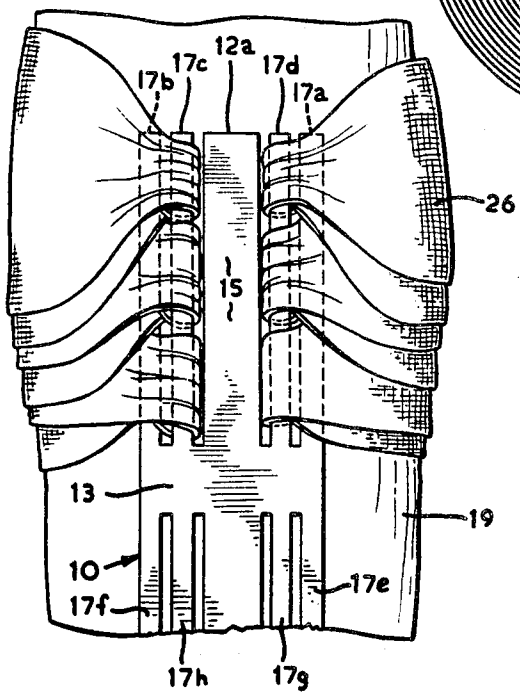


FIG. 6

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3,389,700

METHOD OF FORMING SURGICAL CAST, AND SPLINT THEREFOR

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9 Claims. (Cl. 128—91)

ABSTRACT OF THE DISCLOSURE

A method and device for forming a surgical cast, and a cast itself, in which the set bandage material forms a circumferentially discontinuous wall rendered continuous by a longitudinal connecting splint having tongues symmetrically disposed about a central rib, the bandage material being looped over the tongues. The splint is severable to remove the cast.

The present invention relates to a splint for use in a surgical cast of the type using ribbon bandage material impregnated with a hardenable substance such as plaster of Paris.

The most common type of surgical cast used to immobilize a limb or other body portion, for instance in setting a bone fracture, is a plaster cast. This type of cast is formed by taking a plaster of Paris bandage (defined as a cotton bandage impregnated with plaster of Paris), immersing the bandage in water, wrapping the bandage in multiple layers about the limb to be immobilized, and allowing the plaster to set whereupon a rigid laminated structure is obtained.

While this type of cast has proved to be economical and effective, its use is attended by the difficult problem of subsequent removal after its purpose has been served. In order to detach the cast from the limb it is necessary to cut through the cast along its entire length and then laterally separate the abutting edges formed by the cut. Because of the thickness and solidity of the cast, the cutting operation requires use of a special type of electric saw or other cast cutter which must be kept on hand for the purpose.

Numerous innovations in the structure of this type of cast have been developed to overcome the problem of its removal while maintaining the rigidity of the structure when in use. In one type of cast a zipper or a separable hinge unit is incorporated longitudinally in the wall of the structure but this development is complicated and expensive since it requires a special construction for the body of the cast itself. In another type of structure a strip cutting device is embedded in the wall of the cast adjacent its inner surface and, when pulled outwardly, will sever the cast longitudinally. In still another variation of plaster cast structure a longitudinal backing strip is embedded in the cast adjacent its inner surface to provide a guard plate or a guide channel adapted to co-operate with a conventional cast cutting instrument. These latter devices facilitate cutting through the cast but do not eliminate the cutting problem itself.

It is an object of the present invention to provide a method of forming a surgical cast which is easily removable after use.

It is a further object of this invention to provide a splint, for use with a surgical cast, which is simple and inexpensive to produce and enables easy removal of the cast by surgical equipment ordinarily at hand.

Still another object of the present invention is to provide a surgical cast, using impregnated ribbon bandage material, which has a circumferentially discontinuous rigid wall of bandage material the edges of which are connected by a splint which is easily severable.

In its broadest aspect the invention resides in a method of forming a surgical cast on a body portion to be immobilized, comprising the steps of: placing on the surface of the body portion a splint of form retaining severable sheet material having a longitudinal central rib and a plurality of tongues symmetrically disposed on each side of, and parallel to, the rib; interlacing with the splint a ribbon bandage impregnated with hardenable material, the interlacing being effected by looping the bandage about one of the tongues, passing the bandage about the body portion, looping the bandage about a second tongue symmetrically disposed with respect to the first tongue, and advancing the bandage in like manner along the splint; and setting the resultant cast structure.

In another aspect the invention resides in a splint for use with impregnated ribbon bandage material to form a surgical cast. The splint comprises an elongated strip of form retaining severable sheet material. The strip has a longitudinal central rib together with a plurality of tongues extending from a transverse support and symmetrically disposed on each side of the central rib and parallel to it. Each tongue is adapted to support a ribbon of impregnated bandage material looped transversely over it whereby the bandage may be interlaced with the strip to form a cast having a circumferentially discontinuous rigid wall of bandage material the juxtaposed edges of which are connected by the splint.

The invention also contemplates a cast formed by the above mentioned splint using the above mentioned method of construction.

An example embodiment of the invention will now be described with reference to the accompanying drawings in which:

FIGURE 1 is a view in prespective of a splint according to the invention, applied to a limb and showing the initial step of interlacing an impregnated bandage to form a cast;

FIGURE 2 is a view in cross-section taken along the line 2—2 of FIGURE 1;

FIGURE 3 is a view in cross-section similar to FIGURE 2 but showing the bandage windings completed about one pair of symmetrically disposed tongues;

FIGURE 4 is a plan view of the structure shown in FIGURE 3;

FIGURE 5 is a view in cross-section similar to FIGURES 2 and 3 but showing the completed bandage windings along one section of the splint;

FIGURE 6 is a plan view of the cast structure shown in FIGURE 5; and

FIGURE 7 (shown on the sheet containing FIGURES 1 to 3) in a view in perspective showing application of the single outer covering layer of the completed cast.

The embodiment of the invention shown in FIGURE 1 of the drawings consists of a splint comprising an elongated rectangular strip **10** of sheet material, preferably polyethylene. Strip **10** is molded or cut to provide longitudinal slots **11** which are arranged in tandem along the length of the strip and in parallel rows across the width of the strip. Each slot **11** is of a width sufficient to receive a ribbon of bandage material inserted laterally into it. In the illustrated embodiment slots **11** are cut inwardly from each end **12***a* and **12***b* of strip **10** approximately one-fifth the length of the strip. Leaving a short uncut portion to act as a transverse support **13**, the cutting of slots **11** is continued approximately two-fifths the length of strip **10** spanning its central transverse axis. Slots **11** are spaced inwardly from each side edge **14** of strip **10** in two parallel rows, leaving a central rib **15** extending the length of the strip. At its central transverse axis a portion of strip **10** on each side of rib **15** is removed to form gaps **16**. The resultant structure as shown in FIGURE 1 is a splint having a central rib **15**

with transverse rows of tongues **17** symmetrically disposed about the rib and parallel to it, the tongues being in the form of cantilevers integral with transverse supports **13**. It will be seen that groups of tongues **17** are longitiudinally aligned to extend the length of strip **10** while each tongue is readily accessible at its free end for bending outwardly normal to the plane of strip **10**.

To form a cast **18** (see FIGURE 7), strip **10** is applied to the portion of that limb or portion of the body to be immobilized. In FIGURE 1 the splint is shown placed on the anterior surface of a forearm **19** with one end **12***a* of strip **10** adjacent the pit **20** of the elbow **21** and the other end **12***b* of the strip extending over the wrist **22** onto the palm **23** of the hand **24** and reaching the base of fingers **24***a*.

A roll **25** of plaster of Paris bandage **26**, comprising a ribbon of cotton bandage impregnated with plaster of Paris, is dipped in tepid water and held until the ensuing bubbling ceases. The bandage is then removed from the water and the excess water is squeezed from it.

Bandage **26** is wound on forearm **19** by placing end **27** of the bandage on forearm **19** adjacent an outer tongue **17***a* of strip **10** nearest end **12***a* of the strip lying adjacent elbow **21** at the proximal end of forearm **19**. Bandage **26** is then passed across the posterior surface of forearm **19**, say in a clockwise direction, to meet the outer tongue **17***b* of strip **10** symmetrically disposed with respect to tongue **17***a* about rib **15**. Bandage **26** is then passed under tongue **17***b* and up through adjoining slot **11***b* by passing the ribbon of bandage laterally into the slot from end **12***a* of strip **10**. Before passing bandage **26** into slot **11***b* it is crossed, that is twisted 180 degrees, to reduce its width, the cross portion lying beneath tongue **17***b* and the width of bandage in the slot being approximately one-third the length of tongue **17***b*. After bandage **26** has been looped transversely about tongue **17***b* it is pushed along slot **11***b* to bear against transverse support **13**. This first winding stage is shown in FIGURES 1 and 2 of the drawings.

To continue forming the cast **18**, bandage **26** is again passed across the posterior surface of the forearm, this time in a counter-clockwise direction, and similarly engaged with tongue **17***a*, passing in crossed fashion beneath tongue **17***a* and up through adjoining slot **11***a* adjacent support **13**.

The above mentioned procedure is repeated three times until bandage **26** is looped on three occasions through each tongue **17** and seven layers of bandage **26** are formed about forearm **19**. This stage of the formation of the cast is shown in FIGURES 3 and 4 of the drawings.

The next stage in the formation of cast **18** is to repeat the procedure outlined above but having bandage **26** engage inner tongues **17***c*, **17***d* positioned between central rib **15** and outer tongues **17***a*, **17***b* respectively. Cast **18** formed to this stage is shown in FIGURES 5 and 6 of the drawings with thirteen layers of bandage **26** circumscribing forearm **19**.

Bandage **26** is now advanced diagonally across the posterior surface of the forearm to the next transverse row of parallel tongues **17** and the same steps are repeated, the bandage being first interlaced by three loops with each symmetrical outer tongue **17***e*, **17***f* and subsequently interlaced by three loops with each symmetrical inner tongue **17***g*, **17***h*. In looping about this second row of tongues **17**, bandage **26** is passed into slots **11** through gaps **16** on either side of central rib **15**.

When the four rows of tongues **17** have been interlaced in the above manner, complete cast **18** has been formed with thirteen layers of plaster of Paris bandage. As best seen in FIGURE 5, cast **18** is circumferentially discontinuous with its longitudinally discontinuous edges **28** spaced apart by central rib **15** of strip **10** and interconnected by the strip. To finish cast **18** it is preferable to form one additional wrapping layer **29** of bandage **26** by winding the bandage completely around the entire cast as shown in FIGURE 7.

After completion, cast **18** is polished with water in the conventional manner and then allowed to set.

The nature of polyethylene enables it to be easily cut with an ordinary instrument such as a pair of nurse's dressing scissors. Thus when the time comes to remove the cast it may be cut by these scissors along central rib **15**, both the central rib of strip **10** and the single wrapping layer **29** of bandage **26** being severed longitudinally along the cast as indicated by broken line **30** in FIGURE 7. After the cut has been completed cast **18** is pulled open by spreading it laterally at cut **30**.

It will be appreciated that the type of material used for strip **10** may be varied but polyethylene is preferred. Similarly the dimensions of strip **10** and the number of tongues **17** may be varied according to circumstances. For an adult forearm splint an 11½" strip 1¾" wide and 3/32" thick will retain its form adequately for the purpose when slotted to form four transverse rows having four tongues **17** in each row. A 3" width bandage is most advantageously employed with a splint of these dimensions. Such bandages are usually provided in fifteen foot rolls and if one roll is not adequate for the purpose then a further roll may be brought into use, the end of the first roll and the beginning of the second roll being overlapped.

Preferably the thickness of strip **10** and the lateral width of tongues **17** should be such that flexibility of the tongues is achieved in a direction normal to the plane of the strip but is inhibited in the plane of the strip. In other words, tongues **17** should be bendable upwardly to allow bandage **26** to pass beneath them but should be otherwise relatively rigid. This condition can best be achieved by forming slots **11** so that the width of each tongue **17** is a multiple of the thickness of strip **10**.

I claim:

1. A splint, for use with a plaster of Paris bandage to form a surgical cast, comprising a strip of form-retaining severable sheet material having a central longitudinal rib, at least one support transverse to said central rib and being located intermediate the ends thereof, and a plurality of cantilevers extending laterally from each side of said support to provide at least two pairs of tongues symmetrically disposed about each side of said central rib parallel thereto, said tongues being spaced one from another and from said central rib to form slots, each tongue being adapted to support a ribbon of a plaster of Paris bandage material looped transversely thereover whereby said bandage may be interlaced with said splint to form a cast having a circumferentially discontinuous rigid wall of bandage material the juxtaposed edges of which are connected by said splint.

2. A splint as defined in claim **1**, in which the sheet material is a thermoplastic material, said tongues being resiliently bendable in a direction normal to the plane of said strip.

3. A splint as defined in claim **2** in which the plastic material is polyethylene.

4. A splint, for use with plaster of Paris bandage to form a plaster cast, comprising an elongated strip of form retaining severable sheet material, said strip being slotted longitudinally to provide a longitudinal central rib, a pair of supports transverse to the rib intermediate its ends, and a pair of tongues extending laterally from each side of each said support on each side of said central rib and parallel thereto, all said tongues being of substantially equal length, the tongues extending from one of said supports being spaced from the adjacent tongues extending from the other of said supports, each tongue being adapted to support said bandage looped transversely thereover whereby the bandage may be interlaced with said splint to form a cast having a circumferentially discontinuous rigid wall of bandage material the juxtaposed edges of which are connected by said splint.

5. A splint as defined in claim 4 in which the sheet material is a thermoplastic material, said tongues being resiliently bendable in a direction normal to the plane of said strip.

6. A splint as defined in claim 5 in which the plastic material is polyethylene.

7. A method of forming a surgical cast on a body portion to be immobilized, comprising the steps of: placing on the surface of said body portion a splint of form retaining severable sheet material having a longitudinal central rib and a plurality of tongues symmetrically disposed on each side of said rib parallel thereto; immersing in water and then interlacing with said splint a ribbon bandage impregnated with plaster of Paris, said interlacing being effected by looping said bandage about one of said tongues, passing said bandage about said body portion, looping said bandage about a second tongue symmetrically disposed with respect to said first tongue, and advancing the bandage in like manner along said splint; and setting the resultant cast structure by exposure to air.

8. A surgical cast for immobilizing a body portion, comprising a splint of form retaining severable sheet material slotted longitudinally to provide a longitudinal central rib and a plurality of tongues symmetrically disposed on each side of the rib parallel thereto, and a plaster of Paris bandage, said bandage being looped in sequence about each of said tongues and the symmetrically disposed counterpart thereof in advancing order along said splint to form a circumferentially discontinuous wall of bandage material the juxtaposed edges of which are connected by said splint, said bandage being set.

9. A cast as defined in claim 8 including a single layer of circumferentially over-wrapped impregnated bandage material.

References Cited

UNITED STATES PATENTS

1,018,452	2/1912	Slaughter	128—89
1,212,731	1/1917	Banks	128—169
2,318,864	5/1943	Jackson	128—87
2,700,383	1/1955	Moodie	128—87
3,062,370	11/1962	Morin	128—91
3,074,399	1/1963	Bitting	128—87

FOREIGN PATENTS

17,828	8/1896	Great Britain.
1,202,733	1/1960	France.

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