June 20, 1950 L. R. YOUNG 2,512,081

MEANS FOR APPLYING CASTS

Filed Dec. 12, 1945

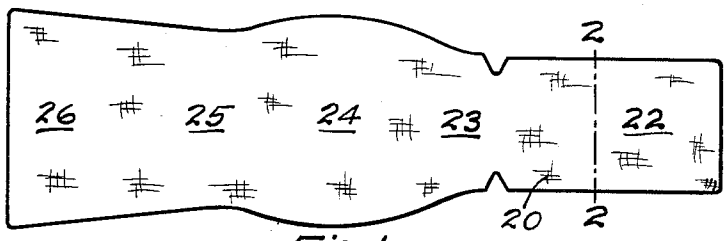


Fig. 1

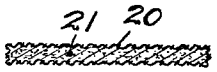


Fig. 2

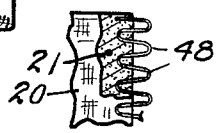


Fig. 4

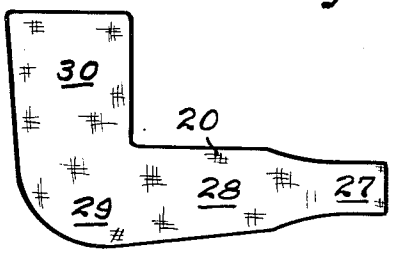


Fig. 3

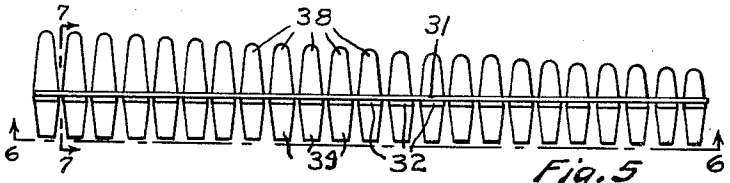


Fig. 5

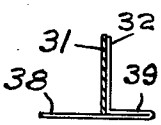


Fig. 7

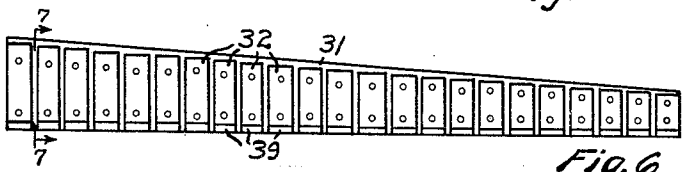


Fig. 6

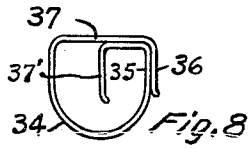


Fig. 8



Fig. 9



Fig. 10

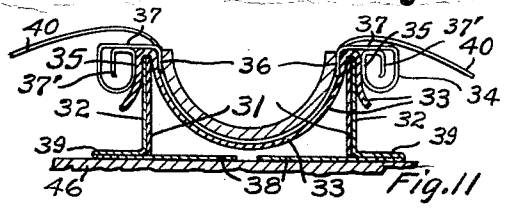


Fig. 11

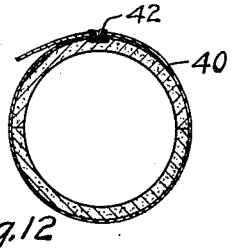


Fig. 12



Fig. 14

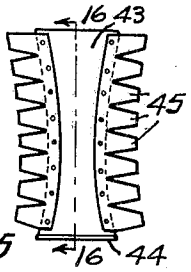


Fig. 15

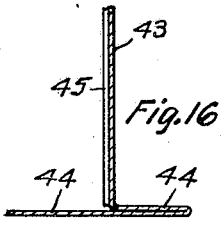


Fig. 16

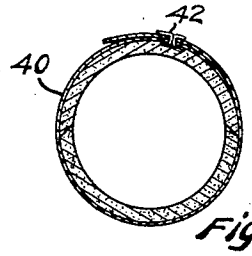


Fig. 13

INVENTOR.

Lawrence Romaine Young

BY

Fred C. Matheny

ATTORNEY

Patented June 20, 1950

2,512,081

UNITED STATES PATENT OFFICE

2,512,081

MEANS FOR APPLYING CASTS

Lawrence Romaine Young, Seattle, Wash.

Application December 12, 1945, Serial No. 634,529

5 Claims. (Cl. 18—5)

1

This invention relates to a cast for application to the human body and to means for applying such a cast.

Casts, as usually applied to parts of the human body are of one piece construction molded from plaster of Paris or like material. These casts are wet when applied, must dry out on the body of the patient, are heavy and cumbersome to wear and can not be taken off to permit inspection and treatment of a portion of a patient except by cutting them off and thus destroying the cast. Also these one piece casts are liable to have pressure spots therein which are painful to the patient and which can not be relieved without destroying the cast.

It is an object of this invention to construct a cast of two or more sections or pieces so that, after this cast has been applied to an injured portion of a patient, a part of the cast may be removed while the injured portion of the patient is adequately and safely supported in another part of the cast. This makes it possible to inspect and treat an injured portion of a patient and to make mechanical changes in a cast without destroying the cast.

Another object of this invention is to provide a simple and efficient means for quickly, easily and inexpensively molding or constructing a multiple piece cast on an injured portion of a patient.

Another object is to provide a multiple part cast that may be quickly and easily applied to a portion of the human body and to provide a cast that is lighter and stronger than the usual plaster cast and one that does not have to be cut off of the body.

Another object is to provide a multiple part cast that can be molded on a portion of the body in such a manner as to reduce to a minimum the danger of internal pressure spots in the cast and to further provide a cast from which any internal pressure spots that are left in molding can be removed or relieved by mechanical processes at any time after the cast has been completed.

Another object is to provide a cast that can be quickly and easily opened up to provide access to an injured portion of the body for the purpose of inspection, taking of X-ray pictures, application of dressings, or other treatments such as light treatments or massage.

Another object is to provide means for applying a cast to an injured portion of the body of a patient with a minimum amount of movement of the injured portion and in such a manner that the injured portion will remain visible during the application of the first half of the cast thereby making it easier to maintain the correct positioning and alignment of the injured body portion than it would be if a cast were being wrapped or molded entirely around the injured portion in one operation.

2

Another object is to provide a multiple part cast in which internal padding can be renewed and lining material placed in the cast when desired, thus making it possible to internally pad the cast or to apply lining material to compensate for a reduction in size of an injured body member to which the cast is applied such as may occur when the swelling of an injured body member decreases.

Another object is to provide a cast formed of parts which can be removed from the patient as soon as they have hardened or set for the purpose of completing the drying out of said parts, thus relieving the patient of wearing the cast while it is drying, shortening the time required for drying out the cast, and facilitating the taking of X-ray pictures which are difficult to take through a wet cast.

Another object is to provide a cast which can be removed and have holes drilled therein to lighten the weight of the cast and to provide for air circulation or ventilation and for the evaporation of body moisture.

Other objects of the invention will be apparent from the following description taken in connection with the accompanying drawings.

In the drawings, Figure 1 is a plan view of a piece of cast forming material suitably shaped for forming a leg cast in accordance with this invention. Fig. 2 is a cross sectional view of said cast forming material taken on broken line 2—2 of Fig. 1. Fig. 3 is a plan view of another piece of cast forming material, suitably shaped for forming an arm cast in accordance with this invention. Fig. 4 is a fragmentary view partly in section and partly in plan illustrating means that may be used for permanently joining two cast members together. Fig. 5 is a plan view of one section of a flexible or conformable mold member constructed in accordance with this invention. Fig. 6 is an elevation of said mold member looking in the direction indicated by the arrows of broken line 6—6 of Fig. 5. Fig. 7 is a sectional view taken on broken lines 7—7 of Figs. 5 and 6. Fig. 8 is an elevation of a spring clip or fastener used in connection with this invention. Fig. 9 is a detached view showing a fragment of a flexible strap member that is used for binding together two or more parts of my cast. Fig. 10 is a detached view of a clip used in securing to-

gether two overlapped portions of a strap of the type shown in Fig. 9. Fig. 11 is a view in cross section illustrating the manner of using my cast forming apparatus in applying the lower half of a cast to a part of the body. Fig. 12 is a view in cross section showing the lower and upper halves of a finished cast secured together by a strap member of the form shown in Fig. 9. Fig. 13 is a view in cross section of a cast made in accordance with my invention and in which the adjoining edges of the two cast members are overlapped. Fig. 14 is a fragmentary view in cross section showing how a raised or recessed portion may be formed in a part of my cast. Fig. 15 is an elevation of a footplate constructed in accordance with this invention. Fig. 16 is a sectional view of said footplate taken on broken line 16—16 of Fig. 15.

Like reference numerals designate like parts throughout the several views.

Figs. 1, 2, and 3 show two different pieces of cast forming material that may be used in carrying out my invention. These two pieces are merely illustrative and it is to be understood that cast forming pieces of many different shapes and sizes may be provided and that these cast forming pieces may be of various different materials.

The cast forming pieces shown in Figs. 1, 2 and 3 preferably consist of fabric 20, such as cheesecloth, containing or carrying a dry finely divided material 21, such as plaster of Paris, that is capable of hardening and setting after liquid, such as water, has been added or applied thereto. The piece of cast forming material shown in Fig. 1 is well adapted for use in forming the lower half of a leg cast. This piece comprises a foot portion 22, an ankle portion 23, a lower leg or calf portion 24, a knee portion 25 and an upper leg portion 26. Obviously the foot portion 23 can be omitted to provide a cast forming piece for use in instances where the cast is not to extend over the foot. Similarly the upper leg portion 27 and knee portion 26 may be omitted to provide a cast forming piece for use where the cast is to terminate below the knee.

The piece of cast forming material to be used in forming the top half of a leg cast and to be paired with the piece shown in Fig. 1 will have a general configuration similar to the piece of Fig. 1 but may be slightly varied in shape to conform to the top of the leg and foot.

The piece of cast forming material shown in Fig. 3 comprises a hand portion 27, a lower arm portion 28, a bent elbow portion 29 and an upper arm portion 30. The piece of cast forming material that mates with the piece shown in Fig. 3 may be of substantially the same shape. The piece of cast forming material shown in Fig. 3 is for use where an arm is to be bent at the elbow and placed in the cast. Obviously straight rather than angular pieces of cast forming material will be provided for use where arms, in a straight position, are to be placed in casts.

Devices used to facilitate the application of my cast are shown in Figs. 1 to 11 and 15. These devices comprise conformable means for supporting the lower half of the cast forming material while said cast forming material is being fitted to a portion of the body, such as a leg or arm, and is hardening or setting. The conformable side support shown in Figs. 5, 6, 7 and 11 comprises a thin plate 31 of conformable material, such as lead, that is capable of being bent into different shapes and that will tend to remain in any position into which it is bent. The plate 31

has angle brackets 32 of inverted T shape secured to one side thereof at frequent intervals. The brackets 32 have base flanges 38 and 39 that are preferably beveled as shown and are slightly spaced apart so that they will not interfere with each other when the plate 31 is bent to the maximum curvature required.

The angle brackets 32 are preferably made of magnetic material such as iron and one practical way of holding the conformable side members against accidental movement is to place the base portions of these brackets 32 on a metal table that is magnetized and that will magnetically hold the brackets 32 with enough force to prevent them from being moved inadvertently.

Obviously mechanical means can be provided for securing these conformable side members in any desired position.

Two of the conformable side members constitute a pair, to be applied as shown in Fig. 11. The plate 31 in each conformable side member tapers to conform to the taper of the part of the body to which the side member is to be applied. This taper can be approximately as shown in Fig. 6 for a device that is to be used in applying a leg cast. Preferably the lengths of the base flanges 38 of the angle brackets 32 are varied to provide a similar taper. Also preferably the two conformable side members of each pair are made right and left and the brackets 32 are secured to the outer sides of the plates 31 so as to leave the inner sides of the plates 31 smooth and unobstructed. These conformable side members are of similar construction whether they are intended for use on the leg, arm or body and function in a similar manner but obviously are of different shapes and sizes, depending on what part of the body they are to be applied to. Also these conformable side members are made in different sizes for use on persons of different size such as large and small persons and adults and children.

A rubber sheet 33, Fig. 11, is provided for use with each pair of conformable side members. Also a plurality of spring clips, Fig. 8, are provided to secure the rubber sheet 33 to the top edge portions of the conformable side members. Each spring clip comprises a loop 34 of spring metal having two jaw portions 35 and 36 adapted to fit over and clamp the rubber sheet 33 to the top edge portion of each plate 31. Also each spring clip has a flat top portion 37 and a trigger portion 37' which may be conveniently grasped so as to exert a squeezing force on the clip and spread the jaws 35 and 36 apart to facilitate application or removal.

Straps 40, Fig. 9, of thin flexible material, are provided for securing two parts of a completed cast together. Each strap 40 is provided near both ends with openings 41 through which clips 42, Fig. 10, may be passed to secure two overlapped end portions of a strap together. Preferably these straps 40 are made of transparent material so that they will not tend to obstruct the taking of X-ray pictures.

Figs. 15 and 16 show a footplate that may be used to assist in providing a cast on the foot of a patient. This footplate comprises an upright portion 43, a base portion 44 and tabs or plates 45 of conformable material such as lead secured to the upright portion 43 and overhanging the edges thereof. The tabs 45 can be bent around the sides of the foot to support plastic cast forming material that is applied to the foot. These tabs 45 are spaced apart far enough so

that they will not interfere with each other when bent around the sides of the foot.

In applying a cast in accordance with this invention a rubber sheet **33** is laid on a table **46** or like support. Any desired number of metal straps **40** are laid across the rubber sheet **33**. A piece of cast forming material such as the piece shown in Figs. 1 and 2 is placed on the rubber sheet **33** and is suitably moistened or otherwise treated to render it plastic and capable of hardening or setting and to condition it so that it will readily conform to the shape of a part of the human body such as the back portion of a leg. The part of a patient to which the cast is to be applied, such as the leg, is positioned on the cast forming material. This may be done by moving the leg onto the cast forming material or by moving the cast forming material under the leg. The sides of the rubber sheet **33** are then lifted up and two of the conformable side members **31—32** are positioned alongside and pressed against the rubber sheet and the base flanges of the brackets **32** are pushed under the rubber sheet and under the cast forming material and body part supported thereon.

The rubber sheet is drawn tightly over the top edges of the conformable members and is secured at frequent intervals, by clips of the form shown in Fig. 8, to the conformable side members **31—32**. This rubber sheet **33**, being elastic, yieldingly supports the moist cast forming material in such a manner that the cast forming material is caused to conform accurately to the shape of the part of the body to which the cast is being applied. The body part is thus supported in the plastic cast forming material with the cast forming material preferably extending approximately half way around the body part so that when the cast forming material hardens it will provide half of a cast for the body part. If a cast is being applied to a leg and the piece of cast forming material shown in Figs. 1 and 2 is being used, then the rubber sheet **33** will extend under the foot piece **22** of the cast forming material and when this rubber sheet is drawn up the foot piece **22** of the cast forming material will first be raised and pressed against the sole of the foot, after which the footplate, Figs. 15 and 16, will be applied by slipping the flange **44** under the heel, pressing the upright portion **43** against the sole of the foot and bending the conformable tabs **45** around the sides of the foot so that the foot portion **22** of the cast forming material is supported over the bottom half of the foot.

When the cast forming material is drawn around the sides of the leg and foot and before this material has started to harden or set, the edges of said cast forming material are shaped in any desired manner to provide for satisfactory edge to edge contact with the upper half of the cast. For instance, these edges may be flattened, as shown in Figs. 11 and 12, to provide a simple butt joint or they may be beveled, as shown in Fig. 13, to provide a bevel joint that will resist relative sidewise displacement of the lower and upper parts of the cast.

Afterward, the edge portions of the lower half of the cast are covered with strip material such as "Cellophane" and this covering material will prevent the adjoining edges of the upper half of the cast from adhering to the edges of the lower half of said cast. The upper half of the cast is preferably formed manually by applying cast forming material to the upper half of the leg or other body part and properly molding and shaping the same. After the upper half of the cast has been properly applied then the straps **40** are drawn upwardly and around both halves of the cast, their ends are overlapped and the clips **42** are used to fasten these overlapping ends together. In applying these straps **40** the clips **42** are preferably inserted in the underlying strap end with their relatively flat heads downwardly and their two prongs extending upwardly. The other strap end is then drawn snugly over the upper cast forming material and over the said underlying end and one of the openings **41** thereof is fitted over the prongs of a clip **42** and the prongs bent outwardly. When the straps are thus applied while the upper half of the cast is soft the soft cast forming material will tend to enter or bulge into the openings **41**. When this cast forming material sets it will help to anchor the straps **40** more securely to the cast and thus tend to relieve the clips **42** of sheering strain. The heads of the clips **42**, being thin and flat, will not have any appreciable tendency to form pressure spots in the cast.

If it is desired to permanently secure the ends or edges of two cast members together then preferably a wire connector member **48**, Fig. 4, is embedded half in one cast member and half in the other cast member. Thus a wire connector member **48** may be partially embedded in one cast member and this cast member allowed to cure and set and later another cast member may be molded so as to embed therein the protruding part of the connector member **48** of the first cast member, thus permanently connecting the two cast members together.

If it is desired to mold an internal depression in any part of a cast this may be done by placing a pad **47**, Fig. 14, of soft material, such as cotton, on the part of the body to which the cast is to be applied before said cast is molded. As this cast is made in two or more separable pieces it is possible to cast an internal depression in a cast over the location of an incision or injury to avoid painful pressure on the injured spot.

For purpose of illustration I have shown and described a cast that is made in two parts and I have referred to these parts as a lower half and an upper half. It will be understood however that this cast may be made in more than two pieces. Also it will be understood that said cast may be applied to a portion of the human body such as a leg or an arm or a trunk or torso so that the two parts of the cast are two side halves rather than an upper and lower half. Also it will be understood that pieces of cast forming material of all desired shapes and sizes to fit all parts of the human body may be provided or may be formed or prepared as needed, or that the cast forming material may be mixed as a plaster and thus used.

For instance in applying a cast to the leg of a patient the patient can be positioned on his back, on his face, on either side or in any intermediate position and the two parts of the cast can be applied to the bottom and top of the leg in whatever position the leg is placed. Thus the two parts of the cast can fit together at any desired location around the leg. A cast can be applied in a similar manner to an arm or to the body.

In removing a part of the cast from an injured portion of the body it is preferable to let the injured portion of the body lie in the lower half of the cast and remove the upper half of the cast. This can be done by unclinching the clinched

ends of the clips 42, bending the released end portions of the straps 40 outwardly and lifting off the top segment of the cast. Thus the cast can be opened up for inspection and treatment of the injured part without danger of damage to the body part in the cast. In this manner it is possible to open up the cast first on one side and then on the other without depriving the injured portion of the body of the support of the cast. The separable parts of the cast can always be replaced in their correct relative positions on the injured member and the straps 40 again made fast by the insertion and clinching of clip members 42.

This cast can be made from plaster of Paris or from any other suitable material that can be made plastic and that will quickly harden or set. It can be made in two or more sections as desired and the cast can be of any length and size. This cast can be molded so that the parts of the cast are separable in any desired plane around the injured part to which the cast is applied. It can be applied directly over the skin of a patient and then removed and lined or internally padded if desired. It is less difficult and cleaner to apply than an ordinary cast and is not so liable to be fitted too tight for comfort. It is free from the grit and plaster dust that results from the cutting off of an ordinary plaster of Paris cast.

Obviously changes in this cast and the method of and means for applying the same may be made within the scope of the following claims.

I claim:

1. In cast forming means, a cast supporting member comprising a relatively long narrow plate of inelastic pliable conformable material capable of being bent into different shapes and of retaining a shape into which it is bent, and a plurality of angle brackets secured to said plate at closely spaced intervals adapted to rest on a horizontal support and support said plate in a substantially vertical plane.

2. In cast forming means, two cast supporting plates of conformable material adapted to be placed along opposite sides of a portion of a human body to which a cast is to be applied, said plates being conformable to the shape of the portion of the body to which they are applied and being capable of retaining the shape into which they are formed; means supporting said plates in upright positions; an elastic sheet extending over said plates providing an elastic support between the top edges of said plates for the reception of cast forming material; and readily detachable clips securing said elastic sheet to the top edge portions of said plates leaving said elastic sheet unsupported between said top edges of said plates.

3. In cast forming means, two cast supporting plates of conformable material adapted to be placed along opposite sides of a portion of a human body to which a cast is to be applied, said plates being conformable to the shape of the portion of the body to which they are applied and being capable of retaining the shape into which they are formed; means supporting the plates in upright positions; an elastic sheet extending over said plates providing an elastic support between the top edges of said plates adapted to receive cast forming material; readily detachable clips securing said elastic sheets to the top edge portions of said plates; and depression forming members extending crosswise of said elastic sheet arranged to form transverse strap receiving grooves in plastic material supported on said elastic sheet.

4. In cast forming means, two cast supporting plates of conformable material adapted to be placed along opposite sides of a portion of a human body to which a cast is to be applied, said plates being conformable to the shape of the portion of the body to which they are applied and being capable of retaining the shape into which they are formed; angle brackets secured to said plates for supporting the plates in upright position, said angle brackets being slightly spaced apart to facilitate bending of said plates between said angle brackets; an elastic sheet extending over said plates providing between said plates an elastic support for cast forming material; and detachable clips securing said elastic sheet to the top edge portions of said plates.

5. In cast forming means, a plate; base means secured to one end portion of said plate and extending substantially at right angles thereto adapted to hold said plate in an upright position; and tabs of non-resilient bendable material secured to the marginal edge portions of said plate, said tabs being inelastic and pliable and being capable of being bent to conform to the shape of an object of irregular outline and of retaining the position into which they are bent.

LAWRENCE ROMAINE YOUNG.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
158,894	Bissell	Jan. 19, 1875
286,693	Fried	Oct. 16, 1883
323,775	Bender et al.	Aug. 4, 1885
1,100,483	Houghton	June 16, 1914
1,197,253	Biddinger	Sept. 5, 1916
1,335,475	Bergman	Mar. 30, 1920
1,640,586	Tusup	Aug. 30, 1927
1,967,888	Kearsley	July 24, 1934
2,082,451	Kevlahan	June 1, 1937
2,233,174	McDonald	Feb. 25, 1941
2,256,036	Redmond	Sept. 16, 1941

FOREIGN PATENTS

Number	Country	Date
604,671	France	May 11, 1926