Feb. 29, 1944. E. S. RINALDY 2,342,695

SURGICAL CAST

Filed Feb. 8, 1943

Fig. 1.

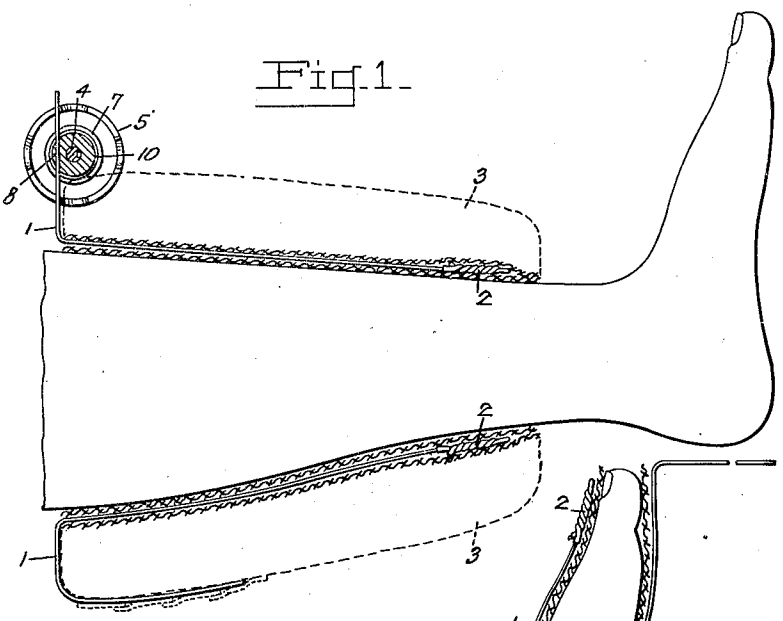


Fig. 3.

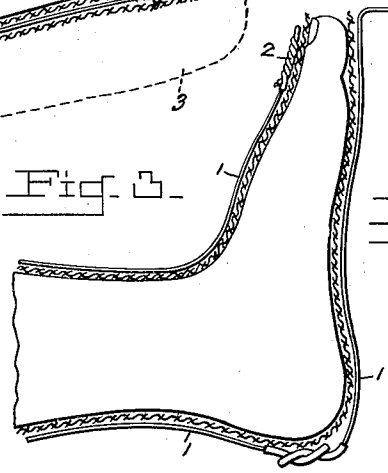


Fig. 4.



Fig. 2.

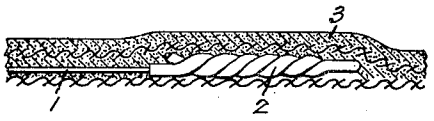


Fig. 5.

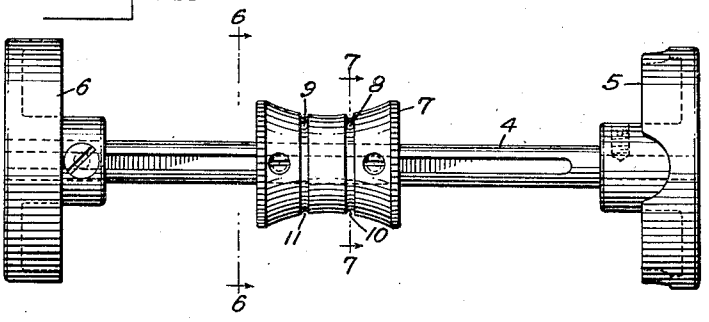
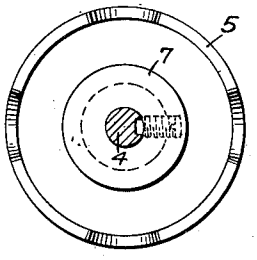


Fig. 6.



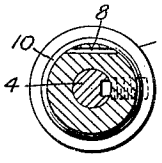


Fig. 7.

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UNITED STATES PATENT OFFICE

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SURGICAL CAST

Edward S. Rinaldy, Chester, N. J.

Application February 8, 1943, Serial No. 475,161

6 Claims. (Cl. 128—317)

(Granted under the act of March 3, 1883, as amended April 30, 1928; 370 O. G. 757)

The invention described herein may be manufactured and used by or for the Government for governmental purposes, without the payment to me of any royalty thereon.

The present invention relates to an apparatus and means for cutting plaster casts that are positioned and set on fractured or broken bones of the body.

The present surgical practice for removing plaster casts that have been set about a broken bone is for the surgeon to use a form of long handled shears which are adapted to cut through the casts. This form of removal is relatively slow and painful. In addition, in the removal of the cast in this manner, the cast is broken, with the result that it cannot be used again. Another objection to this form of removal is that the underside of the shears, in some instances, presses against the body of the patient with resultant pain and discomfort.

A primary object of the present invention is to provide means and apparatus by which a firmly set cast can be quickly and effectively removed in a period of about 30 seconds.

An important feature of the present invention is that, by the use of the apparatus herein described, a cast can be removed from a patient with a minimum of discomfort and pain. Another feature of the invention is that by removal of the cast in the manner herein described, the cast can be reapplied to the member if it is discovered that the fractured bone is not sufficiently knitted together to permit permanent removal of the cast.

While the invention will be described in application to the setting and removal of a cast from the leg of a person, it is obvious that similar and like practices can be utilized in connection with the setting and removal of a cast from any member or part of the body.

The invention can best be understood from the following description to be read in view of the drawing in which:

Figure 1 is a sectional view of cast applied to a member and means for removing the same;

Figure 2 is an enlarged view in detail of the anchoring means forming part of the cast.

Figure 3 is a sectional view of another application of the invention, showing the cast applied to a curved surface;

Figure 4 is a detail view of the connecting means shown in Figure 3;

Figure 5 is a view of the cast removing mechanism;

Figure 6 is a sectional view taken on the line 6—6 of Figure 5, and

Figure 7 is a sectional view taken on the line 7—7 of Figure 5.

In applying a cast to a leg as shown on Figure 1, the leg is first covered with gauze or a net stocking, to prevent adhering of the plaster cast to the leg.

A wire 1 of high tensile strength, preferably No. 20 gauge, is then positioned along the entire length of the member where the cast is to be formed, and, in addition, extends about 3 inches beyond each point where the cast is to terminate. One end of the wire is then positioned by fastening it to an anchor 2, preferably made of a small section of pliable copper tubing that is twisted to firmly engage the wire. Only one such anchor is made. This anchor is then positioned at the point where the cast is to terminate. A wire similar in construction to wire 1 is likewise positioned on the opposite side of the cast having an anchor and set in the same manner as described supra. Both wires are then drawn taut and the wrapping of the cast material 3 is made over both wires until completed to any desired thickness as indicated by the dotted line of Figure 1. It will be apparent by the procedure set forth that the cast when completed will have an antipodal set of wires encased therein. In the molding of the cast, care should be exercised that the anchor-containing portion of the wire is enclosed completely within the cast so that it becomes encased integrally with the cast. The loose end of the wire is then folded back over the cast and taped down, so that the ends are made safe and will not dangle.

For the removal of the cast, the following technique is used in conjunction with the apparatus hereinafter described, forming part of my invention. The preferred embodiment comprises a shaft 4, having affixed at each end thereof a pair of handles 5 and 6 respectively. Handle 5 is permanently affixed to one end of the shaft 4, while handle 6 is so constructed that it is removable at will. Any conventional type of set screw, bayonet slot, or spring arrangement may be utilized for the removal of handle 6 from the shaft. Slidably engaged on shaft 4 is a drum 7, which has two passageways, 8 and 9, respectively, approximately $\frac{1}{16}$ in. in diameter extending therethrough positioned in a pair of channelled grooves 10 and 11. It is understood that neither of the handles 5 and 6, or drum 7, is rotatable about the shaft 4. If desired, handles 5 and 6 may have finger grips or serrated edges in order to provide a firm grip hold.

To remove the cast after being set in the manner described above, one loose end of the wire is untaped and passed through one of the passageways in the drum 7 with one or two windings. The handles 5 and 6 are then grasped and revolved in the direction toward the base end of the cast where in the extreme end the wire is anchored. This will cause the drawing of the wire up through the cast, cutting the cast in its passage and causing the wire to be drawn on to the

drum. After one side of the cast is cut in this manner, the under side of the cast having contained therein the other wire is cut in the same manner. The cast can then be readily removed by lifting each portion away from the member.

In placing of the cutting wire, care must be taken to prevent it from being placed in a cast of a convex portion of the body, such as the heel of a foot, as it is evident that traction and drag at the end of the wire as, for instance, when removing the cast will cause it to cut through the underside of the cast and cause pressure against that portion of the body. If it is necessary to place a cast over a convex member of the body, two wires will preferably be placed on each side of the cast, one extending from the end of the cast to that portion of the body where it begins to curve, and another wire from the other extreme end of the cast to the junction point of the first wire as shown in Figure 3. In cases where a cast is to be removed from a portion of the body which, because of its shape and contour, will not permit ready access of the two handles of the cast remover, handle 6 may be removed. The drum 7 can then be moved over to the extreme end of the shaft and handle 5 alone can be turned to operate the cast cutter in the manner described heretofore.

Casts prepared and removed in the manner described above have been removed in relatively short periods of time, that is from 30 to 60 seconds. In addition, it is obvious that a cast removed in this manner will have clean-cut edges, with the result that the cast may be re-used and reset upon the same member on which it was originally set, if it is discovered that the member needs additional cast treatment.

While there has been herein described a cast cutter of particular shape and design, it is obvious that modifications may be made in the shape and design of any of the component parts without departure from the spirit and scope of the invention.

What is claimed as new is:

1. In a device for removing a cast from a body limb, the combination of a pair of wires placed, preparatory to forming the said cast, next to the limb and on opposite sides thereof, the said wires being provided at one end with means for anchoring the said ends in the cast, the said wires being sufficiently long to extend beyond the cast, a spindle, a drum provided with a pair of circumferential grooves, one for each of the said pair of wires, the said drum tapering outwardly to form enlarged ends adapted to roll directly on the said cast and to space the middle portion of the drum and the said pair of grooves away from the cast, the said drum being feathered on the said spindle whereby the drum may be shifted axially in coiling the wires thereon, and means for securing the said free end of the wires in the said drum grooves.

2. In a device for removing a cast from a body limb, the combination of a pair of wires placed, preparatory to forming the said cast, next to the limb and on opposite sides thereof, the said wires being provided at one end with means for anchoring the said ends in the cast, the said wires being sufficiently long to extend beyond the cast, a spindle, a drum provided with a circumferential groove, the said drum tapering outwardly to form enlarged ends adapted to roll directly on the said cast and to space the middle portion of the drum and the said groove away from the cast, the said drum being feathered on the said spindle whereby the drum may be shifted axially in coiling the wires thereon, and means for securing the said free end of the wire in the said drum groove.

3. In a device for removing a cast from a body limb, the combination of a pair of wires placed, preparatory to forming the said cast, next to the limb and on opposite sides thereof, the said wires being provided at one end with means for anchoring the said ends in the cast, the said wires being sufficiently long to extend beyond the cast, a spindle, a drum on the said spindle provided with a pair of circumferential grooves, one for each of the said pair of wires, the said drum tapering outwardly to form enlarged ends adapted to roll directly on the said cast and to space the middle portion of the drum and the said pair of grooves away from the cast, and means for securing the said free end of the wires in the said drum grooves.

4. The combination according to claim 3 wherein the said wire anchoring means comprises a length of tubing coiled along the said end of the wire to form an enlargement.

5. The combination according to claim 3 wherein the said wire securing means comprises a passage drilled through the said drum at the said circumferential grooves.

6. The combination according to claim 3 further provided with handwheels at each end of the said spindle.

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