Feb. 17, 1970 W. ZEILLER 3,495,590

SURGICAL CAST AND CAST REMOVAL SAW

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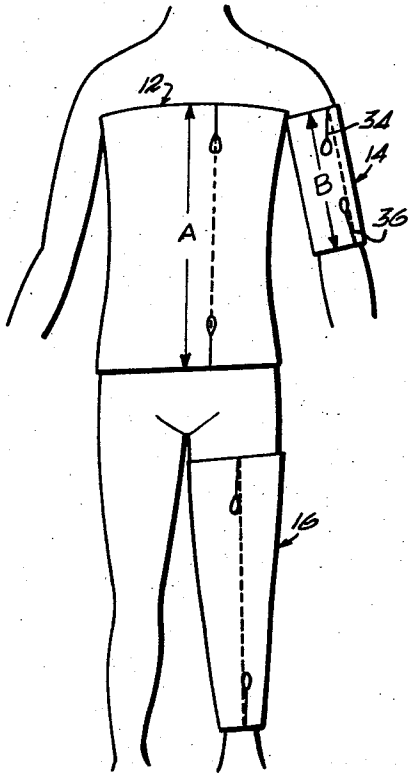


Fig. 1

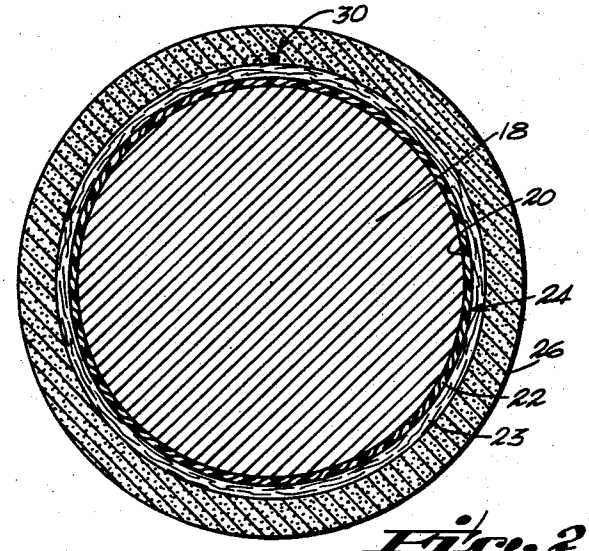


Fig. 2

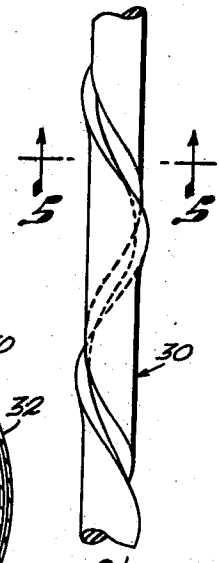


Fig. 4

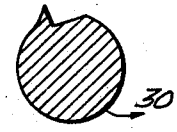


Fig. 5

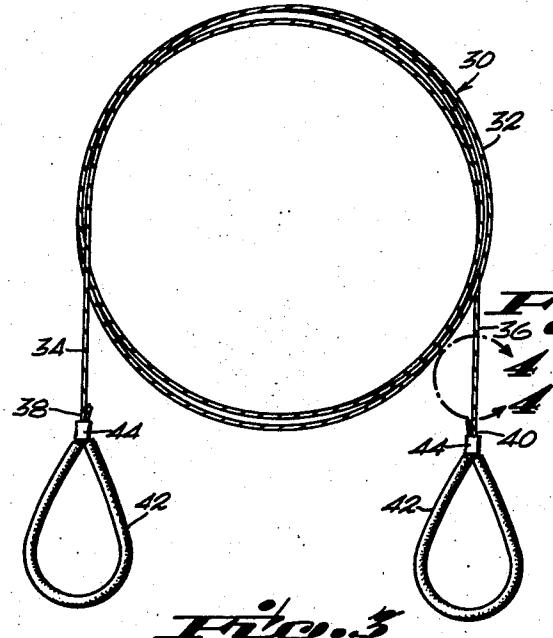


Fig. 3

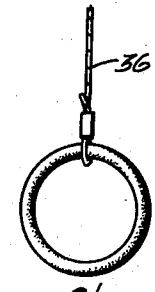


Fig. 6

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SURGICAL CAST AND CAST REMOVAL SAW

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ABSTRACT OF THE DISCLOSURE

A cast removal saw for removing reinforced cast materials in sleeve form from snug encompassing relation of the body of a patient, the cast having a liner means between the skin of the patient and the outer shell of the cast, the saw being a single flexible metal thread having a helicoidal recess in the surface with the crests between the recesses having a sharp edge and the saw being of a length greater than the longitudinal length of the cast and nested between the liner and the outer shell with the ends of the saw thread being folded back on the exterior surface of the shell and having gripping means connected thereto for reciprocally moving the saw to remove the cast from the patient's body.

This invention relates to an improved saw for removing a cast from the body of a patient.

In the past it has been known to provide saws of slender rod material having a sharp edged groove extending along the length thereof, such slender rod saws being useful, for instance, hacksaws. Also, for instance, in brain surgery it has been known to drill spaced holes in the boney material of the skull and pass a length of saw which is flexible between the holes so that the ends of the saw may be reciprocally moved to saw through the thickness of the skull between the holes.

In the prior art there have been numerous types of blades which have been attempted for use in removing surgical casts from patients, such as a conventional oscillating blade. While these types of blades have been useful, there have been accidents, and it is generally accepted that even in the hands of a skilled operator accidents may happen readily causing an injury to the patient having the cast removed, which injury is not visible to the operator's eye until the cast has been removed and the extent of the damage can then be determined and remedial action taken. This invention in combination with the surgical cast provides means for reinforcing a portion of the human body and for removing of the cast without damage to underlying tissue or flesh in a rapid and expeditious manner.

This invention relates to an improved surgical cast including a saw for removing the cast, the said saw being imbedded in the cast between the interior liner means which protects the skin and the exterior outer shell, and the said saw comprising a flexible metal thread having a helicoidal recess defining a sharp cutting edge spirally extending the length of the thread, the length of the thread being longer than the longitudinal length of the cast and with the distal or terminal ends of the thread being folded back on the exterior of the shell portion of the cast and provided with gripper means to reciprocally move the saw back and forth while an outwardly directed force or radial force with respect to the center line of the cast is applied to cause the sharpened edge to cut through the cast to remove it.

It is, accordingly, an object of this invention to provide an improved cast including an imbedded surgical saw and an improved saw for removing surgical casts.

In accordance with these and other objects which will become apparent hereinafter, the instant invention will

now be described with reference to the accompanying drawing illustrating a preferred embodiment thereof.

In the drawings:

FIGURE 1 is a schematic illustration of human figure including surgical casts incorporating the instant invention for various portions of the body;

FIGURE 2 is a typical cross-sectional view of a surgical cast of FIGURE 1 as applied to a body member;

FIGURE 3 is an elevational view of a flexible metal thread saw of the present invention;

FIGURE 4 is an enlarged elevational view of the length of the saw designated by the arrowed line **4—4** in FIGURE 3;

FIGURE 5 is a cross-sectional view taken along the line **5—5** of FIGURE 4 and looking in the direction of the arrows;

FIGURE 6 illustrates an alternate embodiment of a gripper means for the ends of the saw.

Referring to the drawings wherein like reference characters designate like or corresponding parts throughout the different views, and referring particularly to FIGURE 1, the numeral **12** generally designates a surgical cast for the trunk of a patient, the numeral **14** a surgical cast for the upper arm, lower arm, or lower leg of a patient, and the numeral **16** designates a surgical cast for the leg length of a patient, which is substantially similar in all material respects to that of the trunk cast as far as this invention is concerned.

Referring to FIGURE 2 in which the surgical cast is shown in cross section, the body member to be treated is designated by the numeral **18** and in practice, when a surgical cast has been applied, the outer fleshy surface **20** of the body portion of the patient is provided with a means **24** to act as a liner between said fleshy surface and the outer shell **26**. The liner means includes ordinarily two portions, a skin contacting portion, such as an elasticized fabric sleeve **22**, and a jacket **23**, preferably of yieldable padding material, such as cotton, which is adapted to cohere when pressed together so that the fibers intermingle. The outer shell is of reinforced cast material such as gauze impregnated with set plaster, which is conventional in the art.

Referring to FIGURE 3, the saw **30** is seen to include a main length **32** which is longer than the distance A which characterizes the trunk cast length or the lower leg cast length, or, in the case of an upper arm cast, the length B, so that there are terminal length portions **34** and **36** each in the order of two to three inches. To the distal ends **38** and **40** of the respective end portions a gripper means is provided. In the preferred embodiment a loop, such as that designated by the numeral **42**, having a smooth rubberized surface, may be employed. The ends of the loop are connected by a suitable fastening means, such as the connector element **44**, to the ends of the end portions.

While the main length of the saw will be described more fully hereinafter, it will be apparent at this point that, by reason of the fact that the saw **30** is imbedded intermediate the liner and the outer shell, reciprocal motion of the saw through the permitted stroke length, of, in the order of four to six inches, will cause the saw teeth to bite into the cast as it is reciprocated with a constant applied outward or radial force by a user.

Referring to FIGURE 4, which is an enlarged portion of the length of the saw shown in FIGURE 3 as is designated by the arrowed line **4—4** therearound, it will be seen that an endless or continuous spiral groove is provided in the exterior surface of the thread extending between the ends. In the preferred embodiment, the groove is characterized by a shallow having a tapered side from the main diameter of the thread to a point of maximum

depth and a relatively straight or sharp side extending from the point of maximum depth to a spiral edge radially outwardly of the main surface of the thread and thence tapering to the main length. The peak between the straight or sharp side of the groove and the main surface of the saw thread comprises a sharpened helicoidal cutting edge. In FIGURE 6 there is shown an alternative embodiment of the gripper means for the ends of the saw. A ring is looped by an end portion of the saw and held in place by a crimped sleeve, all as is well known in the art.

The size of the thread of the saw is preferably between about .020" diameter and .040"; however, it is important to realize that variations in the size of of the wire may be employed within the spirit of this invention which contemplates the use of a flexible saw and one which is not of such a large diameter so as to be objectionable when nested beneath the shell of the cast of a patient.

The saw thread material is preferably of steel which is of the spring tempered type and since it is preferred that the sharp outer edge of the groove radially outwardly of the main surface of the thread be a hardened edge, it has been found that a chrome material on the outer surface of the wire is preferred. It is to be realized that three main lengths may be employed; however, since the patient may be an animal or have a varying length requirement because of a bone fracture or the like for the cast, other lengths of the saw herein taught may by employed other than one or two or three predetermined lengths. In manufacturing the ends of the saw may be dipped in a plasticized or flowable rubber material to harden as an outer lining for the ends which may then be loped back upon themselves to provide a gripping means for reciprocally moving the saw relative to the shell of the cast to cut it.

Referring to FIGURES 4 and 5 it will be seen that the groove in the preferred embodiment is formed by pushing as it were the metal of a helicoidally extending area on the surface of the wire so that this area is characterized by a margin which is somewhat depressed by reason of a displacement of metal which is raised so that the central zone of this area is sharpened and slopes to an opposing margin to merge and blend with the main surface of the thread.

What is claimed is:

1. In combination an open-ended cast assembly including liner means for overlying the flesh of a patient upon whom the cast is adapted to be disposed,

said cast assembly including an outer shell of reinforced, rigid cast material; and an elongated, metal saw-thread embedded between said cast assembly immediately beneath and in direct contact with said rigid cast material and above said liner means,

said saw-thread having opposite ends extending beyond ends of said rigid cast material and being folded upon themselves at opposite ends of the rigid cast,

gripping means on opposite end of the saw-thread facilitating reciprocation of the saw-thread and cutting of the rigid cast material,

said saw-thread having a helicoidal cutting tooth extending from end-to-end and having a cross section including a radial side terminating in a lateral, substantially normal base, said side forming an edge with an angularly disposed opposite side merging into the outer surface of the saw-thread.

3. The structure as claimed in claim **1** in which said saw-thread diameter is in a range from .020" and .040", comprises a spring-tempered steel, and is chrome-metal coated.

3. The structure is claimed in claim **1** in which said gripping means comprises a resilient-material coated closed loop integral with opposite ends of said saw-thread, said closed loop normally overlying the rigid outer cast material when the cast assembly is initially formed whereby the loops are readily accessible for cast removal.

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30—166; 128—317; 143—133; 145—31