Feb. 23, 1943. H. CLEMINSON 2,311,735

PACKAGED SUTURE

Original Filed April 11, 1941

Fig. 1.

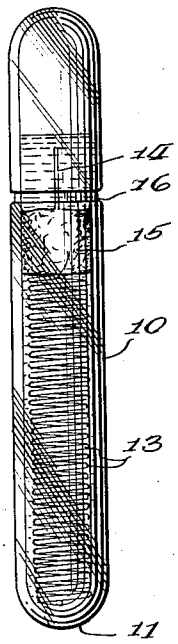


Fig. 2.

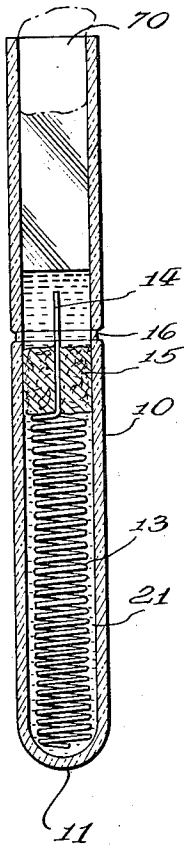
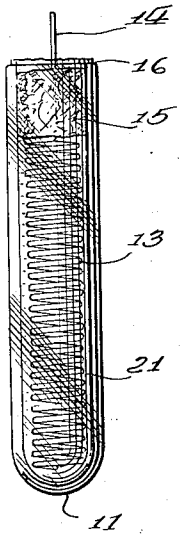


Fig. 3.



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Patented Feb. 23, 1943

2,311,735

UNITED STATES PATENT OFFICE

2,311,735

PACKAGED SUTURE

Haldane Cleminson, Chicago, Ill.

Original application April 11, 1941, Serial No. 387,999. Divided and this application June 5, 1941, Serial No. 396,727

1 Claim. (Cl. 206—63.3)

The present invention relates to packaged sutures and is a division of my prior application Serial No. 387,999 filed April 11, 1941. That application is now particularly directed to the method of preparing the sutures for market, while the present application is directed to the product resulting from the method of the parent application.

One of the objects of the invention is the provision of an improved suture package in which the suture is so arranged that a part of it may be withdrawn from the package while the remainder of the suture is still retained in the package and maintained in a sterile condition for future use.

Another object of the invention is the provision of an improved package and method of packaging sutures by means of which the suture is made more readily available for withdrawal from the package without possibility of tangling.

Another object of the invention is the provision of an improved suture package and method of packaging, by means of which a greater length of suture may be packaged in a relatively small tube or other container so as to utilize to the best advantage the space available.

Another object of the invention is the provision of an improved suture package which is adapted to be put up with a minimum amount of hand labor, and with resulting economy and spaced of production in the packaging of the sutures, by reason of the fact that the packaging may be carried on more quickly.

Another object of the invention is the provision of an improved method of packaging, and a package for sutures, by means of which economy in the use of the suture is effected on account of the possibility of using only as much as needed at one time, the remainder of the suture being kept in a sterile condition in its container, and the protruding part being maintained sterile by its immersion in a sterile alcohol bath.

Other objects and advantages of the invention will be apparent from the following description and the accompanying drawing, in which similar characters of reference indicate similar parts throughout the several views.

Referring to the single sheet of drawings accompanying the specification:

Fig. 1 is a view in elevation of the packaged suture as it appears after it has been sterilized and hermetically sealed so that it is ready for the market;

Fig. 2 is a vertical sectional view taken on a plane passing through the axis of the tube, showing the package as it appears after the suture has been placed in the tube, sterilized and covered with a preserving liquid, in the condition in which the package is found just before it is sealed off as shown in Fig. 1; and

Fig. 3 is an elevational view similar to Fig. 1, of the packaged suture as it appears after the tube has been broken off and the suture is ready for use or after a portion of it has been used and the remainder, as shown in Fig. 3, is adapted to be thrown back in an alcohol solution until further suture material is to be used.

Referring to Fig. 1, this is a vertical sectional view, taken on a plane passing through the axis of the suture package, showing the structure and arrangement of such a package.

The suture is contained in a glass tube 10 of substantially cylindrical form, having its lower end 11 closed and its upper end sealed and similarly closed.

The suture indicated at 13 is helically coiled, and it is found that a greater length of gut can be placed in the small tube when arranged in this way than when it is arranged according to the methods of the prior art.

The diameter of the coils of the suture 13 is such that there is preferably a small spacing between the inner wall of the tube 10 and the suture coils, and the coils may be placed quite close together in contact with each other, if desired, depending upon the relative sizes of the parts.

One of the most important features of the invention is the arrangement of the suture so that it is not necessary to provide any type of spool or mandrel or other member on which it is wrapped in the package and the manner in which the major portion of the suture is enclosed against contamination with only one end projecting through the cotton plug.

The lower end of the helically coiled suture 13 is free, but the upper end preferably extends in axial direction, as indicated at 14, through a fibrous plug 15 of absorbent and sterile cotton, which keeps the helical coils of the suture from becoming disarranged or getting outside of the tube after the upper end of the tube has been broken off at a scored portion 16.

The cotton plug 15 is made by rolling sterile cotton in the form of batting into a substantially cylindrical roll five-eighths of an inch or more in length, and placing it on the needle, which forms a part of the apparatus for packaging sutures of this type covered by my copending application entitled "Apparatus for packaging sutures," Serial No. 396,728, filed June 5, 1941.

The suture has an axially extending portion 14 so that when the suture is enclosed in the chamber 21 and the plug 15 is in the tube supporting the axially extending portion 14, this portion projects beyond the cotton plug so that it may be

grasped by the surgeon and the suture may be pulled out as desired.

The cotton plug 15 is of sufficient size so that it has tight fit in the tube 10 and is frictionally held in place. The plug is adapted to seal, bacteriologically, the chamber 21 of the tube against ingress of micro-organisms or bacteria of any kind.

The scored portion 16 of the tube is preferably made by grinding and without any cracking of the tube so that there is no tendency for the tube to break due to shock, but the wall is made thinner and is weakened at 16 so that when the tube of Fig. 1 is subjected to a bending force it will break off cleanly as shown in Fig. 3.

The tube is preferably broken by placing it in a towel and exerting a bending force, which will produce a clean break at the scored groove 16. The operator may then grasp the axially extending end portion 14 of the suture and withdraw as much as is needed from the chamber 21 in the tube below the plug 15. As the end of the suture is drawn out, the helical coil 13 will rotate in the tube, and its coils adjacent the plug 15 will be at least temporarily straightened as they pass through the plug 15. The proper length of suture may be cut off, and the rest left in the tube and the liquid without being disturbed, where it will be maintained in its sterile condition.

The method of making such suture packages is fully described in my prior application Ser. No. 387,999, which also shows the apparatus adapted to be used. Briefly stated, the suture is coiled upon a mandrel and subjected to heat for setting the suture in a helical shape. At this time the longitudinally extending portion 14 is carried by a needle which is supported by the mandrel and the cotton plug 15 is slidably mounted on the needle.

When a sufficient length of suture has been wrapped on the mandrel, it is stripped off the mandrel and simultaneously forced into a carrier tube which may be used for carrying it from the mandrel to the glass tube 11. The use of this carrier enables the suture to be inserted into the glass tube 11 with the suture lowermost, located in the lower part of the tube, and with the cotton plug above the suture and located below the scored portion.

The tube is then plugged at its upper end with a second cotton plug 70 located sufficiently above the end of the suture so that the tube may be sealed between the plugs 15 and 70 in the manner shown in Fig. 1 after the sterilization has been completed.

The assembly shown in Fig. 2 is then subjected to the simultaneous action of a vacuum and sterilizing heat in a closed container at a sterilizing temperature, and for a sufficient number of hours to insure the destruction of all micro-organisms and their spores.

Thereafter, the vacuum in the closed container may be broken and the ends of the tubes may be immersed in a predetermined amount of sterile preserving fluid, such as ethyl alcohol.

The container may then be subjected to a vacuum which will cause the air to bubble out through the alcohol from the chamber 21, through the cotton plugs 15 and 70.

The vacuum may again be broken to raise the pressure in the container, which will cause the preserving alcohol to filter through the plugs 15 and 70, into the chamber 21 to a predetermined level. The open end of the glass tube 10 may then be sealed, after drying out plug 70, below the plug 70, while the plug 70 is still in place, and the sealing of the glass tube is accomplished in the usual manner, by the application of heat and drawing out the tube.

The result is a packaged suture as shown in Fig. 2, which is arranged in helical form, with one end extending axially through the plug 15.

It will thus be observed that I have invented an improved method and apparatus for packaging sutures, by means of which the sutures may be arranged in a helical form with a minimum amount of hand labor. This arrangement permits the suture to be withdrawn and used only as needed, the remainder being kept sterile in its tube, which is thrown back in an alcohol solution.

The present product may be packaged more economically than the products of the prior art because less hand labor is required and less material is required as there is no spool or reel needed in the package. A greater length of suture may be packaged in the same size tube or the same amount of suture may be packaged in a shorter or smaller tube than with the arrangements of the prior art.

The portion of the suture which is not used by the surgeon is untouched and is not removed from the package until it is ready to be used and it is maintained in a sealed condition, bacteriologically, by means of the sterile cotton plug 15 through which suture material may be withdrawn as desired.

While I have illustrated a preferred embodiment of my invention, many modifications may be made without departing from the spirit of the invention, and I do not wish to be limited to the precise details of construction as set forth, but desire to avail myself of all changes within the scope of the appended claim.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent of the United States is:

A packaged suture comprising a glass tube having a wall of substantial thickness, said tube being hermetically sealed at both ends and having a pair of chambers formed therein and separated by a sterile plug of fibrous material frictionally secured in the tube and adapted to exclude micro-organisms and their spores, the first of said chambers being a main suture chamber, and the second of said chambers being an enclosure adapted to be broken off to expose said sterile plug, the wall of said last tube having formed therein an annular groove of substantial width and depth by grinding away a portion of the outer wall of said tube in said second chamber adjacent to said sterile plug, whereby the tube is unaffected by ordinary shocks in shipping, but is adapted to be broken by the application of a bending force, and a sterile suture having its parts arranged in helical coils and set by heat, located in the first of said chambers, said coils being of smaller diameter than the interior of said tube, and said suture having at one end an axially projecting portion extending through said sterile fibrous plug and frictionally secured therein, whereby the end of the suture may be grasped and a predetermined length withdrawn against the friction of said plug, the helical coils rotating in said tube during the withdrawal, and a preserving liquid in a sterile condition located in said tube and substantially surrounding said suture.

HALDANE CLEMINSON.