Aug. 27, 1957 R. B. HARKNESS ET AL 2,804,203

LIGATURE RECEPTACLE

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FIG. 1.

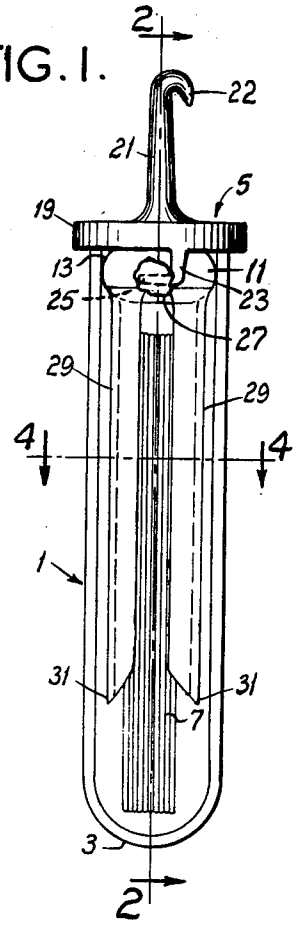


FIG. 2.

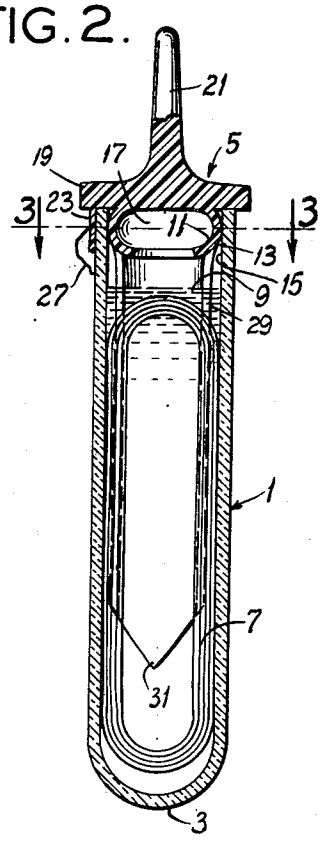


FIG. 3.

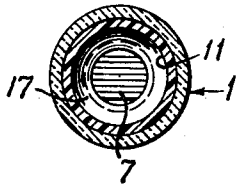
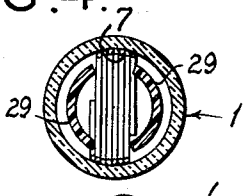


FIG. 4.



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LIGATURE RECEPTACLE

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2 Claims. (Cl. 206—63.3)

This invention relates to ligature receptacles, and more particularly to an improved ligature receptacle which is adapted for rapid and convenient opening to dispense a sterile ligature.

Heretofore, it has been common to seal surgical ligatures in glass tubes which are closed at both ends and circumferentially scored around the middle thereof. When a sterile ligature is needed at the operating table, the tube is broken open along the score line and the ligature is dispensed. It has been found that in opening the tube in this manner, particles of glass may adhere to the suture, and, also may be introduced into the sterile operating area, incidents that present a substantial source of danger with respect to the strength of the suture and contamination.

Among the several objects of this present invention may be noted the provision of an improved ligature receptacle of the class described which permits the safe, rapid and convenient dispensing of a sterile ligature into the operating area; the provision of a receptacle of this class having a cap of a special form which provides an effective seal for the sterile ligature within the receptacle and which can be safely and conveniently removed for dispensing the ligature; and the provision of a receptacle which is economical to manufacture and adapted for safe shipment. Other objects and features will be in part apparent and in part pointed out hereinafter.

The invention accordingly comprises the constructions hereinafter described, the scope of the invention being indicated in the following claims.

In the accompanying drawings in which one of various possible embodiments of the invention is illustrated,

Fig. 1 is a view in elevation of a ligature receptacle of the invention;

Fig. 2 is a longitudinal cross section taken on line 2—2 of Fig. 1;

Fig. 3 is a cross section taken on line 3—3 of Fig. 2; and,

Fig. 4 is a cross section taken on line 4—4 of Fig. 1.

Corresponding reference characters indicate corresponding parts throughout the several views of the drawings.

Referring to the drawings, a ligature receptacle of our invention is shown to comprise a tube 1 closed at one end as indicated at 3, and open at its other end. The closed end 3 is shown as rounded. The tube is preferably made of glass or a transparent nonresilient plastic material. The tube 1 is closed by a cap 5 which fits into the tube at its open end. A ligature 7 or a bundle of ligatures is sealed in the capped tube under sterile conditions with respect to the inside and outside surfaces of the tube, the inside and outside of the cap at the open end of the tube and the inside of the container in which the tube is packaged for shipment. The ligature receptacle of the present invention may be conveniently packaged, for example, in the single-use ligature-tube containers described and claimed in our copending applications Serial No. 356,762, filed May 22, 1953, issued as Patent 2,788,893 and Serial No. 449,965, filed August 16, 1954. The ligature 7 may be sealed in the capped tube with a quantity of ascepticizing fluid 9 or it may be sealed in the tube under sterile conditions without any ascepticizing fluid.

The cap 5 may be made of any suitable material, either resilient or relatively nonresilient, but preferably is molded of a resilient plastic material. As shown, it has a resilient annular skirt 11, which fits into the open end of the tube. The skirt 11 is of concavo-convex form in cross section as indicated in Fig. 2 with its outer periphery 13 convex for engagement with the interior surface 15 of the tube. A recess 17 formed by the inner periphery of the skirt 11 is adapted to accommodate the adjacent end of the ligature 7. The cap may have integral radial extensions as indicated at 19. Also, the cap has an integral vertical extension 21 outward of the tube for removal of the cap from the tube. As shown, the extensions 21 is adapted for grasping by the hand. It will be understood that extension 21 may assume various shapes and may, for example, be provided at its outer end with a hook as indicated at 22 adapted for engagement of the ligature 7 to aid its removal from the tube.

As shown in Figs. 1 and 2, the cap 5 may also be provided with a longitudinal extension 23 having an integral laterally projecting flexible finger 25 toward its end. After the ligature 7 has been sealed in the tube 1 by means of the cap 5, a spot of a colored adhesive may be applied to the tube over the finger as indicated at 27. In this embodiment of the invention, the tube 1 and the cap 5 are made of different materials, and the adhesive used at 27 is such as to adhere tightly to the material of the tube but not to the material of the cap. Further, the adhesive 27, while of a different color than either 1 or 25, is so composed that it will not color the finger 25, leaving it a contrasting color to the spot 27. Also, the adhesive 27 does not break off or splinter in any way upon removal of the cap, with possible resultant contamination of the sterile area. The finger slides loose, but does not break.

The tube may be made of glass, the cap of polyethylene, and the adhesive used at 27 may be a composition comprising a base consisting of 20% by weight of vinyl chloride-acetate copolymer, 5% of dioctyl phthalate, 37½% by weight of methyl isobutyl ketone, 37½% by weight of toluene, and a pigment such as Turkey red oil or Sudan green in suitable amount. With the spot of adhesive 27 adhered to the tube 1, but not to the finger 25, when the cap 5 is pulled from the tube the finger 25 slides out of the spot 27 substantially clean, leaving the spot 27 on the receptacle. If the cap is pushed back into the tube, the finger overlies the spot free of the tube. Further, it cannot be refitted into the original position. Thus, the user may inspect the tube by feeling the finger 25 to determine whether it is free, or by eye to see if the finger is clean, thereby determining whether the tube has been opened and the ligature 7 possibly rendered unsterile. The adhesive 27 adheres to the tube and cannot fly loose onto the sterile field.

As shown in Figs. 1, 2 and 4, the cap is provided with a pair of integral fingers 29 projecting from the skirt 11 into the tube 1. The fingers are relatively narrow in width and are tapered at the lower end thereof to a point as indicated at 31. Also, as shown in Fig. 4, the fingers 29 are curved or part-cylindrical in cross section and are spaced from the interior surface 15 of the tube. In dispensing the ligature from the receptacle of the present invention, the cap and tube may be relatively rotated as the cap is being removed from the tube in such a way that the fingers 29 move the ligature 7 in a circular motion thereby breaking contact of the ligature with the interior surface 15 of the tube so that upon tilting the tube in a downward direction the ligature will be readily dispensed from the tube. For example, assuming that the fingers 29 and the ligature occupy the position shown

in Fig. 4, it will be observed that relative rotation of the cap and tube will set the ligature in motion and thereby overcome the tendency of the ligature to resist sliding from the tube by reason of being in contact with the wall of the tube. Alternatively, the cap may be removed and then rotated to accomplish the removal of the ligature from the tube.

The construction described above is such as to hold the ligature **7** sealed in the capped tube, which in turn is sealed in a capped container of the type described in our aforementioned copending applications, under sterile conditions during storage and shipment and until the time of use at the operating table. When a ligature is needed at the operating table, the ligature receptacle of the present invention can be quickly dispensed from its container onto a sterile field by an attendant such as an unsterile nurse. A sterile nurse then takes up the ligature receptacle of the present invention in one hand and grasps extension **21** in the other hand. Upon pulling extension **21** in an upward direction, the concavo-convex form of the skirt **11** becomes elongated, thereby facilitating easy removal of the cap **5** from the tube. As previously mentioned, extension **21** may be provided with the hook **22**, in which case, after the cap is removed from the tube, the hook may be inserted into the tube to aid the removal of the ligature. The cap is also provided with the fingers **29** for rotating against the ligature and facilitating its removal from the tube as previously described. In either event, the construction of the cap permits its ready removal, and rapid and safe dispensing of a sterile ligature. Moreover, the concavo-convex form of the annular skirt **11** allows a cap of one size to be used in tubes of various diameters. Thus, for example, the cap may be fitted into a tube having a diameter somewhat smaller than that of the skirt **11**, since the skirt will elongate or flatten out upon the application of force, thereby conforming the skirt to the size of the opening and providing a tight and effective seal. Further, the construction of the cap is such that it resists being forced out of the tube by pressure built up within the tube in the course of capping. Thus, the novel ligature receptacle of the present invention not only permits rapid and convenient dispensing

of a sterile ligature, but also protects the sterile operating area from any glass splintering or other contamination.

In view of the above, it will be seen that the several objects of the invention are achieved and other advantageous results attained.

As various changes could be made in the above constructions without departing from the scope of the invention, it is intended that all matter contained in the above description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

We claim:

1. A ligature receptacle comprising a ligature-containing tube closed at one end and open at the other, and a closure for the open end of the tube comprising a cap made of a resilient plastic material and having a portion fitting in the open end of the tube and a pair of integral fingers projecting therefrom inside the tube, said fingers being adapted for rotating against the ligature for removing the ligature from the tube.

2. A ligature receptacle comprising a ligature-containing tube closed at one end and open at the other, and a closure for the open end of the tube comprising a cap made of a resilient plastic material and having an integral annular skirt fitting in the open end of the tube, said skirt being of concavo-convex form in cross section with its outer periphery convex for engagement with the interior surface of the tube, and said cap having a pair of integral fingers projecting therefrom inside the tube, said fingers being adapted for rotating against the ligature for removing the ligature from the tube.

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