Aug. 6, 1957 R. B. HARKNESS ET AL 2,801,741

STERILE CONTAINER AND LIGATURE PACKAGE

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FIG. 1.

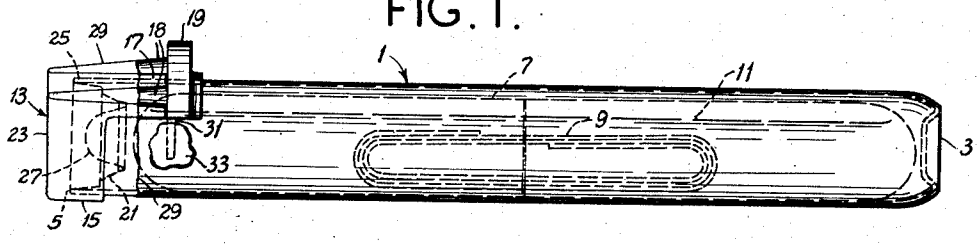

FIG. 2.

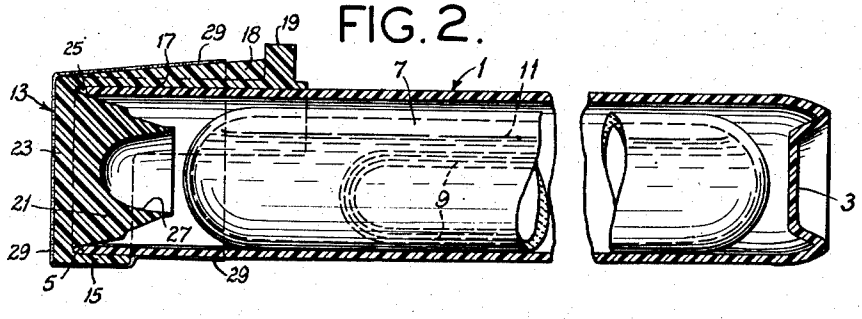

FIG. 3.

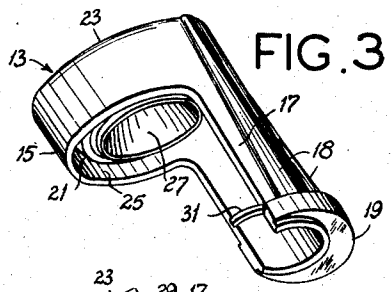

FIG. 4.

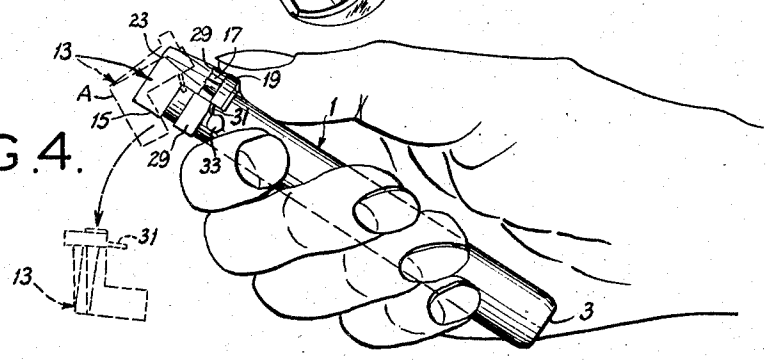

FIG. 5.

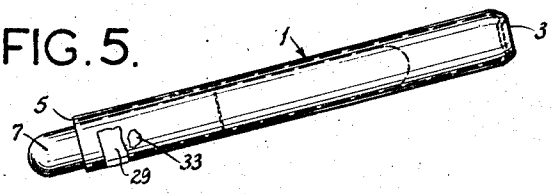

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FIG. 7.

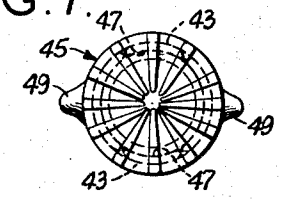


FIG. 6.

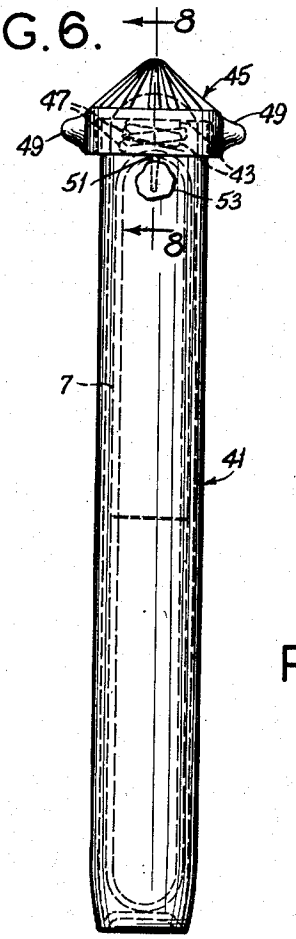


FIG. 9.

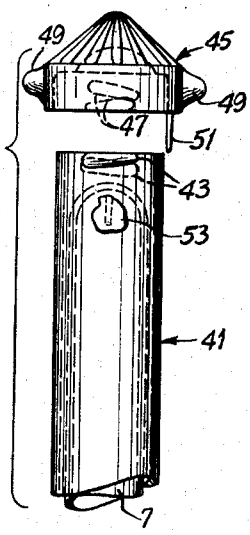
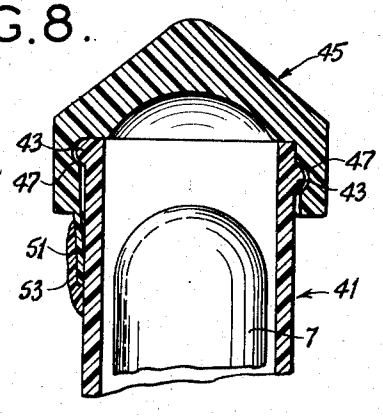


FIG. 8.



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2,801,741

STERILE CONTAINER AND LIGATURE PACKAGE

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Application August 16, 1954, Serial No. 449,965

3 Claims. (Cl. 206—63.3)

This invention relates to sterile containers, and more particularly to single-use ligature tube containers enabling transfer of a sterile ligature tube from an unsterile onto a sterile field.

This application is a continuation-in-part of our copending application entitled Ligature Tube Container, Serial No. 356,762, filed May 22, 1953, issued Patent 2,788,893, April 16, 1957.

Among the several objects of the invention may be noted the provision of improved sterile containers, and particularly ligature tube containers of the class described; the provision of containers of this class with a special seal which, once broken, provides a positive indication that the container has been opened and thus possibly rendered unsterile; the provision of a container of this class with a seal the broken condition of which may be readily detected either by feel or by eye; and the provision of a seal such as described which is economical to apply. 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 several of various possible embodiments of the invention are illustrated,

Fig. 1 is a view in elevation of a ligature tube container of this invention;

Fig. 2 is an enlarged longitudinal cross section of Fig. 1, and broken away adjacent the center;

Fig. 3 is a perspective of a cap per se of the container;

Fig. 4 is a view showing a mode of removing the cap;

Fig. 5 is a view showing how the ligature tube is dispensed from the receptacle;

Fig. 6 is a view in elevation of another form of ligature tube container of this invention;

Fig. 7 is a plan of Fig. 6;

Fig. 8 is an enlarged cross section taken on line 8—8 of Fig. 6, and,

Fig. 9 is an exploded view similar to Fig. 6 showing a cap of the container removed.

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

Referring to Figs. 1–5 of the drawings, a ligature tube container of our invention is shown to comprise an elongate generally cylindrical receptacle 1 closed at one end as indicated at 3, and open at its other. The open mouth end of the receptacle is indicated at 5. The receptacle 1 is preferably made of a transparent plastic material, with a thin flexible wall. Its inside diameter is somewhat greater than that of the ligature tube 7 packaged therein, and its length is somewhat greater than that of the tube. The ligature tube 7 is a conventional rounded-

end glass ligature tube in which is sealed a ligature 9. A quantity of asepticizing fluid 11 may be sealed in the ligature tube to insure sterile conditions within the tube. It will be understood that in some instances the ligature is sealed in the tube 7 without asepticizing fluid. The receptacle 1 is closed by a cap 13 slidably telescoped on the receptacle at its open end, the ligature tube 7 being sealed in the capped receptacle with the outside surface of the tube, the inside of the receptacle, and the inside of the cap at the open end of the receptacle in sterile condition, without any asepticizing fluid in the receptacle.

The cap 13 is preferably molded of a plastic material. As shown, it has a cylindrical skirt 15 having a close sliding fit on the outside of the receptacle, with an integral longitudinal extension 17 from the skirt of less than semicylindrical form. Reinforcing ribs 18 extend lengthwise of the cap and the extension. At its end, the extension 17 has an outwardly projecting bead 19. A tapered nose 21 extends from the head 23 of the cap into the receptacle 1, there being an annular groove 25 between the nose and the skirt 15 receiving the mouth end of the receptacle. This end of the receptacle is tightly received in the bottom of the groove 25. The nose acts to reinforce the mouth end of the flexible-walled receptacle 1, and prevents breaking of the seal between the cap and the receptacle by preventing deformation of the mouth end of the receptacle. In the end of the nose is a recess 27 adapted to accommodate the adjacent rounded end of the ligature tube 7. After the tube 7 has been inserted in the receptacle 1 and the latter capped under the sterile conditions above mentioned, the capped end of the receptacle is sealed as by a coating 29 of any suitable sealing material, preferably a transparent sealing material. Coating 29 terminates short of the end of the extension 17.

The extension 17 is provided with an integral laterally projecting flexible elongated finger 31 toward its end. This finger is constituted by an integral part of the cap. After the ligature tube has been sealed in the receptacle 1 as above described, a spot of a colored adhesive is applied to the receptacle over the finger as indicated at 33. In accordance with this invention, receptacle 1 and the cap 13 are made of different materials, and the adhesive used at 33 is such as to adhere tightly to the material of the receptacle but not to the material of the cap. Accordingly, the finger lies within a recess in the adhesive and is withdrawable from the recess by reason of the nonadherence of the adhesive to the finger. Further, the adhesive 33, while of a different color than either 1 or 31, is so composed that it will not color the finger 31, leaving it a contrasting color to the spot 33. An important advantage of this combination is that the adhesive 33 does not break off or splinter in any way, with possible resultant contamination of the sterile area. The finger slides loose; it does not break. The receptacle may be made of cellulose acetate-butyrate, the cap of polyethylene, and the adhesive used at 33 may be a composition comprising a base consisting of 20% by weight of vinyl chloride-acetate copolymer, 5% by weight 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 33 adhered to the receptacle 1, but not to the finger 31, when the cap 13 is pushed toward the end of the receptacle the finger 31 slides out of the spot 33 substantially clean, leaving the spot 33 on the receptacle. If the cap is pushed back on the receptacle, the

finger overlies the spot, free of the receptacle. Further, it cannot be refitted into the original position. The user may inspect the container by feeling the finger **31** to determine whether it is free, or by eye to see if the finger is clean, thus to determine whether the container has been opened and the ligature tube **7** thereby rendered possibly unsterile. The adhesive **33** sticks and cannot fly loose onto the sterile field.

The above-described construction is such as to hold the ligature tube **7** sealed in the capped receptacle under sterile conditions during storage and shipment and until the time of use at the operating table, or sterile field. When a ligature is needed at the operating table, the attendant (such as the unsterile nurse) simply takes up the container in one hand as illustrated in Fig. 4. The attendant first determines whether the container is sealed as by sliding the thumb over the finger **31** to determine whether the finger is sealed down by spot **33**, or free. If the finger is free, the attendant is immediately apprised that the ligature tube is possibly unsterile, and discards the container and the tube. Assuming that the container is sealed, the attendant holds it in the upwardly inclined position shown in Fig. 4, and, applying the tip of the thumb to the bead **19** at the end of extension **17**, slides the cap **13** (but keeps control of it) toward the end of the receptacle with the thumb to the point where the cap, when released by the thumb, will drop off the end of the receptacle. The attendant holds the receptacle (and keeps control of the cap with the thumb) in the Fig. 4 position over a point for disposal of the cap, and releases the cap to allow it to drop off the end of the receptacle. The cap inherently tilts with respect to the receptacle, as shown in dotted lines at A in Fig. 4, before it drops off the end of the receptacle. This tilting occurs by reason of the provision of extension **17**, with the extension being free to tilt away from the container since it is of less than semicylindrical form. Then, as shown in Fig. 5 the receptacle is tilted to a downwardly inclined position to allow the tube **7** to slide out onto the sterile field, without being touched or contaminated by the attendant. The cap may also be removed by applying the tip of the thumb behind the bead **19**, rather than on top of the bead, and pushing to off directly in one motion, without holding down on the extension **17**.

It will be observed that the tilting of the cap as it drops off the receptacle (which tilting could not occur if the skirt of the cap were not provided with the extension **17**) insures against contamination of the lip of the receptacle by the act of removing the cap. No portion of the cap which might be contaminated comes into contact with the lip of the receptacle, and hence transfer of contamination from the cap to the lip of the receptacle (from whence it might be picked up by the tube **7** as the latter slides out of the receptacle) is avoided. Thus, even though the container may be highly contaminated on the outside, the ligature tube may be readily dispensed by a simple one-hand operation with assurance that the tube is delivered in sterile condition. The containers may be cheaply transported (since they eliminate any necessity for having the ligature tubes immersed in an asepticizing storing fluid), and may even be carried in the pocket or military service kits, without precluding the possibility of dispensing sterile ligature tubes. Assurance that the container has not been opened (deliberately or inadvertently) and hence that the ligature tube is sterile is obtained by provision of the finger **31** and spot of adhesive **33**.

Figs. 6–9 illustrate another form of ligature tube container of this invention comprising an elongate generally cylindrical receptacle **41** similar to the receptacle **1** described above, with the exception that the receptacle **41** is provided at its open end with external part-threads on opposite sides as indicated at **43**. A cap indicated at **45** has internal part-threads **47** at opposite sides cooperable with the part-threads **43** on the receptacle **41** for positively locking the cap on the receptacle, and permitting

the cap to be pushed off the receptacle upon turning the cap to disengageg the part-threads. The positive lock is desirable in cases where the containers may be subjected to severe handling, as, for example, when parachuted from aircraft. A ligature tube **7** is sealed in the capped receptacle under the same conditions as described above. The cap may be provided with laterally projecting bosses **49** to facilitate pushing it off the receptacle with the thumb. The receptacle **41** and the cap **45** are made of different plastics like the receptacle **1** and cap **13** above described. The cap **45** is provided with an integral axially extending flexible finger **51** which extends on the outside of the receptacle **41**. A spot of adhesive **53** corresponding to the spot **33** above described is applied to the receptacle over the finger **51**. In this case, when the cap is turned, the finger pulls out of the spot **53** substantially clean, in the same manner as the finger **31** comes out of the spot **33**.

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 sterile container comprising a receptacle and a removable closure for the receptacle, the receptacle and the closure being made of different materials, an elongated finger constituted by an integral part of the closure projecting from the closure on the outside of the receptacle, and a spot of adhesive applied to the receptacle over the finger, the adhesive being adherent to the receptacle but not the finger, the finger lying within a recess in the adhesive and being withdrawable from the recess by reason of the nonadherence of the adhesive to the finger.

2. In combination, an elongate generally cylindrical plastic receptacle, said receptacle being adapted to be held in the hand and being closed at one end and open at the other, a cap made of a different plastic slidably telescoped on the receptacle at its open end, the cap having a skirt which has a close sliding fit on the exterior of the receptacle, and a longitudinal extension from the skirt of less than semicylindrical form for engagement by the thumb of the hand to push the cap off the receptacle, and a ligature tube having a ligature sealed therein, said tube being sealed in the capped receptacle with the outside surface of the tube, the inside surface of receptacle and the inside of the cap which is exposed interiorly to the receptacle in sterile condition, the cap having a flexible elongated finger constituted by an integral part of the cap projecting laterally from said longitudinal extension toward the end of the longitudinal extension, and a spot of colored adhesive applied to the receptacle over the finger, the adhesive being adherent to the receptacle but not the finger, the finger lying within a recess in the adhesive and being withdrawable from the recess by reason of the nonadherence of the adhesive to the finger.

3. In combination, an elongate cylindrical receptacle made of a flexible plastic closed at one end and open at the other, said receptacle having external part-threads on opposite sides at its open end, a cap made of a different plastic having internal part-threads at opposite sides cooperable with the part-threads on the receptacle and threaded thereon, and a ligature tube having a ligature sealed therein, said tube being sealed in the capped receptacle with the outside surface of the tube, the inside surface of the receptacle and the inside of the cap at the open end of the receptacle in sterile condition, the receptacle and the cap being made of different materials, the cap having a flexible elongated finger constituted by an integral part of the cap projecting therefrom on the outside of the receptacle, and a spot of colored adhesive

applied to the receptacle over the finger, the adhesive being adherent to the receptacle but not the finger, the finger lying within a recess in the adhesive and being withdrawable from the recess by reason of the non-adherence of the adhesive to the finger.

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