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SURGICAL LIGATURE DISPENSER

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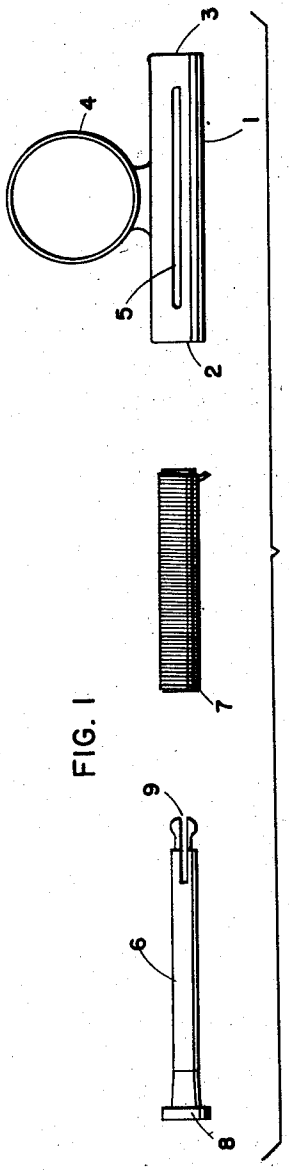


FIG. 1

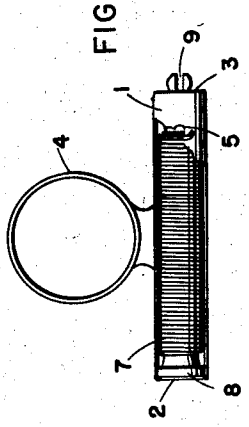


FIG. 2

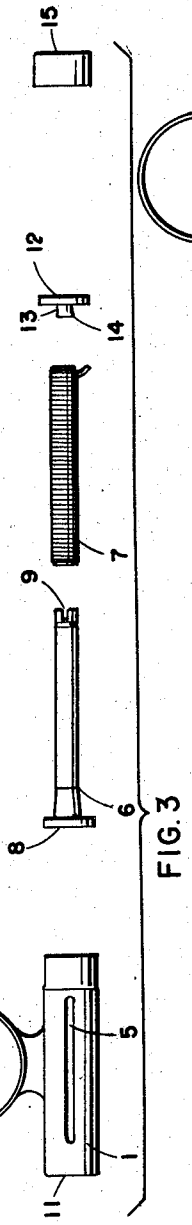


FIG. 3

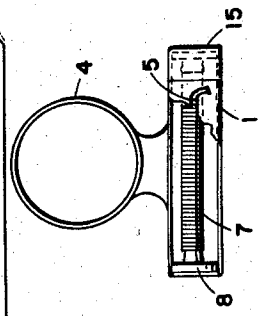


FIG. 4

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SURGICAL LIGATURE DISPENSER

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4 Claims. (Cl. 206—63.3)

This invention relates to a ligature dispenser.

The problem of dispensing ligature to the surgeon as he uses them is a very serious one. The surgeon must hold the ligature dispenser in his hand, he must be able to exert a very strong pull when tying off heavy structures, such as large arteries, and it is also vital that the ligature does not unwind from its reel and snarl or kink, resulting either in delay in the operating room or to weakened spots in the ligature. There is involved the risk of dropping it outside of the sterile field and, what is even more important, imposing a serious cramping strain on the surgeon's hand which, in a long operation, can be a very serious problem. In the past, ligature reels have been used either plain or in capped containers, through a small opening in which the ligature passes. While the latter is a big improvement as far as unwanted uncoiling of the ligature is concerned, it is still necessary for the surgeon at all times to grip the ligature container.

Another feature which is necessary is that the dispenser be capable of sterilization and that it be possible quickly to insert fresh reels of ligature either where the ligature is used up of where it is necessary to use ligatures of different sizes.

The present invention is directed to a ligature dispenser with a cooperating reel spindle which supports itself in the surgeon's hand without gripping, gives complete protection against premature unwinding of the ligature and can be reloaded easily and quickly. The ability to use standard ligature reels which are wound on cylindrical tubes, usually of fiber, is important not only from the standpoint of economy using standard ligature reels which can be wound cheaply but the use of standard reels improves the protection against infection. Ligature reels are wound commercially either under aseptic conditions or are sterilized after winding, depending on the ligature material, and are packaged so they are maintained in a sterile condition. Specially wound bobbins or other types of equipment which have to be wound in the hospital present a serious problem of complication and are far more difficult to sterilize.

Essentially the dispenser package of the present invention includes a cylindrical casing having a strong ring or partial ring attached thereto which fits one of the surgeon's fingers, usually the middle finger and provided with a longitudinal slot through which the ligature passes as it unwinds. Inside the casing there is a spindle having a flange at one end and a spring fastening, such as a slot and circumferential groove, at the other end. The standard commercial ligature reel is slipped on the spindle before the latter is inserted in the casing. In order to prevent premature unwinding of the ligature there must be a flange, or its equivalent, at the other end of the spindle. One way to handle the problem is to snap a removable flange over the small end of the spindle after the ligature reel has been mounted thereon. In such a case a casing closed at one end and with a suitable cap at the other end is used. This form, while operable and useful, has some disadvantages. For one thing, it requires an additional small part, a snap flange, which can be dropped and which is one more part to be sterilized and sterilization of casings and constant use may result in loosening of an end cap. A better modification, which is the preferred one in the present invention, is to provide a casing open at one end and with a small hole at the other end just slightly smaller than the small end of the spindle, which is then introduced therethrough and snaps into position. In this preferred modification the end of the casing performs the functions both of a casing end and of a spindle flange. Other modifications of spindle design and casing form are included in the present invention.

The invention will be described in greater detail in conjunction with the drawings in which:

Fig. 1 is an exploded view of a preferred form of dispenser;

Fig. 2 is an elevation, partly broken away, of the dispenser package in assembled form;

Fig. 3 is an exploded view of a modified form of spindle; and,

Fig. 4 is an elevation, partly broken away, of an assembled dispensing package using the spindle construction of Fig. 3.

The dispenser illustrated in Figs. 1 and 2 includes a cylindrical casing **1** having an open end **2** and a small opening **3** at the other end. In the center there is rigidly attached to the casing a split ring **4** oriented in the longitudinal plane of the casing and adapted to fit over the middle finger of a surgeon. A longitudinal slot **5** is provided through which the end of a ligature passes. A spindle, fitting in the cylindrical casing, is provided with a small diameter cylindrical portion **6** on which a suture reel **7** can be slid. One end of the spindle carries a flange **8** which fits snugly into the large opening **2** of the dispenser casing. The other end is slotted at **9** and provided with a groove **10**. The end of the slotted portion acts as a collar and is beveled so that it can slide through the small opening **3** in the closed end of the dispenser casing and snap tight. In operation the tubular suture reel is slipped over the spindle, the end of the ligature fed through the slot **5** of the case, and the spindle and reel inserted into the casing, the slotted end being pushed through the small opening **3**. Fig. 2 shows the assembled casing with the ligature end protruding through the slot.

As there are in effect two flanges at the ends of the ligature reel, one being the large flange **8** of the spindle and the other the closed end of the dispenser casing, coils of ligature cannot unwind prematurely and slip off the reel. There is thus no possibility of snarling or kinking of the ligature, and yet it is always ready in the surgeon's hand for use. When wearing the dispenser on his middle finger the surgeon does not have to grasp it continually and there is no danger of his fingers being cramped by gripping a separate ligature reel for long periods of time.

Figs. 3 and 4, in which the same parts bear the same reference numerals, illustrate a modified form of dispenser package. Here the dispenser casing **1** is provided with a closed end **11**, the spindle **6** has a large flange **8**, and there is provided a second flange **12** which is snapped on the slotted end of the spindle after the ligature reel has been mounted thereon. This flange has a main flange body **13** and a short collar **14** which actually engages the slotted end. The dispenser casing is also provided with an end cap **15**. After the ligature reel is mounted on the spindle and the removable flange snapped on, the ligature end is passed through the slot **5** and the spindle carrying the ligature reel is inserted through the open end of the casing. Thereupon the cap is slipped over the open end and the assembled dispensing package is of the form illustrated in Fig. 4. This

modification has many of the advantages of the preferred modification illustrated in Figs. 1 and 2 but requires a cap and a separate removable flange. Once the package is assembled, however, the surgeon has the same convenience in wearing and using it.

The advantages of the dispensing package of the present invention are not limited to operations where the ligature is in constant use. Sometimes a surgeon may have to use the ligature during only a part of the operation. With ordinary ligature reels, they must be set down with a possibility of misplacement or delay in picking up, whereas the dispensing package of the present invention can, if necessary, be worn by the surgeon throughout the operation, as the fingers of the hand wearing the dispenser are free to grasp any instruments needed. Yet, the ligature is always at hand and can be used without delay.

The particular material used in making the casing is not critical. It must, of course, be strong enough and rigid enough for the mechanical requirements of its operation and it must also resist corrosion and other conditions encountered in sterilization. Very satisfactory casings can be made of chrome-plated metal. Stainless steel may also be used, but the attachment of the ring by welding is not as smooth, and so the dispenser package is less attractive. However, stainless steel has the advantage that its corrosion resistance is not in the form of a plating. It is possible to use plastics of adequate heat resistance to withstand the sterilization but a thicker wall is then required and normally non-corroding metal casings are preferable.

The spindle can be made of any material which has sufficient springiness for the slotted end. Thus, it can be made of metal which is either plated or non-corroding, such as stainless steel. However, a metal spindle is heavier and a plastic such as nylon which has adequate strength and springiness is preferred.

We claim:

1. A two-piece readily sterilizable ligature dispenser package comprising in combination: a dispenser casing having a cylindrical body which has an open end, and a partially closed end having a central hole therein, having rigidly attached to said body at approximately the center thereof a finger ring of a size adapted to surround an adult, human middle finger and oriented so that the plane of the ring is substantially parallel with the longitudinal axis of the casing, said casing having a longitudinal slot in the cylindrical body thereof, a ligature on a reel in said casing, with the end of the ligature extending through said slot, and a spindle having a cylindrical body portion of a size adapted to be fitted into the ligature reel and fitted in said reel, said spindle having a flange at one end inserted in the casing and fitting snugly in the open end thereof, said spindle having a groove at the end opposed to the flange, and an axial slot extending part way along the said cylindrical body portion from said grooved end, said groove snap fitting into the central hole in the restricted end of the casing.

2. A two-piece readily sterilizable ligature dispenser package comprising in combination: a dispenser casing having a cylindrical body which has an open end, and a partially closed end having a central hole therein, having rigidly attached to said body at approximately the center thereof a finger ring of a size adapted to surround an adult, human middle finger and oriented so that the plane of the ring is substantially parallel with the longitudinal axis of the casing, said casing having a longitudinal slot in the cylindrical body thereof, a ligature on a reel in said casing, with the end of the ligature extending through said slot, and a spindle of springy plastic material having a cylindrical body portion of a size adapted to be fitted into the ligature reel and fitted in said reel, said spindle having a flange at one end inserted in the casing and fitting snugly in the open end thereof, said spindle having a groove at the end opposed to the flange, and an axial slot extending part way along the said cylindrical body portion from said grooved end, said groove snap fitting into the central hole in the restricted end of the casing.

3. A readily sterilizable ligature dispenser package comprising in combination: a dispenser casing having a cylindrical body which has an open end and a closed end and having rigidly attached to said body at approximately the center thereof a finger ring of a size adapted to surround an adult, human middle finger and oriented so that the plane of the ring is substantially parallel with the longitudinal axis of the casing, said casing having a longitudinal slot in the cylindrical body thereof; a ligature on a reel in said casing, with the end of the ligature extending through said slot, a spindle having a cylindrical body portion of a size adapted to be fitted into the ligature reel and fitted in said reel, said spindle having a flange at one end inserted in the casing and fitting in the open end thereof, a reel and ligature retaining flange removably attached to the other end of said spindle, and a removable cap closing the open end of the cylindrical body.

4. A readily sterilizable ligature dispenser package comprising in combination: a dispenser casing having a cylindrical body which has one open end, and having rigidly attached to said body at approximately the center thereof a finger ring of a size adapted to surround an adult, human middle finger and oriented so that the plane of the ring is substantially parallel with the longitudinal axis of the casing, said casing having a longitudinal slot in the cylindrical body thereof, a ligature on a reel in said casing, with the end of the ligature extending through said slot, a spindle having a cylindrical body portion of a size adapted to be fitted in said reel and fitted in said reel, said spindle having a flange and at one end inserted in the casing and fitting in the open end thereof, removable flanging means engaging the other end of the spindle, and means to retain the spindle having the reel and ligature mounted thereon in the casing.

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