

Jan. 2, 1968

M. CONVERSE

3,361,382

HAND-HELD LIGATURE DEVICE

Filed Dec. 1, 1966

3 Sheets-Sheet 1

FIG. 1

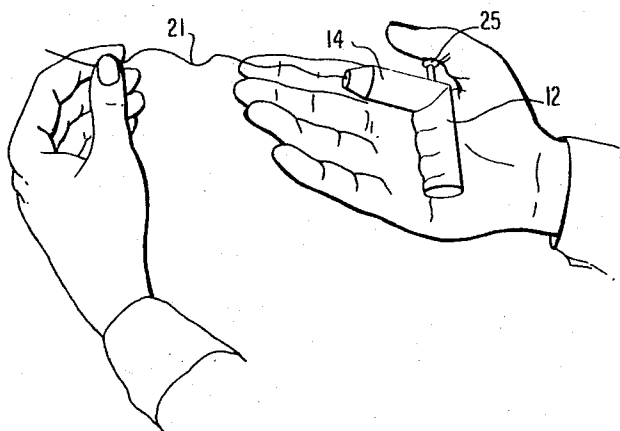


FIG. 4

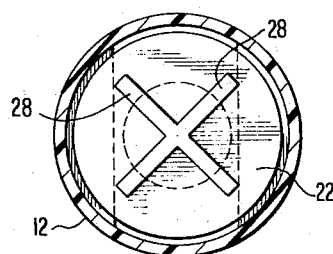


FIG. 2

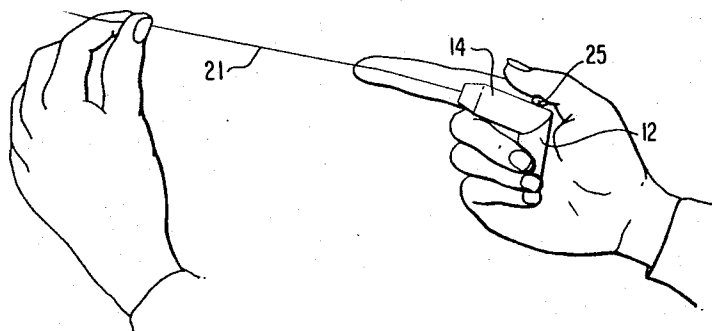


FIG.5

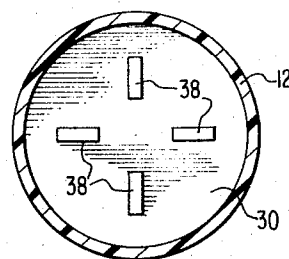
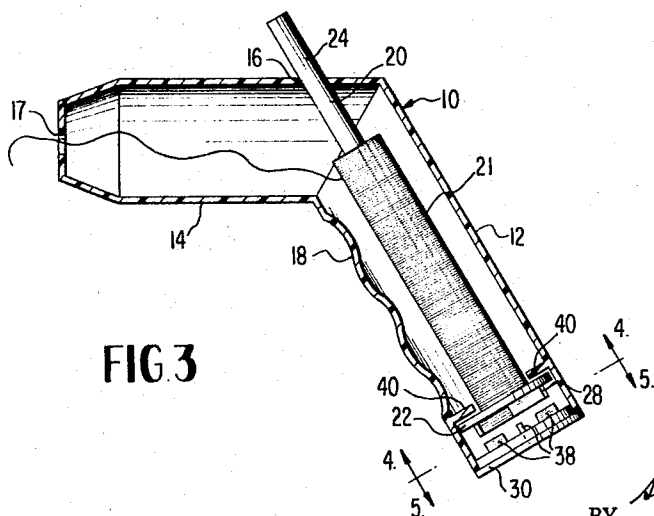


FIG. 3



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FIG. 6

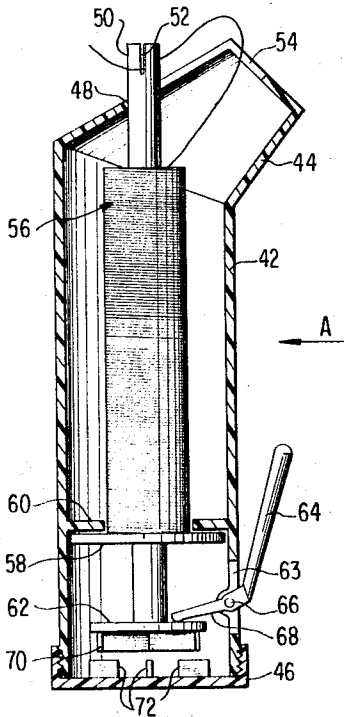


FIG. 8

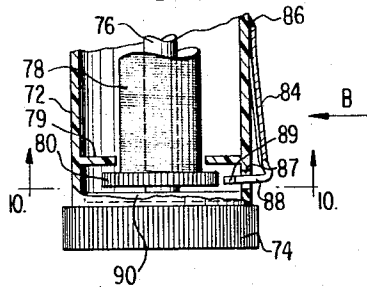


FIG. 11

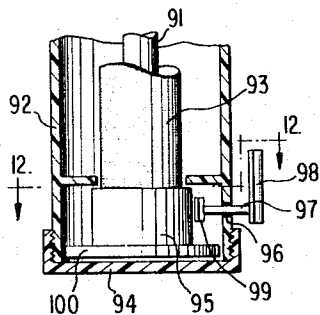


FIG. 12

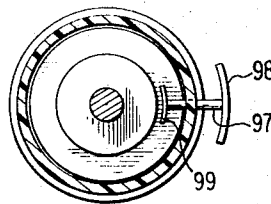


FIG. 7

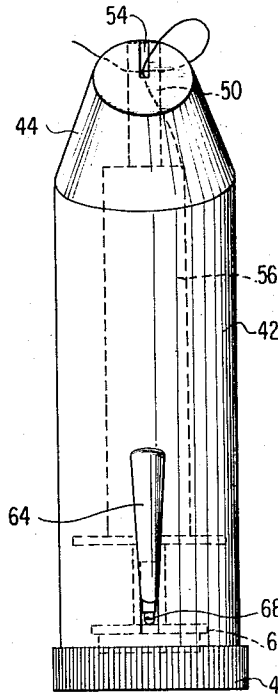


FIG. 9

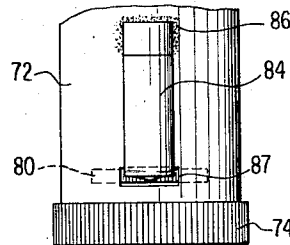
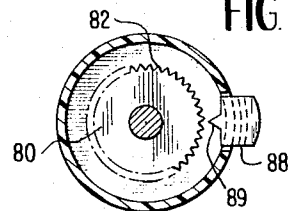


FIG. 10



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FIG. 13

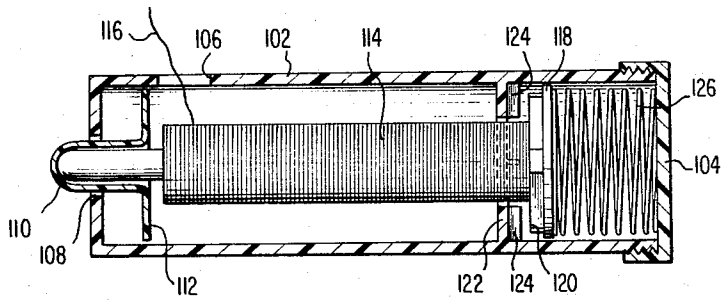


FIG. 14

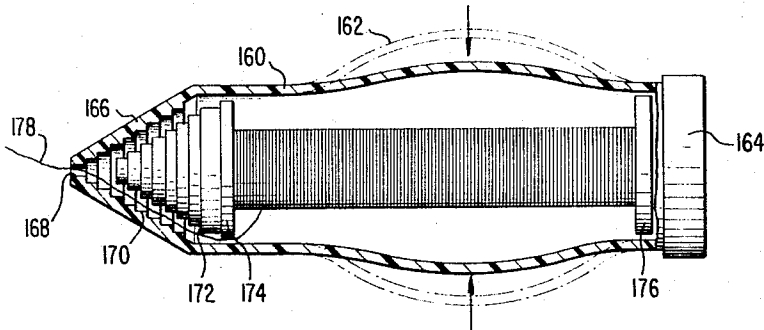
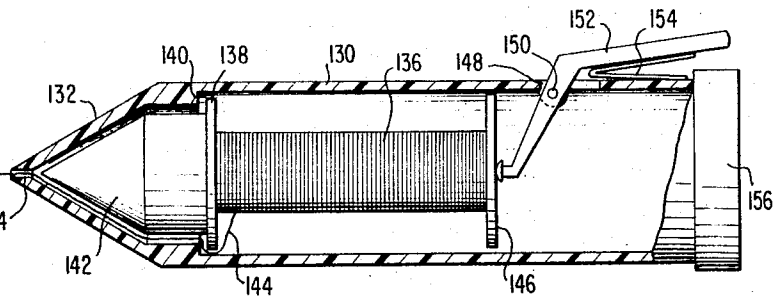


FIG. 15

FIG. 16

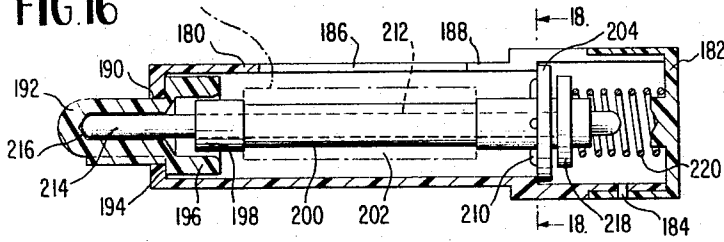


FIG. 17

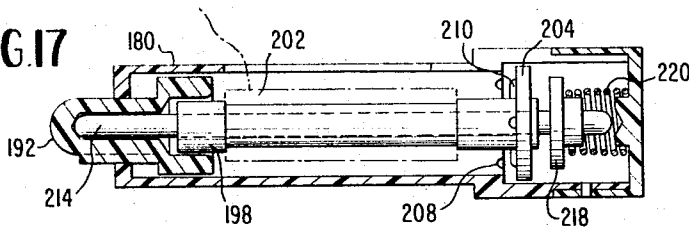
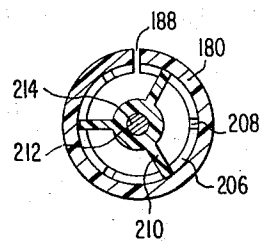


FIG. 18



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11 Claims. (Cl. 242—137.1)

ABSTRACT OF THE DISCLOSURE

A thread dispensing package having a cylindrical hand-held casing and a thread containing spool mounted therein for reciprocation and rotation within the casing. Complementary releasable braking means are provided on the spool and casing for manual actuation to prevent thread dispensing.

This application is a continuation-in-part application of applicant's copending application Ser. No. 529,687, filed Feb. 24, 1966, and entitled, "Hand-Held Ligature Device."

This invention relates to a thread dispensing package, and more particularly, to a hand-held package for dispensing suturing thread from a rotatable thread supply reel that can be easily restrained from rotation by the user to prevent further dispensation of the thread.

Some of the presently available suture thread packages are of the type that include a thread wound reel grasped in one of the doctor's palms during a suturing operation. It is often the case that varying amounts of pressure are required to tug the thread from the reel, the thread becomes loose and entangled during a critical time in the operation, or both hands are required to manipulate the reel to dispense the thread.

The suture thread package of this invention overcomes the shortcomings inherent in the present day related packages by providing an inexpensive easily constructed package with relatively few parts that can be comfortably and naturally grasped by the doctor during the suturing operation.

Generally outlined, the suture thread package of the present invention is constructed from a plastic casing adaptable to receive therein a thread supply reel which is rotatable and axially shiftable with respect to the casing. The casing is provided with an aperture through which the thread may be withdrawn from the supply reel. Braking means are provided to prevent relative rotation of the supply reel with respect to the casing. The brake means may be either frictional or positive and may be readily released by the person holding the casing to enable the thread to be withdrawn from the supply reel.

In the drawings:

FIGURE 1 is a view which shows the thread supply package of this invention lying in the open palm of the doctor before it is firmly grasped;

FIGURE 2 is a view which shows the package prepared for use with the doctor's forefinger held against the barrel, his thumb resting on the exposed end of the reel and his other three fingers wrapped around the handle portion which is preferably contoured to accommodate these fingers;

FIGURE 3 is a side elevational view of the package with a portion of the casing removed and the reel in the unlocked position;

FIGURE 4 is a view taken along the line 4—4 of FIGURE 3 showing the locking elements associated with the lower end of the reel;

FIGURE 5 is a view taken along the line 5—5 of FIGURE 3 showing the locking elements associated with the base portion of the handle;

FIGURE 6 is a side elevational view of a modified package with a portion of the casing removed;

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FIGURE 7 is a side elevational view of the package in FIGURE 6 as viewed in the direction of the arrow A;

FIGURE 8 is a partial side elevational view of another modified package with a portion of the casing removed;

FIGURE 9 is a partial side elevational view of the package in FIGURE 8 as viewed in the direction of the arrow B;

FIGURE 10 is a sectional view taken along the line 10—10 in FIGURE 8;

FIGURE 11 is a partial side elevational view of still another modified package with a portion of the cover removed;

FIGURE 12 is a sectional view taken along the line 12—12 in FIGURE 11;

FIGURE 13 is a partial side elevational view of a further modified package with a portion of the casing removed;

FIGURE 14 is a partial side elevational view of still a further modified package with a portion of the casing removed;

FIGURE 15 is a partial side elevational view of a still further modified package with a portion of the casing shown in section;

FIGURE 16 is a partial side elevational view of another modified package with some of the elements shown in section;

FIGURE 17 is a view similar to FIGURE 16 showing the supply reel in the unlocked position, and

FIGURE 18 is a sectional view along the line 18—18 in FIGURE 16.

Referring to the drawings in more detail and to FIGURE 3 in particular, the suture thread dispensing package of this invention is shown to have a casing 10 constructed of any suitably sturdy material but preferably of plastic that is transparent enabling the doctor to see the amount of thread remaining in the package. The casing has a handle portion 12 and a thread dispensing barrel portion 14 which diverge from one another to accommodate the holding of the package by the doctor in a manner to be described. Finger grips 18 are formed on handle 12 to assist the doctor in comfortably and snugly gripping the handle portion 12 of the package.

Extending through the center of the handle 12 is an elongated spindle-shaped reel 20 around which is wound suturing thread made from catgut, silk, nylon, cotton or any material of this general type adequate for suturing. One end 24 of reel 20 extends through a guide aperture 16 formed in the casing 10. Upper end 24 upon which the doctor's thumb will rest when the package is being used is designed to be depressed by the doctor for reasons to be indicated. The base end of reel 20 is connected to a disk 22 formed on its lower face, as shown in FIGURE 4, with a plurality of radially extending locking ribs 28.

The base wall 30 of handle 12 is formed with a plurality of locking projections 38 as shown in FIGURE 5. Under ordinary conditions, when thread 21 is being drawn from reel 20, locking ribs 28 and locking projections 38 will be spaced from each other so as to permit the free rotation of reel 20. Base wall 30 can be integrally formed with handle 12 or it can be attached to handle 12 by any other means such as by snap fitting into an annular groove (not shown) formed on the interior wall of the handle. In FIGURE 3, it is seen that a reduced portion of the base wall 30 is press fitted within the handle member 12 to provide a removable base wall. If the entire package is to be disposed of following use of all the thread 21, base wall 30 could be integrally formed with casing 10. If the package is to be reused with a new thread supply reel of the same construction as reel 20 or if reel 20 to be wound with a new supply of thread 21, then base wall 30 be designed for detachable connection with handle 12.

Barrel 14 is formed with a dispensing aperture through which thread 21 passes. The side of the barrel 14 may be provided with a groove (not shown) in which the doctor's forefinger may be positioned when the package is grasped.

Positioned slightly above disk 22 is a pair of stop shoulders 40 which are separated sufficiently to allow a reel wound with the thread 21 to be inserted therethrough but prevent the passage of the disk 22. The disk 22 is of a diameter slightly less than the inside diameter of the handle 12 so as to prevent undue wobbling of the reel 21 during the thread dispensing operation. The stops 40 limit the axial movement of reel 20 in one direction while base wall 30 limits this motion in the opposite direction.

When the doctor is prepared to undertake a suturing operation, he first lays the suture thread dispensing package of this invention in his palm as shown in FIGURE 1 with his thumb resting on the depressible end 24 of reel 20 and his forefinger positioned generally parallel to and in contact with the barrel 14. His other three fingers are then curled around the contoured grooves 18 on handle 12. With thumb pressure relaxed on the depressible end 24, a gentle tug on the suturing thread 21 is sufficient to cause free rotation of reel 20 and passage of thread through dispensing aperture 17. While the package is held in the dispensing condition, locking ribs 28 and locking projections 38 are separated from one another and hence rotation of reel 20 can occur unrestrained. Reel 20 can only slide through guide aperture 16 by a predetermined distance since stops 40 will be engaged by disk 22 to limit the axial movement of reel 20. Therefore, should the doctor accidentally or intentionally entirely remove his thumb from depressible end 24, entanglement of thread 21 due to excessive movement of reel 20 could not take place.

Thread 21 is smoothly and continuously dispensed without any necessity by the doctor to use his other hand to adjust the reel 20 or other portions of the package. Once the package is firmly and comfortably grasped, it need not be shifted to any new position.

When the doctor wants the dispensing of the thread to be stopped either temporarily during the suturing operation or at the end of the operation, he can quickly and effectively achieve this by simply exerting downward thumb pressure upon the depressible end 24 of reel 20. This action automatically serves to thrust reel 20 downwardly causing the locking ribs 28 on disk 22 to become interlocked with locking projection 38 on base wall 30 with disk 22 firmly locked against base 30 under the thumb pressure of the doctor, reel 20 is unable to rotate and dispensing of thread 21 must stop. To commence dispensing, the doctor need only relax his thumb pressure upon depressible end 24. Placing the package in its dispensing condition from its non-dispensing condition and vice versa is completed by manipulation of only the hand used to grasp the package. The doctor's other hand is free at all times.

A modified form of the dispensing package is shown in FIGURE 6 wherein the main barrel or handle 42 is connected to a much shorter dispensing nozzle 44. The opposite end of the barrel 42 is closed by means of a cap 46 which may be screwed, snapped or frictionally secured to the end thereof. The nozzle 44 has an opening 48 therein for the reception of the spindle 50 having a supply of thread 56 wound thereon. A slot 54 communicates with the circular opening 48 and extends to the extreme end of the nozzle 44. The end of the spindle 50 is provided with a notch or slit 52 which is adapted to frictionally hold the end of the thread 56 when the device is not in use.

The spindle 50 is provided with an enlarged disk 58 intermediate the ends thereof. An annular retaining ring 60 is secured to the inside of the barrel 42 and defines an opening smaller than the diameter of the disk 58 to pre-

vent the passage of the disk therethrough. Spaced from the disk 58 is a second disk 62 having a plurality of locking members 70 similar to the locking members shown in the embodiment of FIGURE 3. The cap 46 is likewise provided with complementary projections 72 which are adapted to mate with the projection 70 to prevent the rotation of the spindle 50. The barrel 42 is provided with an opening 63 through which a bell crank lever 64 extends. The lever 64 is pivoted through the barrel 42 at 66. The inner end 68 of the lever 64 bears against the upper surface of the disk 62. When the lever 64 is squeezed against the barrel 42 by means of the fingers which surround the barrel 42, the lever portion 68 will press the disk 62 downwardly, thereby bringing the locking elements 70 and 72 into meshing engagement. When it is desired to withdraw thread from the reel 50, the operator merely releases the grasp on the lever 64 and a subsequent pulling on the thread 56 will lift the spindle 50 upwardly as viewed in FIGURE 6, thereby freeing the locking elements 70 and 72 from each other and allowing the reel 50 to rotate.

Another form of locking means is shown in FIGURE 8 wherein the barrel 72 is provided with a cap 74 and a spindle 76 carrying a supply of thread 78 similar to the other forms of the invention. The spindle 76 is provided with a toothed disk 80 which cooperates with the annular disk 79 on the inside of the barrel 72 to prevent excessive longitudinal movement of the spindle upwardly. The lower end of the barrel 72 is provided with an opening 87 adjacent the toothed wheel 80. A leaf spring member 84 is secured to the outside of the housing 72 at 86 by means of gluing, soldering or the like. The spring 84 has a bent end 88 provided with a pointer element 89 which is adapted to extend between the teeth of the wheel 80 to prevent rotation thereof. The spring 84 is normally in its outward position as illustrated in FIGURE 8. Upon squeezing of the leaf spring 84 against the barrel 72, the projection or pointer 89 moves radially inwardly and engages the teeth 82 on the disk 80. The lowermost end of the spindle 76 is provided with an enlarged disk 90 substantially filling the lower end of the housing to stabilize the spindle 76 during the rotation thereof, thereby enabling the toothed wheel 80 to be in the proper relationship for cooperation with the projection 89 on the leaf spring 84.

Still another form of braking device is shown in FIGURE 11. As with the previous devices, the suture package is comprised of a barrel 92 having an end cap 94 and a spindle 91 journaled for rotation therein and having a supply of thread 93 thereon. The lower end of the spindle 91 is provided with an enlarged brake drum portion 95. Adjacent the brake drum 95 the barrel 92 is provided with an opening 96 for the reception of a plunger 97 therethrough. One end of the plunger 97 has a handle member 98 thereon and the other end of the plunger 97 has a brake shoe 99 secured thereto. Immediately below the brake drum portion 95 of the spindle an enlarged disk portion 100 is formed which substantially fills the inside diameter of the barrel 92 to stabilize the rotation of the spindle 91. When it is desired to brake the rotation of the spindle, the operator merely squeezes the handle portion 98 inwardly toward the barrel 92. This in turn presses the plunger 97 inwardly to press the brake shoe 99 against the brake drum 95 and stop the rotation of the spindle 91.

The modification of the said package as shown in FIGURE 13 comprises a tubular casing 102 having one end closed by a removable cap 104 which may be secured to the casing by any of the means enumerated above with respect to the other embodiments. An aperture 106 is provided in the side of the casing 102 adjacent the opposite end thereof. The end of the tubular casing opposite the cap 104 is provided with an opening 108 through which protrudes a hollow, bullet-shaped member 110 having a flange 112 thereon disposed interiorly of the casing

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and substantially equal in diameter thereto. A spindle 114 upon which the thread is adapted to be wound has one end thereof journaled in the hollow bullet-shaped member 110. The thread 116 which is wound upon the spindle 114 is adapted to be pulled outwardly through the aperture 106 in the casing 102. The opposite end of the spindle is provided with an enlarged end portion 118 of substantially the same diameter as the interior diameter of the casing. A plurality of locking ribs 120 are provided on the surface of the enlarged end portion and are similar in construction to the rib members 28 shown in FIGURE 4. An annular stop member 122 is provided on the interior surface of the casing adjacent the rib carrying surface of the enlarged end portion of the spindle. A plurality of locking ribs 124 are provided on the surface of the stop shoulder adjacent the enlarged end portion of the spindle. These ribs 124 are similar in construction to the ribs shown in FIGURE 5 and are adapted to cooperate with the locking ribs 120 on the enlarged end of the spindle to prevent rotation thereof. A coil spring member 126 is disposed intermediate the enlarged end portion of the spindle 118 and the cap 104 to bias the spindle into its locked position, thereby preventing the rotation of the spindle and the dispensation of thread therefrom. Upon pressing the bullet-shaped member 110 inwardly, the locking ribs will be disengaged from each other and by pulling on the thread 116, the spindle 114 will rotate within the casing to aid in the dispensation of thread therefrom.

The modification shown in FIGURE 14 has an elongated tubular casing 130 adapted to be held in the palm of the hand in the same manner as the previous modifications. One end of the tubular member 130 is provided with a conical portion 132 having an aperture 134 at the apex thereof. A thread carrying spindle 136 is journaled for rotation within the casing and is provided with an enlarged disk portion 138 at one end thereof adapted to mate with the shoulder portions 140 on the inside of the casing 130. The end of the spindle member adjacent the thread aperture 134 is of conical shape 142 complementary to the conical end of the casing 132. The thread 144 wound upon the spindle 136 is adapted to extend around the flange portion 138 past the conical portion 142 and out through the aperture 134. The opposite end of the spindle 136 is provided with an enlarged end portion 146 of substantially equal diameter with the internal diameter of the casing 130. The casing is provided with an opening 148 in the side thereof through which a bell crank lever 152 is adapted to extend. The bell crank lever 152 is pivoted to the casing at 150. The arm of the bell crank lever which extends into the casing is adapted to bear against the enlarged end portion 146 of the spindle member. A spring member 154 is disposed between the other arm of the bell crank lever 152 in the casing 130 to bias the bell crank lever away from the enlarged end portion of the spindle 146. Upon squeezing the outward arm of the bell crank lever 152 inwardly against the force of the spring 154, the inner arm of the bell crank lever will press against the spindle member to shift the spindle axially within the casing to bring the conical portions and the flange 138 and shoulder portion 140 into engagement with each other. In this manner, the thread 144 which extends past the shoulder 140 and between the conical members 132 and 142 will be clamped to prevent further dispensation of the thread from the spindle. When the spindle is released to allow thread dispensation, the thread will be pulled axially from the spindle without necessarily causing any rotation of the spindle within the casing. The opposite end of the casing may be closed by a removable cap member 156 similar to the cap member shown in the previous embodiment.

The embodiment shown in FIGURE 15 is comprised of an elongated, tubular casing 160 which may be constructed of transparent plastic or the like. The casing 160 is formed with a circumferential bulge 162 shown

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in dot-dash lines, which is the normal unstressed position of the casing. The right-hand end of the casing is closed by means of a cap 164 similar to the closure caps shown and described in the previous embodiments. The opposite end of the casing is provided with a cone-shaped portion 166 having a hole 168 extending therethrough coaxial with the axis of the casing 160. The internal surface of the cone is provided with a series of notches or steps 170 which are adapted to cooperate with a plurality of notches or steps 172 formed on a complementary cone portion integral with the end disk 174 of the supply reel. The opposite end of the supply reel is provided with a similar end disk 176. The diameters of disk members 174 and 176 is slightly less than the internal diameter of the casing 160 so that the supply reel may freely turn within the casing without becoming unduly skewed with respect to the axis of the casing. When the casing is in its relaxed or normal position shown by the dot-dash lines, the overall length of the casing is less than the corresponding length of the supply reel located therein. Thus, the notches or steps 170 cooperate with the stepped end 172 of the supply reel to clamp the thread 178 therebetween. The compressive force exerted by the casing on the ends of the supply reel will frictionally prevent the supply reel from rotation within the casing. When it is desired to extract a length of thread from the supply reel, the person holding the casing in his hand need only squeeze the casing to thereby elongate the casing and free the supply reel for rotation within the casing. Such elongation of the casing will simultaneously release the thread 178 and the thread may be freely withdrawn from the full supply reel.

The embodiment of FIGURE 16 is somewhat similar to the embodiment shown in FIGURE 13 except it is considerably more efficient as will be seen from the following description. The tubular casing 180 is closed at one end by means of a removable cap 182 which may be secured by a pin and slot connection. The pin is shown at 184 but the slot has not been shown since such a locking means is considered to be quite conventional. Furthermore, the end closure cap 182 could be secured to the tubular casing 180 by any other suitable means, such as screw threads or the like. An aperture 186 is provided in the side of the casing 180 and may be somewhat oblong in shape with the length thereof being approximately five or six times the width of the opening. Extending from one end of the aperture 186 is a very fine narrow slit 188 which extends all the way to the end of the casing to facilitate threading the suture thread through the aperture 186.

The end of the tubular casing opposite the cap 182 is provided with an opening 190 through which protrudes a hollow bullet-shaped member 192 having a flange 194 thereon disposed interiorly of the casing and substantially equal in diameter thereto. A hollow tubular skirt member 196 is secured to the flange 194 and extends axially within the casing 180. The external diameter of the skirt 196 is slightly less than the internal diameter of the casing 180 so as to provide clearance for relative movement therebetween. The internal diameter of the skirt 196 is slightly larger than the end 198 of the supply reel or spindle 200. A thread package 202 is shown in phantom lines on the spindle 200 with the free ends of the thread extending outwardly through the aperture 186. The opposite end of the spindle 200 is provided with an enlarged circular flange 204, and the external diameter of the flange 204 is slightly larger than the internal diameter of the casing 180 in the area of the aperture 186 but slightly less than the internal diameter of the casing 180 adjacent the end cap 182. The two cylindrical internal portions of the casing 180 of different diameter are joined by means of a radial step portion 206. This step portion 206 is provided with six equally spaced notches 208 therein which are adapted to receive three equally spaced

ribs 210 formed on the opposing surface of the spindle flange 204.

The supply reel spindle 200 and its end portions 198 and 204 are provided with an elongated axial bore 212. An elongated plunger 214 extends through the bore 212 and extends into the hollow center portion 216 of the bullet-shaped member 192. The opposite end of the plunger is formed flange 218 which is disposed adjacent the flange 204 on the thread supply spindle. A spring member 220 is compressed between the flange 218 and the end cap 182.

Thus, it is seen that the spring 220 normally biases the plunger 214 and the supply spindle 200 to the left as shown in FIGURE 16. With the parts disposed as shown in FIGURE 16, the ribs 210 are disposed in blocking engagement with the notches 208, thereby preventing relative rotation of the supply reel spindle 200 with respect to the casing 180. The flange portion 194 of the bullet-shaped member 192 is held in engagement with the end of the casing 180 by means of the plunger 214.

When it is desired to remove a length of thread from the supply reel spindle 200, it is only necessary for the person holding the thread package to depress the member 192 with his thumb or any other convenient means to shift the plunger 214 to the right as shown in FIGURE 17, thereby compressing the spring 220. Continued depression of the member 192 will bring the flange portion 194 of the member 192 into engagement with the end portion 198 of the supply reel spindle 200, thereby shifting the spindle 200 to the right as shown in FIGURE 17. This movement of the spindle 200 to the right will shift the flange 204 to the right, thereby separating the ribs 210 from the notches 208 to unlock the supply reel spindle for rotation with respect to the casing 180. By first removing the spring force entirely from the supply reel spindle, the spindle will rotate in a much freer and easier fashion allowing the person to pull on the thread which protrudes through the aperture 186 and pull off the desired amount of thread in a quick and efficient manner.

It is obvious in utilizing any of the above embodiments that numerous features may be interchangeably used between the various embodiments. As for example, the hand grip grooves shown in FIGURE 3 may be provided on any or all of the thread packages disclosed. Likewise, the thread dispensing portions 14 in FIGURE 3 and 44 in FIGURE 6 may be readily interchanged with each other or with the end construction shown in FIGURES 13 through 16.

What is claimed is:

1. A thread dispensing package of the type adapted to be held in the hand having a hollow, elongated, tubular casing having a thread aperture therein and thread supply spindle means mounted for rotation and longitudinal reciprocation within said casing, complementary releasable braking means formed on said casing and said spindle to prevent relative rotation between said casing and said spindle to prevent undesired dispensation of thread through said aperture when said spindle is in one longitudinal position within said casing.

2. A thread dispensing package as set forth in claim 1 wherein said spindle means is provided with at least one flange member having an external dimension slightly smaller than the complementary internal dimension of said casing to allow rotation of said spindle means relative to said casing while preventing undue skewing of said spindle means.

3. A thread dispensing package as set forth in claim 2 wherein said flange member is provided with at least one axially directed positive engagement member and said casing is provided with at least one complementary axially directed positive engagement member and means for maintaining said members in engagement.

4. A thread dispensing package as set forth in claim 1 wherein said tubular casing is provided with a detachable end cover to enable removal of said spindle means for thread replenishing.

5. A thread dispensing package as defined in claim 1 further comprising lever means pivotally mounted on said casing and extending through said casing into operative engagement with said spindle means to move said spindle means axially relative to said casing.

6. A thread dispensing package as set forth in claim 1 wherein said casing is formed from a flexible resilient plastic material and is formed with a circumferential bulge intermediate the ends thereof, said casing being shorter than said spindle means when said bulge is in its normal condition and longer than said spindle means when said bulge is pressed radially inwardly to provide end clearance between said casing and said spindle means to enable rotation of said spindle means relative to said casing.

7. A thread dispensing package as set forth in claim 1 wherein said spindle means is provided with an axially extending bore, plunger means longer than said spindle means and extending through said bore, spring means disposed between said plunger means and said casing means adjacent one end thereof adapted to bias said plunger means outwardly through the opposite end of said casing, cap means mounted on said plunger means adapted to prevent removal of said plunger means through said opposite end, means on said plunger means operatively connected to said spindle means to shift said complementary braking means into engagement under the action of said spring means and means on said cap means adapted to contact said spindle means and release said braking means.

8. A thread dispensing package as set forth in claim 7 wherein said braking means are comprised of positively engaging elements and said parts are so dimensioned that external pressure on said cap means shifts said plunger means axially of said casing to compress said spring means and condition said brake means for disengagement and that continued axial movement of said cap means causes movement of said spindle means to release said brake means.

9. A thread dispensing package as set forth in claim 1 wherein said aperture is connected to a free edge of said casing by means of a fine slit to facilitate threading a thread on said spindle means through said aperture.

10. A thread supply spool adapted for use with a thread dispensing housing having brake means adjacent one end thereof comprising; an elongated, cylindrical spindle having circumferential flange means secured thereto adjacent one end thereof and brake means mounted on an axially directed surface of said flange adapted to be releasably engaged with the brake means on the housing upon axial movement of said spindle within said casing.

11. A thread supply spool as set forth in claim 10 wherein said spindle is provided with a central portion having a diameter less than the diameter of the end portions of said spindle and wherein said brake means is disposed on the axially directed surface of said flange which is directed toward said reduced diameter portion of said spindle and said brake means is comprised of a plurality of radially extending projections.

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