

April 14, 1959

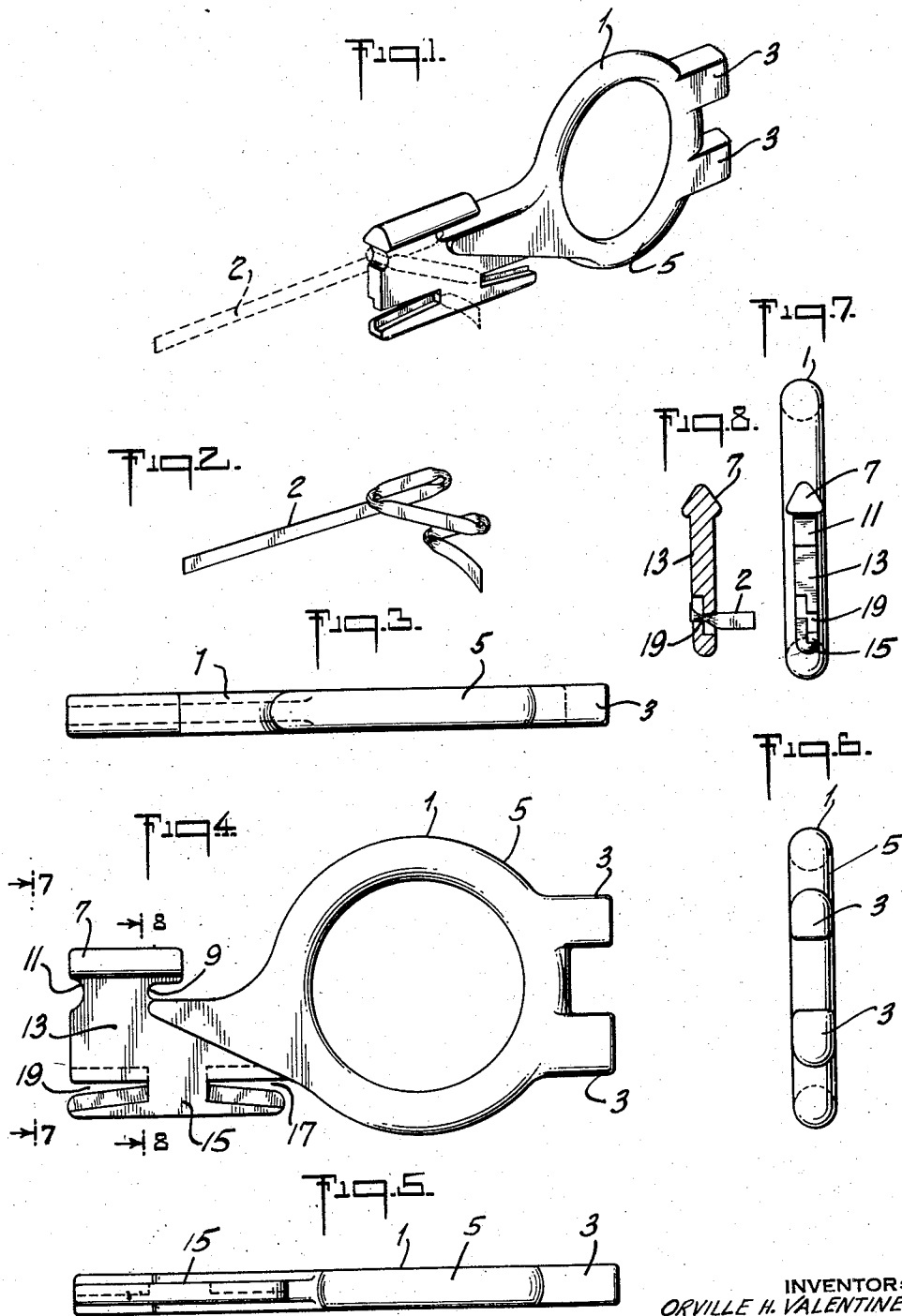
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2,881,498

TERMINAL FASTENER

Filed July 6, 1956

2 Sheets-Sheet 1



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Fig. 9.

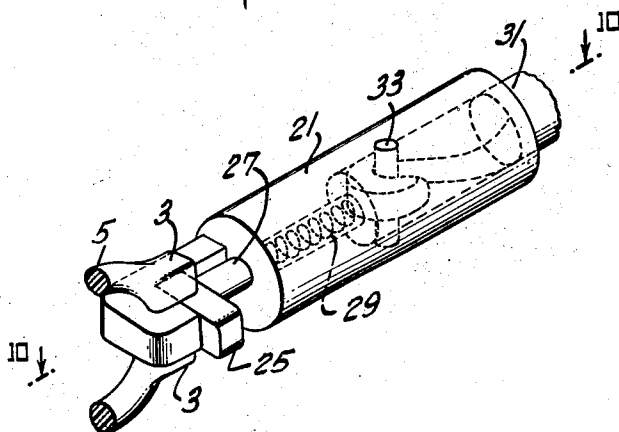


Fig. 10.

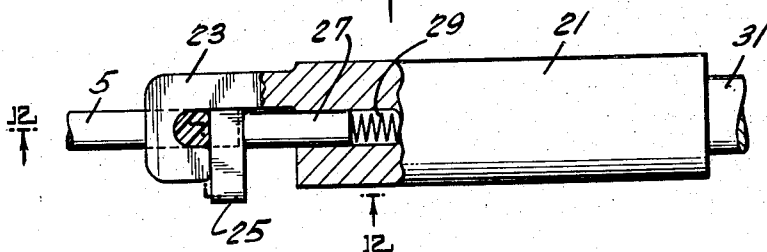


Fig. 11.

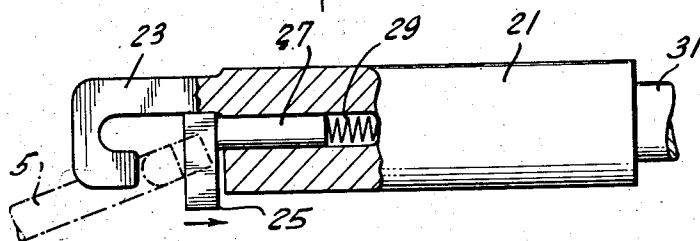
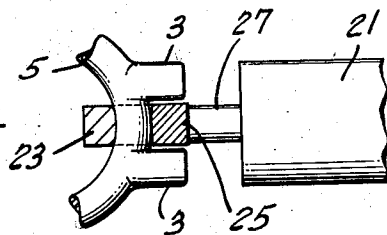


Fig. 12.



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TERMINAL FASTENER

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Application July 6, 1956, Serial No. 596,325

5 Claims. (Cl. 24—130)

This invention relates to a terminal fastener for material in ribbon form and particularly relates to a terminal fastener for ribbons of connective tissue, obtained by longitudinally slitting the submucosal layer of sheet intestines and the submucosal and serosal layers of bovine intestines, which are used in the manufacture of surgical catgut sutures and ligatures.

The practice up to the present time was to tie each end of a ribbon of connective tissue, or two or three combined ribbons, depending on the size of the suture or ligature to be made, to a separate cotton cord loop. The ribbons, which vary in length from about four to about twenty-two feet, were given a twist varying from four and one-half to six turns per inch. In twisting the ribbons, one cotton loop was attached to an immobile hook and the other cotton loop was attached to a hook which could be rotated to apply the desired number of twists to the ribbons. The ribbons were moist when the twist was applied and the strands which were obtained were dried at constant temperature and humidity while under a slight tension. The cotton cord loops were cut away and the dried strands then converted to usable surgical catgut sutures or ligatures by a sequence of operations including: polishing to a uniform diameter throughout, cutting into approximately five foot lengths, winding on a reel, sterilizing, and hermetically sealing in a container such as a glass tube or plastic envelope with a tubing fluid. Although the use of the cotton cord loops as terminal fasteners in the process of making surgical catgut sutures and ligatures has been practiced for a number of years, it has been recognized that making the tie to the cotton cord loop required a substantial portion of the ribbons and was time-consuming.

It has now been discovered that the difficulties inherent in the use of the cotton cord loop as a terminal fastener for ribbons and particularly for ribbons of connective tissue may be overcome by the use of the device of this invention which is in the nature of a terminal fastener designed so that one or more ribbons may be readily and quickly attached thereto with the use of a minimum amount of the ribbons.

The device of this invention will now be described with reference to the drawings in which,

Figure 1 is a view in perspective of a terminal fastener showing the manner in which the end of a ribbon is turned about the head of the device;

Figure 2 is a view in perspective showing the configuration assumed by a ribbon attached to the head of the terminal fastener;

Figure 3 is a top view of the terminal fastener;

Figure 4 is a side plan view of the terminal fastener;

Figure 5 is a bottom view of the terminal fastener;

Figure 6 is an end view of the terminal fastener showing the relation of the driving tangs to the holding ring;

Figure 7 is an end view of the terminal fastener along the line 7—7 of Figure 4 taken in the direction of the arrows;

Figure 8 is a view in section of the terminal fastener

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along the line 8—8 of Figure 4 taken in the direction of the arrows;

Figure 9 is a view in perspective showing the hook of an adapter for the holding ring and driving tangs of the terminal fastener and a hidden view of the spinning hook of the adapter;

Figure 10 is a top view of the adapter, part being broken away, along the line 10—10 of Figure 9 taken in the direction of the arrows and showing a segment of the holding ring of the terminal fastener locked in position in the adapter;

Figure 11 is a view similar to that of Figure 10 but showing a segment of the holding ring of the terminal fastener entering the locking means of the adapter;

Figure 12 is a partial plan view along the line 12—12 of Figure 10 taken in the direction of the arrows and showing the relation of the driving tangs of the terminal fastener to the locking means of the adapter.

In order to describe with particularity the device of this invention, the various features of the terminal fastener and its modifications are described in detail below with reference to the drawings in which like numbers refer to like parts.

The structural details of the terminal fastener and the manner in which a ribbon or ribbons are attached thereto are shown in Figures 1 to 8 inclusive. The structural details of an adapter to which the terminal fastener is attached in order to mechanically rotate the terminal fastener and provide a twist in the ribbons attached thereto is shown in Figures 9 to 12 inclusive.

Referring to Figures 1 to 8 inclusive in which the terminal fastener is referred to generally at 1, driving tangs 3 are positioned at one side of holding ring 5 and the tying head to which a ribbon or ribbons is attached is positioned on the other side of the holding ring. The tying head has an alignment cap 7 with rear retaining groove 9 and front retaining groove 11 positioned thereunder. Grooves 9 and 11 are positioned such that a straight line drawn through the center of the grooves would pass through the center of the holding ring and midway between the driving tangs. Binding head 15 is positioned below the alignment cap and retaining grooves and connected with the latter by web 13. In the preferred form, the web has a thickness less than that of the alignment cap and binding head, the thickness of the latter and the holding ring being substantially the same. The binding head is provided with a rear nip 17 and a front nip 19, the shape of the front and rear nips being best illustrated in Figures 5, 7 and 8 which show the preferred embodiment in which opposite segments of the sides of the nips are cut away so that the opposed faces are in the same plane and V-shaped. In another embodiment, the edges of the front and rear nips of the binding head are beveled on each side.

In using the terminal fastener, an operator positions the fastener in a fixture which holds it by the ring and the tangs with one hand and with the other hand grasps one or more ribbons. The ribbon end or ends are then turned about one side of the alignment cap in the direction of the holding ring, around the rear retaining groove along the other side of the alignment cap, around the front retaining groove, diagonally across the web, through the rear nip and finally through the front nip. The manner in which a ribbon 2 is attached to the terminal fastener is illustrated in Figure 1, and the manner in which the front nip holds a ribbon is illustrated in Figure 8. The configuration taken by a ribbon attached to the terminal fastener is illustrated in Figure 2. The other end of the ribbon or ribbons are attached to a second terminal fastener in the same manner.

Referring to Figures 9 to 12 inclusive, the holding

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ring of the terminal fastener is shown positioned in holding hook 23 of the hook adapter 21 and held by locking bar 25. The driving tangs, which are integral with the holding ring of the terminal fastener, are positioned on either side of the locking bar. The locking bar is integrally attached to plunger 27 and is held in place by means of spring 29. Hook 31 may be removed from the hook adapter by withdrawing pin 33. In order to insert the terminal fastener in the hook adapted, the segment of the holding ring between the driving tangs is pushed against the locking bar thereby forcing the locking bar away from the holding hook of the hook adapter which enables the holding ring to slide along the locking bar and into the proper position in the holding hook of the hook adapter. The locking bar then holds the holding ring of the terminal fastener firmly in position. The method of positioning the terminal fastener in the hook adapter is best illustrated in Figure 11. The end of hook 31 of the hook adapter, shown broken away in Figures 9 to 12 inclusive, is attached to rotation propelling means, not shown, and the desired amount of twist is put in a ribbon or ribbons attached at each end to a terminal fastener by rotating the hook adapter, the terminal fastener at one end being fixed in a manner to prevent rotation. The strands obtained in this manner are subjected to the same sequence of steps described above to provide usable surgical catgut sutures and ligatures.

The terminal fastener may be fabricated of any suitable plastic or metal; particularly suitable plastics are polystyrene and nylon. Stainless steel is the preferred metal.

A terminal fastener and the method and apparatus by which it is used has been particularly described with respect to its use in the manufacture of surgical catgut sutures and ligatures from ribbons of connective tissue, such as are obtained from the submucosal layer of sheep intestines and the submucosal and serosal layers of beef intestines, and the invention directed to the terminal fastener has been described with particular reference to specific embodiments; accordingly, it is to be understood that the invention is not to be limited to its specific aspects and details but it is to be construed broadly and restricted solely by the scope of the appended claims.

What is claimed is:

1. A terminal fastener for holding an end of at least one ribbon, comprising a holding ring with driving tangs on one side and a tying head diametrically opposed thereto, the said tying head having an alignment cap and retaining grooves positioned below the alignment cap and in alignment with the center of the holding ring, a binding head having front and rear nips positioned below the

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alignment cap and a web extending between and connecting the alignment cap and the binding head.

2. A terminal fastener for holding an end of at least one ribbon of connective tissue, comprising a holding ring with driving tangs on one side and a tying head diametrically opposed thereto, the said tying head having an alignment cap and retaining grooves positioned below the alignment cap and in alignment with the center of the holding ring, a binding head having front and rear nips positioned below the alignment cap and a web extending between and connecting the alignment cap and the binding head, the web having a thickness less than that of the alignment cap and binding head.

3. A terminal fastener for holding an end of at least one ribbon of connective tissue, comprising a holding ring with driving tangs on one side and a tying head diametrically opposed thereto, the said tying head having an alignment cap and retaining grooves positioned below the alignment cap and in alignment with the center of the holding ring, a binding head having front and rear V-shaped nips positioned below the alignment cap and a web extending between and connecting the alignment cap and the binding head.

4. A terminal fastener for holding an end of at least one ribbon of connective tissue, comprising a holding ring with driving tangs on one side and a tying head diametrically opposed thereto, the said tying head having an alignment cap and retaining grooves positioned below the alignment cap and in alignment with the center of the holding ring, a binding head having front and rear nips with opposed, V-shaped faces in the same plane positioned below the alignment cap and a web extending between the connecting and alignment cap and the binding head.

5. A terminal fastener for holding an end of at least one ribbon of connective tissue, comprising a holding ring with driving tangs on one side and a tying head diametrically opposed thereto, the said tying head having an alignment cap and retaining grooves positioned below the alignment cap and in alignment with the center of the holding ring, a binding head having front and rear nips with opposed, V-shaped faces in the same plane positioned below the alignment cap and a web extending between the alignment cap and the binding head, the web having a thickness less than that of the alignment cap and binding head.

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UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 2,881,498

April 14, 1959

Orville H. Valentine, Jr., et al.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction and that the said Letters Patent should read as corrected below.

Column 3, line 51, for "retarding" read -- retaining --; column 4, line 33, for "the connecting and" read -- and connecting the --.

Signed and sealed this 28th day of July 1959.

(SEAL)

Attest:

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Attesting Officer

ROBERT C. WATSON
Commissioner of Patents