

May 22, 1934.

E. H. LYDEARD

1,960,117

SURGICAL NEEDLE OR THE LIKE AND SUTURE THEREFOR

Filed Dec. 15, 1931



Fig. 1.

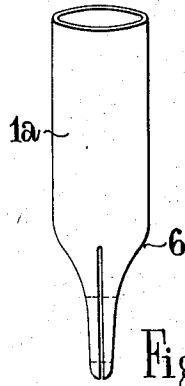


Fig. 2.

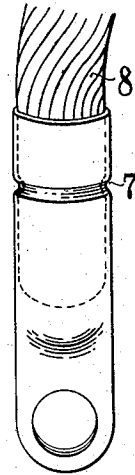


Fig. 3.

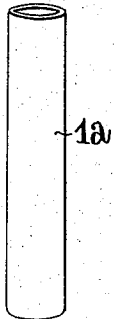


Fig. 7.

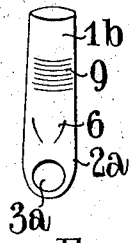


Fig. 6.

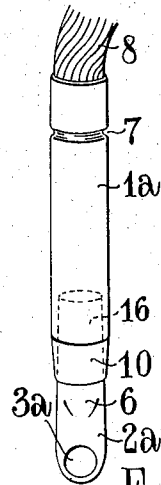


Fig. 5.

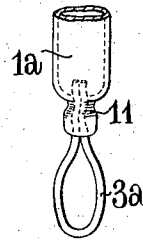


Fig. 8.

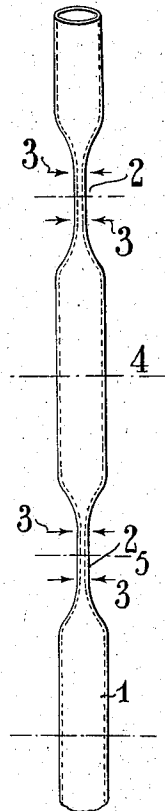


Fig. 4.

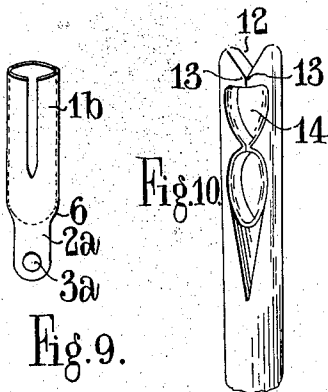


Fig. 10.

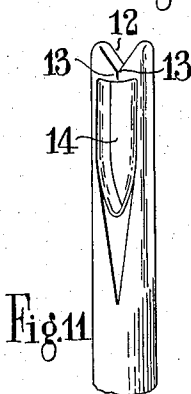


Fig. 11.

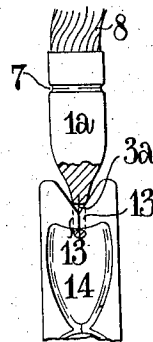


Fig. 12.

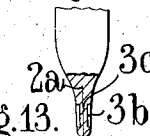


Fig. 13.

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UNITED STATES PATENT OFFICE

1,960,117

SURGICAL NEEDLE OR THE LIKE AND
SUTURE THEREFOR

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Application December 15, 1931, Serial No. 581,249
In Great Britain November 30, 1931

12 Claims. (Cl. 128—339)

This invention relates to surgical needles or the like and to sutures for use with such needles.

There is upon the market a type of eyeless surgical needle in which the suture is irremovably secured in the tubular end of the needle. This form of needle and suture has the technical advantage that the junction of the needle with its suture avoids the usual double suture thickness found in threaded needles and offers little or no resistance or obstruction to its smooth passage through tissues or membranes. Although this unitary needle and suture is very successful and approved by surgeons it is, nevertheless, somewhat expensive as when once a needle has been employed it cannot be used again but must be discarded as there is no means of replacing the old suture by a new one; consequently, a fresh needle with its attached suture has to be employed for every operation however small.

The object of the present invention is to remove the above disadvantage and provide a form of suture and mode of securing such to a needle whereby sutures can be attached to their needles and removed therefrom at will while at the same time providing a junction which offers little or no resistance or obstruction to its smooth penetration through tissues or membranes or, in other words, affords sewing facilities substantially equal to those of eyeless needles with permanently attached suture.

The invention consists in providing sutures with eyes adapted to be engaged or temporarily secured in needle eyes. By suture "eyes" is meant, not only holes or apertures extending from side to side but is intended to include opposed sockets or recesses separated from one another by a thin web or partition. According to the invention sutures are formed each with an eyed end or an eyed link or ferrule permanently secured to the suture end and adapted to be engaged or temporarily interlocked in the eye of a self-threading or spring-eyed needle of known form per se.

The invention comprises an improved mode of securing a suture to a self-threading or spring-eyed needle, which consists in detachably engaging the eyed suture end between the spring shoulders of the needle so that the shoulders meet or close in the eye aperture or recess, in contradistinction to locating the suture in the eye of the needle below the spring shoulders.

The invention also consists in various methods of manufacturing suture eyes or eyed links or ferrules, for fixing to one end of the suture, on the

one hand, and detachably securing to a self-threading or spring-eyed needle on the other.

The links are preferably of metal but may be of any suitable material such for example as one of the appropriate mouldable compositions.

The eyes (holes or sockets) may be circular, rectangular, triangular or any other desired shape.

In the accompanying drawing:—

Figure 1 is an enlarged front elevation of an eyed suture link or ferrule according to one form of the invention.

Figure 2 is a side elevation according to Figure 1 and

Figure 3 shows the ferrule illustrated in Figures 1 and 2 attached to a fragment of a suture.

Figure 4 is a diagrammatic enlarged side elevation intended to illustrate one suitable method of forming links or ferrules as seen in Figures 1, 2 and 3.

Figure 5 is an enlarged side elevation showing a modified form of construction of an eyed suture link or ferrule according to the invention while

Figures 6 and 7 show the independent parts of the link or ferrule shown assembled in Figure 5.

Figures 8 and 9 are fragmentary enlarged side elevations illustrating modified constructions of link or ferrule according to the invention.

Figures 10 and 11 show enlarged perspective views of self-threading or spring-eyed needles of known form.

Figure 12 shows a ferrule or link (with its attached suture) according to Figure 3 detachably secured to a self-threading needle (as shown in Figure 10) according to a feature of the invention.

Figure 13 is an enlarged fragmentary section illustrating socket eyes in a link instead of the through eye hole.

In carrying the invention into effect according to one convenient mode for the production of eyed links or ferrules for sutures, as illustrated in Figures 1, 2 and 3, a suitable length of metal tube 1 of appropriate diameter and preferably of silver or non-corrosive metal, is flattened (see Figure 4) at points separated by double the length required for a link or ferrule. The flattened portion 2 is bored or stamped to form eyes at two places as indicated by the arrows 3 and is then severed on the lines 4 and 5, the severance at 4 being a straight cut while at 5 the tube may be sheared so as to give each portion a rounded or radiused end contour substantially parallel with the outer semicircular portion of the eye hole, as seen in Figure 1.

The link or ferrule thus formed comprises a sleeve or tubular socket 1a terminating in a flattened portion 2a having an eye 3a which, as will be seen, is located as close to the rounded end 5a as is consistent with strength. The flattening process in the region 2 (see Figure 4) is also adapted to afford smooth curving shoulders 6 so as to offer no obstruction to the passage through a tissue or membrane in the sewing direction.

The suture is introduced into the socket 1a and secured by an indented annulus 7 or by crimping or otherwise deforming the socket in such a way as to pinch the suture 8 without unduly roughening the surface of the socket.

In carrying the invention into effect according to another mode, suitable tubes (such as seen in Figure 7) are cut to the required length and tubular or solid pieces (see Figure 6) having a barrel portion 1b and a flattened portion 2a are formed with eye holes 3a. The barrel portion may be formed with a roughened or serrated area 9 and with shoulder at 6 as already described in reference to Figure 2. The unit shown in Figure 6 is introduced into the end of a tube 1a (Figure 7) and a junction is made by crimping or clamping pressure or by spinning down the end of the tube as at 10 upon the roughened part 9 of the barrel 1a. The suture is introduced into the open end of the tube 1a and crimped or provided with an indented annulus as at 7.

According to another modification a tubular element 1a (see Figure 8) has introduced into its end a loop 3a of rustless steel, silver or other wire which is secured in position by crimping the end of the tube as at 11 thereon.

In carrying the invention into effect according to another convenient mode, a split tubular socket 1b (as seen in Figure 9) is formed and closed upon the suture in any suitable manner as, for example, substantially according to the mode described in British Letters Patent No. 288,425 with reference to eyeless needles and is also provided with a flattened piece or extension 2a which is provided with an eye hole 3a. In this form, as in those previously described, it is preferred to make the tubular portion with a curved shoulder 6 and in this connection it is pointed out that in the form shown in Figure 1 the shoulder may be of annular form instead of upon each side as shown in Figure 2.

It will be understood that the customary way of introducing a suture into a self-threading or spring-eyed needle (as shown in Figure 10 or 11) is to lay the running end of the suture across the V-shaped end 12 of the needle and force it between the spring-pressed shoulders 13 into the eye 14 of the needle. It will be understood that according to this mode, when the needle is threaded there is a double thickness of suture or thread at the needle eye in the ordinary way.

The improved suture is attached to the needle, according to the invention, by introducing the rounded edge of the flattened portion 2a of the ferrule or eyed link into the V-shaped cavity 12 and pressing downwards between the spring shoulders so that the latter snap into the eye 3a of the ferrule, in which position it will be seen that the shoulders meet together or close in the eye 3a and that the suture is thereby firmly yet detachably secured or locked in position. The suture may be released by turning it through a right-angle (out of the plane of the paper as seen in Figure 12) and pressing downwardly upon the ferrule so that the upper edge of the aperture 3a acts upon the V-shaped incline of the

shoulders and allows the eye to slip freely away downwards and be released.

In any of the forms of the invention above described instead of making the suture or link eyes as throughway apertures or holes they may be formed as shown in Figure 13 in which a pair of opposed or back to back sockets or recesses 3b are stamped or impressed in the link. These sockets or recesses are engaged in the needle between the shoulders 13 in the same way as the throughway eyes are, with the exception that the shoulders 13 will not meet but will be separated by and close upon the web or partition 3c.

If desired, instead of attaching the sutures to needles in the manner indicated, a pair of forceps or other instrument may be utilized in the eye of the needle to open the spring shoulders so that the eyed ferrule is introduced or engaged between the shoulders after which the forceps or instrument is withdrawn.

The outside diameter of the ferrules or links as described above, may be made less than that of the needle, particularly with regard to the larger sizes of needle, but ferrules of larger diameters than the needles may be employed as the sloping shoulders of the ferrule afford a lead or smooth entrance in passing through a membrane or tissue.

The sutures employed according to the invention may be of catgut, silk, linen thread, silk-worm gut, Japanese gut or the like. Furthermore, silver wire or other metal sutures may be employed in which case the end of a wire may be clamped in a ferrule of any of the forms above described or, alternatively, the end of the wire itself may be provided with an eye hole or sockets as, for example, by flattening the wire at the end and rounding it, if desired, and piercing or drilling an eye hole or stamping eye sockets or recesses of appropriate diameter, thus forming an integral eyeleted suture.

The invention may be supplied to the trade in the form of eyed sutures or sutures having eyed ferrules or links secured thereto, or eyed ferrules or wire loops may be supplied alone for attachment by the surgeon or operator to sutures as required. For this purpose the sutures are inserted in the tubular sockets of the ferrules which are clamped upon the suture by the use of a pair of pliers or other appliance which may be specially formed with a pair of semicircular dies for the purpose, or may be otherwise provided with dies for crimping or pressing the ferrule on to the suture end. Where a link as shown in Figure 9 is employed pliers having jaws suitable for closing the lips of the slot or slit upon the suture in the ferrule, may be employed.

It is pointed out that self threading needles (see Figures 10 and 11) having the shoulders and V notch proportions as illustrated are recommended for use in connection with eyed ferrules as shown in the other figures but where needles having other notches and shoulders are to be employed changes in dimensions should be made in the eyed ferrule to suit.

It will be appreciated that the invention is primarily concerned with surgical needles but sutures or sewing threads for other purposes (where the features of the invention would be advantageous and suitable) may be provided with eyed links or eyed ends for attaching to spring-eyed needles according to the invention, if desired.

Having now described my invention, what I

claim as new and desire to secure by Letters Patent is:—

1. For a surgical or other needle provided at its eye extremity with spring shoulders, a suture terminating in a flattened portion having an eye therein adapted detachably to be engaged between the spring shoulders of the needle. 80
2. For a self-threading or spring-eyed surgical or other needle, a suture provided with a ferrule having an eye for detachably engaging the eyed end of the needle. 85
3. For a surgical or other needle provided at its eye extremity with spring shoulders, a suture to the end of which is fixed a ferrule provided with a flattened portion enclosing an eye adapted detachably to be engaged between the spring shoulders of the needle and having a curved shoulder portion adjoining the flattened part. 90
4. For a surgical or other needle provided at its eye extremity with spring shoulders, a suture the end of which is fixed in a tubular ferrule provided with a flattened portion enclosing an eye adapted detachably to be engaged between the spring shoulders of the needle and having a radiused end substantially parallel with the outer semi-circular portion of the eye socket. 95
5. A ferrule for detachably fastening a suture to a surgical or other needle provided at its eye extremity with spring shoulders, comprising a tubular part in which the end of the suture is securable and a flattened part formed with an eye adapted detachably to be engaged between the spring shoulders of the needle. 100
6. For detachable engagement with a self threading needle provided with spring shoulders, a suture having a terminal upon the extremity of its running end, said terminal having a hole pierced therein forming an eye for detachable engagement between the spring shoulders of the needle. 105
7. For a self-threading or spring-eyed surgical or other needle, a suture provided with a ferrule having a wire loop for detachably engaging the eyed end of the needle. 110
8. For a surgical or other needle provided at its eye extremity with spring shoulders, a suture having at its end a ferrule comprising a tubular portion in which the suture end is fixed and having a separate eyeleted piece secured in the tubular portion, the eye of the piece being adapted to be engaged between the spring shoulders of the needle. 115
9. A ferrule for detachably fastening a suture to a self-threading or spring-eyed surgical or other needle, comprising a part to which a suture is securable and a wire loop adapted detachably to engage the eyed end of the needle. 120
10. For detachable engagement with a self-threading needle provided with spring shoulders, a suture having upon the extremity of its running end a terminal which is flattened and having sockets formed in each side of the flattened portion adapted to receive the spring shoulders of the needle. 125
11. A surgical suture device comprising a suture permanently carrying on its end a flattened portion having a small eye in which is engaged the outer spring shoulders of a self-threading needle the size of the eye in the suture being such that the eye is free to turn about the shoulders as on a pivot. 130
12. A surgical suture device comprising a suture permanently carrying on its end a flattened portion having a small eye in which it engaged the outer spring shoulders of a self-threading needle and means on said flattened portion limiting the extent it enters the needle opening. 135

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