

J. A. BIGELOW & L. F. CHAPIN.
SUTURE.

APPLICATION FILED MAY 23, 1916.

1,250,114.

Patented Dec. 11, 1917.

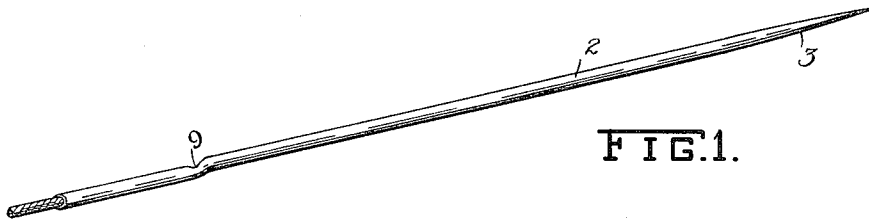


FIG. 1.

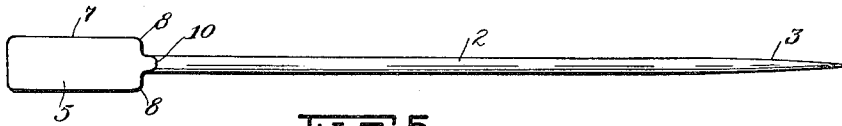


FIG. 5.



FIG. 4.

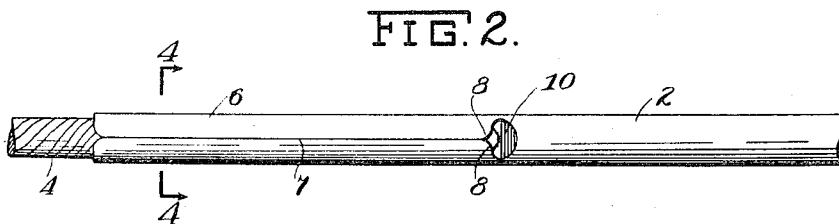


FIG. 2.

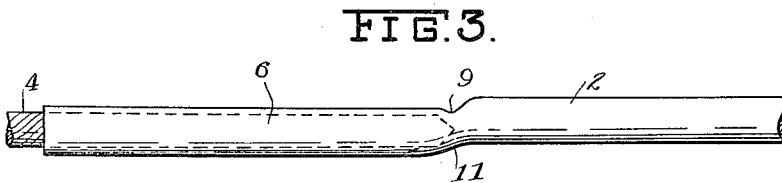


FIG. 3.

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SUTURE.

1,250,114.

Specification of Letters Patent.

Patented Dec. 11, 1917.

Application filed May 23, 1916. Serial No. 99,450.

To all whom it may concern:

Be it known that we, JAMES A. BIGELOW and LOUIS F. CHAPIN, citizens of the United States, residing at Waltham, county of Middlesex, Commonwealth of Massachusetts, and Newton Center, county of Middlesex, Commonwealth of Massachusetts, respectively, have invented certain new and useful Improvements in Sutures, of which the following is a specification.

This invention relates to surgical instruments, and particularly to sutures.

The present invention is an improvement in surgical needles of the type in which a ligature and a needle are securely joined without the formation of a fold or bend in the ligature, and without the requirement of an eye in the needle to receive the ligature, and it is important to so connect the ligature to the needle as to eliminate as far as possible the formation of any abrupt shoulders or angles in the surface of the needle adjacent the jointure therewith of the ligature, and to avoid as far as possible the exposure of the surface of the ligature at its connection with the needle, and thereby to furnish a surgical needle which, when being used in operations, will make a small aperture in the tissue being operated upon, and which being free from rough surfaces and sharp angles will therefore cause less pain to the subject during the operation, and permit of more rapid operation.

It is therefore an object of the present invention to provide a suture in which the ligature is so connected to the needle body as to avoid the making of an aperture in the sensitive tissues being operated upon of any larger size than is absolutely necessary for the passage of the needle, and to provide a suture in which the needle and the ligature are so connected that the end of the ligature is substantially encircled, inclosed and covered, so as to practically eliminate the exposure of the inserted end of the ligature, and to provide a suture in which the penetrating needle presents its surface from end to end, so that in passing through an aperture in the tissue being operated upon there are no sudden and abrupt shoulders presented to the tissues at any point in the length of the needle while traversing the aperture in the tissue.

In the accomplishment of the objects of

this invention, the suture consists of a needle having a pointed end and being formed at its opposite end with a sheath or ligature-receiving tubular part which is formed of a previously flattened or swaged end of the needle, this swaged portion being subsequently formed or shaped into a tubular part which is substantially parallel to the main portion or body of the needle, and which is adapted to receive and to be firmly closed down upon an inserted end of a ligature to securely attach the said ligature to the needle, and to cover the inserted end of the ligature in a manner to be free from acute shoulders or projections which might tend to enlarge the aperture in the tissues unnecessarily, and also cause unnecessary pain during the operation.

A form of the invention is illustrated in the accompanying drawings in which:

Figure 1 is a perspective view of the needle and a portion of the attached ligature forming the suture.

Fig. 2 is a plan view on an enlarged scale of a portion of the needle and the attached ligature.

Fig. 3 is a side elevation of Fig. 2.

Fig. 4 is a transverse section on the line 4-4 of Fig. 2, and

Fig. 5 is a plan view of the needle flank showing the swaged sheath-forming end; the needle being shown on a scale somewhat smaller than the scale of Figs. 2 and 3.

It is very desirable to provide a surgical needle, and especially to provide a suture which may be used in various surgical operations, such as gastroenterostomy and intestinal, which will, when in use, form an aperture in the tissues of as small size as consistent with the requirements of the case in hand, and to provide a suture the ligature is firmly attached to a needle in a manner which will eliminate as far as possible the formation of acute or abrupt shoulders at the point of juncture of the ligature to the needle, and in the following description a suture is described in which a straight needle is referred to, although in practice the contour of the needle may be changed or varied as may be readily understood according to the nature of the case to be operated upon, and also it is obvious that any suitable material and character of ligature may be employed in the construction of

the suture. The suture herein disclosed embodies a straight needle 2 of suitable length and diameter as the proportion may require, having a suitable point 3 at one end, and
 5 connected to the needle at the end opposite the point 3 is a ligature 4 which may be gut, silk, etc. The ligature 4 must be securely attached to the needle 2 and it is preferable that the method or manner of connecting the
 10 ligature to the needle be such as to eliminate the formation of any larger aperture in the tissues being operated upon than is absolutely necessary, and one manner of accomplishing this attachment of the needle and
 15 the ligature consists in shaping one end of the needle in such fashion that an end of the ligature is joined to the needle in substantial longitudinal alinement with the body of the needle, and thus eliminates any
 20 bends or folds at the point of connection of the ligature to the needle.

By the present invention, the ligature 4 is not only connected securely to the needle 2 without any fold or bend, but also so connected to the needle that the portion of the
 25 ligature which is engaged by the needle at the point of juncture is substantially encircled and covered, and in a manner to eliminate any acute or abrupt shoulders in the needle at the portion to which the ligature
 30 is joined.

In accomplishing the jointure of the ligature and the needle, the latter is first flattened down at one end as by swaging or in
 35 any other suitable manner, to form the flattened portion 5 at one end, this flattened portion being of such proportions as to length, width, and thickness as to permit of its being rolled or otherwise shaped to form a sheath
 40 or inclosing tubular portion 6, nearly coaxial with the needle body, Figs. 1, 2, and 3, to encircle and preferably cover an inserted end of the ligature 4. When the flattened portion 5 has been rolled or shaped to form
 45 the sheath or ligature-receiving portion 6, of the needle 2, the longitudinal edges 7 of the portion 5 are brought into juxtaposition to overlap and encircle the inserted end of the ligature 4 as clearly shown in Figs. 2 and
 50 3, and the inner divergent shoulders 8—8 of the swaged end 5 of the needle are thus brought inwardly over the innermost end of the inserted ligature 4 to substantially cover the same and form a smooth and continuous
 55 surface at the inner end of the ligature and zone 9 of juncture of the inwardly curved edges 7 of the sheath 6 adjacent the downwardly and obliquely inclining surface 10 formed in the body of the needle 2 and from
 60 which the flattened end 5 of the needle was swaged down.

In forming the ligature-receiving sheath 6 on the end of the needle 2, when the parallel edges 7 of the flattened or swaged
 65 portion 5 are brought inwardly toward each

other by the rolling or curving of the portion 5 to form, substantially, a tube, any abrupt shoulder above and adjacent the inner end of the inserted ligature 4 is eliminated by firmly closing the parallel edges
 70 7—7 of the rolled portion 5 together and down upon the ligature as clearly shown in Figs. 2 and 3, and by pressing the divergent shoulders 8—8 toward each other, over the inner end of the ligature in front of the
 75 oblique surface 10 of the needle in such a manner that the upper portion of the sheath 6 has its axis slightly offset with relation to and parallel with the axis of the needle 2. This offset relation of the sheath 6 as to the
 80 body of the needle 2 is clearly shown in Fig. 3, in which the upper surface of the sheath 6 is shown as below the plane of the upper surface of the needle 2 and the lower surface of the sheath 6 is in a plane slightly
 85 lower than the lower surface of the body 2; the offset portion of the sheath 6 and the body of the needle 2 being connected by a slightly inclined joining portion 11, Fig. 3. The purpose of this offset is to dispose the
 90 inturned ends 8 of the sheath behind and below the plane of the downwardly inclined portion 10 of the needle so as to be protected and covered substantially by this overhang in the use of the needle and to avoid leaving
 95 any abrupt tissue-engaging surfaces exposed at the juncture of the sheath and needle. The shoulder 11 left at the lower side of the juncture is smooth and rounded and in itself offers no impediment to the passage of the needle through the tissue. Thus the ligature 4 is connected firmly to the
 100 needle 2 by a tubular or sheath portion 6 which is rolled or shaped from a previously flattened or swaged portion at one end of the
 105 needle.

The sheath 6 is adapted to be closed upon and firmly embraced, and to substantially cover an inserted end of a ligature 4 without the formation or occurrence of any sharp
 110 or acute angles or shoulders in the length of the needle from end to end, and in such a manner that there are no exposed or projecting portions or surfaces of the inner end of the ligature at its point of juncture and
 115 attachment to the needle 2.

It is understood that owing to the small size of the article forming the subject matter of the present invention that the drawings have been considerably enlarged for
 120 the purpose of more clearly illustrating the details of construction of the needle, and it will therefore be understood that the relative lateral offset of the ligature-receiving sheath 6 will appear somewhat exaggerated in comparison to the degree of the offset actually
 125 existent in the needles, in which in their usual size, and more particularly in the smaller size needles the lateral offset of the tubular sheath with relation to the body of
 130

the needle as indicated at the inclined portion 11 will be hardly noticeable to the eye.

Various modifications in the form and construction of our invention may obviously be resorted to if within the limits of the appended claims.

What we therefore claim and desire to secure by Letters Patent is:

1. A suture comprising a needle and a ligature, the needle having at one end a sheath to receive and clamp the inserted end of the ligature, said sheath being integral with the needle and formed from a flattened end shaped to encircle and embrace the inserted ligature and close upon the same to secure the needle and the ligature together, the axis of the sheath being slightly offset laterally from and parallel with the axis of the needle, to dispose the upper surface of the sheath below and behind the overhang of the needle at the juncture of sheath and needle so as to be substantially covered thereby.

2. A surgical needle having a pointed body provided with an inclined surface and with a tubular ligature-receiving end formed of a portion previously flattened down to a width sufficient to be shaped into a tube, the inner end of which joins the needle body adjacent said inclined surface of the needle body, the transverse shoulders of the flattened portion being turned inwardly toward each other, and worked down upon the inserted end of the ligature to cover the latter at an angle opposite to and below the top of the incline of said inclined surface of the body, so as to dispose the in-

serted end of the ligature in protective relation beyond the overhang of the needle body at the juncture of the ligature-receiving end, thereby eliminating any abrupt tissue engaging shoulders at said juncture.

3. A surgical needle having a ligature covering and clamping sheath slightly offset relative to the axis of the needle to position the inserted end of the ligature and the forward end of the upper surface of the sheath below the plane of the corresponding surface of the needle so as to be covered and protected by the overhang thereof at the juncture of sheath and needle.

4. A surgical needle having a body portion pointed at one end and formed as an offset tubular ligature receiving and clamping sheath at its other end, said sheath having transverse intumed shoulders at one end adapted to be closed upon the inserted end of the ligature to substantially cover said end and to lie below the plane of the upper surface of the needle so as to be covered and protected by the overhang thereof at the juncture of needle and sheath and to provide a substantially smooth, continuous covering for the ligature end which is free of any abrupt tissue engaging surfaces at the juncture of sheath and needle.

In testimony whereof we affix our signatures in presence of two witnesses.

JAMES A. BIGELOW.
LOUIS F. CHAPIN.

Witnesses:

MARY P. WOTHERSPOON,
VICTORIA LOWDEN.