

Jan. 29, 1946.

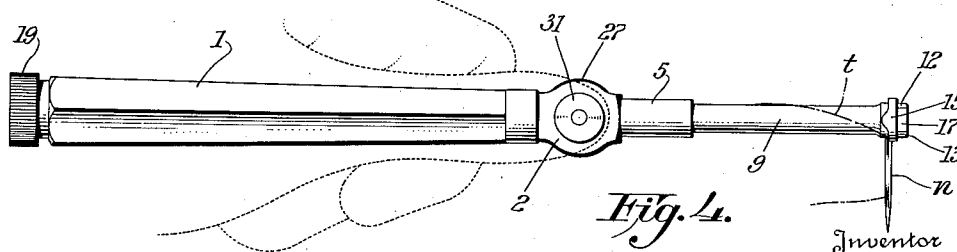
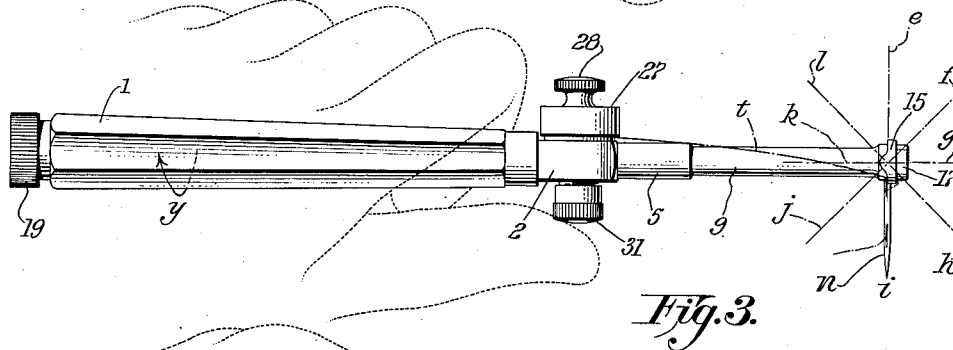
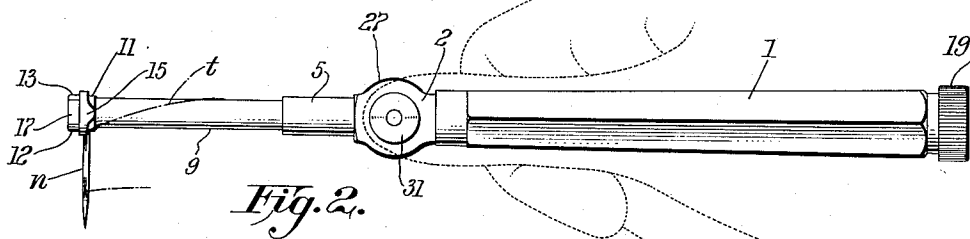
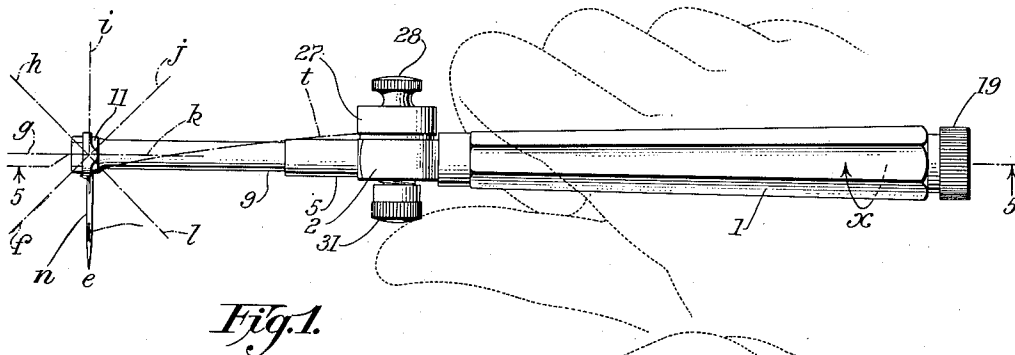
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2,393,910

UNIVERSAL SURGICAL STITCHING INSTRUMENT

Filed July 8, 1943

2 Sheets-Sheet 1



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UNIVERSAL SURGICAL STITCHING INSTRUMENT

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2 Sheets-Sheet 2

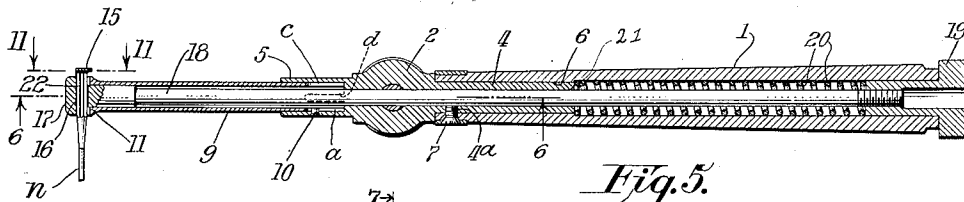


Fig. 5.

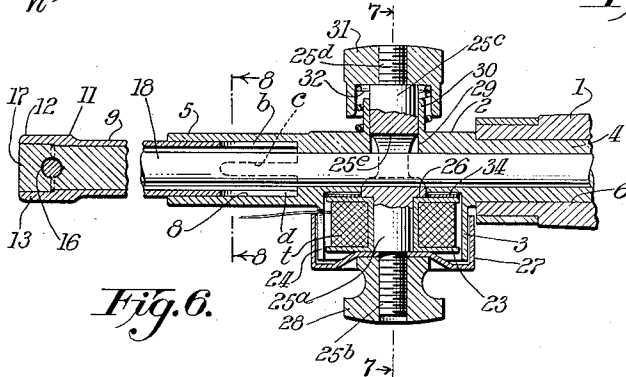


Fig. 6.

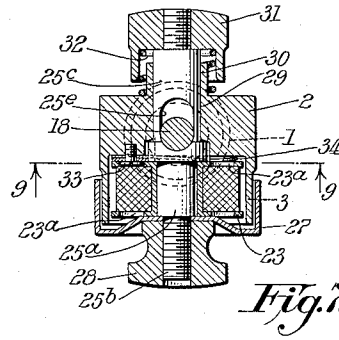


Fig. 7.

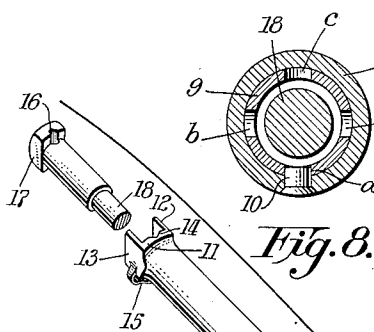


Fig. 8.

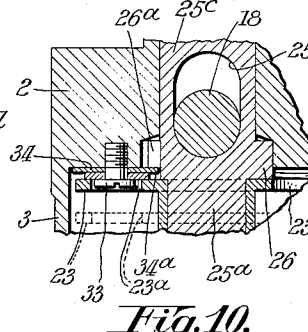


Fig. 9.

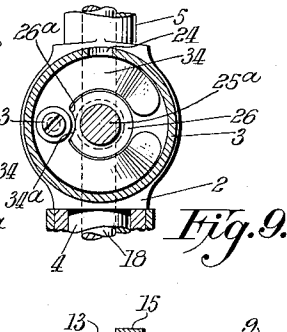


Fig. 10.

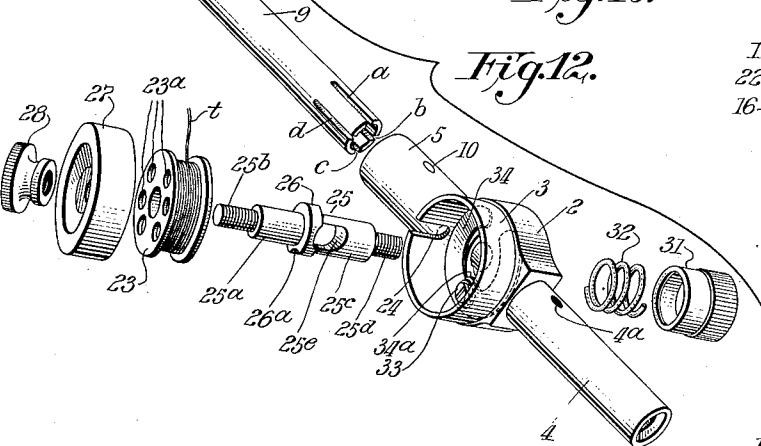


Fig. 11.

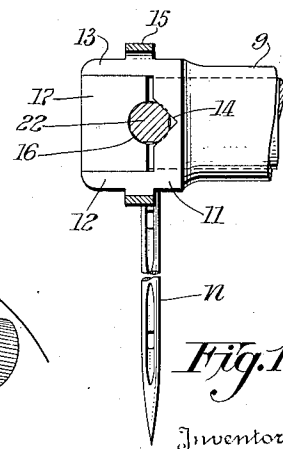


Fig. 12.

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UNITED STATES PATENT OFFICE

2,393,910

UNIVERSAL SURGICAL STITCHING
INSTRUMENT

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Application July 8, 1943, Serial No. 493,819

15 Claims. (Cl. 128—340)

This invention relates to surgical stitching instruments and more particularly to improvements in the instrument which forms the subject of my pending United States patent application Serial No. 438,292, filed April 9, 1942, which has matured into Patent No. 2,348,218, dated May 9, 1944.

The primary object of this invention is to provide a universal surgical stitching instrument which may be used as readily with the left hand as with the right and in which the operating conditions and the position of the thumb-releasable spool-holder relative to the thumb of the user will be precisely the same regardless of the hand in which the instrument is held.

It has been found that in the use of instruments of this nature, one surgeon will prefer to hold the instrument with his hand in one position, for example, with his thumb on top of the handle, while another will prefer to hold the instrument with his hand turned approximately ninety degrees about the handle so that his thumb will lie beside the handle. Also different operating conditions make it desirable to have the needle adjustable to a plurality of predetermined angular positions about the axis of its shank.

All of these desirable features have been obtained in a surgical stitching instrument having the improved needle-clamp actuating means and angularly adjustable needle disclosed in my above mentioned application, by mounting the thumb-releasable spool-holding means on the axis of the instrument so that it is equally accessible to the thumb of either the right or left hand; by so constructing and mounting the spool-holding and -locking means that interference between that means and the needle-clamp actuating rod, which extends lengthwise through the instrument, is avoided; and by so constructing the needle-holder bar that it may be secured in any one of four angular positions relative to the handle of the instrument and the thumb-releasable spool-holding means.

With the above and other objects in view, as will hereinafter appear, the invention comprises the devices, combinations, and arrangements of parts hereinafter set forth and illustrated in the accompanying drawings of a preferred embodiment of the invention, from which the several features of the invention and the advantages attained thereby will be readily understood by those skilled in the art.

In the drawings,

Fig. 1 is a top view of my improved instrument showing it held in one position in the right hand

of a user with the thumb-releasable spool-holder located at the side of the instrument.

Fig. 2 is a view similar to Fig. 1 but showing the handle turned about the axis of the instrument ninety degrees relative to the needle-holding bar to bring the thumb-releasable spool-holder to the top of the instrument, as preferred by certain users.

Figs. 3 and 4 are views similar to Figs. 1 and 2 but illustrating the instrument as held in the left hand of a user.

Fig. 5 is a longitudinal sectional view taken on the line 5—5 of Fig. 1.

Fig. 6 is an enlarged longitudinal sectional view taken on the line 6—6 of Fig. 5 with portions of the instrument broken away.

Fig. 7 is a transverse sectional view taken on the line 7—7 of Fig. 6.

Fig. 8 is a transverse sectional view taken on the line 8—8 of Fig. 6, showing particularly the means for locating the needle-holder bar in the handle in any one of four positions.

Fig. 9 is a sectional view taken substantially on the line 9—9 of Fig. 7.

Fig. 10 is an enlarged view of a portion of Fig. 7 showing, more clearly, the means for locking the suture-spool against rotation in the spool-holder.

Fig. 11 is an enlarged sectional view taken on the line 11—11 of Fig. 5 showing, more clearly, the needle-clamp and the needle held therein.

Fig. 12 is a disassembled perspective view of various parts of the instrument, hereinafter to be described.

Referring more specifically to the drawings, the invention is disclosed as embodied in a surgical stitching instrument comprising a handle 1, a spool-holding section 2, having a cup-like spool-receiving portion 3 and oppositely extending tubular members 4 and 5 of which the former is adapted to fit within one end of a bore 6 formed in the handle 1 and to be removably held therein by a screw 7 threaded into a hole 4* in the member 4, while the opposite member 5 is formed with a bore 8 adapted to receive the rear end of a hollow needle-holding bar 9. The rear or inner end of the bar 9 is formed with four slots or notches a, b, c and d, spaced ninety degrees apart and which are adapted selectively to receive a positioning pin 10, carried by the member 5. In Fig. 12 the parts are shown as rotated 180 degrees about the longitudinal axis of the instrument, from the position shown in Fig. 5.

The outer or free end of the needle-bar 9 is enlarged to form a head 11 having spaced cheek-pieces 12 and 13 between which is formed a V-

shaped needle-holding notch 14. A combined needle-stop and right and left thread-guiding member 15 extends over the head 11, from one cheek-piece to the other. The walls of the V-shaped notch 14 comprise the fixed jaw of a needle-clamp while the movable jaw of the clamp consists of the outer semi-circular wall of an aperture 16 drilled in a head 17 formed at one end of a needle-clamp actuating rod 18. The head 17 is slidably mounted between the cheek-pieces 12 and 13. The rod 18 extends through bores in the needle-bar 9 and spool-holding section 2 and through the hollow handle 1 to adjacent the free end of the handle where it is threaded into a clamp-actuating nut 19 having a knurled portion which abuts the free end of the handle. A coil spring 20 surrounding the rod 18, within the hollow handle, has one end bearing against a shoulder 21 in the handle and its other end bearing against the nut 19. This spring normally urges the two jaws of the needle-clamp into yielding contact with the octagonal shank 22 of the needle *n* thereby permitting the needle to be rotated in the clamp, about the axis of its shank, without dropping from the needle-clamp. Rotation of the nut 19, in one direction, serves to increase the pressure of the jaws on the needle shank and causes the needle to be positively locked in its predetermined angular positions. This needle-clamp and its actuating means are fully disclosed in my above mentioned application Serial No. 438,292. The pull of the needle-clamp actuating rod 18 serves to hold the needle-bar in the portion 5 of the spool-holding section 2 and prevents accidental separation of the pin 10 from the engaged slot *a*, *b*, *c* or *d* in the needle-bar. The needle-bar 9 and the clamp-actuating rod 18 may be made of any desired length or bars and rods of various lengths may be provided.

When it is desired to remove the needle-bar for the purpose of cleaning or angular adjustment, the nut 19 is unscrewed from the rod 18, thereby permitting the rod and the needle-bar to be drawn outwardly from the section 2.

Suture thread *t*, for the needle, is wound upon a spool 23 held within the cup-like spool-case 3 of the spool-holding section 2, intermediate the needle-bar 9 and the handle 1. The thread *t* runs from the spool 23 through a slot 24 in the side wall of the spool-case 3, thence through the thread-guide 15 and finally to the eye, or eyes, of the needle. The spool is rotatably journaled on the portion 25^a of a spool-supporting pin or rod 25 against a collar 26 formed thereon. The spool-case 3 is closed, to protect the suture thread and to prevent contamination thereof, by a sheet metal cover or cap 27 which is supported on the spool-pin 25 and telescopes with the spool case. A knurled nut 28 threaded onto the portion 25^b of the spool-pin holds the cap 27 in its normal operative position.

At the side of the collar 26 remote from the portion 25^a on which the spool is mounted, the spool-pin has an enlarged portion 25^c which is slidably mounted in a transverse bore 29 formed in the section 2 and in a boss 30 projecting therefrom. A cup-nut 31, which also serves as a thumb-button, is threaded upon the end 25^d of the spool-pin and serves as means to shift the pin axially, in one direction, in opposition to a coil spring 32 surrounding the boss 30 intermediate the member 2 and the nut 31.

Provision is made for locking the spool against rotation except when it is desired to draw suture

thread therefrom. To that end, each flange of the spool 23 is formed with a series of apertures 23^a adapted to receive the head of a screw 33, located within the spool-case 3, to prevent rotation of the spool. The screw 33 also serves to hold, within the spool-case, a light C-shaped flat metal friction spring 34, adapted to bear upon the innermost flange of the spool to prevent over-running of the spool when it is released from the screw 33, as will now be described.

When it is desired to unlock the spool from the screw 33 so that the spool will be free to rotate to permit suture thread to be withdrawn from the spool, the user presses on the thumb-button 31 thereby shifting the rod 25, and the spool carried thereby, axially away from the screw 33, as illustrated in dotted lines in Fig. 10. Upon release of the pressure upon the thumb-nut the spring 32 shifts the parts in the opposite direction again to bring one of the holes 23^a in the spool 23, into locking engagement with the head of the screw 33.

As hereinbefore stated the suture spool and its locking and unlocking means are located on the longitudinal axis of the instrument so as to be equally accessible to the thumb of either hand. When so located the axis of the spool pin 25 intersects the axis of the clamp-actuating rod 18. To permit the parts to have this desirable location and yet to avoid interference between the spool-pin and the needle-clamp actuating rod 1 I have so formed the parts that one may pass transversely through the other. Preferably the portion 25^c of the spool-pin 25 is formed with a transverse clearance aperture 25^e which is of sufficient width to permit the needle-clamp actuating rod 18 to pass therethrough, as shown in Figs. 5, 6, 7 and 10. Also, the aperture 25^e is sufficiently long to permit the spool-pin to be shifted lengthwise, under thumb-pressure applied to the thumb-button 31 or by the spring 32, to cause the spool to be released from or locked to the screw 33, as hereinbefore described.

To prevent the spool-pin from turning in the section 2 when the rod 18 is withdrawn, the collar 26 is formed with an arcuate notch 26^a which fits upon a complementary rounded portion 34^a of the spool-tensioning spring 34, as shown most clearly in Figs. 9 and 10.

In Fig. 1 the instrument is shown as held in the right hand of a user with the spool-releasing thumb-button 31 at the side of the instrument. In this position of the parts, the needle-holding bar 9 is inserted into the section 2 as shown in Figs. 5 and 8, i. e., with the positioning pin 10 within the slot *a* in the inner end of the needle-bar.

When the parts of the instrument are so assembled that the spool-releasing thumb-button 31 is above the instrument, as shown in Fig. 2, the needle-bar 9 is rotated ninety degrees about its axis from the position shown in Figs. 1 and 8 so that the slot *b* in the free end of the bar engages the positioning pin 10, thereby, in effect, rotating the handle and the spool holder ninety degrees from the position shown in Fig. 1 in the direction indicated by the arrow *x* in that figure.

Fig. 3 shows the instrument held in the left hand of a user with the parts in the same position relative to the left hand as are the parts in Fig. 1 to the right hand. To obtain this positioning of parts, the instrument is turned end for end, the needle-bar is inserted into the section 2 with the notch *c* in engagement with the pin 10 and the needle is rotated 180 degrees about

the axis of its shank from the position *e* in Fig. 1 to the position *i* in Fig. 3.

Fig. 4 shows the handle turned in the direction indicated by the arrow *y* in Fig. 3 ninety degrees relative to the needle-bar and needle from the position shown in Fig. 3. This is effected by inserting the needle-bar into the section 2 with the notch *d* therein in engagement with the pin 10.

It is to be understood that because of the octagonal cross-sectional shape of the shank of the needle and the construction of the needle-clamp, the needle may also be shifted to and positively locked in each of the other angular positions *f*, *g*, *h*, *j* and *l*, as shown in Figs. 1 and 3 as may be required for various suturing conditions or to the safety position *k*, in which the needle underlies the needle-bar, for the purpose of handling or transportation.

Having thus set forth the nature of the invention, what I claim herein is:

1. A surgical stitching instrument comprising a handle; a spool-holding section secured to said handle in axial alignment therewith; a spool-case provided by said section and having its axis perpendicular to and intersecting the longitudinal axis of said section; means to lock a spool against rotation in said spool-case; a manually actuable spool-lock releasing rod arranged coaxial with said spool-case; a needle-carrying bar removably secured in said spool-holding section in axial alignment with said section and handle; a needle-clamp at the free end of said bar; and a needle-clamp actuating rod extending through said needle-bar, spool-holding section and handle and intersecting the axis of said spool-lock releasing rod, one of said rods having an aperture there-through to permit passage of the other rod.

2. A surgical stitching instrument comprising a handle; a spool-holding section carried by said handle and in axial alignment therewith; a needle-carrying bar removably secured in said spool-holding section in axial alignment with said section and handle; and cooperating interengaging means provided by said needle-bar and said section to position the needle-bar in a plurality of predetermined angular positions in said section.

3. A surgical stitching instrument comprising a handle; a spool-holding section carried by said handle and in axial alignment therewith; a needle-carrying bar having one end fitted within said spool-holding section in axial alignment with said section and handle, said end having therein a plurality of notches; and a positioning element located in said spool-holding section and adapted to enter any one of said notches to hold said needle-bar in any one of a plurality of angular positions.

4. A surgical stitching instrument comprising a handle; a spool-holding section carried by said handle and in axial alignment therewith; a needle-carrying bar having one end fitted within said spool-holding section in axial alignment with said section and handle, said end having therein a plurality of circumferentially spaced open-ended slots; and a positioning element carried by said section and adapted selectively to be inserted into any one of said slots to hold said needle-bar in any one of a plurality of angular positions relative to said spool-holding section and handle.

5. A surgical stitching instrument comprising a handle; a spool-holding section carried by said handle and in axial alignment therewith; a needle-carrying bar having one end fitted within

said spool-holding section in axial alignment with said section and handle, said end having therein a plurality of circumferentially spaced open-ended slots; a positioning element carried by said section and adapted selectively to be inserted into any one of said slots to hold said needle-bar in any one of a plurality of angular positions relative to said section and handle; a fixed needle-clamping jaw at the outer end of said needle-bar; a movable needle-clamping jaw cooperating with said fixed jaw to clamp a needle; and means extending through said needle-bar, spool-holding section and handle to draw said movable clamping jaw into needle-clamping position and to hold said needle-bar against outward movement relative to said positioning element.

6. A surgical stitching instrument comprising a hollow handle; a spool-holding section having a cup-like spool-holding portion and two tubular portions extending in opposite directions therefrom, one of said tubular portions being secured within the axial bore in said handle; a needle-bar having one end secured within the other tubular portion of said spool-holding section; a needle-clamp at the opposite end of said needle-bar; a needle-clamp actuating rod extending through said needle-bar, spool-holding section and handle; and means at the free end of said handle for actuating said needle-clamp actuating rod.

7. A surgical stitching instrument comprising a hollow handle; a spool-holding section having a central portion and two tubular portions extending in opposite directions therefrom, one of said tubular portions being secured within said handle; a cup-like spool-case provided by said central portion having its axis perpendicular to and intersecting the axis of said tubular portions; a needle-bar having one end secured within the other tubular portion of said spool-holding section; a spool-supporting pin mounted in said central portion coaxial with said spool-case, said spool-pin having a transverse bore there-through; a needle-clamp at the opposite end of said needle-bar; a needle-clamp actuating rod extending through the bores in said needle-bar, spool-holding section, spool-pin, and handle; and means at the free end of said handle for actuating said needle-clamp actuating rod.

8. A surgical stitching instrument comprising a hollow handle; a spool-holding section having a spool-holding portion and two tubular portions extending in opposite directions therefrom, the inner of said tubular portions being secured within said handle; a cup-like spool-case provided by said central portion having its axis perpendicular to and intersecting the axis of said tubular portions; a needle-bar having its inner end secured within the outer tubular portion of said spool-holding section; a spool-supporting pin mounted in said central portion coaxial with said spool-case, said spool-pin having an elongated transverse bore therethrough; a spool rotatably journaled on said spool-pin in said spool-case; interengaging means between said spool and said spool-holding section to lock said spool against rotation; thumb-actuated means for shifting said spool-pin and spool axially to release said spool-locking means; a needle-clamp at the outer end of said needle-bar; a needle-clamp actuating rod extending through the bores in said needle-bar, spool-holding section spool-pin and handle; and means at the free end of said handle for actuating said needle-clamp actuating rod.

9. A surgical stitching instrument as set forth in claim 8 in which the side wall of the spool-case is provided with a thread-slot and a closure cap is telescopically mounted on said spool-case to close the same and encase the spool therein.

10. A surgical stitching instrument as set forth in claim 8 in which interengaging means is provided between the spool-pin and the spool-holding section to prevent rotation of the spool-pin while permitting axial movement thereof.

11. A universal surgical stitching instrument comprising a handle; a spool-holding section carried by said handle and having its major axis in alignment with the axis of said handle, said section including a spool-case having its axis arranged transversely of said major axis; means to lock a suture spool against rotation in said spool-case; means including an endwise movable rod extending axially through said spool-case and having a thumb-button on one end thereof for releasing said spool-lock; a needle-bar adapted to have one end thereof removably secured in any one of a plurality of predetermined angular positions in said spool-holding section at the side of said spool-case opposite said handle; a needle-clamp at the free end of said needle-bar; and a needle adapted to be secured in said needle-clamp in any one of a plurality of predetermined angular positions, the angular adjustments of said needle-bar and needle permitting the instrument selectively to be assembled for identical operating conditions whether held in the right or left hand of a user.

12. A universal surgical stitching instrument comprising a handle; a spool-holding section carried by said handle and having its major axis in alignment with the axis of said handle, said section including a spool-case having its axis arranged transversely of and intersecting said major axis; means to lock a suture spool against rotation in said spool-case; means including a thumb-actuated endwise movable rod, having an elongated transverse aperture therethrough, extending axially through said spool-case for releasing said spool-lock; a needle-bar adapted to have one end thereof removably secured in any one of a plurality of predetermined angular positions in said spool-holding section; a needle-clamp at the free end of said needle-bar; a needle-clamp actuating rod extending through the bores in said needle-bar, spool-holding section, spool-releasing rod and handle; a nut threaded on said clamp-actuating rod to shift it axially;

and a needle adapted to be secured in said needle-clamp in any one of a plurality of predetermined angular positions, the angular adjustments of said needle-bar and needle permitting the instrument selectively to be assembled for identical operating conditions whether held in the right or left hand of a user.

13. A universal surgical stitching instrument comprising a handle; a spool-holding section secured thereto and including a spool-case and thumb-controlled means for locking a suture spool therein; a needle-bar having one end removably secured in said section; a needle secured in the opposite end of said needle-bar; and means for effecting relative angular adjustment between said needle-bar and said section to cause the handle and the thumb-controlled spool-locking means to have a plurality of predetermined angular positions in a hand of a user without changing the position of the needle.

14. A universal surgical stitching instrument comprising a handle; a spool-holding section secured thereto and including a spool-case and thumb-controlled means for locking a suture spool therein, the axes of said spool-case and thumb-controlled means being arranged perpendicular to and intersecting the axis of said handle; a needle-bar having one end secured in said section; a needle-clamp at the free end of said needle-bar; a needle secured in said needle-clamp; a needle-clamp actuating rod extending axially through said needle-bar, spool-holding section and handle; and means for effecting relative angular adjustment between said needle-bar and said section to cause the handle and the thumb controlled spool-locking means to have a plurality of predetermined angular positions in a hand of a user without changing the position of the needle-clamp and needle.

15. A universal surgical stitching instrument comprising a handle; a spool-holding section secured to said handle and including a spool-case and thumb-controlled means for locking a suture spool therein; a needle-bar having one end secured in said section; a needle secured in the opposite end of said needle-bar; and means for effecting relative angular adjustment between said needle-bar and said section and angular adjustment of said needle in said needle-bar to cause the handle, the thumb-controlled spool-locking means and the needle to have identical relative operative positions when the instrument is held in either the right or the left hand of a user.

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