

[54] SUTURE CARTRIDGE
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3,807,407 4/1974 Schweizer 128/340 X
 3,842,840 10/1974 Schweizer 128/334 R

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Primary Examiner—Dalton L. Truluck
 Attorney, Agent, or Firm—Melvin R. Stidham, Esq.

[21] Appl. No.: 479,587

Related U.S. Application Data

[63] Continuation-in-part of Ser. No. 358,082, May 7,
 1973, Pat. No. 3,842,840.

[52] U.S. Cl. 128/334 R; 128/340; 206/63.3;
 242/137.1; 242/171

[51] Int. Cl.² A61B 17/04

[58] Field of Search 128/326, 334 R, 339, 340;
 206/63.3, 389, 409; 242/137.1, 171

[57] **ABSTRACT**

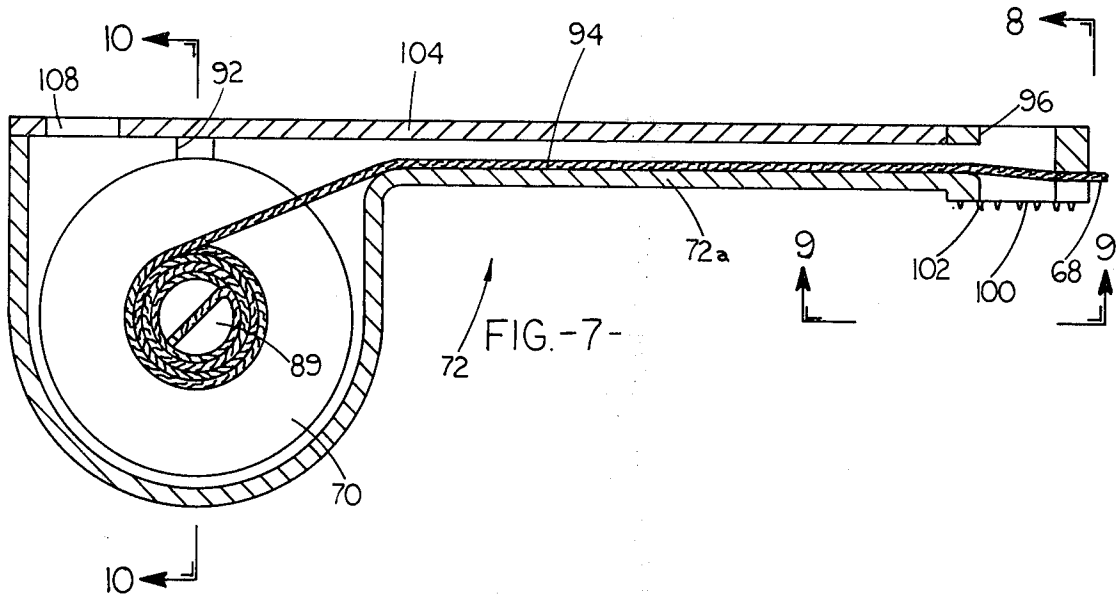
A cartridge for a suturing clamp in which the flesh is clamped by a pair of jaws and further movement of the clamp actuator handle drives a needle, carrying a length of suture with it, through the flesh. A cartridge, which rotatably carries a bobbin with suture, is releasably gripped on one of the jaws, and a narrow slot at the forward end grips a length of suture to hold it across the path of the needle. When the cartridge is in place on the clamp, a roughened undersurface forms one of the flesh gripping surfaces, and a cover on the cartridge is held against a surface of the clamp jaw so that it cannot fall from the cartridge.

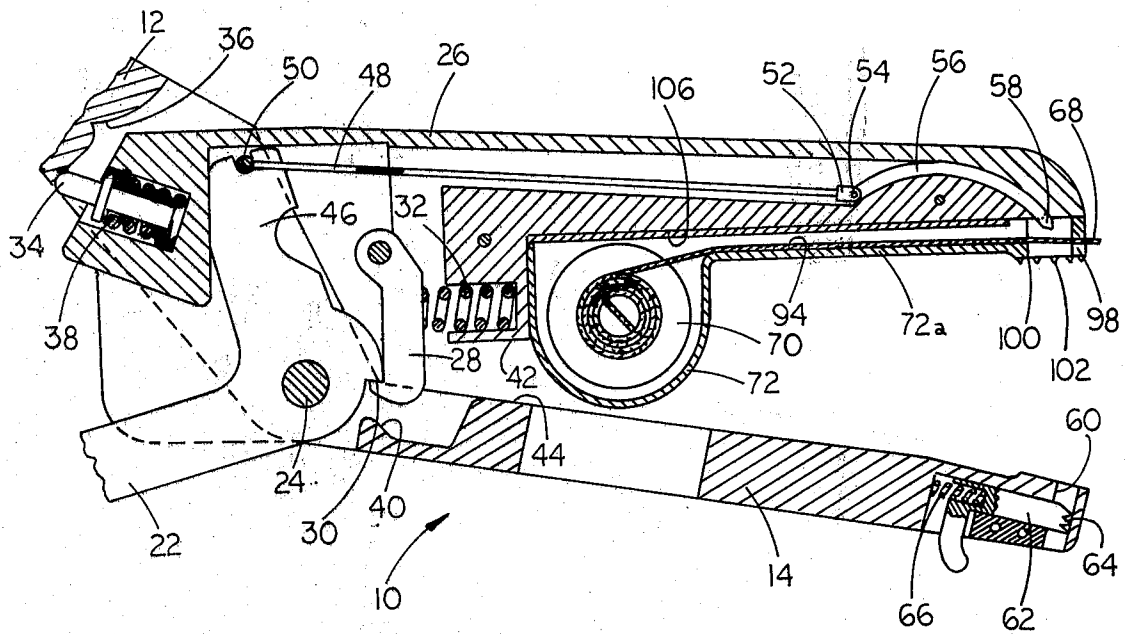
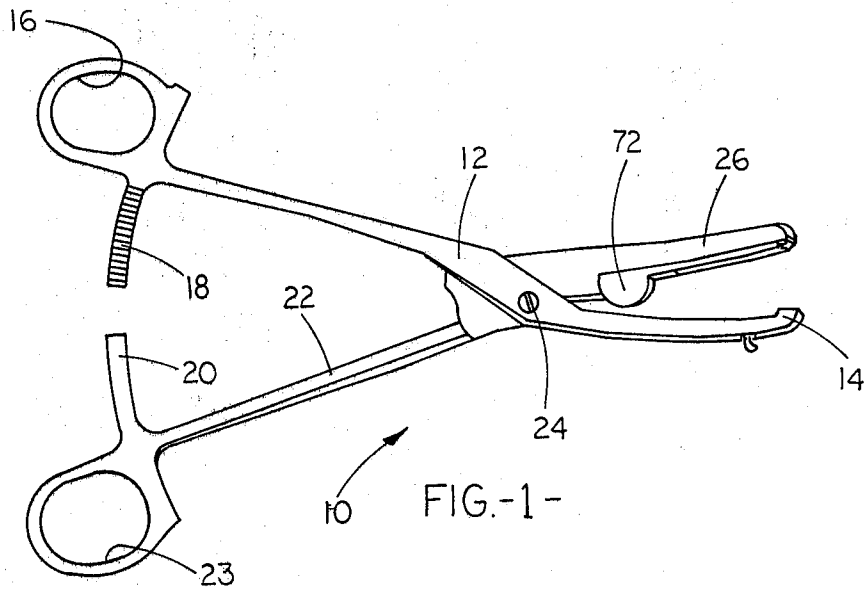
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8 Claims, 10 Drawing Figures





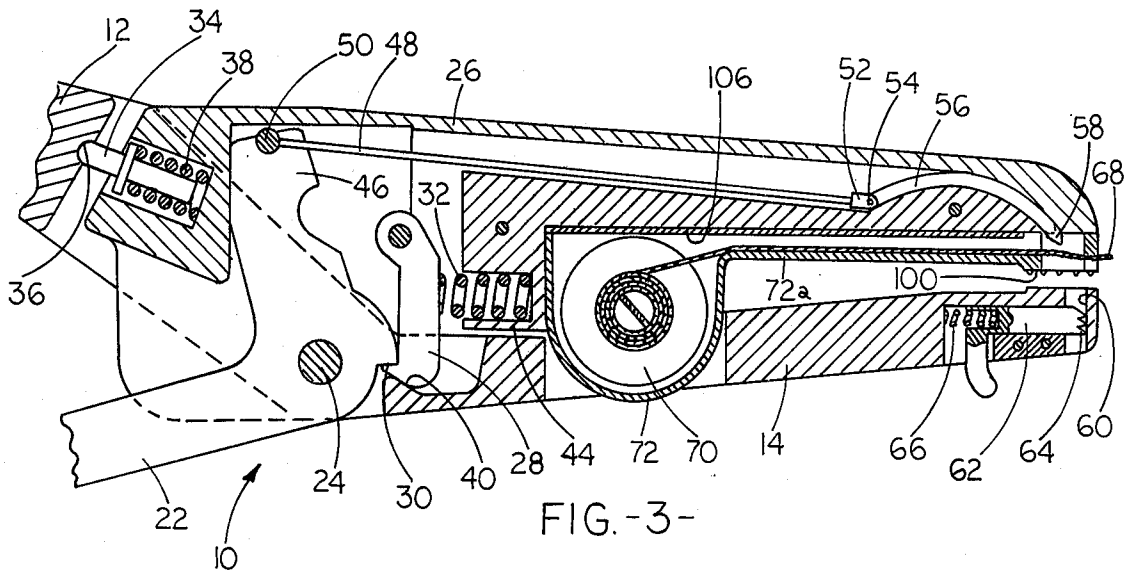


FIG.-3-

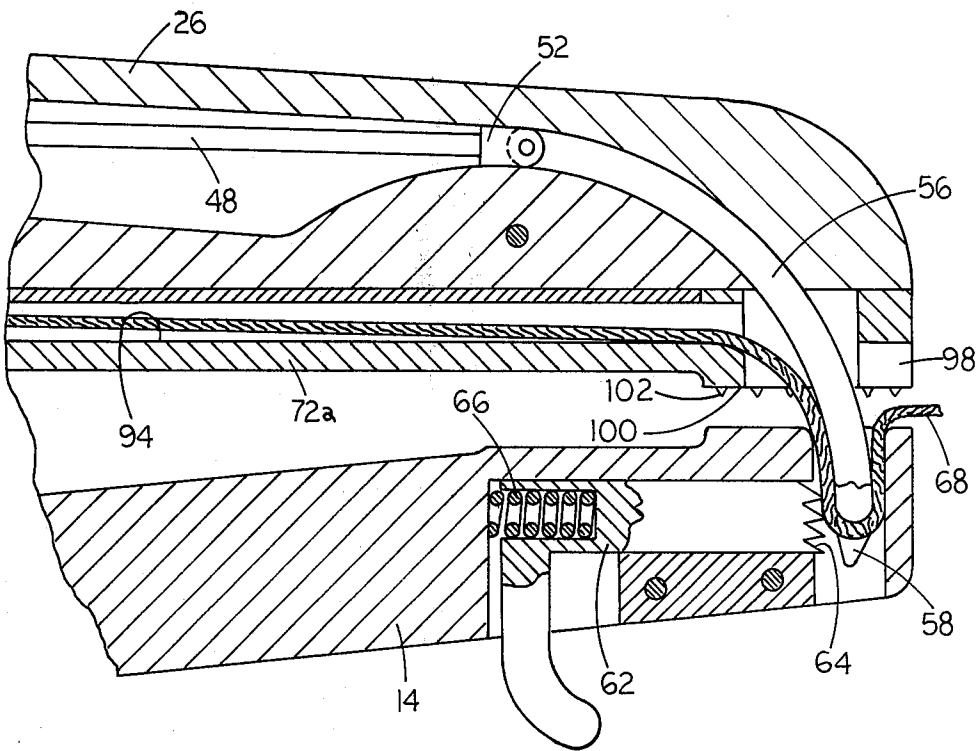


FIG.-4-

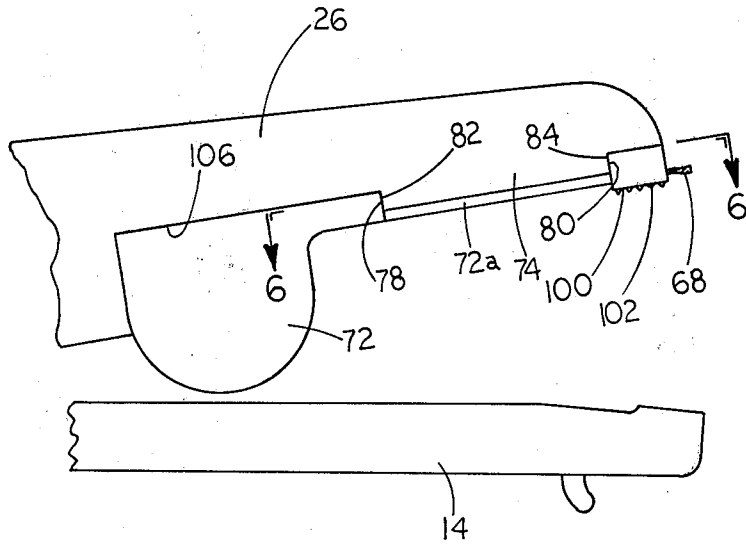


FIG.-5-

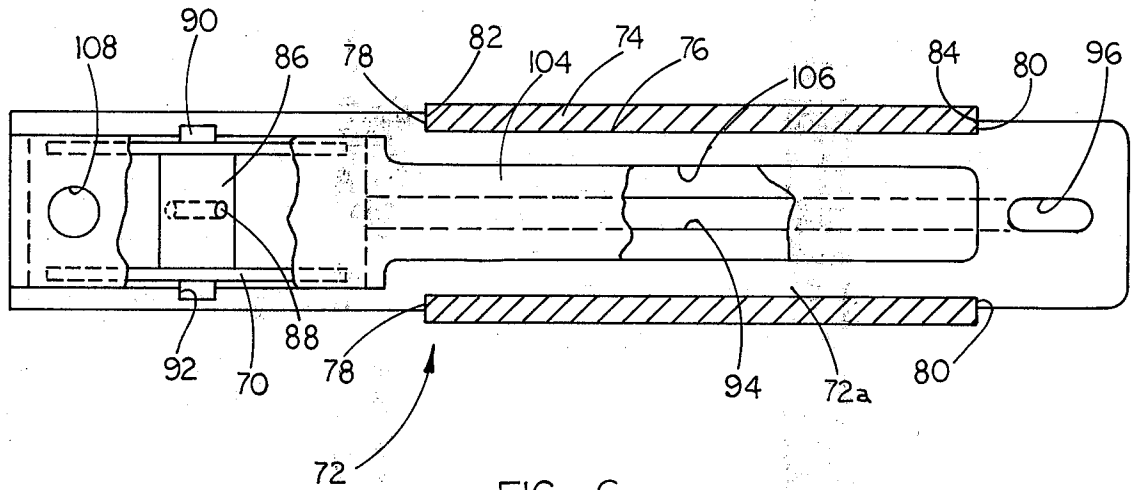


FIG.-6-

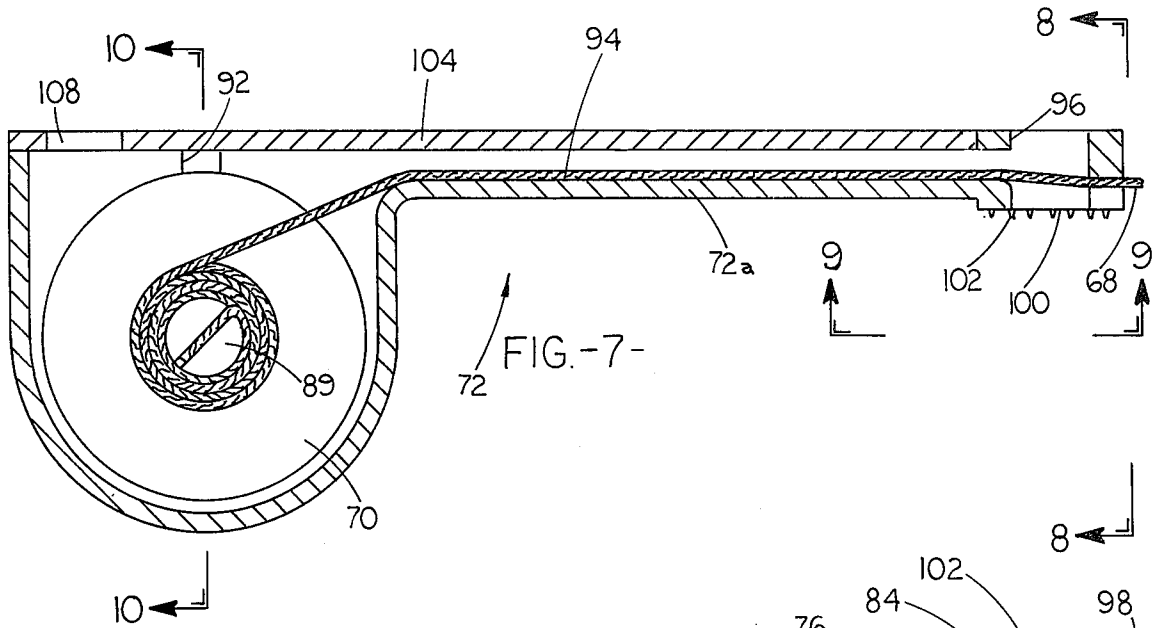


FIG. 7-

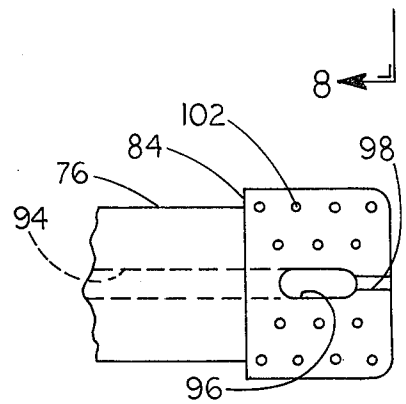


FIG. 9-

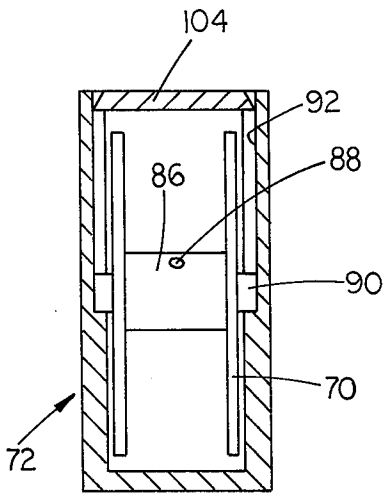


FIG. 10-

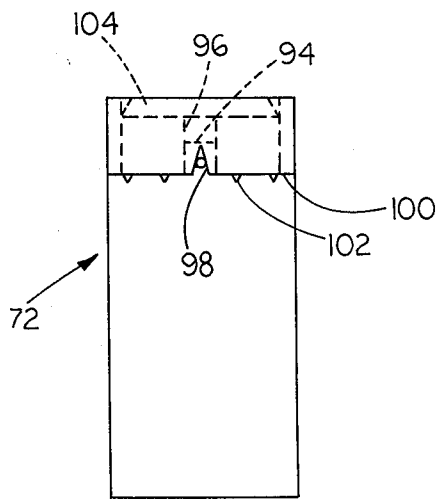


FIG. 8-

SUTURE CARTRIDGE

RELATED APPLICATION

This application is a continuation-in-part of my co-pending application Ser. No. 358,082 filed May 7, 1973, for "Suture Applicator," now U.S. Pat. No. 3,842,840 granted Oct. 22, 1974.

BACKGROUND OF THE INVENTION

Applicant has previously developed suturing clamps which are designed to clamp flesh between two jaws and to then drive one or more needles carrying sutures with them through the flesh. In a preferred embodiment, the suture is carried on a bobbin rotatably supported on the jaw with a length thereof disposed across the path of a needle with a bifurcated tip. Then, when the needle is driven, it carries the suture with it through the flesh, which is gripped between the jaws, to form the stitch. It is highly desirable to have the suture bobbin carried in a cartridge which can be snapped into place on the suturing jaw and form an integral part of the jaw whereby a plurality of stitches may be made without removing the cartridge therefrom. It is, of course, also desirable that no component part of such cartridge be so situated on the jaw that it might fall off unnoticed into an open wound.

OBJECTS OF THE INVENTION

It is an object of this invention to provide a surgical suture cartridge which may be releasably gripped on the jaw of a surgical clamp.

It is a further object of this invention to provide a surgical suture cartridge from which a plurality of stitches may be made without replacement.

It is a further object of this invention to provide a surgical suture cartridge which includes a passageway for a needle and means for gripping a length of suture across such passageway.

It is a further object of this invention to provide a surgical suture cartridge which includes a passageway for a needle and a roughened flesh gripping surface surrounding such passageway.

Other objects and advantages of this invention will become apparent from the description to follow when read in conjunction with the accompanying drawings.

BRIEF SUMMARY OF THE INVENTION

The suturing cartridge of this invention is particularly adapted for use with a suturing clamp having a one piece jaw and handle to which are pivoted separable jaw and handle elements. The separable jaw and handle are latched together so that they move as a unit until a pre-set limited clamping position is reached. At that point, the separable jaw is unlatched from its handle and latched to the one piece jaw handle. Further movement of the separable handle will produce no further squeezing of the jaws but instead, will drive a needle across the space between the jaws. The cartridge of this invention is adapted to be releasably gripped on the jaw in which the needle is movably carried. Rotatably mounted in the cartridge is a bobbin carrying a length of suture thread. A forward extension forming a suture passageway extends from the bobbin to the end of the jaw wherein the needle is carried. There, a transverse passageway is formed through the cartridge and surrounding it on the undersurface is a roughened flesh gripping surface, forming one of the clamping ele-

ments. At the extremity of the elongated passageway is a narrow slot which grips the end of a suture which has been pulled from the bobbin. Hence, in operation, a length of suture is pulled from the bobbin and releasably gripped in the narrow slot. Then, the clamps are engaged, with the cartridge surface itself forming one of the flesh gripping elements. When the flesh is fully clamped, further movement of a handle drives the needle through the passageway, where it picks up the length of suture and drives it through the flesh. Then, a length of suture is cut and tied and a further length is pulled from the bobbin and engaged in the narrow gripping slot so that the stitching procedure may be repeated.

BRIEF DESCRIPTION OF THE DRAWING

In the drawings:

FIG. 1 is an isometric view of a suturing clamp embodying features of this invention;

FIG. 2 is a section view of the suturing clamp prior to operation thereof;

FIG. 3 is a section view of the suturing clamp in relatively closed position but prior to the suturing operation thereof;

FIG. 4 is an enlarged partial section view of the jaw portions of the clamp during a suturing operation;

FIG. 5 is a side view partially broken away of the clamping jaws with suture cartridge in place;

FIG. 6 is a view, partially broken away, taken along line 6—6 of FIG. 5;

FIG. 7 is a vertical section view of the suture cartridge;

FIG. 8 is an end view of the suture cartridge;

FIG. 9 is a partial bottom view of the end portion of the suture cartridge; and

FIG. 10 is a section view taken along line 10—10 of FIG. 7.

DESCRIPTION OF A PREFERRED EMBODIMENT

Referring now to FIGS. 1 to 4 with greater particularity, the suturing clamp 10 includes a first lever 12 having a lower jaw element 14 integral therewith and a thumb engaging loop 16 for manual operation thereof. An arcuate ratchet member 18 extends laterally from the one-piece lever to engage with a complementary arcuate ratchet member 20 on an actuator lever 22 also carrying a finger operation loop 23. The arcuate ratchet members 18 and 20 operate to hold the clamps 10 in relatively closed position against separation, as in conventional forceps design.

The actuator lever member 22 is pivoted to the first lever member 12 on a pivot pin 24 on which is also pivotably mounted the upper jaw element 26. As shown in FIGS. 2 and 3, the upper jaw element 26 is normally secured to the actuator lever member 22 by engagement of a pawl or latch 28 thereon on a complementary surface 30 on the actuator lever member, the latch being urged into engaging position by means of a spring 32 carried on the upper jaw element. When the jaw elements 14 and 26 move to a pre-set relatively clamped position, as shown in FIG. 3, a detent 34 carried on the separable upper jaw element 26 engages in a recess 36 on the one-piece first lever member 12 effectively to interlock the jaw elements 14 and 26 together under the force of a compression spring 38, which biases the detent 34. At the same instant, the latch 28 engages a camming surface 40 on the lower jaw element which

forces the latch out of engagement with the surface 30 to free the actuator lever 22 from driving engagement with the upper jaw 26, allowing it to pivot relative thereto.

With the separable upper jaw 26 secured to the lower jaw by means of the detent 34, and further clamping movement also precluded by engagement of stop surfaces 42 and 44 on the upper and lower jaws 26 and 14, further pivotal movement of the lever 22 will swing the arm 46 carried thereon to push the rod 48 lengthwise of the upper jaw element 26. The rod 48 may be secured to the arm 46 as by engagement of an enlargement 50 thereon in a complementary recess on the arm 46.

Carried on the end of the pusher rod 48 in the separable upper jaw 26 is a clevis 52 to which, at 54, is pivotably carried an arcuate needle 56. The end of the needle is bifurcated with a V-notch 58 in the end thereof to grasp a length of suture as the needle emerges from the upper jaw. A passageway 60 in the end of the lower jaw is adapted to receive the end of the needle 56, and a slidable clamp 62 having a serrated forward face 64 is spring biased into engagement with the wall of the passageway 60 to grip a length of suture 68 therein under the force of the spring 66, as shown in FIG. 4, whereby the suture cannot be withdrawn with retraction of the needle 56.

The suture 68 is wound on a bobbin 70 rotatably carried in a cartridge 72 which in turn is releasably clipped onto the movable upper jaw 26. Referring to FIGS. 5 and 6, the upper jaw 26 has a pair of parallel lips or rails 74 which snugly embrace the sides 76 of the cartridge 72. The depending end edges 78 and 80 of the rails 74 are tightly received between shoulders 82 and 84 formed in the sides of the cartridge to assist in retaining the cartridge on the upper jaw 26.

The bobbin 70 has a coaxial drum 86 with a cross hole 88 therethrough to grip the end of the suture in order to start the winding. Protruding from the drum 86 are stub shafts 90 which are slidably received in tracks 92 in the cartridge so as to be rotatably carried therein (FIG. 10).

The suture may be pulled from the bobbin 72 through a suture track 94 formed in the bottom of the forward cartridge extension 72a, across a transverse slot or passageway 96 which is traversed by the needle during suturing operation, and gripped in a tapered slot 98 at the end of the cartridge extension 72a. The bottom surface 100 around the transverse slot 96 forms the flesh gripping surface for the upper jaw 26 and is preferably provided with small taper studs 102 to enhance the gripping action.

As shown best in FIGS. 8 and 10, the cartridge 72 is closed by a cover or lid 104 which is snap-fit in place and which fits all around the top opening 106 in the cartridge, in order to prevent suture snag. A liquid pack drainage hole 108 is provided in the area of the bobbin 70 (FIG. 7).

In preparation for use, the suture 68 is wound onto the bobbin 70 and, with the bobbin in place in the bearing tracks 92, a length of suture 68 is pulled from the bobbin 70 and secured into the V-slot 98 at the end of the cartridge extension 72a. Then, the snap-in cover is firmly placed and the cartridge is ready for use.

In operation, the cartridge is simply taken from a storage place and snapped into place between the parallel rails 74 on the upper jaw 26 of the suturing clamp

10. It will be particularly noted that, with the cartridge held in place, the only removable component, i.e. the cover 104, is held firmly against the undersurface 106 of the upper jaw 26. Hence, if for any reason the cover 104 is not firmly snapped into place, it still cannot fall from the cartridge 72 and, perhaps, into an open wound being sutured. This is extremely important, because in actual size, the cover 104 is an extremely small, almost transparent, plastic element which can very easily be overlooked if misplaced.

While this invention has been described in conjunction with a preferred embodiment thereof, it is obvious that modifications and changes therein may be made by those skilled in the art without departing from the spirit and scope of this invention.

What is claimed as invention is:

1. A suture cartridge for use in a surgical suture applicator which includes:

a pair of lever members pivoted together and having jaw elements thereon;

a needle slidably carried on one of said jaw elements for movement between a retracted position within said one jaw element and an extended position protruding therefrom;

means on the end of said needle for grasping a length of suture extended across the path of said movement; and

means on one of said lever members for driving said needle from said retracted position to said extended position in response to closing movement of said lever member;

said suture supply cartridge comprising:

a casing;

a bobbin adapted to carry a length of suture wound thereon;

mounting means in said casing rotatably receiving said bobbin;

a forward extension on said casing forming a passageway for a length of suture unwound from said bobbin;

a forward extension on said casing forming a passageway for a length of suture unwound from said bobbin;

a transverse opening through said forward extension adapted for registry with said path of needle movement;

suture gripping means on said forward extension outboard of said transverse opening;

means on said casing for releasably securing said casing to said one jaw element of the suture applicator; and

a flesh-gripping surface on said forward extension around said transverse opening.

2. The suture supply cartridge defined by claim 1 wherein:

said suture gripping means comprising a narrow slot in the outer end of said forward extension.

3. The suture supply cartridge defined by claim 1 including:

a cover for said casing removably snap-fitted thereon to form a complete enclosure;

said cover, when said casing is in place on said one jaw element, being in face to face engagement with a surface thereof.

4. The suture supply cartridge defined by claim 1 wherein:

said flesh-gripping surface is roughened.

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5. The suture supply cartridge defined by claim 1 including:

a plurality of short stubs protruding from said flesh-gripping surface.

6. A suture supply cartridge for use in a surgical suture applicator which includes

a pair of lever members pivoted together and having jaw elements thereon;

a needle slidably carried on one of said jaw elements for movement from a retracted position within said one jaw element and an extended position into the other of said jaw elements carrying a length of suture therewith; and

means on one of said lever members for driving said needle from said retracted position to said extended position in response to closing movement of said lever member;

said suture supply cartridge comprising:

a casing;

a bobbin adapted to carry a length of suture wound thereon;

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mounting means in said casing rotatably receiving said bobbin;

a forward extension on said casing forming a passageway for suture unwound from said bobbin;

a transverse opening through said forward extension adapted for registry with said path of needle movement;

a cover for said casing removably snap-fitted thereon to form a complete enclosure; and

means on said casing for releasably securing said casing to said one jaw element of the suture applicator.

7. The suture supply cartridge defined by claim 6 including:

a flesh-gripping surface on said forward extension around said transverse opening.

8. The suture supply cartridge defined by claim 7 including:

a plurality of short stubs protruding from said flesh-gripping surface.

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