

Feb. 15, 1966

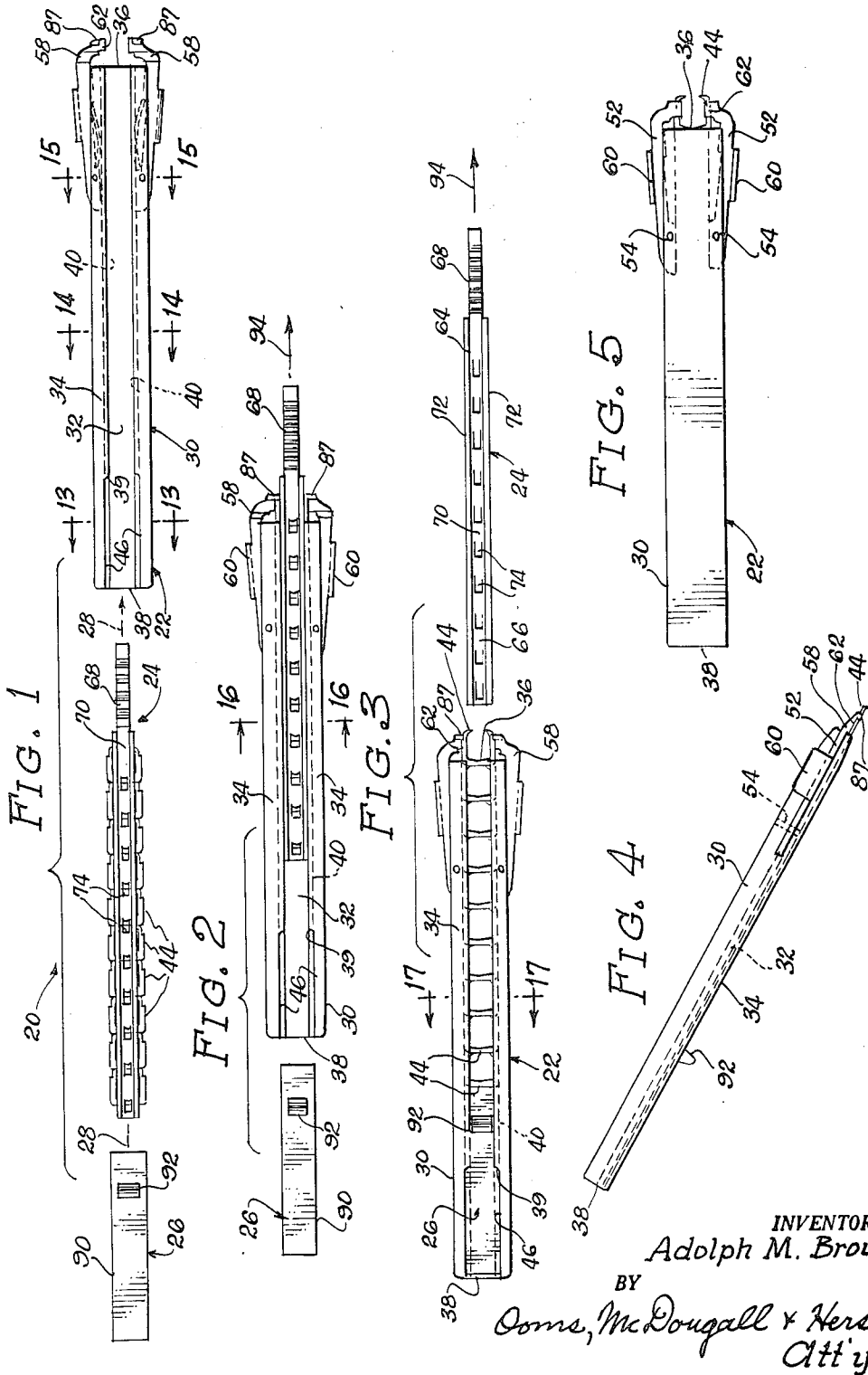
A. M. BROWN

3,234,636

CLIP APPLICATOR

Filed March 19, 1962

2 Sheets-Sheet 1



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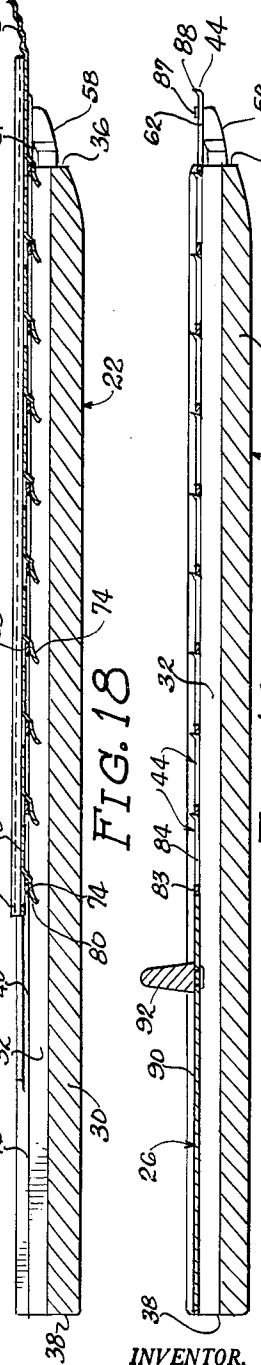
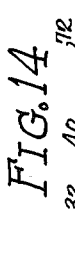
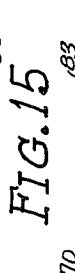
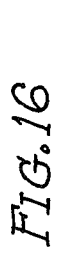
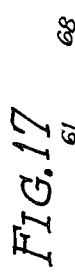
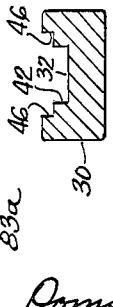
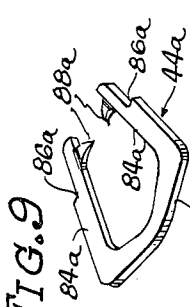
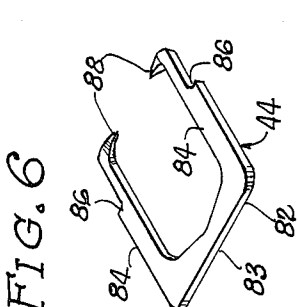
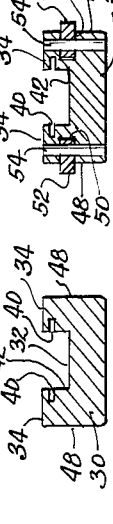
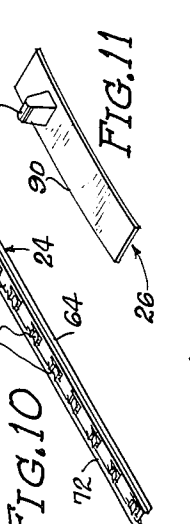
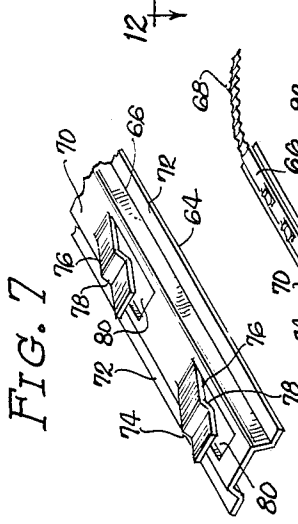
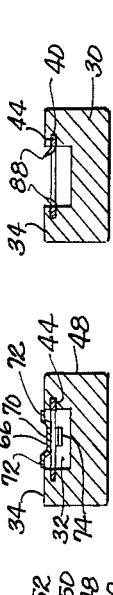
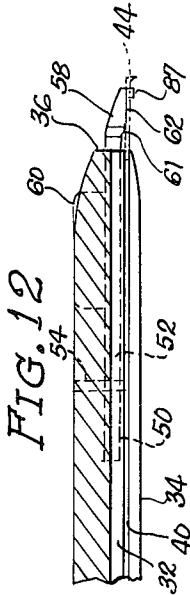
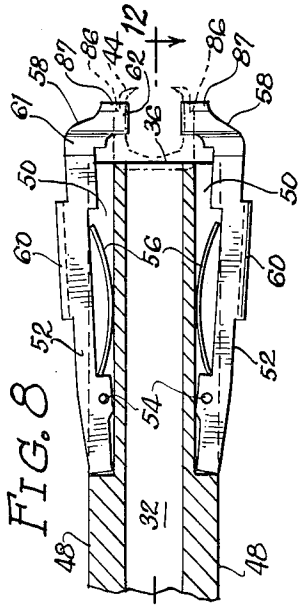
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CLIP APPLICATOR

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2 Sheets-Sheet 2



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3,234,636

CLIP APPLICATOR

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4 Claims. (Cl. 29—212)

This invention relates in general to a clip-type suturing assembly, and more particularly to an improved clip, clip applicator, and arrangement for loading and operating the applicator.

A clip applicator for use in suturing wounds or incisions is described in application Serial No. 10,595, filed February 24, 1960, for "Surgical Clip Application," now Patent No. 3,098,232, issued July 23, 1963. In the applicator described in the aforementioned application, the clip applicator is loaded with a series of clips, and the applicator is operated sequentially to apply the clips across an incision for binding or suturing the incision. The instrument, clips, and loading arrangement are, of course, of modest dimension and must be manufactured with considerable precision in order properly to perform their function. In addition, the clips must be capable of being loaded in the applicator with a minimum of effort and dispensed without danger of becoming jammed or otherwise resulting in a malfunction.

It is accordingly an important object of this invention to provide an improved arrangement for loading a plurality of clips into a clip applicator and to provide a clip applicator that can retain and apply the clips in a simple and efficient manner for suturing an incision or wound.

It is another object of this invention to provide an improved and more economical clip applicator and also a magazine for loading a plurality of clips in position of use into the applicator.

In the drawings:

FIG. 1 illustrates the clip applicator, clip magazine, and pusher in relative sequence for assembly;

FIG. 2 illustrates the clip magazine loaded in the clip applicator and the pusher in position to be assembled thereto;

FIG. 3 illustrates the position of the clip magazine on being withdrawn from the clip applicator and the pusher assembled to the clip applicator;

FIG. 4 is a side illustration of the clip applicator in position for applying a clip to suture an incision;

FIG. 5 is a bottom plan view of the clip applicator and would normally be seen as the top when viewed as in FIG. 4;

FIG. 6 is a perspective view of a clip;

FIG. 7 is a perspective view of a portion of the clip magazine;

FIG. 8 is a cross-sectional view of the front portion of the clip applicator;

FIG. 9 is a perspective view of a modification of the clip shown in FIG. 6 after deformation;

FIG. 10 is a perspective view of the clip magazine;

FIG. 11 is a perspective view of the pusher;

FIG. 12 is a sectional view taken through the line 12—12 in FIG. 8;

FIG. 13 is a sectional view taken through the line 13—13 in FIG. 1;

FIG. 14 is a sectional view taken through the line 14—14 in FIG. 1;

FIG. 15 is a sectional view taken through the line 15—15 in FIG. 1;

FIG. 16 is a sectional view taken through the line 16—16 in FIG. 2;

FIG. 17 is a sectional view taken through the line 17—17 in FIG. 3;

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FIG. 18 is a sectional view illustrating the clip magazine loaded in the clip applicator; and

FIG. 19 is a sectional view showing the clip and pusher in position in the clip applicator after the magazine has been withdrawn.

Referring to FIG. 1 of the drawings, there will be seen a tandem arrangement 20 of a clip applicator 22, clip magazine 24, and pusher 26. The arrangement 20 indicates the order in which the clip magazine 24, and the pusher 26 are assembled to the clip applicator 22 when the clip magazine 24 and pusher 26 are moved in the direction of the arrows 28.

The clip applicator 22 comprises an elongate body 30 having a deep rectangular recess 32 in its top wall 34 and extending longitudinally from the front 36 to the rear 38 of the applicator, as may be best seen from FIGS. 1-4 and 18 and 19. The recess 32 thus forms a passageway. Extending from the front 36 to a position 39 spaced from the rear 38 of the applicator are a pair of guideways 40 formed in the side walls 42 of the recess 32 dimensioned crosswise between their outer edges to correspond to the crosswise dimension of the clips, and dimensioned to have a height corresponding to the thickness of the clip for receipt of the lateral edges of the clips therein for guiding movement during displacement of the clips through the applicator, as seen in FIGS. 14-17, for example. These guideways receive a series of clips 44 carried by the clip magazine 24, as will be explained. From the position 39 to the rear 38 of the body 30, the top wall 34 is cut back to form the shoulders 46.

The body 30 is provided with side walls 48 which are slotted to form a respective elongate recess 50 therein. An elongate lever arm 52 is pivotally mounted adjacent one end on a pin 54 in each recess 50. Each arm is biased by a bowed leaf spring 56 to form forceps. The other end of each lever arm 52 extends past the front 36 of the applicator 22 and toward each other to form jaws 58. A finger-operating portion 60 is also provided on each arm 52 intermediate the extremities of the respective arm. The jaws 58 of the lever arms 52 are each provided with an upwardly extending flange portion 61 normally lying astride a respective guideway 40, and each flange has an arm or seat 62 extending therefrom in a horizontal plane adjacent the top wall of each guideway 40.

The clip magazine 24 which carries the clips 44 for loading the clips into the applicator 22 comprises a single elongate web 64 of spring material having a channel body portion 66 and a serrated or knurled finger grip portion 68 at one end. The channel portion 66 has a central leg 70 from which side legs 72 extend at an offset spaced from the central leg 70 by a distance corresponding to the distance between guideways 40 and the top wall 34 of the applicator. The central leg 70 also has struck therefrom in a direction opposite the offset of the legs 72 a series of tines 74 spaced longitudinally by an amount slightly greater than the length of the clips 44. Tines 74 each comprise an angularly extending finger 76 having a step 78 formed therein and defining an open mouth 80 into which the bail or back legs of clips 44 may be inserted.

The clips 44 each comprise a substantially U-shaped sheet metal body 82 having a back leg 83 and side legs 84. The side legs 84 are provided with outer free end portions of lesser width than the remainder to define forwardly facing shoulders 86 which function as steps which are spaced one from the other and positioned to engage the shoulders or abutments 87 formed on the arms 62 of the jaws 58 properly to position the leading clip in position of use between the jaw arms.

The ends of the side legs 84 each converge toward each

other and terminate in a spicule 88 to enable the clip to easily pierce the skin underlying the spaced spicules when the clip is in position for application. The points 88 depend slightly from the plane of the body 82, as explained in the aforementioned application. In FIG. 9 a clip 44^a similar to that shown on the FIG. 6 after deformation is illustrated with the exception that the spicule 88^a is given a slight setback from the ends to limit penetration of spicules into the skin. The clip 44^a is likewise provided with stop shoulders 86^a in each side leg 84^a.

The clips 44 are loaded on the central web portion 66 of the clip magazine 24 by forcing the back leg 83 of each clip in sequence through a respective mouth 80 formed by the tines 74 with the side legs 84 of the clips extending toward the finger grip 68. The tines 74, of course, are resilient, and, when the back leg 83 is engaged by the step 78, they are firmly held until sufficient manual pressure is applied to effectuate their release.

The pusher 26 comprises a slightly bowed elongate spring plate 90 dimensioned to have a width slightly less than the width between the shoulder 46 on the grooves 40 to be received in the recess 32 between the shoulders 46 and then within the guideways 40 for moving the clips 44 toward the jaws 58. The pusher 26 has an upwardly projecting central tongue 92 dimensioned to have a width less than the recess 32 which enables the pusher to be easily moved forward by the application of manual finger pressure with the tongue extending upwardly beyond the top wall of the applicator.

To load the clip applicator 22, a clip magazine 24 having a series of clips 44 carried thereon by the tines 74 is inserted in the passageway formed by recess 32 with the clips 44 beneath web 64 and with the corrugated end portion 68 at the leading end. The web 64 is moved forward so that the lateral edges of the clips slidably engage the guideways 40, as seen in FIGS. 16 and 17. The pusher bar 26 is thereafter inserted in the passageway and the guideways 40 behind the clips to move the magazine forward. The spring tension of the bowed pusher operates to maintain it securely in position. The clip magazine is moved forward until the stops 86 on the first clip engage the shoulders 87 of the jaw members, at which time the first clip is largely supported on the arms 62 and the guideways 40 adjacent the front 36 of the applicator. Upon reaching this position, clips 44 cannot be moved forward. The finger portion 68 which now extends freely forwardly from the mouth of the applicator can now be grasped and pulled forwardly in the direction of arrow 94, shown in FIGS. 2 and 3, to extract the magazine from the front 36 of the clip applicator while leaving the clips 44 engaged in the guideways 40.

To suture an incision as shown in FIG. 4, the clip applicator is located with its top wall 34 facing downwardly and it is brought into relationship with the incision so that the two pointed ends 88 of the first clip 44 straddle the incision. The lever arms 52 are then operated by pressure against portions 60 to pivot the arm toward each other about pins 52 for squeezing the clip legs 84. This causes the points 88 to penetrate the skin while the free ends of the clip are brought together in closed position to displace the skin edges in the direction toward each other to close the wound. Pressure on the lever arms 52 is then released and they automatically return to their original position aligned with guideways 40 under the pressure of springs 56. Since the legs of

the first clip have been distorted so that the stops 86 can no longer engage shoulders 87, the applicator can be separated from the applied clip, and the jaws 58 are freed to be engaged by the next clip. The pusher bar 26 is now displaced forwardly, as by finger pressure, to move the next clip 44 into engagement with the jaws 58 and the suturing procedure is repeated.

While the above describes one embodiment of the invention, it will be appreciated that the invention is capable of numerous variations whose limitations are believed more adequately set forth in the appended claims.

I claim:

1. In a clip applicator for applying clips of U-shape having a pair of laterally spaced apart parallel side arms and an interconnecting rear edge comprising an elongated body portion, a clip receiving guideway in said body portion dimensioned to have a width corresponding to the width of the clips for receiving a plurality of clips in aligned end to end relationship in a column, jaws associated with said body portion and positioned in advance of the guideway, seats on the jaws for receiving the forward edge of the side arms of the foremost clip while the adjacent end portion of the guideway supports the lateral edge portions of the clip arms, means for displacement of the column of clips forwardly to position the foremost clip in position of use between the jaws comprising a slot extending lengthwise through said body portion in communication with the guideway substantially throughout the length thereof and dimensioned to have a width less than the width of the guideway, an elongate pusher rod dimensioned slidably to be received within said guideway and having a projection extending upwardly therefrom and dimensioned to have a width less than the width of the slot to extend outwardly through the slot to beyond the body portion, said pusher rod being located in the guideway rearwardly of the column of clips for engagement of the rearmost clip of the column to effect forward displacement of the entire column of clips responsive to manual displacement of the projection extending outwardly of the body portion.

2. A clip applicator as claimed in claim 1 in which the pusher rod is dimensioned to have a width corresponding to the width of the slot and a thickness corresponding to the thickness of the slot.

3. A clip applicator as claimed in claim 1 in which the projection is located on the rearward end portion of the rod.

4. A clip applicator as claimed in claim 1 in which the slot terminates short of the forward end of the body portion and short of the rearward end of the body portion to define the extent of movement of the pusher rod within the applicator.

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GRANVILLE Y. CUSTER, JR., Primary Examiner.