

April 23, 1963

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3,086,208

SURGICAL CLIP ASSEMBLY

Filed Oct. 6, 1960

4 Sheets-Sheet 1

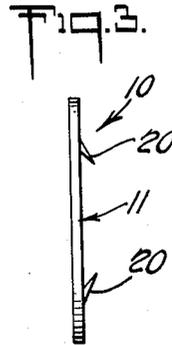
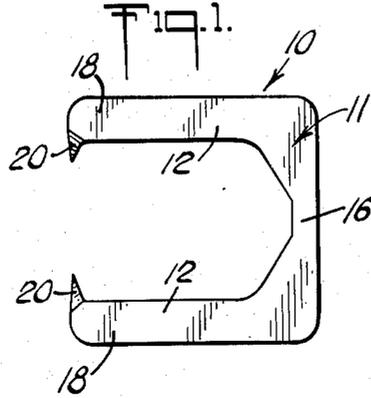
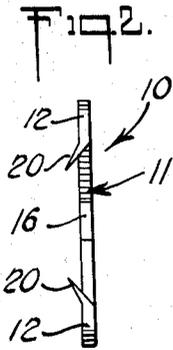


Fig. 4.

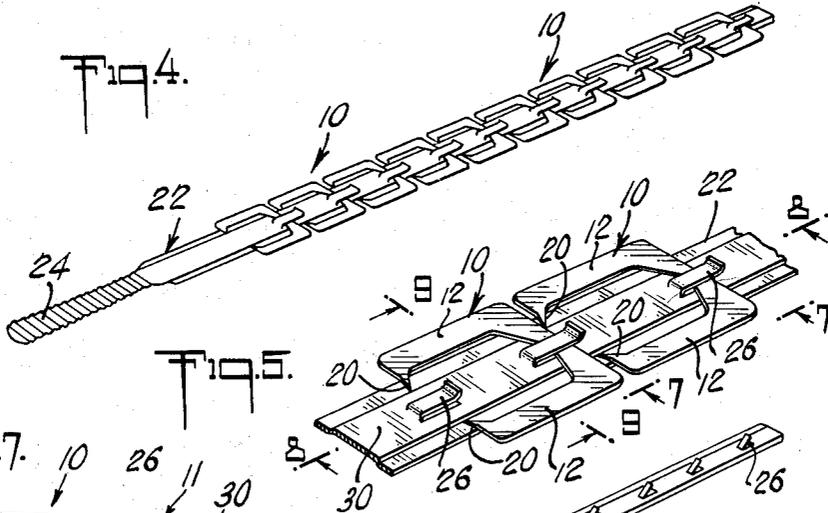


Fig. 5.

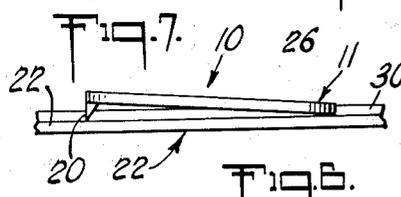
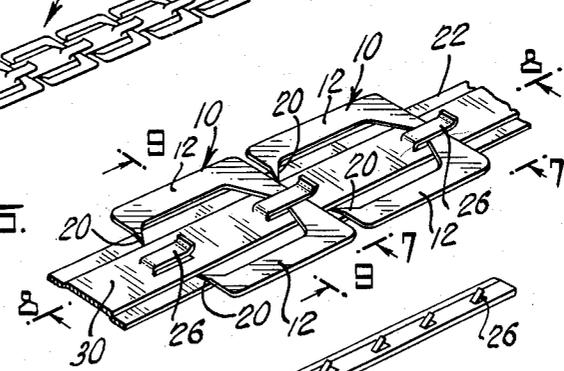


Fig. 6.

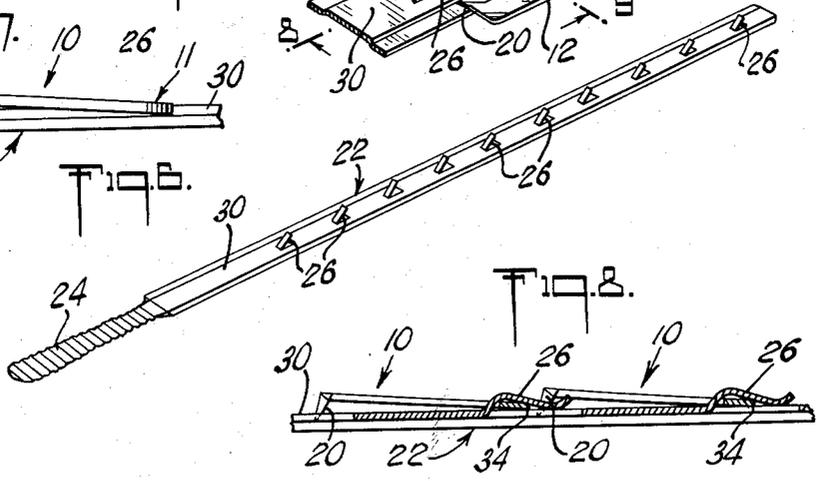
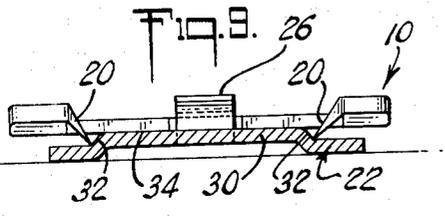
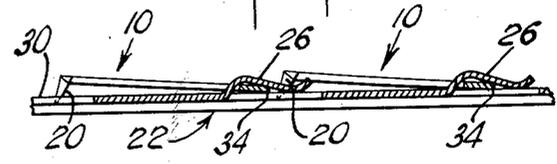


Fig. 8.



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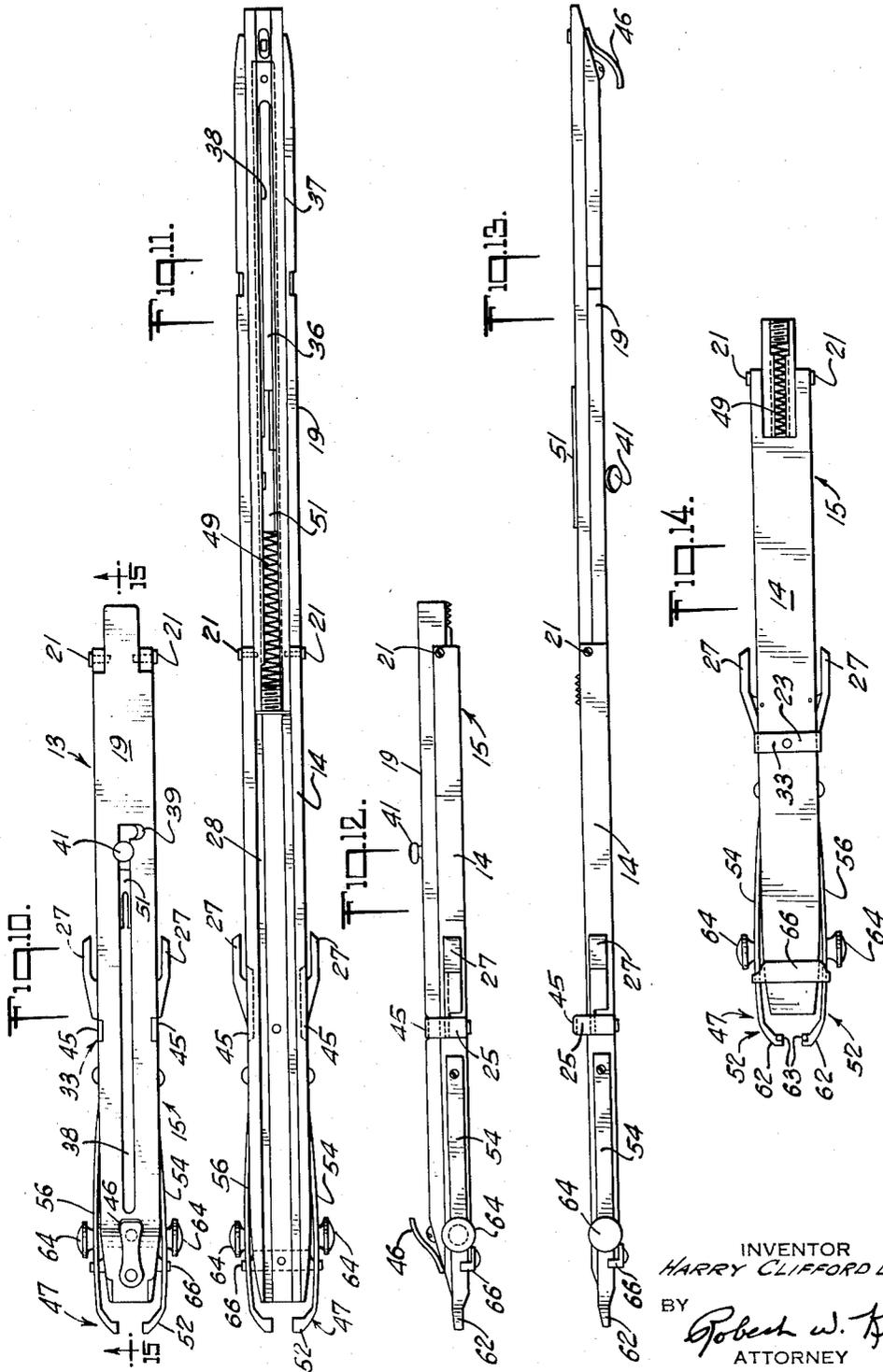
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4 Sheets—Sheet 2



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SURGICAL CLIP ASSEMBLY

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FIG. 24.

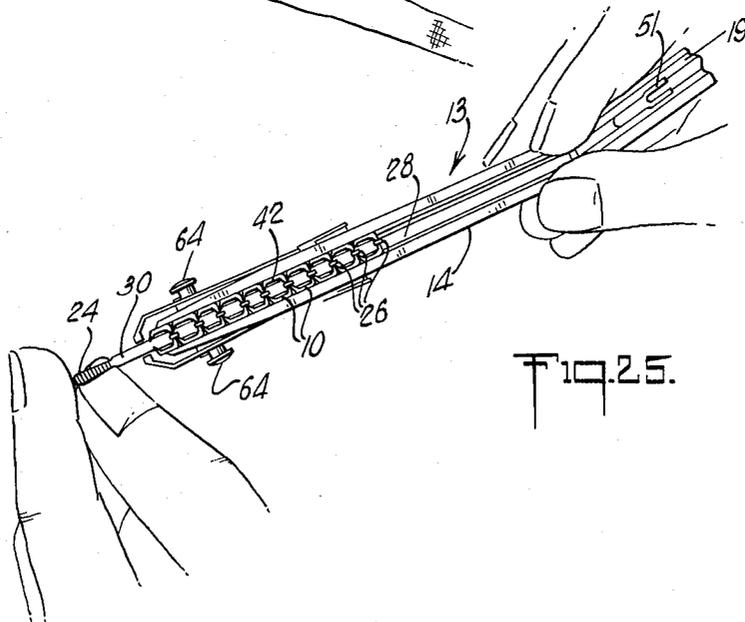
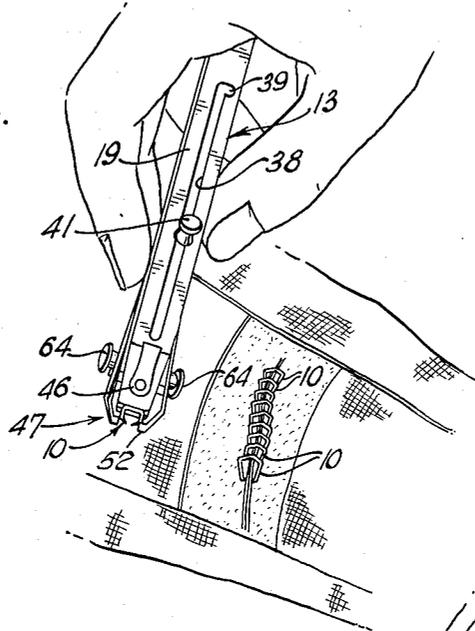


FIG. 25.

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3,086,208
SURGICAL CLIP ASSEMBLY
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5 Claims. (Cl. 1—56)

This invention relates to a skin clip assembly adapted for use in loading an applicator which may then be used by the surgeon for closing incisions or lacerations in flesh.

It is a major object of my invention to provide a loader package of skin clips wherein the skin clips are held together on a carrier for loading into an applicator.

An additional object of my invention is to provide a clip holder or strip adapted to assemble a group of clips in alignment as a unit which can be easily inserted in an applicator.

Another object of the invention is to provide a loader package wherein a number of clips are held in alignment by a metal strip in such a manner that the metal strip may be slidably removed from the applicator after loading.

These and other objects of my invention will become apparent from the following detailed description of a preferred form thereof and from an inspection of the accompanying drawings, in which:

FIGURE 1 is a plan view of a skin clip.

FIGURE 2 is an edge elevation of the left-hand side of the skin clip illustrated in FIGURE 1.

FIGURE 3 is an edge elevation of the right-hand side of the skin clip illustrated in FIGURE 1.

FIGURE 4 is a perspective view of a clip holder and clips mounted thereon.

FIGURE 5 is an enlarged fragment of FIGURE 4.

FIGURE 6 is a perspective view of the clip holder shown in FIGURE 4.

FIGURE 7 is an edge elevation of a skin clip mounted on a clip holder taken on the line 7—7 of FIGURE 5.

FIGURE 8 is an enlarged horizontal cross-section taken on line 8—8 of FIGURE 5.

FIGURE 9 shows a much enlarged transverse cross-section taken on line 9—9 of FIGURE 5.

FIGURE 10 is a plan view of a semi-automatic clip applicator which may be loaded with the clip assembly of the present invention.

FIGURE 11 is a plan view of the clip applicator shown in FIGURE 10, but with the body open for loading with a clip assembly and for exposure of the interior thereof.

FIGURE 12 is a side view of the clip applicator shown in FIGURE 10.

FIGURE 13 is a side view of the clip applicator shown in FIGURE 10 but opened for loading as in FIGURE 11.

FIGURE 14 is a bottom view of the clip applicator shown in FIGURE 10.

FIGURE 15 is a sectional view taken along the line 15—15 of FIGURE 10.

FIGURE 16 is a side sectional view of the front portion of the clip applicator with the clip release lever out of clip retaining position.

FIGURE 17 is a sectional view taken on the line 17—17 of FIGURE 16.

FIGURE 18 is an elevation view taken on the line 18—18 of FIGURE 15.

FIGURE 19 is a sectional view taken on the line 19—19 of FIGURE 15.

FIGURE 20 is a sectional view taken on the line 20—20 of FIGURE 15.

FIGURE 21 is a sectional view taken on the line 21—21 of FIGURE 15.

FIGURE 22 is a sectional view taken on the line 22—22 of FIGURE 15.

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FIGURE 23 is a view similar to that of FIGURE 21 but with the spring-biased plunger located in a retracted position.

FIGURE 24 is a perspective view of a skin clip applicator and a series of clips in position for use to close a wound.

FIGURE 25 is a perspective view of a clip applicator open to receive a loaded package of clips.

The illustrative embodiment of the invention consists of an assembly of skin clips which may be sterilized and packaged in the sterile condition. The individual clips contact the carrier at three different points and are held in alignment to facilitate easy insertion of the assembly into the magazine of a semi-automatic applicator. When the applicator has been loaded, the carrier may be withdrawn leaving the skin clips in position for use in the applicator magazine.

The Skin Clip

An important feature of this invention resides in the clips which are assembled together to provide a loader package. As seen in FIGURES 1, 2 and 3, the clip 10 is formed of sheet material, preferably metal, and in this particular embodiment, the body is planar and generally U-shaped with a rear web portion 11 and forwardly extending leg portions 12. The end of each leg portion 18 projects inwardly and downwardly to form the pointed tines 20. The center 16 of the web portion 11 is reduced in cross-section. With these arrangements, pressure on the sides of the clip sufficient to bend the leg portions 12 would cause the tines 20 on the legs to move toward each other. When the clip is pressed onto a wound, pressure on the sides of the clip causes the tines to penetrate the skin to bring the margins together, see FIGURE 24.

The Skin Clip Assembly

The clips may be assembled together on a carrier to form a unit as illustrated by FIGURE 4. As seen in FIGURE 6, the carrier 22 is a long strip of metal formed with a finger grip 24 and a longitudinal rib 30. The width of the rib 30 is slightly less than the distance between the tines 20 of the skin clip. Uprturned punched tabs 26 project beyond the top surface of the rib 30 and are spaced to engage the web section of consecutive skin clips. The individual clips 10 are spaced along the strip in a straight line in end to end relationship, with the ends of the legs of one clip slightly spaced from the rear of the web portion of the next clip as shown in FIGURES 5 and 8.

Referring now to FIGURES 7, 8 and 9, it will be noted that when the individual skin clips have been assembled on the carrier 22, the inwardly and downwardly projecting points of each clip are supported in a single plane by the metal strip, the raised rib 30 of which snugly fits between the points 20.

Lateral movement of the clip is prevented by the shoulder 32. Longitudinal and vertical movement of the clips with reference to the carrier is restrained by the projections 26 which exert tension upon each clip and maintains the web section in contact with the surface 34 of the rib.

The Applicator

It is necessary to describe in some detail the semi-automatic clip applicator in order to appreciate the functioning of the skin clip assembly during the loading procedure. Referring now to FIGURES 10 through 14, the instrument, indicated generally by the reference numeral 13 comprises a body 15. The body is formed from two sections 14 and 19 pivotally connected together on trunnions 21. With this arrangement, the body sections can

be pivoted apart so the instrument can be loaded with clips.

As best seen in FIGURE 12, when in use, the body is arranged so that section 19 overlies section 14, and these sections are releasably held together by a spring clamp assembly. This spring clamp assembly includes pivotally mounted lever members 27 and a spring clamp 33, see FIGURES 10, 14 and 17.

The spring clamp 33 is a generally U-shaped member including a web portion 23 and upwardly extending leg portions 25 terminating in inturned flanges 45. The web portion is riveted to the base of section 14 and the leg portions 25 embrace the sides of sections 14 and 19, see FIGURES 12 and 13. As seen in FIGURE 10, the inturned flanges 45 embrace the top surface of body section 19, and this is what holds the body sections together. To open the body, levers 27 are pressed, and as seen in FIGURE 17, this will force leg portions 25 apart until flanges 45 no longer embrace the top surface of section 19, whereupon sections 14 and 19 can be pivoted open and the instrument can be loaded with clips.

The body 15 is provided with a magazine for receiving a number of clips. This magazine includes a recess or guideway 28 formed in the upper surface of section 14, see FIGURES 11, 15 and 22. As seen in FIGURES 17, 21 and 22, the guideway 28 slidably supports the sheet surface of the body of the clips.

The body also has means for urging the clips through the guideway toward the front end 47 of the instrument. In this particular embodiment, this comprises a spring 49 and a push member 51 slidably mounted in a groove 36 formed in surface 37 of section 16, see FIGURES 11 and 22. As seen in FIGURES 17 and 21, the front end 35 of the push member is bifurcated for reasons to be described below. In addition, as seen in FIGURES 15, 16 and 17, the front end 35 of push member 51 abuts against the rear edge of the rear clip in the magazine and spring pressure forces the clips toward the front of the instrument.

Section 19 of body 15 is provided with an elongated slot 38 extending along a substantial portion of the length of section 19 with a small bent portion 39 at the rear. A pin 40 with an enlarged head 41 extends through slot 38 and is rigidly secured to push member 51, see FIGURES 15 and 16. This structure provides a means for holding the push member 51 in a retracted position out of contact with the clips. This is done by pushing pin 40 to the rear end of slot 38 and rotating it into the bent portion 39, as seen in FIGURES 11 and 23.

With the push member 51 held in a retracted position, the instrument can be loaded by opening the body of the instrument as shown in FIGURE 11. Then an assembly of clips, see FIGURE 4 is dropped into guideway 28 and the body is closed and the carrier strip 22 withdrawn, leaving the clips 10 in position. Finally, pin 40 is rotated out of the bent portion 39 of slot 38 and is released to move under pressure of spring 49 against the rear edge of the last clip in the magazine, as shown in FIGURE 15.

The front end of the top surface 17 of section 19 is beveled slightly and a spring-biased lever assembly, including a flat spring 44 and a connected clip-release lever member 46, is mounted thereon, see FIGURES 15 and 16. An opening 48 extends through section 19 from top surface 17 and an abutment 50 depending from lever member 46 extends therethrough to a point in the path of clips 10 moving along guideway 28. As seen in FIGURE 16, pressure on lever member 46 causes the abutment 50 to rise out of the path of the clips 10 in a guideway for reasons to be described below. When pressure on lever member 46 is removed, spring pressure forces lever 46 and abutment 50 back to the position shown in FIGURE 15.

A pair of forceps, indicated generally by the reference numeral 52, is mounted on the body 15 extending

out beyond the front end thereof, see FIGURES 11 and 17. The forceps include a pair of resilient metal strips 54 and 56 mounted on the opposite sides 53 and 60 of the body section 14. The front ends of these strips are bent toward each other to form jaw abutments 62. These jaw abutments have an upwardly extending recess forming seats 63, as seen in FIGURE 15. These seats function to support and engage the front edge of the clip next to be applied by the instrument, see FIGURES 16 and 17. The jaw abutments are positioned in advance of the front end of the guideway a distance substantially equal to the length of the individual clips, for reasons to become apparent below.

Oppositely extending cylindrical press members 64 are secured to the sides of strips 54 and 56 whereby pressure can be conveniently exerted on the forceps. A channel-shaped member 66 secured to the under surface of section 14 embraces the sides of strips 54 and 56 and prevents the jaw abutments 62 from moving more than a fixed distance apart against the pressure exerted by the resilience in the strips 54 and 56, see FIGURES 14, 18 and 19. As seen in FIGURE 17, the fixed distance is equal to the width of an individual clip. This permits the forceps to hold the clip when the instrument is not in use.

The assembly of clips is conveniently installed as a unit inside the magazine of the applicator as shown in FIGURE 25. After the housing is again closed, a gently pulling force on the metal stop is sufficient to withdraw it from the applicator, leaving the clips all properly positioned inside the instrument. It will be understood that the slight spacing between the clips contributes to the ease of removing the metal carrier. If the clips are assembled with the ends of the legs of one clip abutting against the rear of the web portion of the next clip, the force required to withdraw the carrier will be much greater than the clips may jam in the magazine.

In operation, after the clips are inserted inside the instrument, the pressure exerted by the spring 49 on push member 51 forces the train of clips toward the front of the instrument until the front of the web portion of the first clip in the train engages abutment 50. Then a momentary pressure on lever member 46 is sufficient to move abutment 50 out of the guide path of the clips, permitting the push member to move the clips forwardly until the front edge 18 of the clips engage seats 63, see FIGURE 17. At the same time, it is noted that the rear edge of the web portion 11 is supported on the front end 29 of the guideway 28. This arrangement, when coupled with the pressure exerted on the front clip by spring 49 is sufficient to hold the body of the clip in advance of the body of the instrument, see FIGURE 17. In this position, the margin of the wound is clearly visible between the legs 12 of the clips 10, so that the clips can be positioned more accurately.

In applying the clips, the instrument is placed against the wound with the points 20 of the clips 10 properly positioned. Then pressure is exerted on press members 64. This forces jaw abutments 62 toward each other, bending the legs 12 of the clip. The points 20 which are downwardly inclined and which extend toward each other, penetrate the skin around the wound. Then when pressure on press members 64 is removed, the jaws 62 move apart due to the resilience in strips 54 and 56. This leaves the clips 10 embedded in the skin to hold the wound margins together and out of the instrument, as shown in FIGURE 24.

It is noted that after a clip has been used, the remainder of the clips in the magazine are prevented from moving along guideway 28 because of the abutment 50 in their path. Consequently, in order to permit the next clip to advance into engagement with the seats 63 on the jaws 62, lever member 46 must again be pressed. This is a useful feature because it keeps all the clips enclosed in the housing 12 until they are to be used. Otherwise, the next clip in the magazine would automatically advance to

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the front position, as shown in FIGURE 17, where it could be dislodged from the instrument or damaged by accidental jars or blows, while the instrument is not in use.

When the last clip in the instrument is to be used, lever member 46 is again momentarily pressed and the push member 51 can then force this last clip into seating position on the jaws. Because the front end 35 of the push member 51 is forked, release of lever member 46 does not prevent the front end of the push member 51 from moving to the front end 29 of the guideway in order to maintain enough pressure on the last clip to keep it seated in the jaw abutments and ready for use.

As seen in FIGURE 9, the points 20 of the clips 10 extend downward from the surface of the body of the clip. Since the clips slide along guideway 28 on the surface of their body, the guideway must be shaped so the points do not rub against any surface of the guideway or any other part of the body of the instrument as the clips are pushed along. This is done by forming a groove, recess, or opening 31 in guideway 28 designed to keep the points 20 out of rubbing contact with the guideway, see FIGURES 16 and 21.

The fact that the points 20 of the clips 10 are downwardly inclined from the body of the clip and the instrument, see FIGURES 15 and 16, is important because when the instrument is used to apply clips to the wound, the instrument need only be held at a comparatively small angle with the surface of the wound. This substantially eliminates the application of pressure on the wound which might otherwise be necessary if the points were generally in the plane of the body of the instrument so that the instrument would have to be applied to the wound at a substantial angle, e.g., in excess of 45°.

The invention may be embodied in other forms without departing from the spirit or essential characteristics thereof as set forth in the claims, and the present embodiment is therefore to be considered as illustrative and not restrictive and it is intended to include all changes which come within the scope and range of the claims. The applicator and skin clip described herein are claimed in copending application Serial No. 10,595, filed February 24, 1960.

What is claimed is:

1. A skin clip carrier for a series of skin clips each having a generally U-shaped body with spaced pointed leg portions and a connecting web portion, the carrier

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comprising a flat strip of metal having a central upstanding rib to support the clip web portions and laterally extending side flanges to support the clip leg portions, the rib having spaced upwardly projecting spring ears extending over the clip web portions to removably retain the clips in position on the carrier.

2. A skin clip carrier for a series of skin clips each having a generally U-shaped body with spaced pointed leg portions and a connecting web portion, the carrier comprising a flat strip of metal shaped to have a longitudinal rib and laterally extending side flanges, the width of said rib being slightly less than the distance between the pointed leg portions of said clip, and upwardly projecting spring ears spaced along said rib to removably retain the clips in position on the carrier.

3. A skin clip carrier for a series of skin clips each having a generally U-shaped body with spaced pointed leg portions and a connecting web portion, the carrier comprising a flat strip of metal shaped to have a longitudinal rib and laterally extending side flanges, the width of said rib being slightly less than the distance between the pointed leg portions of said clip, and upwardly projecting spring ears spaced along said rib at distances slightly greater than the length of said clip.

4. A skin clip carrier comprising a flat strip of metal shaped at one end to form a finger grip, a central upstanding rib extending from the finger grip to the opposite end of the strip and upwardly projecting spring ears evenly spaced along the length of said rib.

5. A skin clip carrier for a series of skin clips each having a generally U-shaped body with spaced pointed leg portions and a connecting web portion, the carrier comprising a flat strip of metal shaped at one end to form a finger grip, and extending from the finger grip to the opposite end of the strip a central upstanding rib to support the clip web portions, said rib having spaced upwardly projecting spring ears extending over the clip web portions to removably retain the clips in position on the carrier.

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