

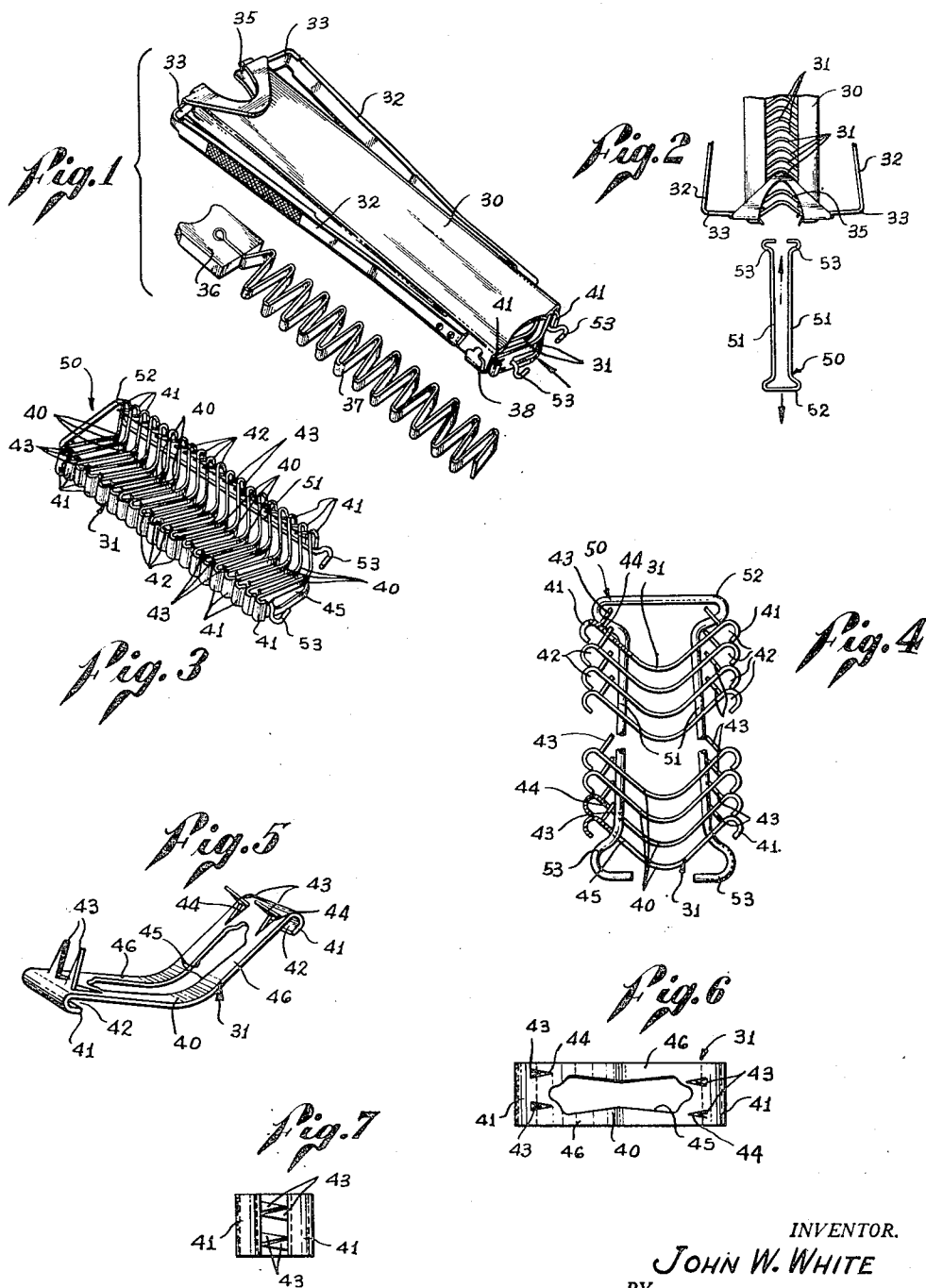
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WOUND CLIP LOADER PACKAGE

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WOUND CLIP LOADER PACKAGE

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My invention relates generally to wound clips for closing incisions or lacerations in the flesh, and more particularly to an improved loader package of clips for use in an applicator. This application is a continuation-in-part of my co-pending application Serial No. 278,221, filed March 24, 1952, for Wound Clip and Applicator. The clips disclosed herein are designed for use with the magazine-type applicator of my aforesaid co-pending application, and reference is made thereto for a complete description of the applicator structure, the clips per se being the subject of a divisional application, Serial No. 448,574, filed August 9, 1954, of this application to which reference is also made.

At the present time, wound clips are generally designed with a single tooth or prong on each end to engage the flesh aside the incision as the clip is collapsed inwardly. These clips are of uniform and relatively narrow width, and have an edge profile characterized by a substantially flat central portion. The accepted surgical tool for applying clips is a pair of tweezers or forceps in which the clips are grasped one at a time and applied. The procedure involved is at best slow, and because of the nature of the clips the resulting closure is imperfect.

My improved wound clip is of approximately double width of a conventional clip and has a central elongated slot therein as well as being provided with a double tooth or prong at each end.

These clips which may be stacked or nested together in front-to-back relationship with the prongs of one clip engaged in a complementary opening provided by the formation of the prongs on an adjacent clip. Thus, a stack of clips forms a relatively rigid unit of minimum size with the clips supporting each other to prevent premature collapse. In order that a unit of clips may be easily handled, I also provide a clip holder or rack which assembles a plurality of clips together as a stacked unit. The clip rack cooperatively engages with the clips in such a manner that the unit may be inserted in the applicator and the rack thereafter withdrawn, leaving the clips properly positioned. Likewise, a group of clips left in the applicator may be taken out as a unit by the re-insertion of the rack. This is, of course, convenient and also facilitates clip counting to greatly decrease the chance of clips being left in the wound.

With the foregoing in mind, it is a major object of my invention to provide a loader package of wound clips wherein the clips are held together for loading into an applicator as a unit.

An additional object of my invention is to provide clips adapted to nest or stack together in a minimum amount of space and in mutually supporting relationship.

It is a further object of my invention to provide a clip holder or rack adapted to assemble a group of clips in a stacked unit which can be easily inserted in an applicator or withdrawn therefrom.

Another object of the invention is to provide a loader package wherein the stack of clips are held in rigid alignment by an internal rack so that the package may be

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moved slidably into position within the applicator body.

Still another object of the invention is to provide a loader rack which is spring-urged outwardly for engagement with a stack of clips and is yieldable for removal therefrom.

These and other objects and advantages 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:

Fig. 1 is a perspective view of an applicator showing a stack of clips and the clip rack being inserted therein;

Fig. 2 is a detail of the applicator head showing the clip rack preparatory to being inserted therein for removing a group of clips;

Fig. 3 is a perspective view of a unit of wound clips shown stacked together and secured in place on a rack;

Fig. 4 is an enlarged detail showing the nesting relationship of the clips in the stack and the position of the clip rack;

Fig. 5 is a perspective view of the preferred form of clip;

Fig. 6 is an enlarged front elevation of the clip in open position;

Fig. 7 is a front elevation of the clip in completely closed position showing the intermeshing of the holding prongs.

Referring now to the drawings and particularly to Fig. 1 thereof, it is necessary to describe briefly a preferred embodiment of the applicator in order to appreciate the functioning of the wound clips and the clip rack. For a complete description of the applicator, reference is made to my aforesaid co-pending application. The body of the applicator is indicated generally by the numeral 30 and is of elongated rectangular shape internally open to take a stack of wound clips 31 therein. Clips 31 are of flat dished shape having opposed end prongs, and are stacked front-to-back along housing 30 so that the front or leading clip is held at the head of the applicator in applying position. The clips 31 are made of easily deformed material permitting the central portion of the clip to yield or bend when pressure is applied to the ends, and thus draw the prongs together in the flesh for closing the wound or incision. The position assumed by the closed clip 31 upon the flesh is seen in Fig. 8.

In order to close clips 31 a pair of opposed forceps or tweezer arms 32 are secured to the sides of housing 30 and mounted for inward flexing movement. Arms 32 carry intumed forward jaw portions 33 which bracket the ends of the leading clip 31 and are adapted to clamp or squeeze thereagainst to close the clip as the arms are pressed together in the hand. As clip 31 is closed or clinched, it is released through a forwardly open applicator head 35 and left properly positioned on the wound. Forcep arms 32 are then allowed to spring outwardly, retracting jaws 33. This permits the stack of clips 31 to slide forwardly in housing 30 and position a succeeding clip in applying position for another cycle of operation.

The stack of clips 31 is urged forwardly in housing 30 by a plunger or follower block 36 which is connected to a spring means 37. As is seen in Fig. 1, a stack of clips is just being inserted forwardly in housing 30 to be followed in turn by plunger 36 and spring 37. When positioned within housing 30 the rear end of spring 37 bears against a pivoted gate 38 mounted at the rear of the housing. Spring 37 urges plunger 36 against the rear end of the stack of clips 31 and is adapted to yield rearwardly upon the reciprocation of the stack of clips which occurs when the forward clip is closed.

As is best seen in Figs. 3 to 7, clips 31 comprise essentially rectangular flat strips having a rearwardly bowed

central portion 40. Preferably, clips 31 are stamped from a thin sheet of deformable and non-septic material such as nickel silver. The end portion of clips 31 are turned rearwardly to form jaw-engaging ends 41 which define with the body of the clip rearwardly open notches or grooves 42 that are used in releasing the clips from the closed position. The front portions of jaw-engaging ends 41 provide a smooth bearing surface for seating against the skin when the clip is engaged in the flesh, while the rear portions initially serve as stops or spacers to insure proper nesting of clips 31 when stacked together.

Clips 31 are made approximately twice as wide as the conventional clip of the same length in order to provide sufficient material for the formation of double prongs or teeth at each end. The use of a double prong combined with the greater bearing surface of the wider ends 41 makes a much firmer engagement in the flesh aside the wound than in the case with a conventional clip, and accordingly holds the clips against rocking from side to side and tearing the flesh. Also, the greater holding power of clips 31 makes feasible the use of fewer clips at greater spacing, and the time needed for application and removal of the clips is reduced as well as providing a cleaner healed wound.

For engagement in the flesh, both clip ends 41 are provided with upper and lower prongs 43 of sharp triangular shape outstruck from the clip body to project forwardly. Prongs 43 extend convergently forwardly and form opposed pairs with the corresponding prongs at the opposite end of the clip. By striking prongs 43 from the body of the clip, a small complemental triangular opening 44 is defined in the wall of the clip extending inwardly from the base of the prong, as is best seen in Fig. 6. When clips 31 are stacked together, the prongs 43 of a succeeding rear clip nest in the complemental openings 44 of a forward clip and allow the respective clip ends 41 to rest firmly upon each other. The rearward length of ends 41 is selected so that prongs 43 project only a short distance through openings 44 and there is no danger of jamming the clips together. However, it can be appreciated that the engagement between prongs 43 and openings 44 holds the clips from sliding endwise or twisting laterally, and a plurality of clips stacked in the manner shown in Figs. 3 and 4 is a relatively stable unit.

Preferably, I stagger prongs 43 as is best seen in Fig. 6, so that the pairs of prongs at the opposite ends of the clips are laterally offset from each other. Thus, as clip 31 is bent into the fully closed position shown in Fig. 7, the opposed prongs 43 may slide by each other without contact, and there is no danger of the prongs being bent out of shape.

As will be remembered, one of the important objects of my clip design is to provide a clip having a uniform yield rate so that the clip closes under a constant pressure. Closing control can therefore be maintained and the clips may be partially closed to any desired position. To this end, I first provide an elongated opening 45 which extends along the central clip portion 40 and divides the latter into upper and lower connecting webs 46 of reduced sectional area. As can be understood, the relative size of opening 45 determines the size and strength of webs 46, and accordingly the pressure needed to close the clip. As illustrated, clip 31 is designed to have a closing pressure approximately the same as that of a conventional narrow clip.

Since the closing pressure is exerted inwardly against jaw-engaging end 41 with substantially a straight thrust, the bending moment acting at any section of clip 31 increases towards the center of the clip and the greatest pressure is exerted at the center line of the clip. For this reason, conventional clips of uniform sectional area and flat center section at first stubbornly resist bending, and then yield or buckle suddenly in a sharp angular bend at the center, causing a loss of closing control. I have overcome this difficulty by providing a clip 31 having a

sectional area which is the greatest at the center and decreases toward the end of the clip. Thus, the yield resistance of clip 31 varies in proportion to the bending moment exerted throughout the sections of the clip, and the clip closes under a uniform pressure which is easily controlled.

Preferably, I make the upper and lower edges of clip 31 parallel and change the sectional thickness of connecting webs 46 by cutting the inner edge walls of opening 45 in outwardly divergent directions from the center of the opening. Webs 46 thus have the greatest thickness at the center and taper outwardly toward the end in proportion to the distance from the bend axis. To overcome the initial resistance of the clip to any bending, I pre-form webs 46 into a rearwardly bowed curvature as shown in Fig. 5 rather than with the conventional flat central portion. These changes in the sectional area of webs 46 and the edge profile thereof, are made by engineering calculations and tests so that the resultant structure has the desired uniform resistance to closing for any particular size and style of clips.

For the purpose of securing a group of clips 31 in a package of convenient size, I have provided a loader rack 50 which extends through a number of clips and holds them against separation. While rack means 50 is not essential, its use is very advantageous for storage of the clips, for maintaining a numerical count thereof, for sterilization of the clip, and finally for facilitating the insertion and removal of a group of clips from the applicator. The size of rack means 50 is variable, and I have chosen to illustrate a rack which holds 20 clips, this being a practical number for insertion in an applicator of convenient hand size.

Rack means 50 is formed as a generally U-shaped spring rod having generally parallel side legs 51 connected by a flanged or outwardly projecting enlarged head 52. The free end of legs 51 are bent arcuately to provide outwardly projecting flanges 53 of clip shape. Flanges 53 are spaced apart sufficiently so that legs 51 may be pressed together to pull the flanges inwardly for passing through the central opening 45 in a stack of clips 31. After legs 51 have been passed rearwardly through a stack of clips 31, they are released and flanges 53 spring apart to bear against the rear surface of the last clip in the stack. The length of legs 51 is just equal to the length of the clip stack, and as flanges 53 engage the rear clip, the flange head 52 bears against the forward clip. The secured stack of clips may then be packaged, sterilized, or otherwise treated as a unit.

An important advantage of rack 50 is that it greatly facilitates the insertion or withdrawal of a group of clips in the applicator. As is best seen in Fig. 1, a loader-package of clips 31 is inserted into the applicator with rack 50 in place. Because of the internal position of rack 50, it does not in any way interfere with the operation of sliding clip 31 into applicator housing 30, but in fact facilitates it, since the clips are held in a rigid elongated unit. After the loader-package has been inserted in the housing, plunger 36 and feed spring 37 are slidably entered into the housing and gate 38 is closed. The stack of clips is now at the head of the applicator, and rack head 52 projects forwardly (downwardly as seen in Figure 2) through the opening in applicator head 35. Head 52 is then pulled forwardly to squeeze legs 51 inwardly, so that flanges 53 are free to pass forwardly through the clip openings 45, and the rack is withdrawn forwardly out of the applicator.

Rack 50 also comes into play in removing the clips 31 remaining in the applicator after its use has been completed. As is indicated in Fig. 2, rack 50 is passed through applicator head 35 to enter within the clip 31. Flanged ends 53 are initially pressed together, and after rack legs 51 have passed through all of the remaining clips 31, pressure is released to allow the flanged ends to spring outwardly beyond the last clip in the

stack. Thereafter, the stack of clips 31 is removed through the back of housing 30 with rack 50 in place so as to hold the clips together as a unit.

Having thus considered the specific nature of clips 31, the operation by which the clips are applied may be appreciated. Applicator housing 30 is held adjacent to the wound with head 35 extended across generally perpendicular to the length of the wound. As forceps 32 are pressed inwardly, jaws 33 engage the clip ends 41 and apply inward pressure tending to force the ends together. This inward movement of the clip ends 41 causes the central clip portion 40 to bend or buckle into a short radius turn so that the clip ends extend generally parallel to each other. During the closing of the clip, the flesh aside the wound is engaged by prongs 43 and is drawn together closing the wound.

While I have thus described in detail my improved wound clip and loader package, it can be understood that changes in design and construction may be made by those skilled in the art without departing from my invention. Therefore, I do not wish to be restricted to the foregoing description except as defined in the appended claims.

I claim:

1. A loader-package of wound clips for a magazine type wound clip applicator comprising: a plurality of identical wound clips of given overall length each comprising a relatively narrow strap of given breadth terminating in upwardly curved end portions and having an elongated narrow central opening in said strap between said end portions, said plurality of clips being stacked one upon the other in aligned back to front relation in a stack of given height having a width and depth equal to said given length and breadth respectively; and a removable loader rack interengaging said plurality of clips and disengageably holding said clips in said stacked aligned relation, said rack comprising a pair of substantially parallel legs spaced a distance substantially less than said given length and having a length corresponding to said height, the upper ends of said legs terminating in outwardly projecting stops, the lower ends of said legs extending outwardly and being interconnected by a head, and the head portion at least of said rack being formed of resilient material and normally urging said legs outwardly relative to each other, said legs extending through said openings in said stacked clips with said stops disposed above the uppermost one of said clips and with said head disposed below the lowermost one of said clips, said legs being resiliently urged into engagement with the ends of said openings and cooperating therewith to maintain said aligned relation and said head and stops coacting to maintain said stacked relation, the width of said rack at said head and stops being substantially less than said given length and wholly contained within said given length, the resilience of said rack permitting the upper ends of said legs to be moved inwardly sufficiently to pass through said openings to permit said rack to be down-

wardly removed from said stack and upwardly inserted into said stack.

2. In a loader-package of wound clips for a wound clip applicator including a clip-receiving magazine of rectangular cross section open at both ends, the combination of: a plurality of identical wound clips of given overall length each comprising a relatively narrow strap of given breadth terminating in upwardly curved end portions, said clips being rectangular in plan for reception in said magazine and having an opening in said strap between said end portions, each of said clips having downwardly projecting prongs near said end portions, said plurality of clips being stacked with said prongs projecting downwardly and one upon the other in aligned back to front relation in a stack of given height having a width and depth equal to said given length and breadth respectively; and a removable loader rack interengaging said plurality of clips and disengageably holding said clips in said stacked aligned relation, said rack comprising a pair of substantially parallel legs spaced a distance substantially less than said given length and having a length corresponding to said height, the upper ends of said legs terminating in outwardly projecting stops, and the lower ends of said legs extending outwardly and being interconnected by a head, said legs extending through said openings in said stacked clips with said stops disposed above the uppermost one of said clips and with said head disposed below the lowermost one of said clips, said legs and said openings co-operating to maintain said aligned relation and said head and stops coacting to maintain said stacked relation, the width of said rack at said head and stops being substantially less than said given length and wholly contained within said given length, said rack being downwardly removable from said stack, whereby said loader-package may be inserted lower end foremost into the upper end of said magazine and whereby said rack may be removed downwardly from said stack through the lower end of said magazine.

References Cited in the file of this patent

UNITED STATES PATENTS

715,612	Van Schott	Dec. 9, 1902
733,723	Lukens	July 14, 1903
1,590,172	Thorberg	June 22, 1926
1,880,569	Weis	Oct. 4, 1932
2,203,412	Hill	June 4, 1940
2,232,142	Schumann	Feb. 18, 1941
2,237,589	Dole	Apr. 8, 1941
2,254,620	Miller	Sept. 2, 1941
2,307,384	Bowen	Jan. 5, 1943
2,317,815	Schumann	Apr. 27, 1943
2,343,921	Nyberg	Mar. 14, 1944
2,470,726	Schafroth	May 17, 1949
2,577,012	Hinckley	Dec. 4, 1951
2,624,880	Lind	Jan. 13, 1953