Oct. 13, 1964 J. J. BRADY 3,152,336

WOUND CLIP APPLICATOR

Filed July 2, 1962 2 Sheets-Sheet 1

Fig. 1

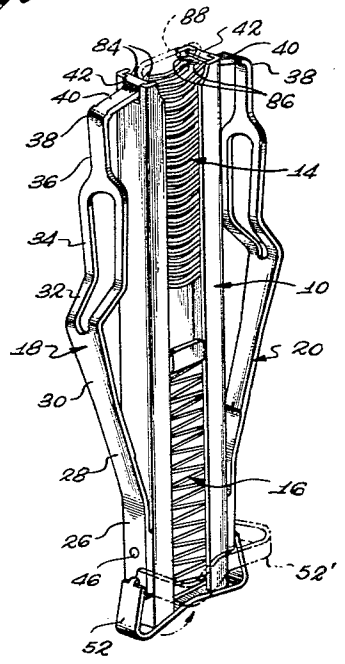


Fig. 2

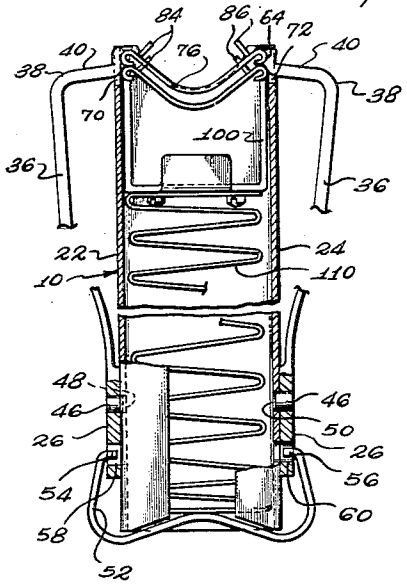


Fig. 4

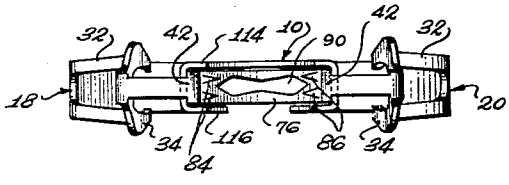
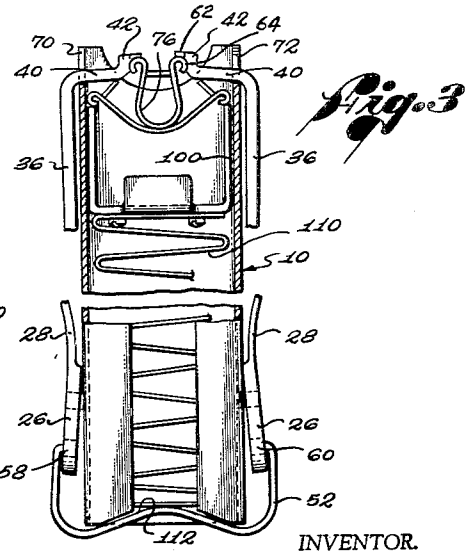


Fig. 3



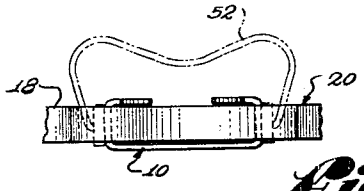


Fig. 5

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WOUND CLIP APPLICATOR

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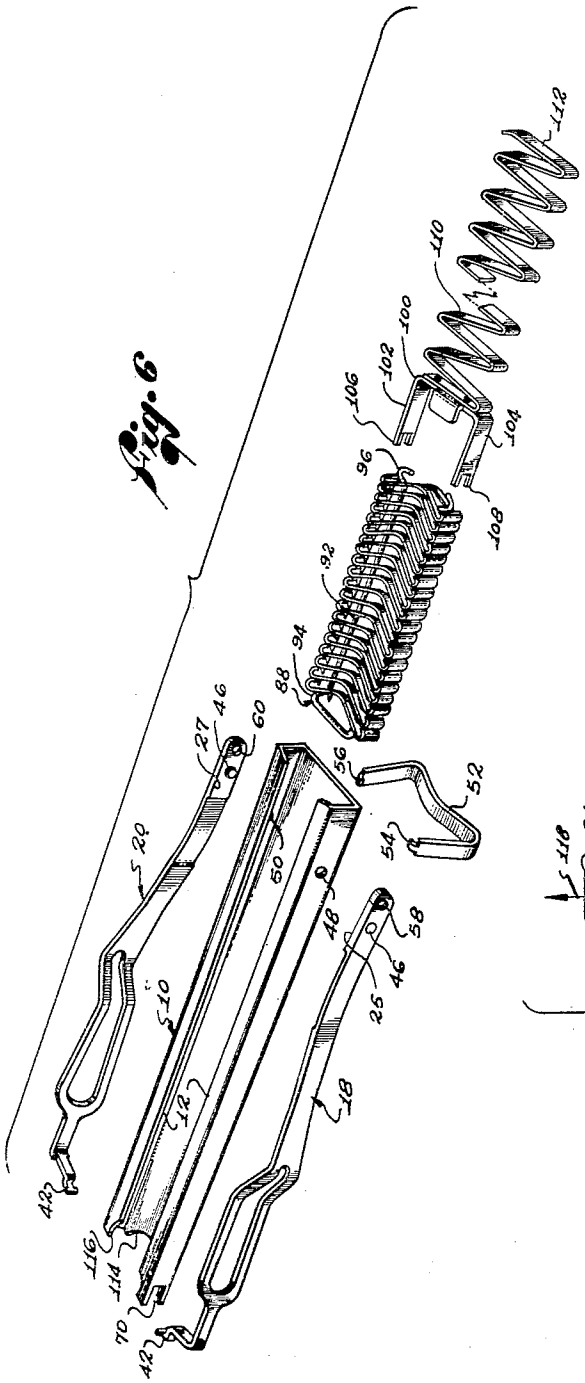


Fig. 6

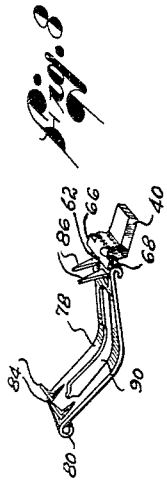


Fig. 8

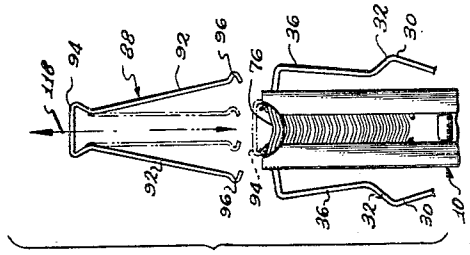


Fig. 7

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WOUND CLIP APPLICATOR

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10 Claims. (Cl. 1—349)

This invention relates generally to surgical tools for closing incisions, wounds, lacerations, and the like openings in flesh. More particularly, this invention relates to improvements in tools combining both automatic dispenser and applicator means for applying wound clips for closing such flesh openings.

Until recently, there had been a need for fundamental improvements in both wound clips and the surgical tools by means of which a plurality of such wound clips could be automatically fed to and applied by the tool in rapid succession. This need was met in substantial measure by certain improvements in magazine feed type wound clip applicators of the kind disclosed in U.S. Letters Patent Nos. 2,733,441 and 2,758,302.

Such an applicator tool comprises in brief a unitary apparatus assembly, adapted to be held in and operated by one hand for applying a plurality of wound clips, one at a time, in succession. Such unitary assembly includes two main components, namely an elongated hollow body or housing adapted to function as a magazine type feed mechanism for a plurality of wound clips contained therein, and a forceps mechanism in conjunction therewith adapted to receive such wound clips from the magazine, one at a time, and to apply them in folded clamping engagement across the flesh opening to be closed.

Such forceps mechanism includes a pair of spring arms attached at their rearward ends to opposite exterior sides of the housing and such arms carrying a pair of jaws on their forward ends positioned adjacent the forward end of their housing to receive and grasp the aforesaid wound clips, one at a time, and by inward hand compression of the forceps arms to bend each such wound clip, as aforesaid, into folded clamping engagement with the flesh adjacent the opening to be closed. The head end of the housing is provided with an opening shaped to prevent escape of the wound clips therefrom until the wound clips are grasped by and partially bent into wound gripping shape by the forceps jaws, and the rear end of the housing is provided with an opening having a closure member openable to permit loading of the housing with a supply of stacked wound clips and when closed, to contain a spring pressed means for advancing the wound clips to forceps gripping position at the forward end of the housing.

All of the before mentioned components of the wound clip applicator were heretofore in substantially permanently assembled form and thus presented at the points of interconnection of the components, numerous relatively small clearance spaces, crevices, and corners which rendered the necessary cleaning and sterilization procedures difficult and the results thereof uncertain.

It is, accordingly, an object of this invention to provide a wound clip applicator generally of the hereinbefore mentioned kind, but so constructed as to be easily and entirely disassemblable for separate cleaning and sterilization of each component part.

It is a further object of this invention to provide a wound clip applicator of the aforesaid type, which is of improved and simplified construction.

It is a still further object of this invention to provide such a wound clip applicator in which the housing head and forceps jaws are of improved and simplified design, having improved smoothness and positiveness of the feeding of wound clips, and more positive holding of such wound clips in the housing head and grasping thereof between the forceps jaws during the initiation of the application of the clips to a wound.

The objects of the invention are accomplished in general by a novel and simplified assembly arrangement, whereby the several components of the applicator tool including the housing, forceps arms, magazine rear end closure, and magazine head mechanism are each arranged to be completely assemblable or disassemblable by resiliently controlled, quick connect and disconnect means.

These and other objects, advantages, and features of novelty of this invention will be evident hereinafter.

In the drawings, which show by way of illustration a presently preferred embodiment of the invention and in which like reference characters designate the same or similar parts throughout the several views:

FIGURE 1 is a perspective view of the entire assembly of the apparatus of this invention including a loading of wound clips.

FIGURE 2 is a shortened, longitudinal sectional view of the apparatus of FIGURE 1, showing the forceps portion of the device and the jaws thereof in open, wound clip receiving and grasping position.

FIGURE 3 is a shortened, longitudinal sectional view similar to FIGURE 2, showing the forceps and the jaws thereof in closed position with a wound clip grasped therebetween in folded, wound gripping position.

FIGURE 4 is a forward end elevational view of the apparatus of FIGURE 1.

FIGURE 5 is a rear end elevational view of the apparatus of FIGURE 1.

FIGURE 6 is an exploded view, in perspective, of the entire assembly of the apparatus of FIGURE 1, showing the parts thereof, including a loading stack of wound clips, in disassembled condition.

FIGURE 7 is a fragmentary longitudinal elevational view of the forward end of the wound clip applicator portion of this invention, showing the manner of removing or inserting a clip retainer rack in connection with the loading and unloading of a stack of wound clips.

FIGURE 8 is an enlarged, fragmentary detailed perspective view of a forceps jaw and a wound clip therein.

Referring now to the drawings, and primarily to FIGURES 1 and 6, the body or housing portion of the apparatus, as indicated by the reference numeral 10, consists of an elongated, rectangular cross sectioned tubular or channel shaped metal member having a rectangular cross sectioned passage of uniform inside dimensions extending axially therethrough from end to end, such passage being adapted to slidably receive therein a loading stack of wound clips and a wound clip advancing mechanism, as shown generally at 14 and 16, respectively, and which will be more fully described hereinafter. The housing is slotted longitudinally throughout the length of a front wall thereof, as shown at 12, to permit visual inspection of the number of clips in the stack of clips 14 and the clip advancing mechanism 16 therein.

A pair of opposed forceps arms 18 and 20, preferably, although not necessarily, of identical shape, are positioned along the opposite sides 22 and 24, respectively, of the housing 10. Such forceps arms 18 and 20 are preferably composed of metal, which is resilient in bending, and each arm is formed with a thickened rear end body attachment portion 26, an adjacent relatively thin, more flexible portion 28, a widened, outwardly inclined intermediate portion 30, a further widening, inwardly sloping grip portion 32, another still wider, outwardly sloping grip portion 34, and a relatively narrow forward end portion 36, which is bent inwardly substantially at

right angles at 38 to form an inturned thrust portion 40, which terminates at its inner end in forceps jaw 42.

The aforementioned forceps arms are attached at their attachment portions 26 adjacent their rearward ends to the opposite sides 22 and 24 of the housing by means of quick detachable connections, such connections consisting, in each of the arms, of a retainer pin 46 fixedly extending inwardly through the thickened attachment portion 26 with the inwardly projecting end portion of such pin projecting relatively loosely into a retainer hole formed, as shown at 48 and 50, in the side walls 22 and 24 of the housing. The attachment portion 26 of the forceps arms 18 and 20 are clamped in position, with some freedom for rocking movement, against the outer surfaces of the side walls 22 and 24 of the housing, and the inner ends of the before mentioned pins 46 are retained in engagement with the holes 48 and 50, by means of a flat, generally U-shaped metal spring member 52 which extends crosswise of the rearward end position of the housing 10. The opposite ends of the spring member 52 terminate in a pair of inturned lugs 54 and 56, which make pivotal engagement within a pair of retaining holes 58 and 60 in the arm attachment portion 26.

The inwardly sloping grip portions 32 and adjoining outwardly sloping grip portions 34 of the oppositely positioned forceps arms together have a configuration which, upon positioning the body portion 10 in the palm of one hand, falls naturally into a secure gripping position, principally between the thumb and forefinger. The applicator is thus adapted to facile operation by one hand with freedom from the tendency to "squirt" out of ones grip, as sometimes was the case with prior devices.

The spring member 52 being pivotable upon the lugs 54 and 56, which extends into the holes 58 and 60 in the attachment portion of the forceps arms 18 and 20, respectively, as aforesaid, is thereby enabled to serve also as an end closure member or gate for the rear end opening of the housing 10. The spring member 52 is thus swingably movable between a sidewise position, as shown in phantom lines 52', clear of the rearward end opening of the housing to permit insertion or withdrawal therethrough of wound clips 14 and the advancing mechanism 16, and a normal position extending across the end of the opening of the housing, to support and contain therein the feed clips 14 and advancing mechanism 16.

Each of the before mentioned forceps jaws 42 is formed, as best shown in FIGURE 8, with a crosswise extending, inwardly overhanging flange 62 joined to the inner end of the before mentioned inturned thrust portion 40 of the forceps arms by a crosswise extending, inwardly facing, arcuately recessed portion 64 for retention and grasping of the ends of wound clips, as shown in FIGURES 2 and 3. The jaw flange 62 is slightly wider than the adjoining recessed portion 64 and thrust portion 40, thereby forming a pair of crosswise, outwardly protruding shoulders 66 and 68. In assembled position, the thrust portions 40 of the forceps arms extend laterally movably through slots or cutouts 70 and 72 formed through the opposite forward end portions of the sides 22 and 24 of the housing 10, and in the normal, opened position of the forceps arms, as best seen in FIGURE 2, the shoulders 66 and 68 engage the inner marginal surface of the housing walls adjacent the sides of said slots 70 and 72. The shoulders 66 and 68 thereby serve as stop means to limit the outward opening movement of the forceps arms and jaws and position them such that only the overhanging flanges 62 of the jaws project inwardly into and obstruct the forward end opening of the housing.

The form and construction of the wound clips 76 making up the hereinbefore referred to stack of wound clips 14 and the arrangement of such wound clips in

stacked form for loading the applicator device is described in detail in U.S. Letters Patent No. 2,758,302 entitled Wound Clip Loader Package and reference is made thereto for a complete disclosure thereof. However, briefly, each of the clips 76 is formed of a generally rectangular shaped, thin metal strip which, as viewed in the drawings, is shaped with a rearwardly bowed middle portion 78 and rounded jaw engaging opposite ends 80 and 82. Formed adjacent the rounded ends 80 and 82 of the wound clip 76 are double sets of pointed prongs 84 and 86 which project forwardly for interengagement in the flesh to which the clip is applied.

For the purpose of assembling a group of clips 76 in a preassembled stack of convenient size, as best shown in FIGURE 6, a holding rack 88 is provided which extends through the clips and retains them against separation, and for this purpose, each of the wound clips 76 is provided with an elongated opening 90, which extends lengthwise of the central portion of the clip. While such rack 88 is not essential to the operation of this device, because the wound clips could be loaded into the applicator one at a time, if desired, its use is nevertheless advantageous for storage of predetermined numbers of the clips in readiness for use, for their sterilization, and for facilitating the rapid insertion and removal of groups of clips from the applicator. The length of the clip rack 88 may be varied, but a length has been chosen for illustration herein, which holds twenty clips as a loading unit, this being a practical number for insertion in an applicator housing of convenient length. The rack 88 is made of a spring rod, which is bent to a generally U-shaped configuration having side legs 92 connected together at the forward closed end in effect by a flanged or crosswise extending enlarged head portion 94. The free ends of legs 92 opposite the head 94 are bent arcuately outwardly to provide outward projections 96 for retention of the wound clips. The outward projections 96 and the legs 92 are spaced apart such that the legs 92 and retaining projections 96 may be pressed together sufficiently to pass through the central openings 90 in each of the wound clips in a stack of such clips. After the legs 92 have thus been passed through a stack of clips 76, they are released, and the legs 92 and flange projections 96 spring apart to bear against the opposite inner ends of the openings 90 in the clips with the projections 96 bearing against the rear surface of the rearmost or last clip in the stack. The lengths of legs 92 between the head 94 and projections 96 are preferably just equal to the desired length of a full clip stack. The thus assembled stack of clips may, as before mentioned, be packaged, sterilized, or otherwise treated as a unit.

In operation of the applicator device, a stack of clips 14 with the rack 88 in place within the clips is inserted with the head end 94 of the rack 88 foremost into the rear end opening of the applicator housing 10 and moved up to the forward end of the applicator. The clip advancing mechanism 16 is then inserted into the rear end opening of the housing 10 and the previously introduced stack of clips 14 is thereby urged forwardly through the passage in housing 10 to the forward clip feeding position, as best shown in FIGURES 1 and 7. Following this, the rack 88 is withdrawn forwardly from the stack of clips and removed from the front end of the applicator, as illustrated and as indicated by the arrow 118 in FIGURE 7. The clip advancing mechanism comprises a plunger or follower 100, which takes the form of a forwardly facing U-shaped member having side arms 102 and 104 adapted to slide guidely along the inner surface of the sides of the housing and to bear at their forward slotted ends 106 and 108 against the under surfaces of the rounded ends of the rearmost wound clip in the stack of clips. The plunger or follower 100 is attached by suitable means to the forward end of a spring 110. The spring 110 is preferably formed, as shown, of flat strip spring metal bent into a series of flat sided convolutions adapted to

fit slidably within the rectangular passage within the housing **10**. When installed, the rearward end **112** of the spring bears against the inner top surface of the spring closure member **52** which, as hereinbefore described, extends crosswise of the rearward end portion of the housing **10** and is pivotable between closed and opened positions.

As hereinbefore mentioned, the longitudinal rectangular passage extending throughout the length of housing **10** is of uniform inside dimensions from end to end, and thus the forward end of the housing itself is openly unobstructed and would permit the wound clips **14** to escape freely outwardly therefrom under the force of spring **110** of the advancing mechanism **16**, if it were not for the before mentioned inwardly projecting flanges **62** of the forceps jaws **42**, which extend into the passage and initially override the forward surface of the rounded ends **80** and **82** of the foremost wound clip. Forward movement of the stack of clips **14** is thus prevented until the leading clip has been partially folded together by the forceps jaws **42**, as best shown in FIGURE 3, while the rounded ends **80** and **82** of the clips remain grasped within the arcuate recesses of portions **64** of the jaws. After folding of the wound clip by compression of the forceps arms together to the position illustrated in FIGURE 3, subsequent release and return of the forceps arms **36** to the fully opened position shown in FIGURE 2 permits release of such folded wound clip from the applicator which, in turn, permits advance of the next clip in the stack to a position at the forward end of the applicator against the overriding flanges **62** of the jaws **42** in readiness for folding into gripping shape, as before described. Such operation is repeated for each wound clip, which is thus, in turn, advanced to the forward end of the housing.

As before mentioned, in the operation of the applicator device, the leading clip **76**, as best shown in FIGURE 3, is initially held against forward movement in the applicator and prevented from escape from the forward end thereof by the before mentioned overhanging flanges **62** of the forceps jaws **42**, and in this position, the opposite jaw engaging ends of clip **76** lie in grasped engagement within and between the arcuate recessed portions **64** of the jaws, and also in this position, the clip prongs **84** and **86** protrude forwardly from the forward end of the applicator in position to engage the flesh to which they are to be applied. In use, the applicator is usually held with the axis of the housing **10** generally perpendicular to the skin area in which the clips are to be applied. In such position, when the forceps arms **36** are squeezed together in the hand of the operator, the forceps jaws **42** are driven inwardly toward one another against the rounded opposite ends of the clip **76**, with the result, by reason of the before mentioned initial bowed shape of the clip, that the clip is partially folded forwardly about its mid-section, thereby forcing the protruding prongs **84** and **86** together toward one another into the flesh to which they are applied and thereby clamping and securing the flesh between the pronged inner surfaces of the clip. The sides of the forward end opening of the housing **10** are provided with semi-circular cutouts, as shown at **114** and **116**, to provide clearance for the flesh, which is drawn up at the head of the applicator between the wound clips.

Incident to the folding of the wound clip **76**, as before described, the bowed center portion **78** of the clip **76** is displaced slightly rearwardly, as best shown in FIGURE 3, and as this occurs, the bowed center portion contacts the midportion of the next successive clip in the clip stack, thereby pushing the stack of clips rearwardly a short distance within the housing **10** against the forward force of the feed spring **110**. The forward force of the spring **110** is thus maintained against the wound clip **76**, thereby assisting in retaining the clip firmly gripped between the forceps jaws during its application. After the leading wound clip has been thus applied to the flesh and the forceps arms **36** released permitting them to open and carry the jaws **42** into the open position shown in FIGURE 2, the next wound clip is moved forwardly under the force of the feed spring **110** and positioned between the forceps jaws **42** and stopped at that position by the before mentioned overhanging lugs **62** in readiness for the next wound clip applying operation corresponding to that before described. The foregoing action contributes importantly to the smoothness and positiveness of action of the applicator device.

An important feature of this invention, as hereinbefore mentioned, is that the structure of the entire wound clip applicator and apparatus is such that each and everyone of its complement parts is completely disassemblable, such as to make all of the surfaces thereof completely accessible to the important cleaning, sterilization, and inspection processes, and also by such construction, substantially all complicated angular shapes, crevices, cracks, and the like are eliminated, which could harbor bacteria and the like undesirable substances. Another advantage of the construction of this apparatus is that any one of the several parts may be made interchangeable and may be readily and quickly replaced. It is to be noted that the entire assembly and disassembly of the apparatus of this invention may be quickly performed by the manipulation of one single element in the assembly, namely, by the spring closure member **52**. Thus, by deflecting the spring member **52** open sufficient to disengage the lugs **54** and **56** from the retainer holes **58** and **60**, all of the several parts of the assembly are immediately released from their assembled positions. Also, by swinging the spring member **52** between the position shown at **52** in solid lines and that shown at **52'** in phantom lines, the rear end of the applicator housing is respectively closed or opened to permit insertion or withdrawal of the wound clip stacks and the wound clip advancing mechanism **16**.

Materials suitable for construction of the various components of the apparatus of the invention are those which are substantially free from corrosion and not harmfully effected by heat and other sterilization treatment. For example, heat treated beryllium copper or, more preferably, stainless steel may be used for the various parts of the device including the housing and forceps arms. The wound clips are preferably made of a ductile, non-corrosive, non-septic material, such as nickel silver.

While a preferred embodiment of the invention has been shown, which is capable of fulfilling the objects and advantages sought, it is to be considered that other modifications and variations may be made by those skilled in the art without departing from the scope of the invention, as defined in the appended claims.

What is claimed is:

1. In a wound clip applicator, apparatus comprising:
   an elongated housing having opposite side walls forming a channel extending longitudinally therethrough for longitudinally slidably receiving therein a plurality of wound clips in superposed relationship, said housing having a front end opening communicating with said channel; a pair of forwardly opening, oppositely positioned slots in the forward end of said housing, each such slot extending longitudinally from the front end of each of said opposite side walls of said housing, and said slots being narrower than the inside width of each of said side walls, thereby forming inwardly facing marginal surfaces extending along the length of such slots;
   a pair of forceps arms positioned opposite one another, each along the exterior of said side walls of said housing, said arms having inturned forward end portions extending laterally movably through said side slots into said channel adjacent said front end opening, and the rear end portions of said arms having attachment portions for detachable attachment to said opposite side walls;

a crosswise extending head member formed on the inner end portion of each of said inturned forward end portions of said arms, such head members being positioned to engage the said marginal surfaces to limit the outward movement and the maximum spacing apart of the said forward end portions of said arms and to lock said forward ends of said arms movably as aforesaid to the forward end portion of said housing;

and attachment means detachably attaching said attachment portions of said arms to the exterior of said opposite sides of said housing, said attachment means normally preventing longitudinal movement of said arms and thereby preventing movement of said crosswise extending head members thereof forwardly out of engagement with said slots, said arms being thereby detachably attached at both ends thereof to said housing.

2. A wound clip applicator comprising:

an elongated housing having a channel extending longitudinally therethrough for longitudinally slidably receiving therein a plurality of wound clips in superposed relationship, said housing having a front end opening which constitutes an unobstructed continuation of said channel through which said clips may pass;

resilient means within said channel for urging said wound clips forwardly therein toward said front end openings;

a pair of swingable forceps arms positioned opposite one another along opposite exterior sides of said housing, said arms having inturned forward end portions terminating in jaws oppositely confronting one another across said channel adjacent the said front end opening, said jaws including inwardly projecting means for engaging opposite end portions of such wound clips for initially preventing passage of such clip forwardly through said front end opening, and constituting the only obstruction between said channel and said opening, and attachment means detachably attaching the rear end portions of said arms to said opposite exterior sides of said housing including;

pin means in one of such elements adjacent the said attachment portions engaging an aperture means in the other of such elements;

and resilient clamping means spanning the width of said housing and the attachment portions of said arms and detachably clampingly engaging said attachment portions, whereby the said attachment portions of said arms are retained against the exterior surface of said opposite side walls of said housing with said pin means and aperture means thereof held in engagement thereby.

3. In a wound clip applicator, apparatus comprising:

an elongated housing having opposite side walls forming a channel extending longitudinally therethrough for longitudinally slidably receiving therein a plurality of wound clips in superposed relationship, said housing having a front end opening communicating with said channel;

a pair of forwardly opening, oppositely positioned slots in the forward end of said housing, each such slot extending longitudinally from the front end of each of said opposite side walls of said housing, and said slots being narrower than the inside width of each of said side walls, thereby forming inwardly facing marginal surfaces extending along the length of such slots;

a pair of forceps arms positioned opposite one another, each along the exterior of said side walls of said housing, said arms having inturned forward end portions extending laterally movably through said side slots into said channel adjacent said front end opening, and the rear end portions of said arms having

attachment portions for detachable attachment to said opposite side walls;

a crosswise extending head member formed on the inner end portion of each of said inturned forward end portions of said arms, such head members being positioned to engage the said marginal surfaces to limit the outward movement and the maximum spacing apart of the said forward end portions of said arms and to lock said forward ends of said arms movably as aforesaid to the forward end portion of said housing;

and attachment means detachably attaching said attachment portions of said arms to the exterior of said opposite sides of said housing, and normally preventing longitudinal movement of said arms relative to said housing and thereby preventing movement of said crosswise extending head members thereof forwardly out of engagement with said slots, said attachment means including;

pin means in one of such elements adjacent the said attachment portions engaging an aperture means in the other of such elements;

and resilient clamping means spanning the width of said housing and the attachment portions of said arms and detachably clampingly engaging said attachment portions, whereby the said attachment portions of said arms are pressed against the exterior surface of said opposite side walls of said housing with said pin means and aperture means thereof held in engagement thereby.

4. Wound applicator apparatus according to claim 3 in which the opposite ends of said resilient clamping means engage the attachment portions of said arms intermediate said pin means and the rear ends of said attachment portions, whereby upon swinging said forward end portions of said arms closingly toward one another about such attachment means, said clamping means is resiliently widened in opposition to such motion and thereby biases said forward end portions of said arms to a fully opened position relative to one another.

5. Wound clip applicator apparatus according to claim 4 in which the engagement between the opposite ends of said resilient clamping means and said attachment portions of said arm is pivotal about a transverse axis, whereby said resilient means is swingable between positions respectively covering and uncovering the rear end opening of said channel extending through said housing.

6. In a wound clip applicator, apparatus comprising:

an elongated housing having opposite side walls forming a channel extending longitudinally therethrough for longitudinally slidably receiving therein a plurality of wound clips in superpositioned stacked relationship, said housing having a front end opening communicating unobstructedly with said channel for discharging said clips forwardly therethrough;

resilient means within the rearward portion of said channel for urging said wound clips forwardly therein toward said front end opening;

a pair of swingable forceps arms positioned opposite one another along opposite exterior sides of said side walls, said arms having inturned forward end portions terminating in jaws oppositely confronting one another across said front end opening, and the rear end portions of said arms having attachment means detachably attaching such rear end portions of said arms to said opposite sides of said side walls of said housing;

and a head portion formed on each of said jaws adapted to engage the inner surfaces of said side walls adjacent the said front end opening, thereby limiting the outward swing of said forward end portions of said arms and the maximum spacing apart of said jaws, said head each including an inwardly projecting, undercut portion adapted to extend into said channel adjacent said front end opening to over-

ridingly engage the opposite ends of the foremost wound clip in the stack of clips urged forwardly in said channel, whereby such clip is initially positioned between said jaws and escape thereof from said front end opening is prevented, and whereby upon compression of said arms toward one another and the attendant inward movement of said jaws toward one another, the opposite ends of such foremost wound clips are thereby driven transversely inwardly toward one another, thereby bending such wound clip into a U-shape clamping configuration.

7. In a wound clip applicator, apparatus comprising:

an elongated housing having opposite side walls forming a channel extending longitudinally therethrough for longitudinally slidably receiving therein a plurality of wound clips in superposed stacked relationship, said housing having a front end opening formed of an unobstructed continuation of said channel through which such clips could escape in the absence of retaining means;

resilient means within the rearward portion of said channel for urging said wound clips forwardly therein toward said front end opening;

a pair of oppositely positioned side openings extending laterally through the said opposite side walls of said housing adjacent said front end opening;

a pair of swingable forceps arms positioned opposite one another along opposite exterior sides of said side walls, the said arms having inturned forward end portions terminating in jaws, and the rear end portions of said arms terminating in attachment means detachably attaching such rear end portions of said arms to opposite exterior sides of said side walls in such position that the said inturned portions of said arms extending laterally movably through said side openings and said jaws are positioned adjacent opposite inner sides of said side walls and confront one another across said channel adjacent said front end opening;

and a crosswise extending head formed on each of said jaws adapted to engage the inner surfaces of said side walls adjacent the edge of its respective one of said side openings, thereby limiting the outward swing of said forward end portions of said arms and the maximum spacing apart of said jaws;

and an inwardly projecting undercut retaining means extending into said channel from each of said jaws to restrict the width of said channel and overridingly engage the opposite ends of the foremost wound clip in a stick of clips urged forwardly in said channel, whereby escape of such clips from the said front end opening is prevented and whereby, upon compression of said arms toward one another and the attendant inward movement of said jaws toward one another, the opposite ends of such foremost wound clip are thereby driven transversely inward toward one another, thereby deforming said wound clip into a U-shaped clamping configuration.

8. In a wound clip applicator, apparatus comprising:

an elongated housing having opposite side walls forming a channel extending longitudinally therethrough for longitudinally slidably receiving therein a plurality of wound clips in superposed stacked relationship, said housing having a front end opening formed of an unobstructed continuation of said channel through which such clips could escape in the absence of retaining means;

resilient means within the rearward portion of said channel for urging said wound clips forwardly therein toward said front end opening;

a pair of oppositely positioned side openings extending laterally through the said opposite side walls of said housing adjacent said front end openings;

a pair of swingable forceps arms positioned opposite one another along opposite exterior sides of said side walls, the said arms having inturned forward end portions terminating in jaws, and the rear end portions of said arms terminating in attachment means detachably attaching such rear end portions of said arms to opposite exterior sides of said side walls in such position that the said inturned portions of said arms extending laterally movably through said side openings and said jaws are positioned adjacent opposite inner sides of said side walls and confront one another across said channel adjacent said front end openings, said attachment means including;

pin means in one of such elements adjacent the attachment end thereof engaging an aperture means in the other of such elements adjacent the attachment end thereof;

and resilient clamping means spanning the width of said housing and the attachment portions of said arms and detachably clampingly engaging the said arms adjacent said attachment end thereof, whereby the attachment ends of said clamps are yieldingly forced against the exterior surface of said opposite side walls of said housing with said pin means and aperture means thereof thereby retained in engagement with one another;

and a crosswise extending head formed on each of said jaws adapted to engage the inner surfaces of said side walls adjacent the edge of its respective one of said side openings, thereby limiting the outward swing of said forward end portions of said arms and the maximum spacing apart of said jaws;

and an inwardly projecting undercut retaining means extending into said channel from each of said jaws to restrict the width of said channel and overridingly engage the opposite ends of the foremost wound clip in a stack of clips urged forwardly in said channel, whereby escape of such clips from the said front end opening is prevented and whereby, upon compression of said arms toward one another and the attendant inward movement of said jaws toward one another, the opposite ends of such foremost wound clip are thereby driven transversely inward toward one another, thereby deforming said wound clip into a U-shaped clamping configuration.

9. A wound applicator according to claim 8 in which the opposite ends of said resilient clamping means engages the attachment ends of said arms intermediate said pin means and the rear ends of said arms, whereby upon swinging the forward end portions of said arms closingly toward one another about such attachment means said clamping means is resiliently widened in opposition to such motion and thereby biases said forward end portions of said arms toward a fully opened position relative to one another.

10. A wound clip applicator according to claim 9 in which the engagement between the opposite ends of said resilient clamping means and said attachment ends of said arms is pivotal about a transverse axis, whereby said resilient means is swingable between positions respectively covering and uncovering the rear end opening of said channel extending through said housing.

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