



US 20020046961A1

(19) **United States**

(12) **Patent Application Publication**  
Levinson et al.

(10) **Pub. No.: US 2002/0046961 A1**

(43) **Pub. Date: Apr. 25, 2002**

(54) **SURGICAL CLIP HOLDER AND METHOD THEREFOR**

**Publication Classification**

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(51) **Int. Cl.<sup>7</sup> ..... B65D 85/24**

(52) **U.S. Cl. .... 206/339**

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(57) **ABSTRACT**

The surgical clip holder retains a plurality of surgical clips which are removed by clip carrying jaws of a clip appliance. The holder includes a pedestal base which defines clip retaining depressions between intervening lands. A superstructure with a plurality of flexible guide ribs is mounted on the pedestal base. In one embodiment, finger tabs from a rim of the superstructure retain lower clip leg segments. At least one of the tabs has an aperture for receiving a lower leg segment of the clip. The aperture helps ensure consistent placement of the clip within the depressions to facilitate alignment and registration of the clip with the jaws of the clip appliance.

(73) Assignee: **Scion International**

(21) Appl. No.: **10/006,165**

(22) Filed: **Dec. 4, 2001**

**Related U.S. Application Data**

(63) Continuation-in-part of application No. 09/692,022, filed on Oct. 19, 2000.

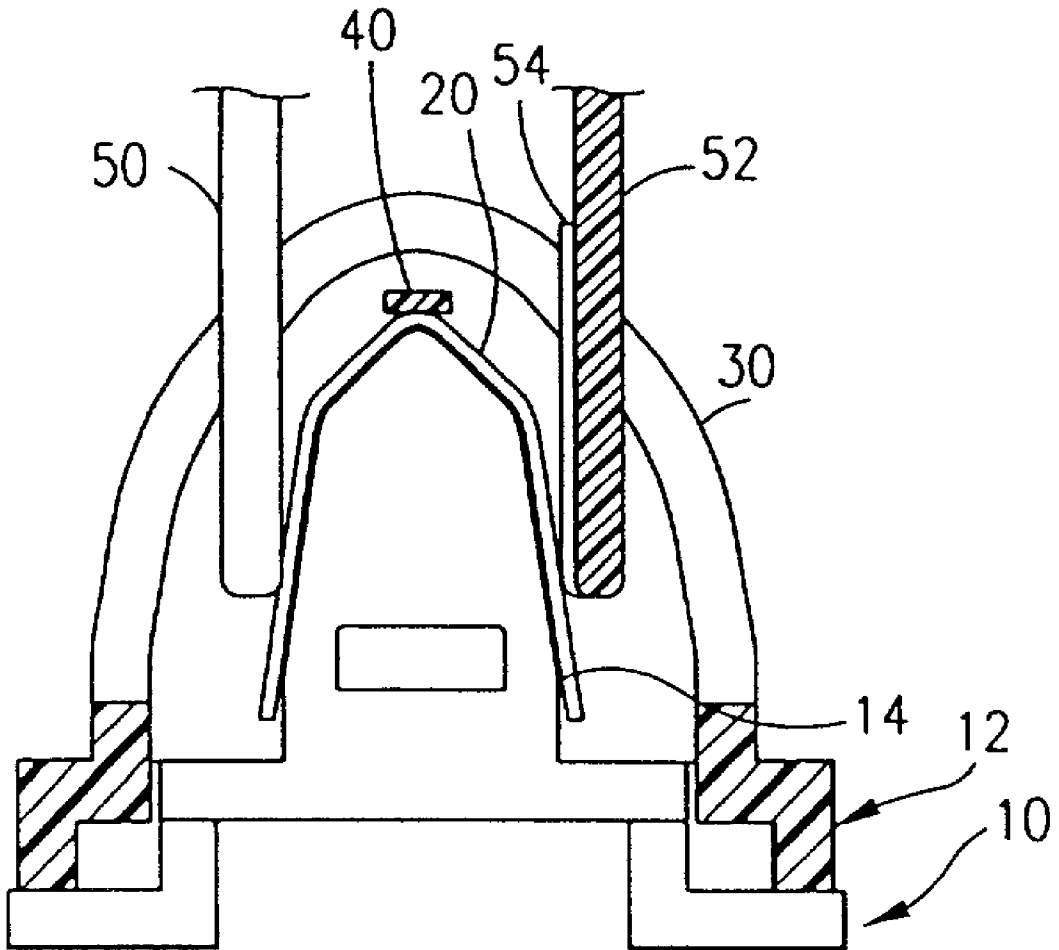


FIG. 2

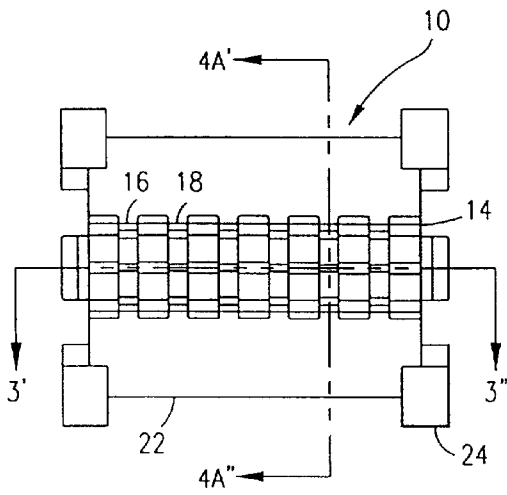


FIG. 1

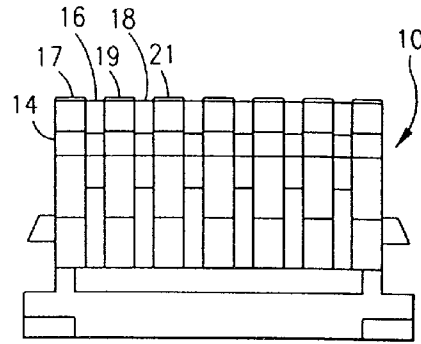


FIG. 4B

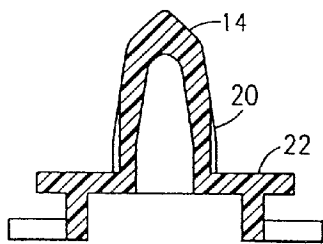
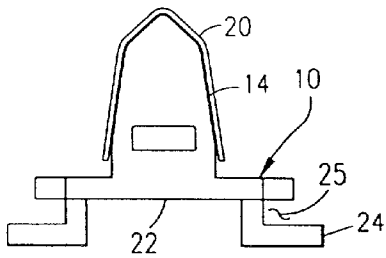
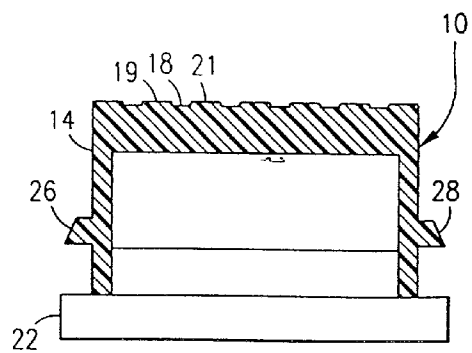


FIG. 4A

FIG. 3



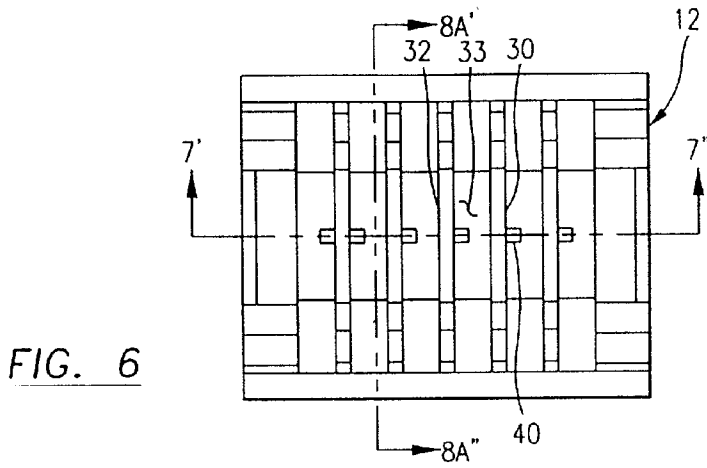


FIG. 6

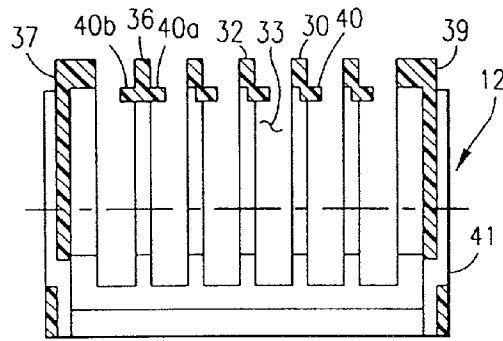


FIG. 7

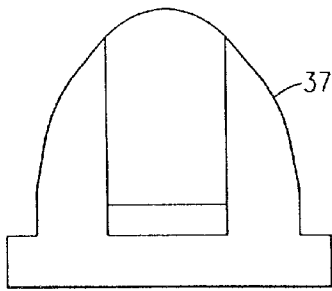


FIG. 8B

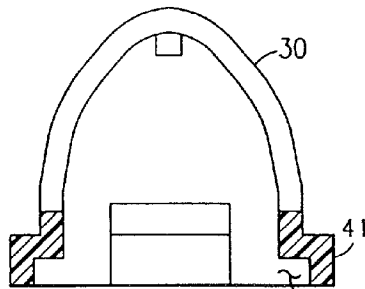


FIG. 8A

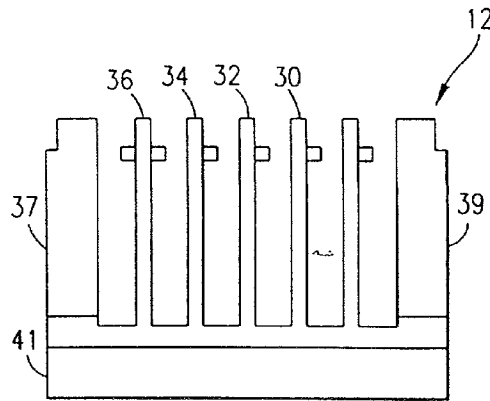


FIG. 5

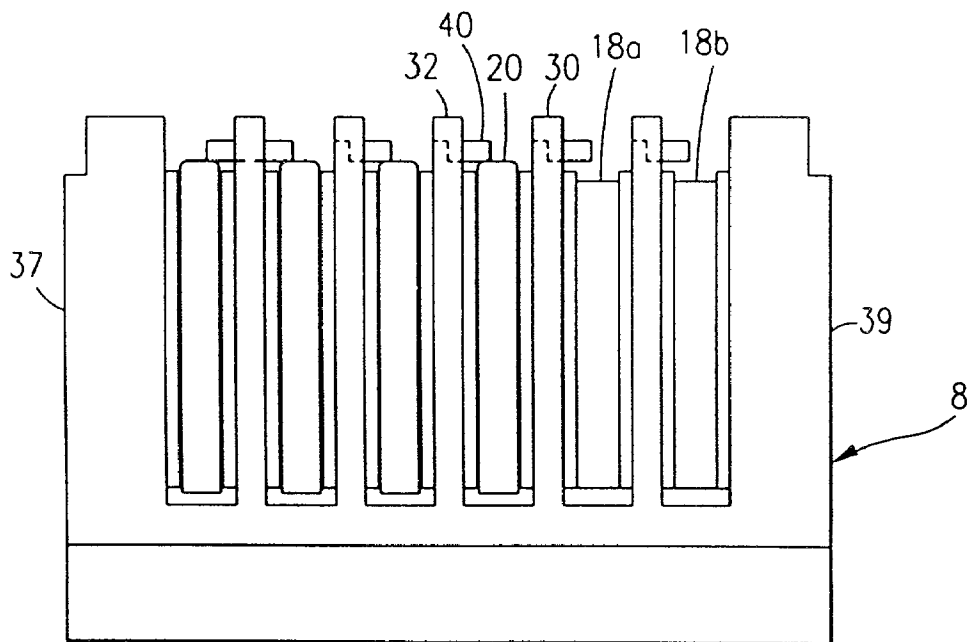
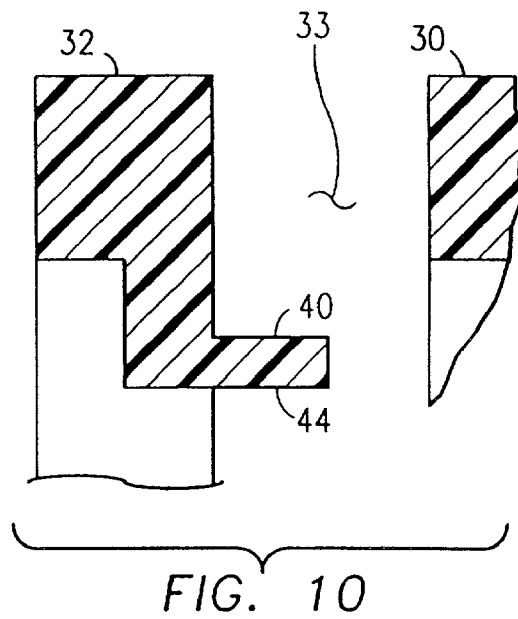


FIG. 9

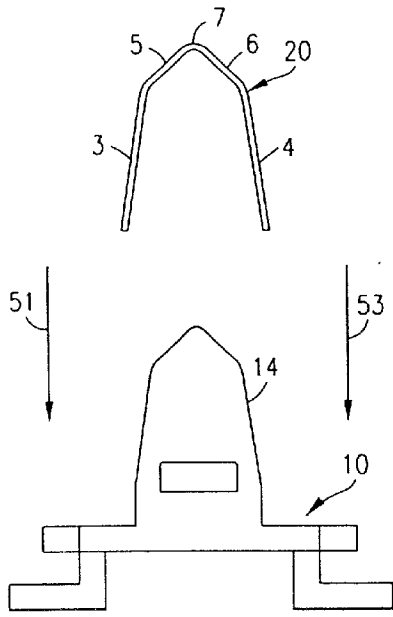


FIG. 11

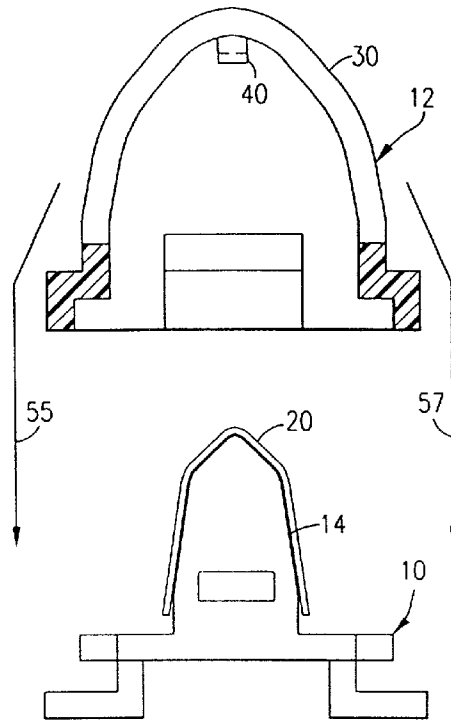


FIG. 12

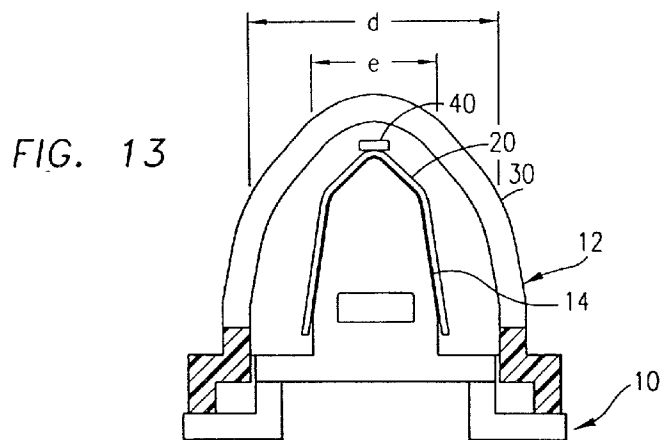


FIG. 13

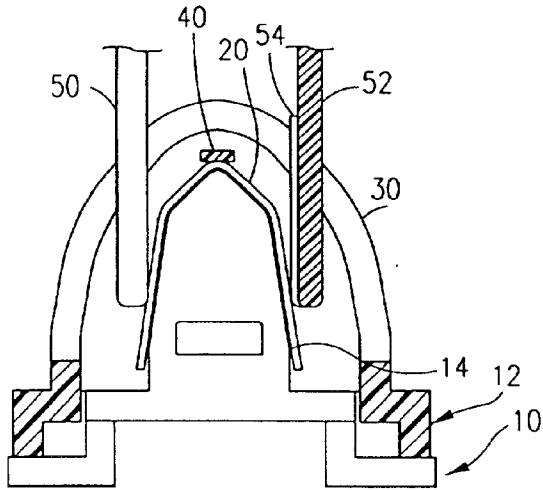


FIG. 14A

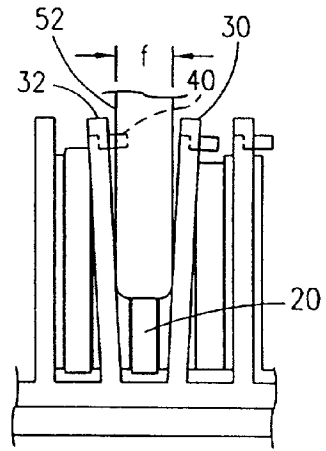


FIG. 14B

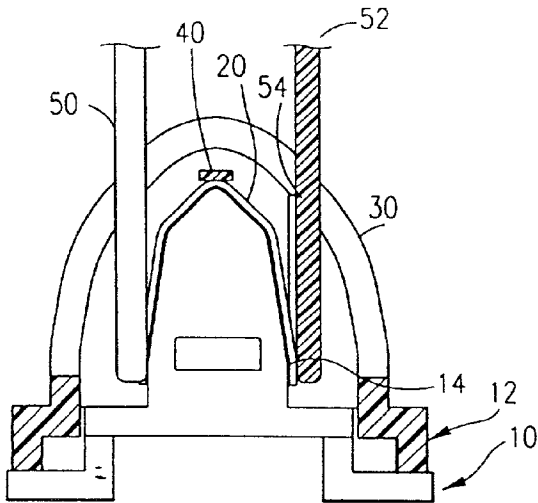


FIG. 14C

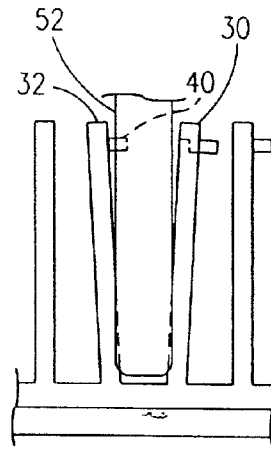


FIG. 14D

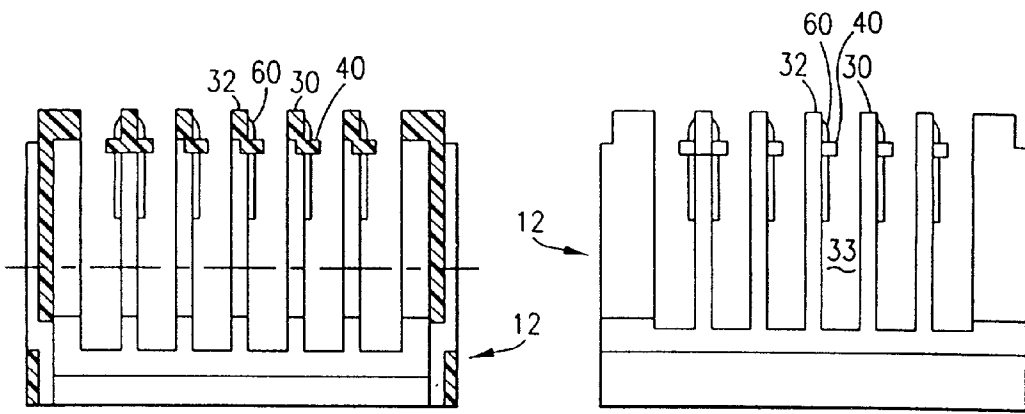


FIG. 16

FIG. 15

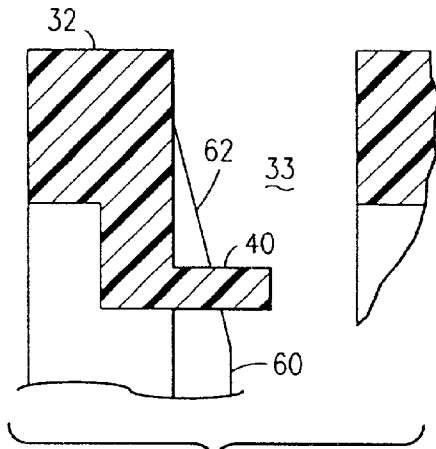


FIG. 17

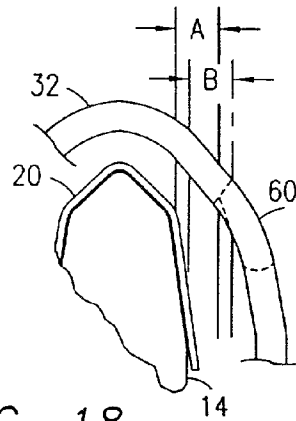


FIG. 18

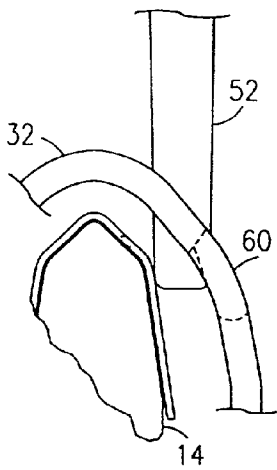


FIG. 19A

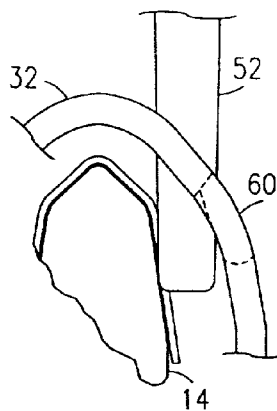


FIG. 19B

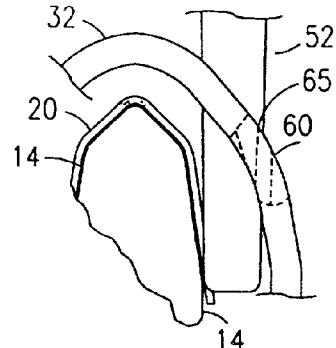


FIG. 19C

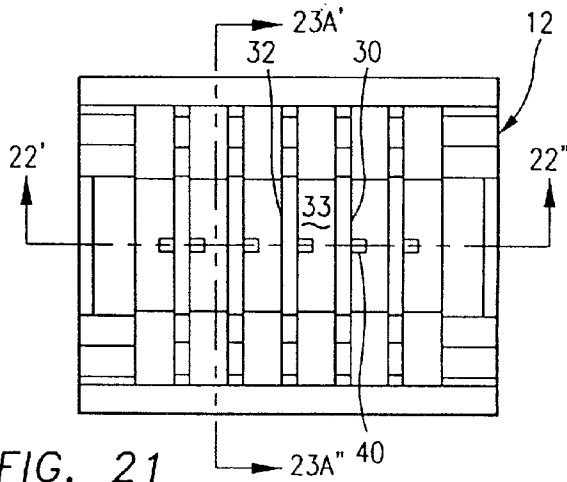


FIG. 21

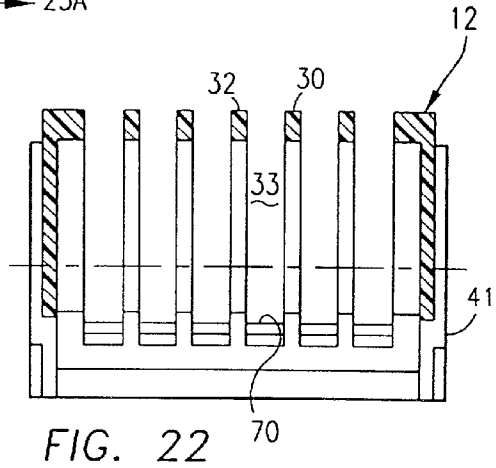


FIG. 22

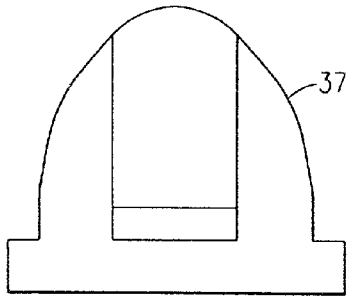


FIG. 23B

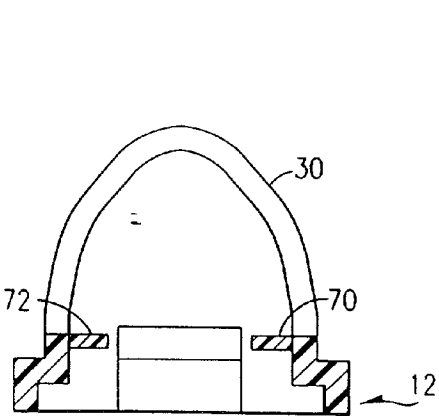


FIG. 23A

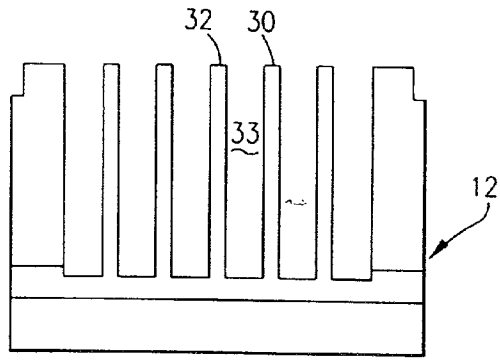


FIG. 20



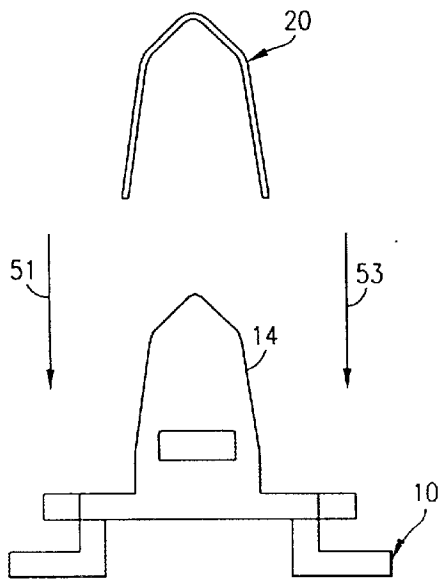


FIG. 24

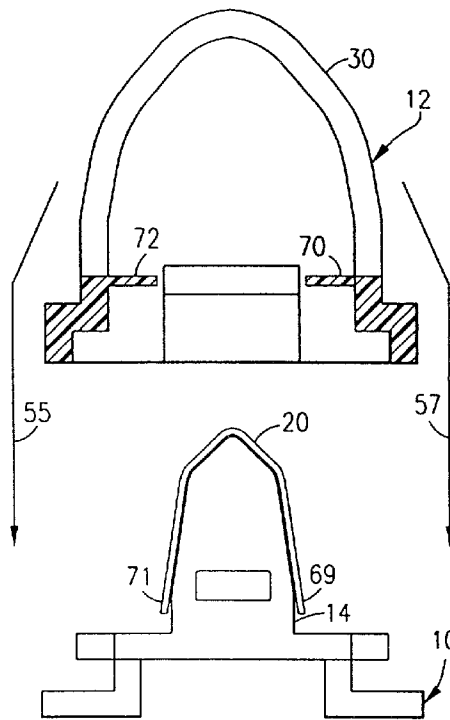


FIG. 25

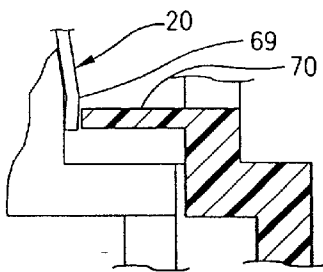


FIG. 27

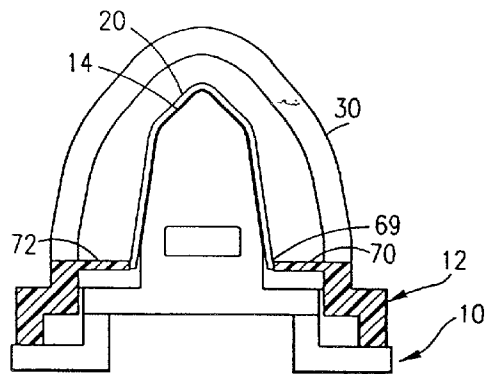


FIG. 26

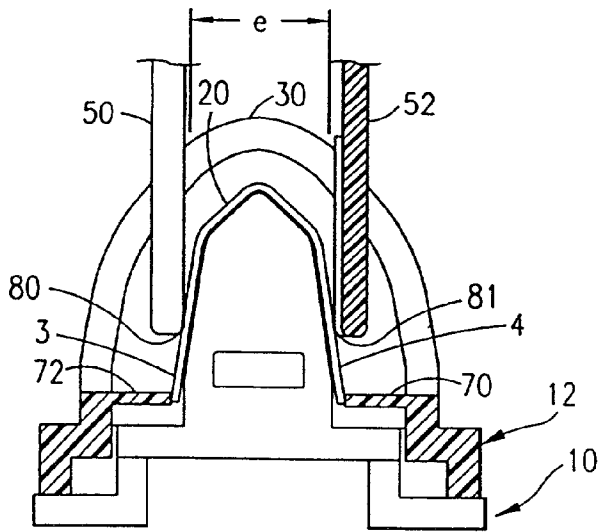


FIG. 28A

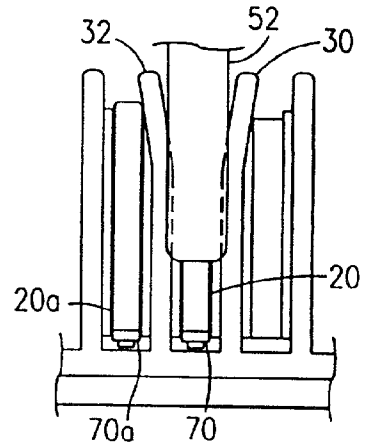


FIG. 28B

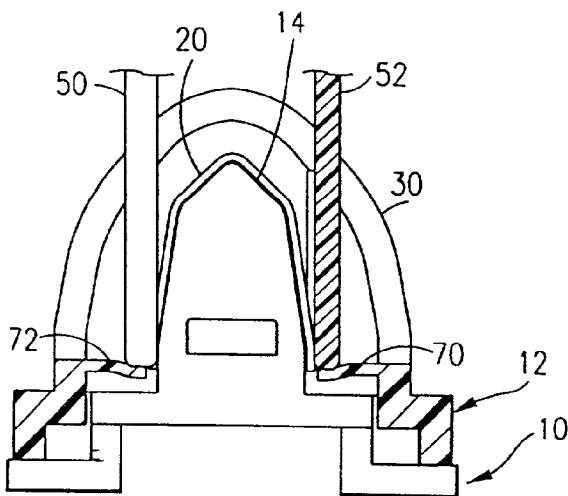


FIG. 28C

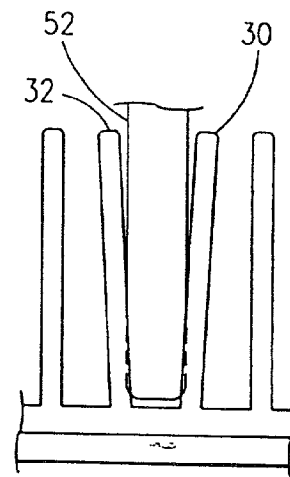


FIG. 28D

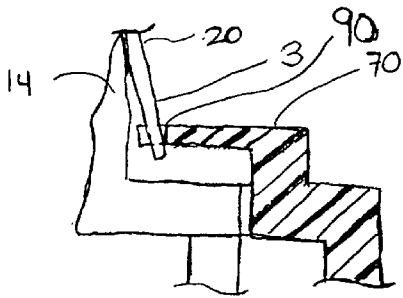


FIG. 29

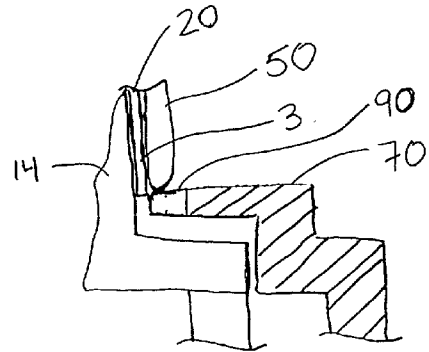


FIG. 31

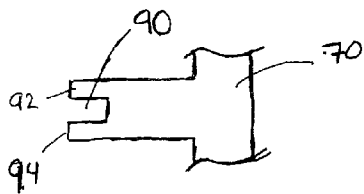


FIG. 30A

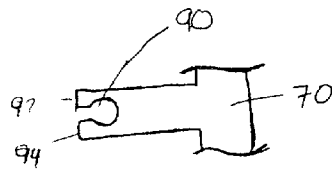


FIG. 30B

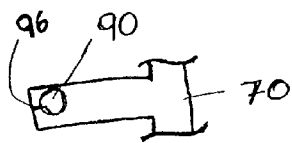


FIG. 30C

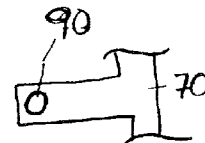


FIG. 30D

## SURGICAL CLIP HOLDER AND METHOD THEREFOR

### CROSS-REFERENCE TO RELATED APPLICATION

[0001] This application is a continuation-in-part of application Ser. No. 09/692,022, filed Oct. 19, 2000, the entire content of which is hereby incorporated by reference.

### FIELD OF THE INVENTION

[0002] The present invention relates to a surgical clip holder and a method therefor.

### BACKGROUND OF THE INVENTION

[0003] Surgical clips are sometimes utilized by physicians and other medical personnel to clamp blood vessels and other organic bodies, biological systems and structures. The surgical clips are typically quite small and are generally V-shaped or U-shaped. The height of these clips sometimes is 5 mm and the span of the clips is on the order of 2-3 mm. Surgeons or other medical professionals close these clips with clip appliances. The clip appliances typically include clip carrying jaws.

[0004] A single clip appliance can be utilized to dispense many surgical clips if the clips are readily accessible during the surgical procedure. Typically, a plurality of surgical clips are retained in a clip holder.

[0005] U.S. Pat. No. 4,936,447 to Peiffer discloses a clip holder wherein each clip is loosely supported on a pedestal base. The pedestal base has clip carrying depressions thereon and intervening raised lands. In one embodiment, the Peiffer '447 clip holder includes centering protrusions extending laterally from the side walls of the raised lands. When the clip is retained in the depression, the centering protrusions grasp the surgical clip on either side of the clip. In another embodiment, the Peiffer '447 clip holder loosely retains the clips on a pedestal and a pair of opposing fingers grasp opposing legs of the clip. The opposing fingers have a downward angle which ensures that the clip carrying jaws of the clip applicator meet minimal resistance from the fingers as the clip jaws are placed over the clips. The downward angle of the fingers also enables the clip jaws to grasp the clip below an intermediate bend in the legs of the surgical clip. The downward angle further ensures that the clip is always in positive contact with either the fingers or the applicator clip jaws. The jaws of the clip applicator contact the surgical clip before the fingers are pushed out of the way. The clips loosely rest on the pedestal in that there is no frictional contact between the clip and the pedestal. See also U.S. Pat. No. 4,972,949 to Peiffer.

[0006] U.S. Pat. No. 4,294,355 to Jewusiak discloses a surgical clip holder wherein the surgical clips are loosely held on a vertical post from a pedestal base and finger springs extend from base side walls to stabilize the loosely hanging surgical clip. The clip also has a spacer shaped leg and that leg of the clip rests on a small ledge rising above the pedestal base.

[0007] U.S. Pat. No. 3,713,533 to Reimels discloses a surgical clip holder wherein the clip is spring loaded in the holder between a base pedestal and opposing side walls or

ledges. To remove the Reimels surgical clip, clip carrying jaws collapse the surgical clip about the pedestal.

[0008] U.S. Pat. No. 4,146,130 to Samuels discloses a surgical clip holder wherein the clips are maintained in tension between a pedestal base and side walls of the clip holder. The tension is released when the clip carrying jaws of the clip applicator bend the clip legs downward about the pedestal base stand.

[0009] U.S. Pat. No. 4,361,229 to Mericle discloses a clip holder which retains the clip with fingers extending from the side walls of the retainer. The clips are loosely hung on a vertical post or pedestal. The clip jaws first move the fingers away from the surgical clip and then lock onto special protruding side tabs from the clip legs.

[0010] U.S. Pat. No. 3,631,707 to Miller discloses a clip holder wherein the clips are closely mounted by an interference fit on a pedestal stand in the clip holder.

[0011] U.S. Pat. No. 4,076,120 to Carroll discloses a clip holder wherein the clips are loosely held on a pedestal stand by side wall protrusions. The side walls which define the clip retaining cavities, flex laterally outward upon insertion of the clip carrying jaws of the clip applicator.

[0012] U.S. Pat. No. 4,344,531 to Giersch discloses a clip holder which retains clips somewhat like a common stapler, i.e., loaded on a pedestal base with a biased clip pusher wall.

[0013] U.S. Pat. No. 4,696,396 to Samuels discloses a surgical holder wherein the clips are closely mounted on a pedestal base and are retained in place by side wall protrusions from side walls defining clip cavities.

[0014] U.S. Pat. No. 4,212,930 to Raczkowski discloses a wound clip rack. U.S. Pat. No. 4,685,564 to Hills discloses a blade holder magazine.

### OBJECTS OF THE INVENTION

[0015] It is an object of the present invention to provide a surgical clip holder which retains the clips with an interference fit on a base pedestal.

[0016] It is an additional object of the present invention to provide a surgical clip holder wherein the clip carrying jaws of a clip appliance are guided through a flexible rib cage to the clips aligned with rib defined gaps in the rib cage.

[0017] It is an additional object of the present invention to provide a clip holder which loosely compresses or holds the top of the surgical clip in a clip retaining depression on the base pedestal.

[0018] It is another object of the present invention to provide a method of retaining and retrieving surgical clips wherein the flexible rib cage acts as an arcuate guide and the rib cage flexes laterally upon insertion of the clip carrying jaws.

### SUMMARY OF THE INVENTION

[0019] The surgical clip holder retains a plurality of surgical clips therein. The surgical clips are adapted to be removed from the clip holder by clip carrying jaws of a clip appliance. The holder includes a pedestal base which defines clip retaining depressions separated by intervening lands. Each depression is adapted to retain a corresponding clip

therein. A superstructure, including a base and a plurality of flexible ribs, is mounted on and over the pedestal base. The ribs have a height exceeding the height of the pedestal. Each pair of ribs forms a guide towards a corresponding clip retaining depression on the pedestal. The ribs act as a guide for clip carrying jaws of a clip appliance and flex apart during insertion of the jaws and retrieval of the clip from the clip retaining depression. In a further refinement of the invention, the ribs are arcuate elements, each having an apex and each carrying a depending finger at its apex. The depending finger is adapted to rest atop the clip retained in the respective depression. Preferably, the depending finger is L-shaped with the vertical portion of the L element disposed in a plane defined by the rib and the horizontal L element extending into the interspace between adjacent ribs. The lower depending surface of the L-shaped finger gently rests atop the apex of the surgical clip. When the clip carrying jaws are inserted through the guide plane defined by the pair of ribs, the ribs flex laterally apart (since the interspace between the ribs is smaller than the lateral span of the clip carrying jaws), the L-shaped finger moves away from the top of the clip, the clip carrying jaws grasp the clip and retrieve the clip. The clip, when withdrawn from the pedestal base, is far removed from the pedestal by the time the rib guides flex back to original, parallel plane positions and the finger tip moves back into the interspace.

[0020] In a further embodiment, finger tabs from a rim of the superstructure retain lower clip leg segments. At least one of the finger tabs has an aperture for receiving one clip leg to facilitate registration of the jaws of the clip appliance with the clip. The aperture is shaped to receive at least a portion of one of the legs of a clip disposed in a corresponding clip depression. Examples of suitable shapes include round, rectangular, and keyhole. If the finger tab is bifurcated, the aperture is formed between the forked end. Alternatively, the aperture can be located at some distance from the end of the finger tab. A slit can extend from the end to the aperture to allow the aperture to flex open.

[0021] The method of retaining and retrieving the surgical clips includes supporting and retaining the clips with an interference fit about substantially the entirety of the underside of the clip. The method includes providing a flexible rib cage acting as arcuate guides. Apertures for receiving at least one of the legs of the clip are also provided. Clip carrying jaws of the clip appliance are guided through adjacent rib guides towards the clip while the rib guides flex laterally outboard. The aperture on the finger tabs facilitates alignment of the jaws with the clip. The clip is gripped by the clip retaining jaws of the clip appliance and the clip is withdrawn from the pedestal's interference fit thereby permitting the adjacent rib guides to return to an initial, parallel plane position. In preferred embodiment, the method includes a step of gently compressing or holding the top end of the clip when the clip is retained with the interference fit.

#### BRIEF DESCRIPTION OF THE DRAWINGS

[0022] Further objects and advantages of the present invention can be found in the detailed description of the preferred embodiments when taken in conjunction with the accompanying drawings in which:

[0023] FIGS. 1-4B diagrammatically illustrate the pedestal base wherein FIG. 1 is a side elevational view, FIG. 2 is

a top view, FIG. 3 is a cross-sectional view from the perspective of section line 3'-3" in FIG. 2, FIG. 4A is a cross-sectional view from section line 4A'-4A" in FIG. 2 and FIG. 4B is a diagrammatic view of the pedestal base with a clip mounted thereon;

[0024] FIGS. 5-8B diagrammatically illustrate one embodiment of the superstructure of the surgical clip holder wherein FIG. 5 is a diagrammatic, side elevational view, FIG. 6 is a top view, FIG. 7 is a cross-sectional view from section line 7'-7" in FIG. 6, FIG. 8A is a cross-sectional view from the perspective of section line 8A'-8A" and FIG. 8B is a front elevational view;

[0025] FIG. 9 diagrammatically illustrates the surgical clip holder with four (4) surgical clips retained by the holder and two (2) empty clip retaining depressions;

[0026] FIG. 10 is a detailed, partial, cross-sectional view of the L-shaped finger depending from the apex of a rib guide;

[0027] FIGS. 11-13 diagrammatically illustrate mounting the surgical clip on the pedestal base, mounting the rib guide superstructure on the pedestal base and a cross-sectional view of the clip holder with a retained clip generally from the perspective of section line 8A'-8A" in FIG. 6, respectively;

[0028] FIGS. 14A-14D diagrammatically illustrate a clip carrying jaw of a clip appliance capturing and grabbing the clip while the guide ribs flex laterally apart;

[0029] FIGS. 15 and 16 diagrammatically illustrate a side elevational view and a cross-sectional view of the surgical clip holder with jaw bumpers on the rib guides;

[0030] FIG. 17 is a partial, cross-sectional, detail view of one type of rib guide and the depending L-shaped finger;

[0031] FIG. 18 diagrammatically illustrates a jaw bumper placed at an arcuate position on the rib guide such that as the clip carrying jaws move from open span position A to open span position B, the rib guides flex further laterally outboard (FIG. 14D) due to the presence of a larger, lateral bumper at position B as compared the lateral size of the bumper at position A;

[0032] FIGS. 19A-19C diagrammatically illustrate the clip carrying jaws moving from initial position A to initial position B and the greater lateral outboard movement (FIG. 14D) caused by a specially positioned jaw bumper;

[0033] FIGS. 20-23B diagrammatically illustrate another embodiment of the clip holder wherein FIG. 20 is a side elevational view, FIG. 21 is a top view, FIG. 22 is a cross-sectional view from section line 22'-22", FIG. 23A is a cross-sectional view from section line 23A'-23A" and FIG. 23B is a front elevational view;

[0034] FIGS. 24-27 diagrammatically illustrate mounting the surgical clip on the pedestal base, mounting the superstructure on the pedestal base wherein the superstructure includes finger tabs, a diagrammatic cross-sectional view of the assembled clip holder and a detail view of the finger tab effecting the lower distal end of the surgical clip;

[0035] FIGS. 28A-28D diagrammatically illustrate grasping and retrieving the surgical clip, the flexing of the guide

ribs and the depression of the finger tab upon full insertion of the clip jaws in the clip holder;

[0036] FIG. 29 diagrammatically illustrates a portion of another embodiment of the finger tabs in which the finger tabs have an aperture for receiving one leg of the clip;

[0037] FIGS. 30A-30D are top views of different embodiments of the finger tabs having an aperture; and

[0038] FIG. 31 diagrammatically illustrates a clip carrying jaw of a clip appliance capturing and grabbing the clip.

#### DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0039] The present invention relates to a surgical clip holder and a method therefor.

[0040] FIGS. 1-4B diagrammatically illustrate the base pedestal utilized in connection with the certain rib guide superstructures one of which is shown in FIGS. 5-8B and the other of which is shown in FIGS. 20-23B. Although the embodiments may be combined, the combination is currently not the preferred clip holder structure. Similar numerals designate similar items throughout the drawings.

[0041] FIG. 1 diagrammatically illustrates a side elevational view of pedestal base 10. FIG. 5 diagrammatically illustrates a side elevational view of superstructure 12. FIG. 15 shows a modified version of superstructure 12 and FIG. 20 shows another embodiment of the superstructure.

[0042] FIGS. 1-2 are discussed concurrently herein. Pedestal base 10 includes a central pedestal stand 14 defining, at laterally spaced apart positions, clip retaining depressions, two of which are identified as clip retaining depressions 16 and 18. Although a plurality of clip retaining depressions 16, 18 are defined between intervening lands 17, 19, the clip retaining depression will be referenced with a single numeral 18 hereinafter. Lands 19, 21 will be identified as necessary in the drawings. There is no substantial difference between the plurality of clip depressions and intervening lands other than the depressions are laterally spaced apart along upright stand 14 as are the intervening lands. Each clip depression is adapted to retain a surgical clip therein. Surgical clip 20 is shown in FIG. 4B.

[0043] Pedestal base 10 includes a base platform 22 and key way defining feet 24. FIG. 4B shows feet 24 defining a key way 25. Pedestal stand 14 is sometimes referred to herein as "pedestal 14."

[0044] FIG. 3 shows pedestal base 10 including a pair of interlocks 26, 28. Interlocks 26, 28 co-act with complementary interlocks on the rib guide superstructure. Other interlock designs may be utilized. The interlocks clip the base 10 to the superstructure.

[0045] FIG. 4A shows pedestal 14 with an outer body surface which is generally complementary to surgical clip 20. This complementary shape enables an interference fit between pedestal 14 and clip 20. FIG. 4B diagrammatically shows clip 20 mounted with an interference fit in a clip retaining depression. In other words, the user can invert pedestal base 10 when the clip 20 is retained on the pedestal and the clip will not fall from pedestal 14. Since the surgical clips typically are titanium or other strong, high quality metal or other biocompatible material, the ridges or grooves

on the inboard surface of the surgical clip typically are not adversely affected by the interference fit with pedestal 14. The "pedestal base" is sometimes referred to as "base 10" herein.

[0046] FIGS. 5-8B diagrammatically illustrate a preferred embodiment of the clip holder superstructure 12. FIG. 5 is a side elevational view showing laterally spaced apart flexible ribs 30, 32, 34 and 36. Hereinafter, the ribs 30, 32 will be utilized to generally designate all adjacent, spaced apart guide ribs. Superstructure 12 includes end panels 37, 39. The end panels have interlock elements (not shown) which mate and lock onto interlock elements 26, 28 in FIG. 3.

[0047] FIG. 7 diagrammatically illustrates that each rib 30 includes a depending finger, one of which is identified as depending finger 40. Depending finger 40 is L-shaped in the currently preferred embodiment as shown in FIG. 10 or, in another configuration, may be a horizontal flexible, finger extending into interspace 33 between adjacent ribs 30, 32. In a preferred embodiment, the lateral extension of depending finger 40 (a horizontal L element or simply a horizontal element) extends into interspace 33 approximately one-half the lateral span of interspace 33. Interspace 33 is defined by adjacent ribs 30, 32.

[0048] Rib 36 adjacent to side wall 37 includes a right hand extending finger 40a and a left hand extending finger 40b. The depending fingers 40 may be right hand extensions or may be left hand extensions.

[0049] FIG. 8A shows rib 30 being an arcuate element rising above superstructure base 41. Superstructure base 41, as shown in FIG. 8A, includes a base key way 43 that coacts with a base key and base key way in pedestal base 22, foot element 24 and pedestal base key way 25 shown in FIG. 4B. The respective base key ways and co-acting keys provide positional registration between the rib guide superstructure and the pedestal base.

[0050] FIG. 9 diagrammatically illustrates surgical clip holder 8 wherein superstructure 12 is mounted atop pedestal base 10. This mounting procedure is discussed in connection with FIG. 12. In FIG. 9, surgical clip 20 is retained in a clip retaining depression. Flexible ribs 30, 32 are disposed in parallel planes on either side of clip 20 and the underlying clip depression. The interspace between ribs 30, 32 is aligned with the clip and associated clip depression and acts as a guide for the clip jaws. Finger 40 extends part way into interspace 33 (see detail in FIG. 10), such that the lower surface 44 of finger 40 gently rests atop the apex of clip 20. Careful registration and alignment of superstructure 12 (FIG. 5) over pedestal base 10 (FIG. 1) is accomplished by the keys and key ways in the respective bases 22, 41. As discussed later, the parallel positioning of ribs 30, 32 and clip retaining depression 18 is important because the flexible ribs act as guide for the clip carrying jaws of a clip appliance. In FIG. 9, depressions 18a, 18b do not carry clips.

[0051] FIGS. 11-13 diagrammatically show the assembly process for the surgical clip holder.

[0052] FIG. 11 diagrammatically shows surgical clip 20 having an apex 7 and clip legs defining a first angular leg configuration 5, 6 and a lower leg segment 3, 4 with a different angular configuration. Pedestal 14 rises above base 10 and has a similar outer body shape which is complemen-

tary to the inner body shape of surgical clip 20. Arrows 51, 53 show that clip 20 is mounted onto pedestal 14.

[0053] In FIG. 12 the rib carrying superstructure 12 is mounted atop pedestal base 10 as shown by arrows 55, 57. Superstructure 12 is placed atop pedestal base 10 after the clips are loaded onto pedestal 14 (FIG. 11). Interlocking mechanism hold the clip holder unit 10, 12 together.

[0054] FIG. 13 shows that rib 30 of superstructure 12 rises above pedestal 14 such that the height of the rib is greater or exceeds the height of the pedestal and the opening span d is greater than the clip span or the pedestal span e. In other words, the plurality of flexible ribs on the superstructure are spaced apart from the pedestal base which defines the plurality of clip retaining depressions both in height and in depth. The term "depth" refers to the opening span d as compared with opening span e. As discussed later with respect to FIG. 14A, opening span e is generally similar to the opening span of the clip carrying jaw of the clip appliance.

[0055] FIGS. 14A-14B diagrammatically illustrate the insertion of the clip appliance, the capture of the clip and the removal of the clip from the surgical clip holder.

[0056] In FIG. 13, finger 40 is shown as "flying" or disconnected from adjacent structures because finger 40 extends from rib 32 which is not shown in FIG. 13. See FIG. 14B. The depending finger from rib 30 is omitted in FIGS. 14A and 14C in order to show the gentle depression or compression of finger 40 on clip 20. Finger 40 is shown on rib 32 in FIG. 14B.

[0057] The clip appliance includes clip carrying jaws 50, 52. Clip jaw 52 is shown in cross section such that inner jaw rib 54 is visible. An opposing rib, not shown on jaw 52 in FIG. 14A, grips the other side of surgical clip 20. In FIGS. 14A and 14B, clip jaw 52 is inserted and guided by flexible ribs 30, 32 towards clip 20 retained in the corresponding depression. Since the lateral span f of clip jaw 52 is greater than the interspace 33 (FIG. 10), when the clip jaw 52 is inserted between flexible ribs 30, 32, the ribs move laterally outboard and away from clip 20. This flexing shown in FIGS. 14B and 14D permits the clip holder to retain a plurality of clips in a smaller space.

[0058] Further, when flexible guide rib 32 moves laterally to the left in FIG. 14B, depending finger 40 is withdrawn from the apex of surgical clip 20. FIGS. 14C and 14D diagrammatically show the complete insertion of clip carrying jaws 50, 52 into the surgical clip holder formed by pedestal base 10 and superstructure 12. In this position, tab 40 of the depending finger has been completely withdrawn away from the apex of clip 20 (see FIG. 14D) and the clip retaining jaws 50, 52 have clamped onto clip 20. Thereafter, the clip carrying jaws 50, 52 are withdrawn vertically from the surgical clip holder consisting of pedestal base 10 and superstructure 12, and ribs 30, 32 flex back to their original or initial position. Base 10 may be weighed down by an additional weight (not shown).

[0059] In this manner, ribs 30, 32 form arcuate guides spaced entirely apart from the retained clips and the underlying pedestal base substructure 10. Ribs 30, 32 of superstructure 12 guide the clip carrying jaws of the appliance and flex laterally outboard while the clip carrying jaws grip the clip.

[0060] FIGS. 15 and 16 diagrammatically show a variation of the system shown in FIGS. 5-8B. The flexible guide ribs 30, 32 include depending fingers 40 but also include jaw bumpers, one of which is jaw bumper 60. In the one embodiment, jaw bumper 60 has a leading edge slope 62 as shown in FIG. 17. The jaw bumper 60 moves the associated rib guide 32 an additional lateral distance when the clip carrying jaws are inserted into interspace 33.

[0061] FIGS. 18-19C diagrammatically show that in certain situations, the placement of jaw bumper 60 can control the lateral displacement of rib 32 dependent upon the opening span of the clip carrying jaw. In some instances, the clip appliance and particularly the clip carrying jaws 50, 52 (FIG. 14A), are not completely open when the appliance is inserted between the rib guides 30, 32. In other words, the initial position of one of the clip carrying jaws, e.g., jaw 52, falls within plane A shown in FIG. 18. As the clip appliance is moved vertically downward the pedestal 14 and the clip 20 causes the clip carrying jaw 52 to further open its opening span from vertical position A to vertical B. In some situations, this may be beneficial since the clip is maintained in the clip depression on pedestal 14 with an interference fit and to cleanly remove the clip from pedestal 14, a tight fit between the clip carrying jaws 50, 52 and clip 20 must be obtained by tight spring action between jaws 50, 52 and clip 20. This tight spring action and clip compression is achieved by forcing jaws 50, 52 further open from position A to B. This further opening is noted by jaw movement from A to B in FIG. 18.

[0062] In any event, when the clip carrying jaw 52 is inserted at position A and moved to position B as shown in FIG. 18, a jaw bumper 60, which is strategically located at a position outboard location A on rib 32, is activated to move or further nudge flexible rib 32 in a lateral direction. See FIG. 14B. The jaw bumper is located behind rib 32 in FIG. 18 as is the clip applier jaw moving from position A to position B.

[0063] FIGS. 19A-19C show that clip jaw 52 moves further to the right as the clip jaw is inserted vertically downward on pedestal 14. In FIG. 19C, jaw bumper 60 has a slope change or gradient change 65 such that when the clip passes to the right of that gradient or slope change 65 on jaw bumper 60, rib 32 moves further in a lateral direction. In FIG. 19A, rib 32 is moved laterally due to the lateral span of clip jaw 52. See FIG. 14D. Bumper has not affected the lateral movement of rib 32 in FIG. 19A. In FIG. 19B, jaw bumper 60 causes additional lateral movement of rib 32. In FIG. 14C, a maximum lateral movement of rib 32 is achieved due to the jaw bumper 60 and the slope change or gradient at bumper line 65. A slope for the jaw bumper 60 is shown in connection with leading slope edge 62 in FIG. 17. The thickness or lateral dimension of bumper 60 is greater to the right of gradient 65 than the left of the gradient.

[0064] FIGS. 20-23B diagrammatically illustrate another embodiment of the present invention wherein clip superstructure 12 includes finger tabs 70, 72 which extend toward the distal end of the clips and also extend towards the distal ends of clip retaining depressions 16, 18 in pedestal base 14. See FIG. 1. Flexible guide ribs 30, 32 are also part of the embodiment shown in FIGS. 20-23B.

[0065] FIG. 23A shows finger ribs or tabs 70, 72 protruding inboard towards a location defined the pedestal base 14. FIG. 23B shows side wall 37.

[0066] FIG. 24 diagrammatically shows clip 20 being mounted on pedestal 14 of base 10. FIG. 25 shows rib guide superstructure 12 being mounted on base 10 after the clip mounting step such that finger tabs 70, 72 mate with and extend over the distal ends 69, 71 of clip 20.

[0067] FIG. 26 diagrammatically shows finger tabs 70, 72 coacting with distal ends 69, 71 of clip 20.

[0068] FIG. 27 shows that distal end 69 of clip 20 is gently urged inboard toward pedestal 14. The terminal ends of each clip leg are urged towards the pedestal.

[0069] FIG. 28A diagrammatically shows clip jaws 50, 52 being inserted between flexible rib guides 30, 32. FIG. 28B shows lateral flexion of the ribs. In FIGS. 28C and 28D, clip jaws 50, 52 have been fully inserted into the clip holder, the flexible guide ribs 30, 32 reach their maximum flexion distance and the distal end of jaws 50, 52 depress finger tabs 70, 72. The depression of finger tabs 70, 72 enable the complete release of clip 20 from pedestal 14.

[0070] As shown with respect to FIG. 28A, the opening span e of clip 20 and the length of lower clip leg 3, 4 is such that clip jaws 50, 52 touch and engage clip 20 prior to the distal ends 80, 81 of clip jaws 50, 52 striking finger tabs 72, 70. The angle of the finger tabs is not important. The opening span of the clip jaws and the span e of pedestal 14 and the length of the clip legs 3, 4 determine when jaws 50, 52 strike or impact legs 3, 4. In this embodiment, clip jaws 50, 52 fully engage surgical clip 20 well before engagement and physical contact with finger tabs 70, 72.

[0071] After clip jaws 50, 52 are withdrawn from the position illustrated in FIG. 28C, finger tabs 70, 72 spring upward to their initial, horizontal position.

[0072] As shown in FIG. 28B, finger tabs 70, 70a coact with the distal ends of each clip 20, 20a. Hence, each clip retaining depression 16, 18 (FIG. 2) has a pair of opposing finger tabs 70, 72.

[0073] As shown in FIG. 29, finger tabs 70, 72 can be provided with an aperture 90 configured and dimensioned to receive one of lower leg segments 3, 4 of surgical clip 20. Aperture 90 helps ensure that clip 20 is centered within clip depression 18, thereby facilitating alignment of clip jaws 50, 52 with clip 20. In an exemplary embodiment, only one of the pair of finger tabs 70, 72 has aperture 90. Alternatively, each finger tab 70, 72 has aperture 90.

[0074] Aperture 90 can have any shape appropriate for receiving lower leg segments 3, 4 of clip 20. Examples of suitable shapes include rectangular (FIG. 30A), keyhole (FIG. 30B), and round or substantially round (FIGS. 30C and 30D). As shown in FIGS. 30A and 30B, the end of finger tab 70 can be bifurcated into tips 92, 94 so that the end is forked with aperture 90 defined between tips 92, 94. The bifurcation can reduce the amount of depression of finger tabs 70, 72 that is needed to allow lower leg segments 3, 4 to disengage from finger tabs 70, 72. FIG. 30C shows finger tab 70 with a slit 96 extending to aperture 90. Slit 96 allows aperture 90 to flex open, thereby releasing lower leg segments 3, 4 from finger tabs 70, 72.

[0075] As with the previously described embodiments, the clip holder of FIG. 29 is loaded with clips by first mounting a plurality of clips 20 onto pedestal 14 (FIG. 11) and then mounting rib carrying superstructure 12 atop pedestal base 10 (FIG. 12). The mounting occurs so that lower leg segments 3, 4 of clips 20 are received in a respective aperture 90 of finger tabs 70, 72. In use, clip jaws 50, 52 of a clip appliance are inserted between flexible rib guides 30, 32 of the clip holder so that clip jaws 50, 52 engage clip 20. Finger tabs 70, 72 flex down as clip jaws 50, 52 are further inserted. This bending disengages lower clip leg segments 3, 4 from aperture 90 of finger tabs 70, 72 and allows complete release of clip 20 from pedestal 14. By providing a consistent placement of lower leg segments 3, 4 within clip retaining depression 18, aperture 90 enables registration and alignment of clip 20 with the clip appliance.

[0076] The claims appended hereto are meant to cover modifications and changes within the scope and spirit of the present invention.

What is claimed is:

1. A surgical clip holder for retaining a plurality of surgical clips, each clip having a pair of clip legs and adapted to be removed from the clip holder with clip carrying jaws of a clip appliance, the surgical clip holder comprising:

a pedestal base defining clip retaining depressions and intervening lands, each said depression adapted to retain a corresponding clip of said plurality of clips; and

a superstructure including a base mounted onto said pedestal;

a plurality of flexible ribs rising above the superstructure base and spaced apart from said pedestal, said ribs having a height exceeding a height of said pedestal and forming a guide towards a corresponding clip retaining depression; and

a plurality of finger tabs extending substantially inboard toward said pedestal from said superstructure base, a respective pair of finger tabs disposed toward opposing ends of a corresponding clip depression, each said finger tab having a length sufficient to engage an adjacent end of a clip adapted to be disposed in said corresponding clip retaining depression,

wherein said ribs are adapted to act as a guide for said clip carrying jaws and to flex apart upon insertion of said jaws of said clip appliance; and

at least one in said respective pair of finger tabs has an aperture adapted to receive one leg of a clip disposed in said corresponding clip depression.

2. A clip holder as claimed in claim 1 wherein said ribs are entirely spaced apart from said pedestal.

3. A clip holder as claimed in claim 1 wherein said pedestal includes a platform, said platform defining at least one interlock, said superstructure base including at least one complementary interlock adapted to mate with said at least one interlock on said platform.

4. A clip holder as claimed in claim 1 wherein said clip carrying jaws have an opening span and a lateral span, said lateral span begin substantially normal to said opening span, said ribs on said superstructure being spaced apart a distance



which is less than said lateral span of said clip carrying jaws, said pedestal having a width which is equal to or less than said opening span of said clip carrying jaws.

5. A clip holder as claimed in claim 1 wherein said ribs are arcuate elements rising above said superstructure base, each said rib having an apex, each rib carrying at its apex a depending finger adapted to rest atop said clip adapted to be retained in the respective depression.

6. A clip holder as claimed in claim 5 wherein said finger is substantially L-shaped and a vertical L-element of said finger is disposed in a plane defined by the rib carrying said finger and a horizontal L-element of said finger extends into an interspace between adjacent ribs.

7. A clip holder as claimed in claim 6 wherein each said horizontal L-element of said fingers extend less than one-half the interspace between adjacent ribs.

8. A clip holder as claimed in claim 5 wherein each rib includes a jaw bumper adapted to displace the finger carrying rib further from said interspace upon insertion of said clip carrying jaws.

9. A clip holder as claimed in claim 8 wherein each finger carrying rib includes two jaw bumpers which are disposed on opposing arcuate segments of the respective rib.

10. A clip holder as claimed in claim 8 wherein said jaw bumper has a leading edge slope which varies the displacement of said finger carrying rib dependent upon a position of said clip carrying jaw adapted to be inserted into said interspace between adjacent ribs.

11. A clip holder as claimed in claim 1 wherein each finger tab is disposed substantially in a horizontal plane.

12. A clip holder as claimed in claim 1 wherein each finger tab has an aperture.

13. A clip holder as claimed in claim 1 wherein the at least one finger tab has a forked end with the aperture defined therebetween.

14. A clip holder as claimed in claim 13 wherein the aperture has a rectangular shape.

15. A clip holder as claimed in claim 13 wherein the aperture has a keyhole shape.

16. A clip holder as claimed in claim 1 wherein the aperture is round.

17. A clip holder as claimed in claim 1 wherein an end of the at least one finger tab has a slit extending to the aperture allowing the aperture to flex open.

18. A clip holder as claimed in claim 17 wherein the aperture is one of a round, square or keyhole strapped aperture.

19. A surgical clip holder for retaining a plurality of surgical clips, each clip having a pair of clip legs and adapted to be removed from the clip holder with clip carrying jaws of a clip appliance, the surgical clip holder comprising:

a pedestal base defining a plurality of clip retaining depressions and intervening lands, each said depression adapted to retain a corresponding clip of said plurality of clips; and

a superstructure including a superstructure base mounted onto said pedestal;

a plurality of flexible ribs rising above said superstructure base and spaced apart from said pedestal, said ribs having a height exceeding a height of said pedestal and forming a guide toward a corresponding clip retaining depression; and

a plurality of finger tabs extending substantially inboard toward said pedestal from said superstructure base, said plurality of finger tabs paired off with said plurality of clip retaining depressions and each respective pair of finger tabs disposed toward opposing ends of a corresponding clip depression, each said finger tab having a length sufficient to engage an adjacent end of a clip adapted to be disposed in said corresponding clip retaining depression,

wherein said ribs are adapted to act as a guide for said clip carrying jaws and to flex apart upon insertion of said jaws of said clip appliance; and

each finger tab has an aperture adapted to receive one leg of a clip disposed in said corresponding clip depression.

20. A clip holder as claimed in claim 19 wherein said ribs are entirely spaced apart from said pedestal.

21. A clip holder as claimed in claim 19 wherein said pedestal includes a platform, said platform defining at least one interlock, said superstructure base including at least one complementary interlock adapted to mate with said at least one interlock on said platform.

22. A clip holder as claimed in claim 19 wherein said clip carrying jaws have an opening span and a lateral span, said lateral span begin substantially normal to said opening span, said ribs on said superstructure being spaced apart a distance which is less than said lateral span of said clip carrying jaws, said pedestal having a width which is equal to or less than said opening span of said clip carrying jaws.

23. A clip holder as claimed in claim 19 wherein said ribs are arcuate elements rising above said pedestal base, each said rib having an apex, each rib carrying at its apex a depending finger adapted to rest atop said clip adapted to be retained in the respective depression.

24. A clip holder as claimed in claim 23 wherein said finger is substantially L-shaped and a vertical L-element of said finger is disposed in a plane defined by the rib carrying said finger and a horizontal L-element of said finger extends into an interspace between adjacent ribs.

25. A clip holder as claimed in claim 24 wherein each said horizontal L-element of said fingers extend less than one-half the interspace between adjacent ribs.

26. A clip holder as claimed in claim 23 wherein each rib includes a jaw bumper adapted to displace the finger carrying rib further from said interspace upon insertion of said clip carrying jaws.

27. A clip holder as claimed in claim 26 wherein each finger carrying rib includes two jaw bumpers which are disposed on opposing arcuate segments of the respective rib.

28. A clip holder as claimed in claim 26 wherein said jaw bumper has a leading edge slope which varies the displacement of said finger carrying rib dependent upon a position of said clip carrying jaw adapted to be inserted into said interspace between adjacent ribs.

29. A clip holder as claimed in claim 19 wherein each finger tab is disposed substantially in a horizontal plane.

30. A clip holder as claimed in claim 19 wherein each finger tab has a forked end with the aperture defined therebetween.

31. A clip holder as claimed in claim 30 wherein the aperture has a rectangular shape.

32. A clip holder as claimed in claim 30 wherein the aperture has a keyhole shape.

**33.** A clip holder as claimed in claim 19 wherein the aperture is round.

**34.** A clip holder as claimed in claim 19 wherein an end of the at least one finger tab has a slit extending to the aperture allowing the aperture to flex open.

**35.** A clip holder as claimed in claim 34 wherein the aperture is round.

**36.** A method of retaining surgical clips and retrieving said surgical clips with clip carrying jaws of a clip appliance comprising the steps of:

supporting and retaining said clips with an interference fit about substantially the entirety of underside of said clip;

providing a flexible rib cage acting as arcuate guides spaced entirely apart from said retained clips;

providing an aperture on a finger tab for receiving a portion of a leg of each of said clips;

guiding said clip carrying jaws of said clip appliance through adjacent rib guides towards said clip while flexing said adjacent rib guides laterally outboard;

flexing the finger tabs with the clip carrying jaws to thereby remove the leg from the aperture;

gripping a clip with said clip carrying jaws and withdrawing said clip from said interference fit and then permitting said adjacent rib guides to return to an initial position.

**37.** A method as claimed in claim 36 including the step of gently compressing a top end of said clip when said clip is retained with said interference fit and including the step of laterally withdrawing the compression of the clip end upon flexion of said adjacent rib guides.

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