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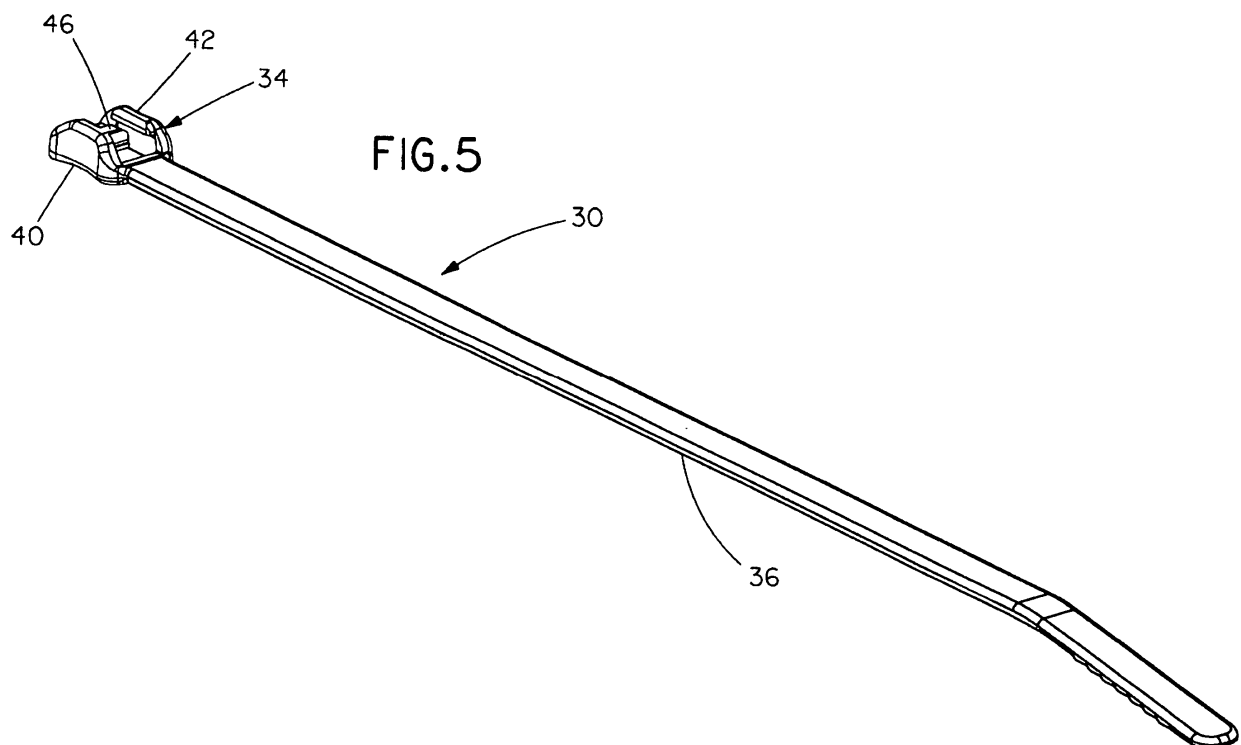
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(54) **Releasable in-line cable tie**

(57) A cable tie includes a strap having a first end and a second end opposite the first end and a head (34) secured to the first end of the strap. The head has a first side wall (40), a second side wall (42), an end wall (44)

and a top wall (46) defining therebetween a strap accepting channel (48). The top wall extends from the first side wall toward the second side wall and covers only a portion of the channel.



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Description

Cross-Reference to Related Applications

[0001] This application claims priority to U.S. Provisional Application Serial No. 60/707,595, filed on August 12, 2005, the entirety of which is hereby incorporated by reference.

Background of the Invention

[0002] The present invention is directed to a cable tie having a locking head at a first end that secures a second end of a strap to form a loop fastener and, more particularly, an in-line cable tie having a releasable locking mechanism that allows removal of the second end of the strap from the locking head without destroying the locking mechanism such that a cable tie can be removed and reused.

[0003] FIGS. 1-4 illustrate the in-line cable tie disclosed in U.S. D444,054, owned by the Assignee of the present application, which is incorporated herein by reference. However, this in-line cable tie is not releasable or reusable.

[0004] U.S. Pat. No. 5,193,250, also owned by the Assignee of the present application, discloses a releasable cable tie. However, this cable tie is not an in-line cable tie and, thus, cannot be easily released by hand by applying upward force to the cable tie.

Summary of the Invention

[0005] It would be desirable to provide a releasable cable tie that may be applied with a hand tool without automatically releasing.

[0006] It would also be desirable to provide a releasable cable tie that acts as a tension-limiting device.

[0007] It would further be desirable to provide a releasable cable tie that is easily releasable by hand by applying upward force to the cable tie.

[0008] It would also be desirable to provide a releasable cable tie having a low profile locking head.

Brief Description of the Figures

[0009] FIG. 1 is a top perspective view of a cable tie according to the prior art;

[0010] FIG. 2 is a rear view of the cable tie of FIG. 1;

[0011] FIG. 3 is a top perspective view of the cable tie of FIG. 1, shown surrounding a bundle of wires;

[0012] FIG. 4 is a partial front view of the cable tie of FIG. 3;

[0013] FIG. 5 is a top perspective view of a cable tie according to a first embodiment of the present invention;

[0014] FIG. 6 is a partial rear perspective view of the cable tie of FIG. 5;

[0015] FIG. 7 is a partial front view of the cable tie of FIG. 5;

[0016] FIG. 8 is a top perspective view of the cable tie of FIG. 5, shown surrounding a bundle of wires;

[0017] FIG. 9 is a partial front view of the cable tie of FIG. 8;

5 **[0018]** FIG. 10 is a partial cross-sectional view taken along lines 10-10 of FIG. 9;

[0019] FIG. 11 is a partial cross-sectional view taken along lines 11-11 of FIG. 10;

10 **[0020]** FIG. 12 is a partial enlarged top perspective view of the cable tie of FIG. 8;

[0021] FIG. 13 is a front sectional view of the cable tie of FIG. 12, with the strap broken away and showing the cable tie as it is released;

15 **[0022]** FIG. 14 is a partial top perspective view of a cable tie according to a second embodiment of the present invention;

[0023] FIG. 15 is a partial rear perspective view of the cable tie of FIG. 14;

20 **[0024]** FIG. 16 is a partial front view of the cable tie of FIG. 14;

[0025] FIG. 17 is a top perspective view of the cable tie of FIG. 14, shown surrounding a bundle of wires;

[0026] FIG. 18 is a partial front view of the cable tie of FIG. 17;

25 **[0027]** FIG. 19 is a front sectional view of the cable tie of FIG. 17, showing the cable tie as it is released;

[0028] FIG. 20 is a partial top perspective view of the cable tie of FIG. 8, shown attached to a hand tool;

30 **[0029]** FIG. 21 is a partial side view of the hand tool and cable tie of FIG. 20;

[0030] FIG. 22 is a partial side view of the hand tool and cable tie of FIG. 20, showing the hand tool prior to cutting the cable tie; and

35 **[0031]** FIG. 23 is a partial top perspective view of the hand tool and cable tie of FIG. 20, showing the hand tool after cutting the cable tie.

Detailed Description of Preferred Embodiments

40 **[0032]** FIGS. 5-23 illustrate releasable in-line cable ties 30, 130. Specifically, FIGS. 5-13 and 20-23 are directed to cable tie 30, and FIGS. 14-19 are directed to cable tie 130. Cable ties 30, 130 are integrally molded from a suitable polymeric thermoplastic material, such as 6.6 nylon securing a bundle of cables 32, 132. It is likewise contemplated that cable ties 30, 130 may be molded from other grades of nylon or non-nylon material.

[0033] As shown in FIG. 5, cable tie 30 includes a head 34 and a strap 36. Strap 36 is formed in any desired length necessary to encompass the diameter of the object to be fastened. As best seen in FIG. 10, strap 36 includes a plurality of teeth 38 longitudinally spaced along an inner surface of strap 36.

50 **[0034]** As best seen in FIG. 6, head 34 is formed with first and second side walls 40 and 42, end wall 44 and top wall 46 that define therebetween a strap positioning channel 48 (see FIG. 7). Locking wedge 50 is attached to end wall 44 by pivotal hinge 52, and wedge 50 has a

plurality of teeth 54. As shown in FIG. 10, teeth 54 engage teeth 38 of strap 36 when strap 36 is inserted into channel 48.

[0035] As shown in FIGS. 20-23, cable tie 30 can be applied using a standard cable tie tensioning and strap severing application tool, such as hand tool 56. Strap 36 can be used for temporary bundling while a harness or wire bundle is being built, and then cut off at the end for a clean final assembly with no tail protruding from head 34, as best seen in FIG. 23.

[0036] As shown in FIG. 7, top wall 46, or partial bridge 46, extends from first side wall 40 of head 34 and covers approximately half of channel 48. Thus, strap 36 is supported not only by first and second side walls 40 and 42, but also partially by bridge 46. This design allows strap 36 to be lifted by hand or hand tool 56, without automatically releasing cable tie 30. As shown in FIGS. 12 and 13, cable tie 30 may be released only by twisting strap 36 in a certain direction.

[0037] In operation, strap 36 is secured within head 34 using a hand or hand tool 56, as shown in FIG. 20. Hand tool 56 then trims excess strap 36, leaving the cable tie shown in FIG. 23. Because strap 36 is supported by first and second end walls 40 and 42, as well as bridge 46, strap 36 may be lifted by hand or by hand tool 56 without releasing cable tie 30. As best seen in FIG. 12, cable tie 30 may be released only by twisting strap 36 in a counterclockwise direction. As shown in FIG. 13, second side wall 42 deflects outward, thus allowing strap 36 to exit channel 48. It is likewise contemplated that bridge 46 may extend from second side wall 42. In such an arrangement, cable tie 30 would be released by twisting strap 36 in a clockwise direction. In either orientation, cable tie 30 may be applied with hand tool 56 without automatically releasing.

[0038] FIGS. 14-19 illustrate cable tie 130. Cable tie 130 is similar to cable tie 30 shown in FIGS. 5-13 and 20-23, except cable tie 130 lacks a top wall or partial bridge. Thus, cable tie 130 has an open top, as best seen in FIG. 16. Strap 136 may be released from head 134 by lifting upwards using a hand or hand tool, as best seen in FIG. 19. The upward force (in the direction of the arrow) creates a sideways force component on the first and second side walls 140 and 142 causing the side walls 140 and 142 to deflect outward, thus allowing strap 136 to exit strap positioning channel 148. In addition to being releasable and reusable, cable tie 130 acts as a tension-limiting device, preventing an object from being bundled tightly with a hand tool. This is an important feature for cable ties used with communication wires, because over-tightening can cause loss of transmission performance.

[0039] The releasable in-line cable tie may be applied with a hand tool without automatically releasing. Alternatively, the releasable in-line cable tie may act as a tension-limiting device. It should be noted that the above-described illustrated embodiments and preferred embodiments of the invention are not an exhaustive listing of the form such a releasable in-line cable tie in accordance

with the invention might take; rather, they serve as exemplary and illustrative of embodiments of the invention as presently understood.

Claims

1. A cable tie comprising:

a strap having a first end and a second end opposite the first end; and
a head secured to the first end of the strap, the head having a first side wall, a second side wall, an end wall and a top wall defining therebetween a strap accepting channel,

wherein the top wall extends from the first side wall toward the second side wall and covers only a portion of the channel.

2. The cable tie of claim 1, wherein the top wall covers approximately half of the channel.

3. The cable tie of claim 1, wherein the strap is released from the head by twisting the strap in a clockwise or counterclockwise direction.

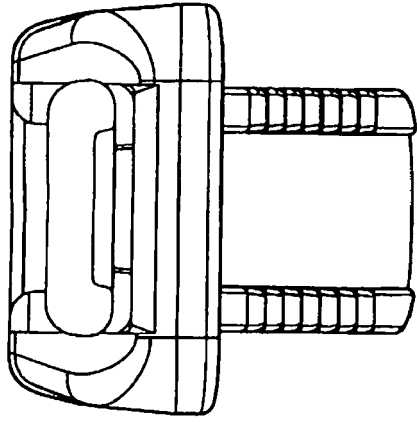
4. The cable tie of claim 3, wherein upon twisting the strap in the clockwise or counterclockwise direction, the first side wall deflects away from the second side wall allowing the strap to be released from the head.

5. A cable tie comprising:

a strap having a first end and a second end opposite the first end; and
a head secured to the first end of the strap, the head having a first side wall, a second side wall and an end wall defining therebetween a strap accepting channel,

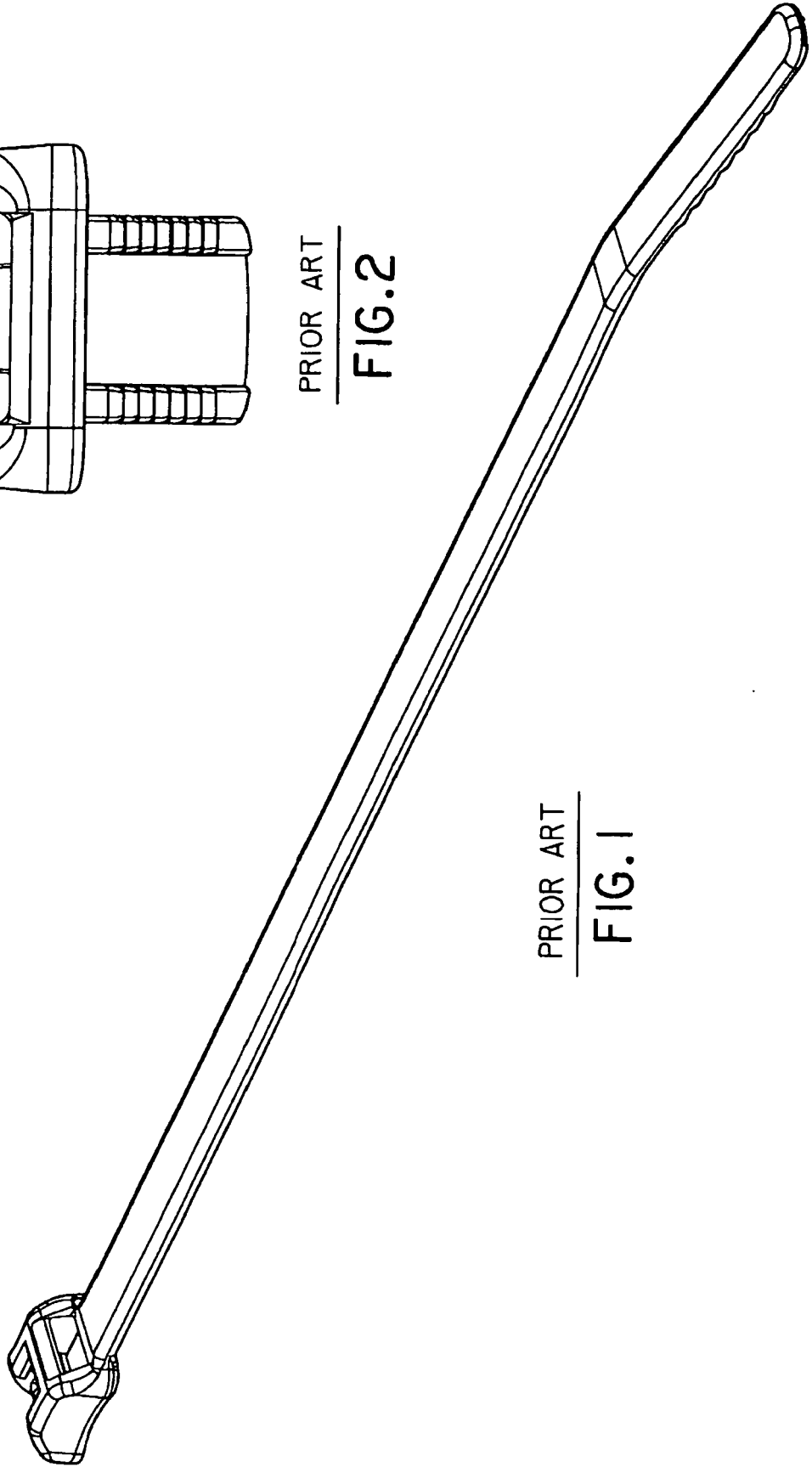
wherein the strap is released from the head by pulling the strap away from the end wall.

6. The cable tie of claim 5, wherein upon pulling the strap away from the end wall, the first side wall deflects away from the second side wall allowing the strap to be released from the head.



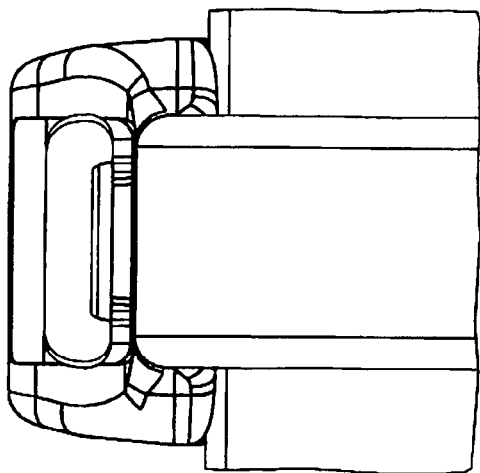
PRIOR ART

FIG. 2

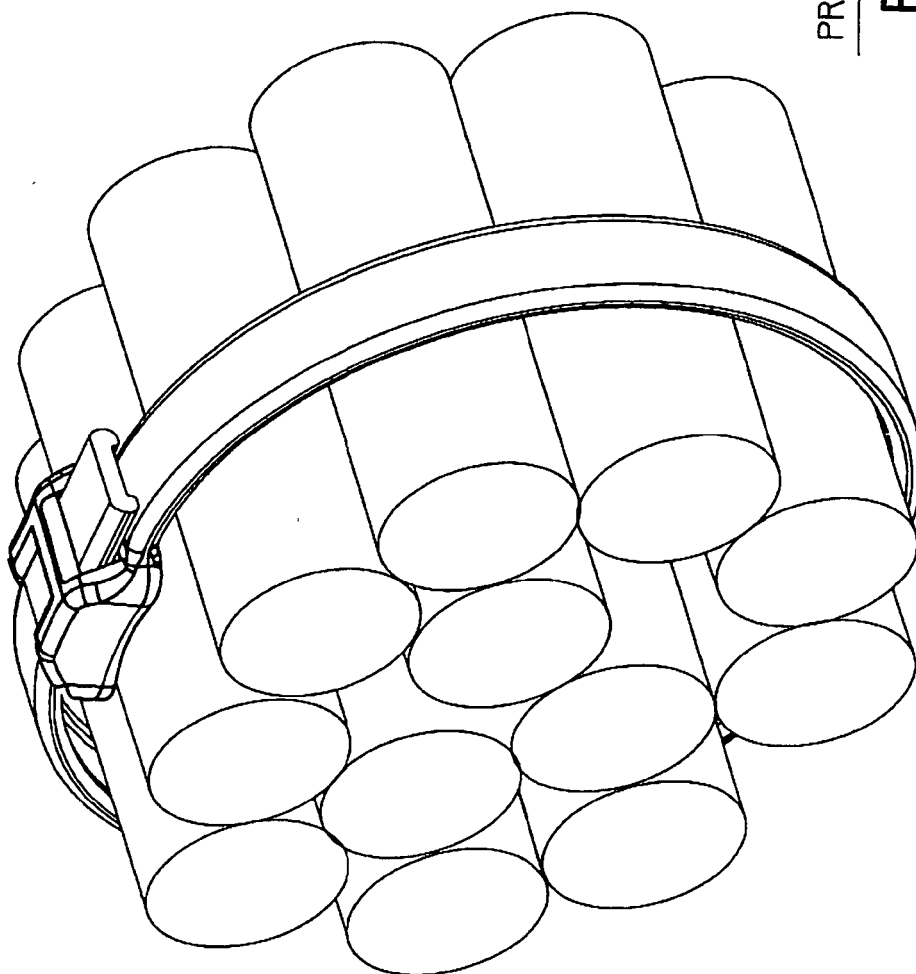


PRIOR ART

FIG. 1



PRIOR ART
FIG. 4



PRIOR ART
FIG. 3

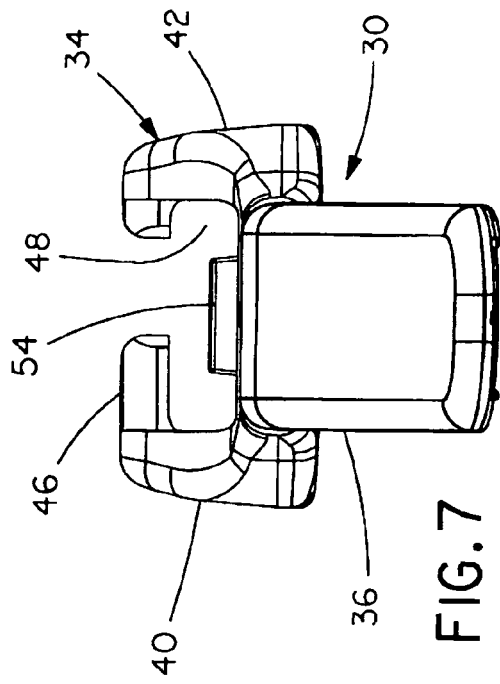


FIG. 7

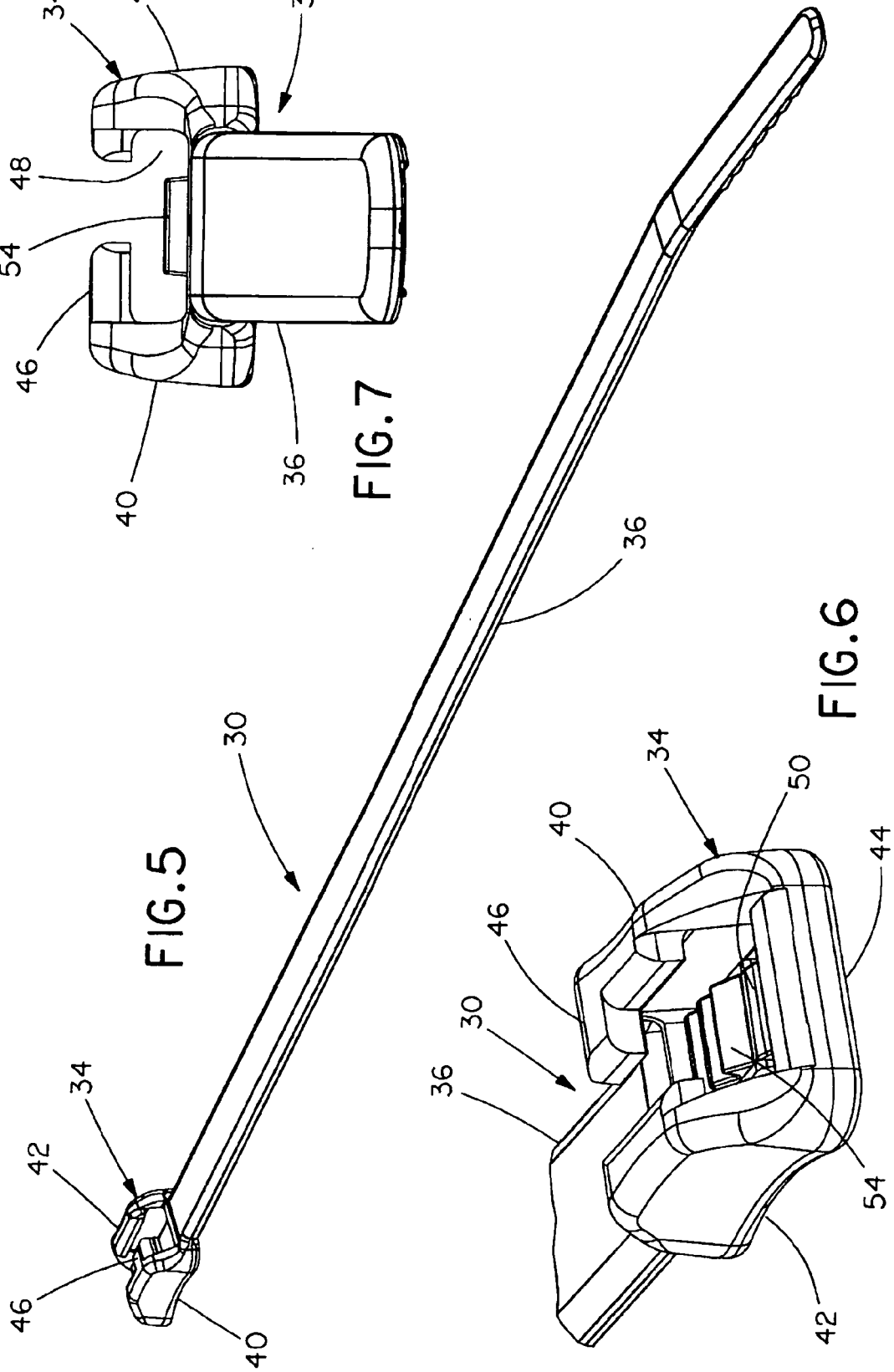


FIG. 5

FIG. 6

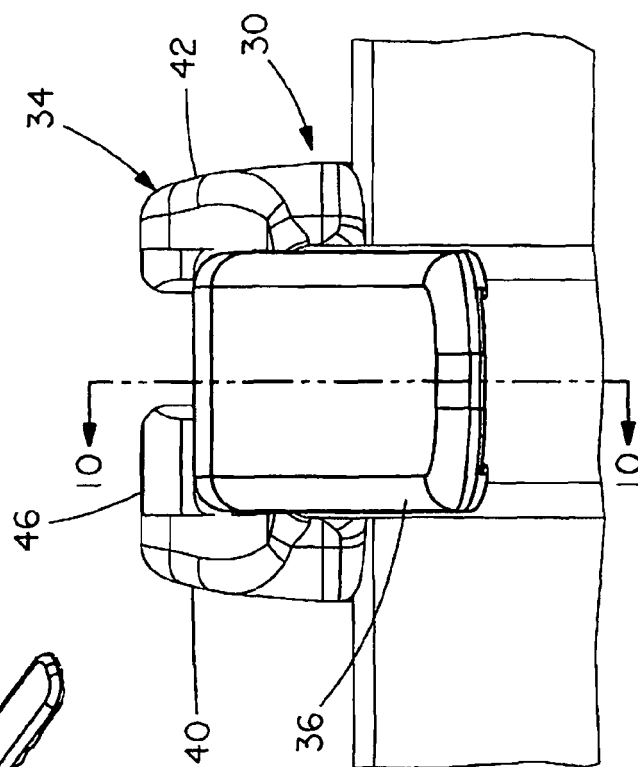
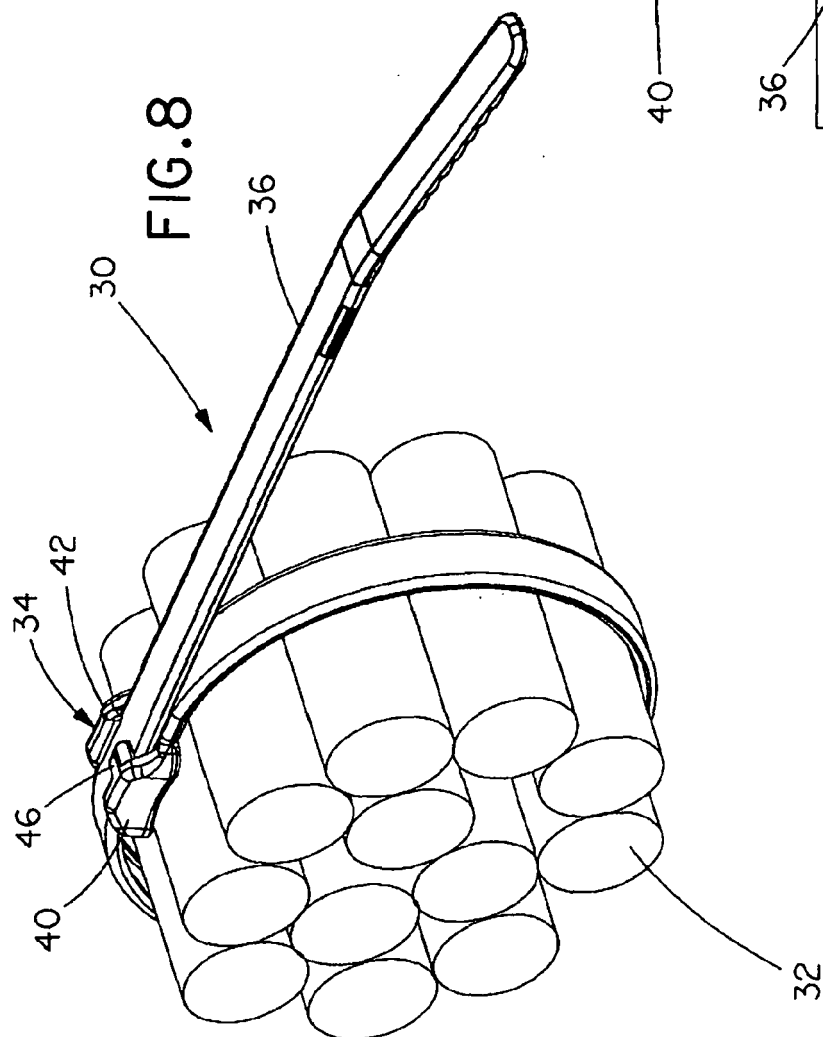


FIG. 9

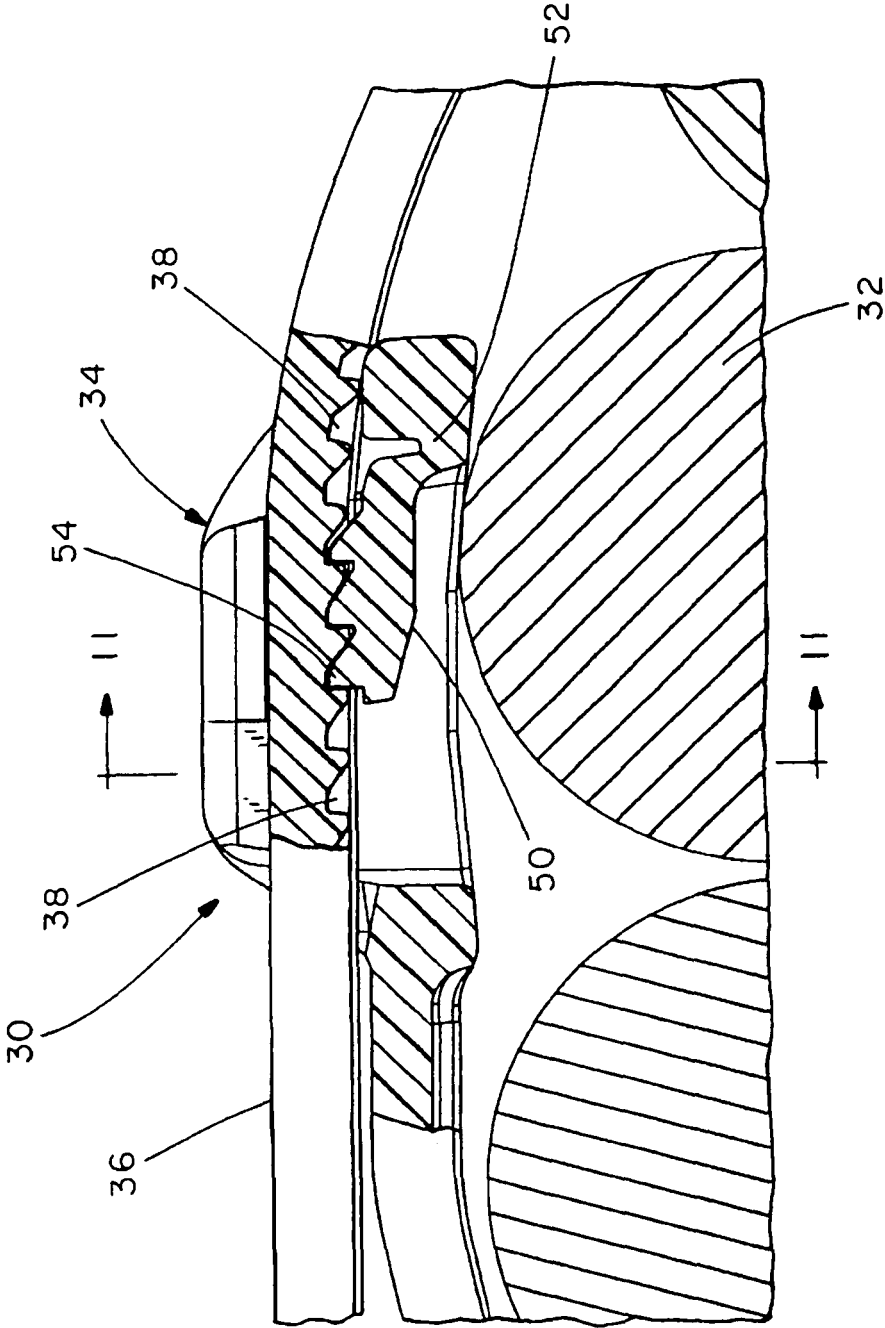


FIG.10

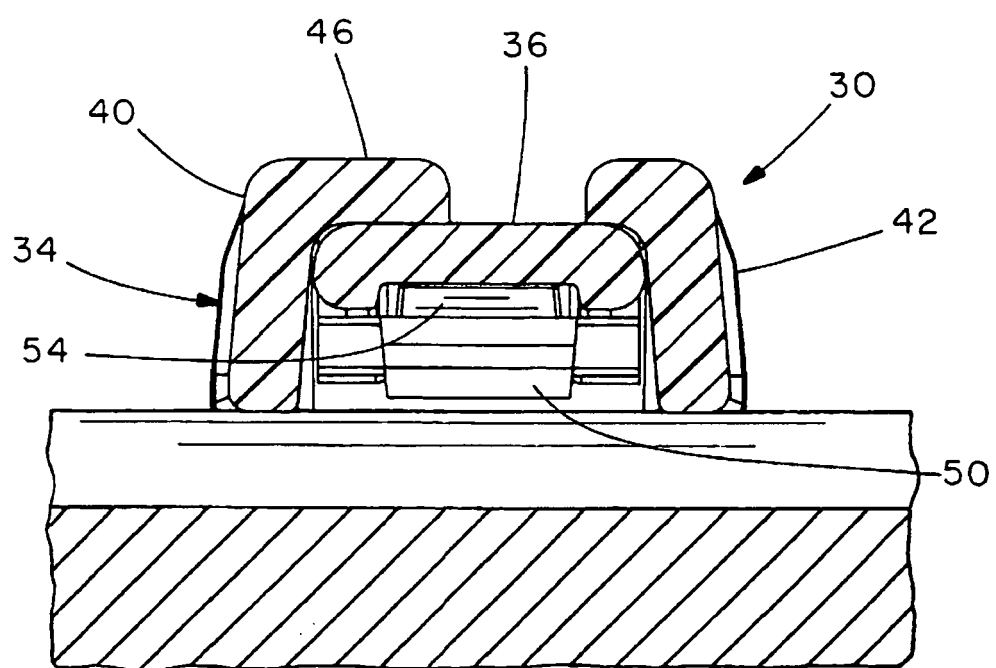
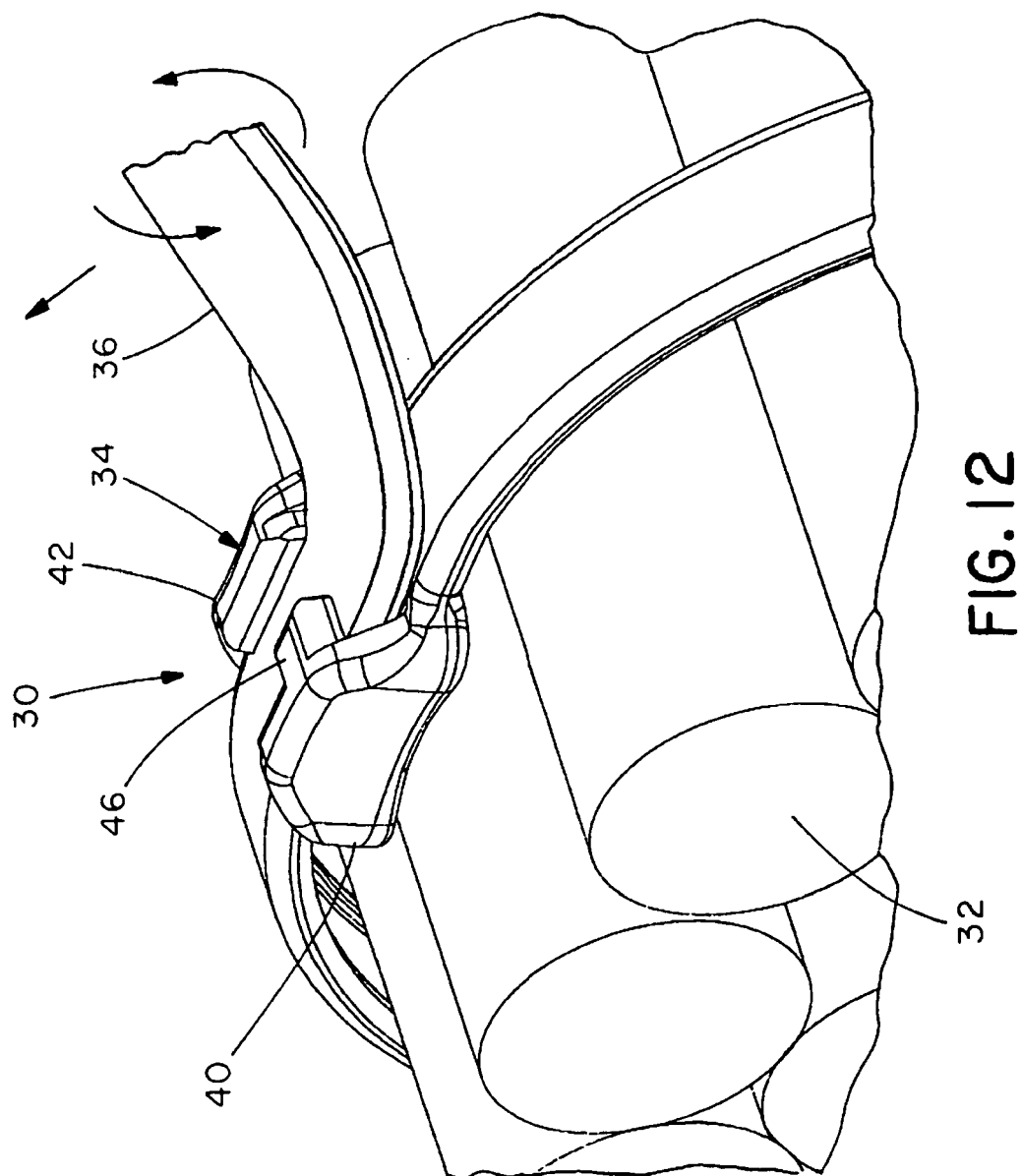


FIG. 11



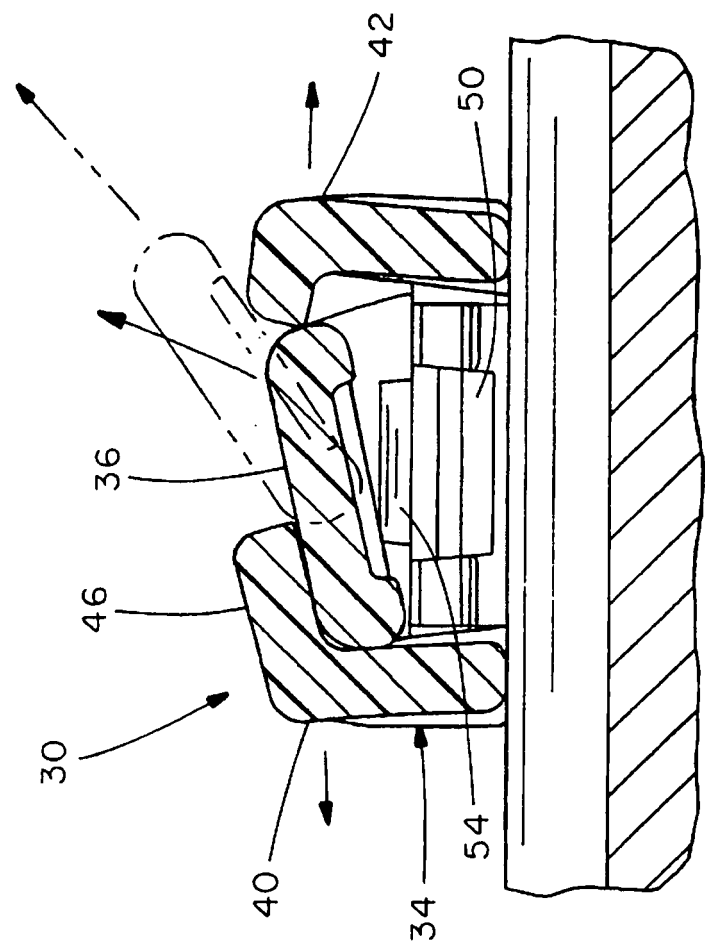


FIG. 13

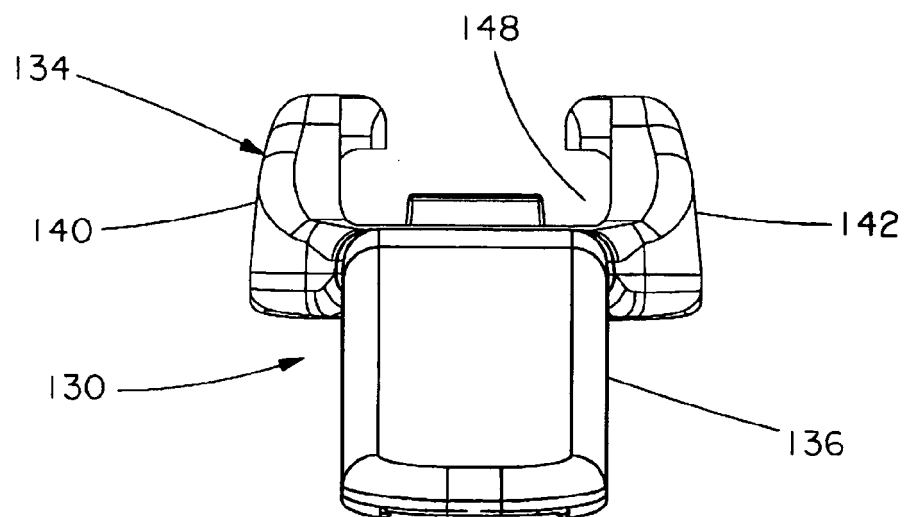
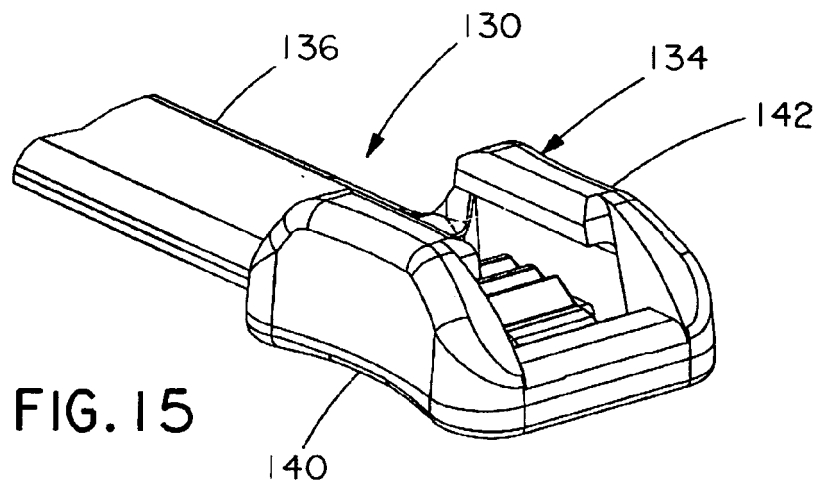
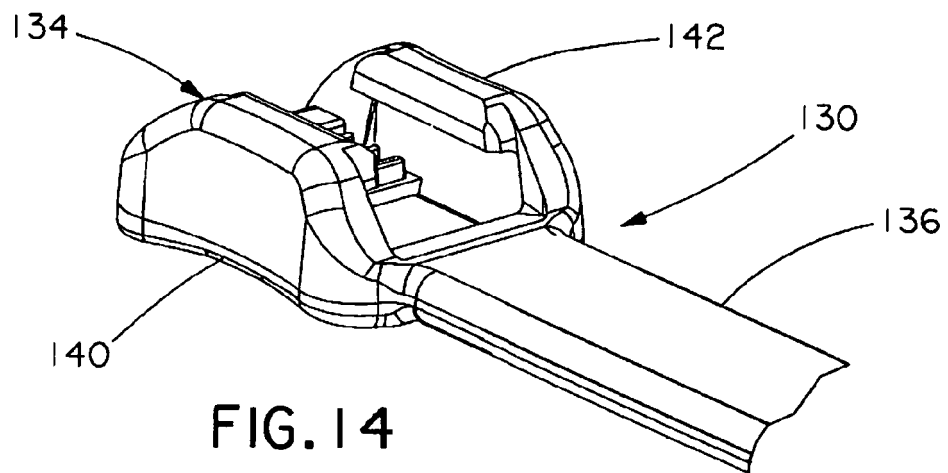
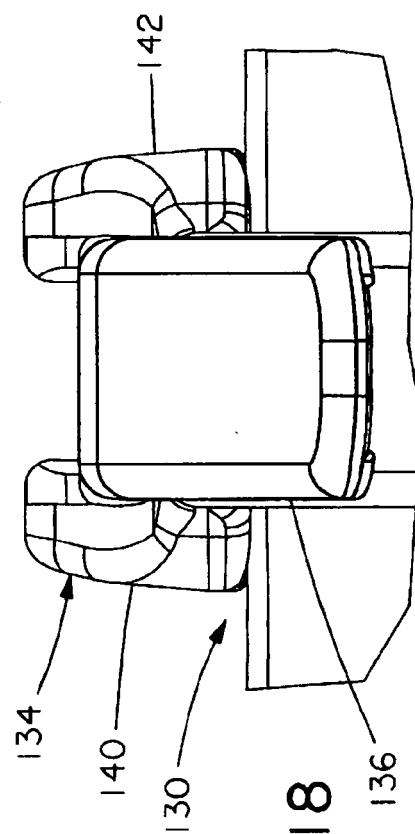
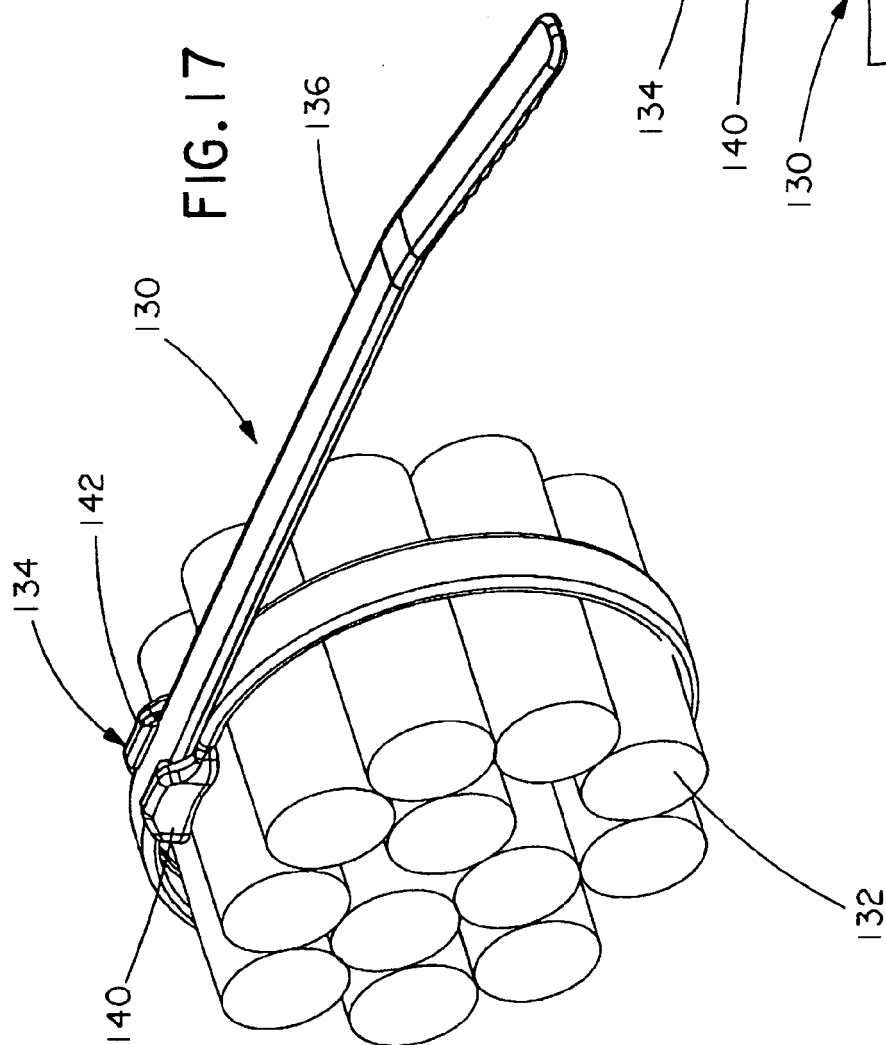


FIG. 16



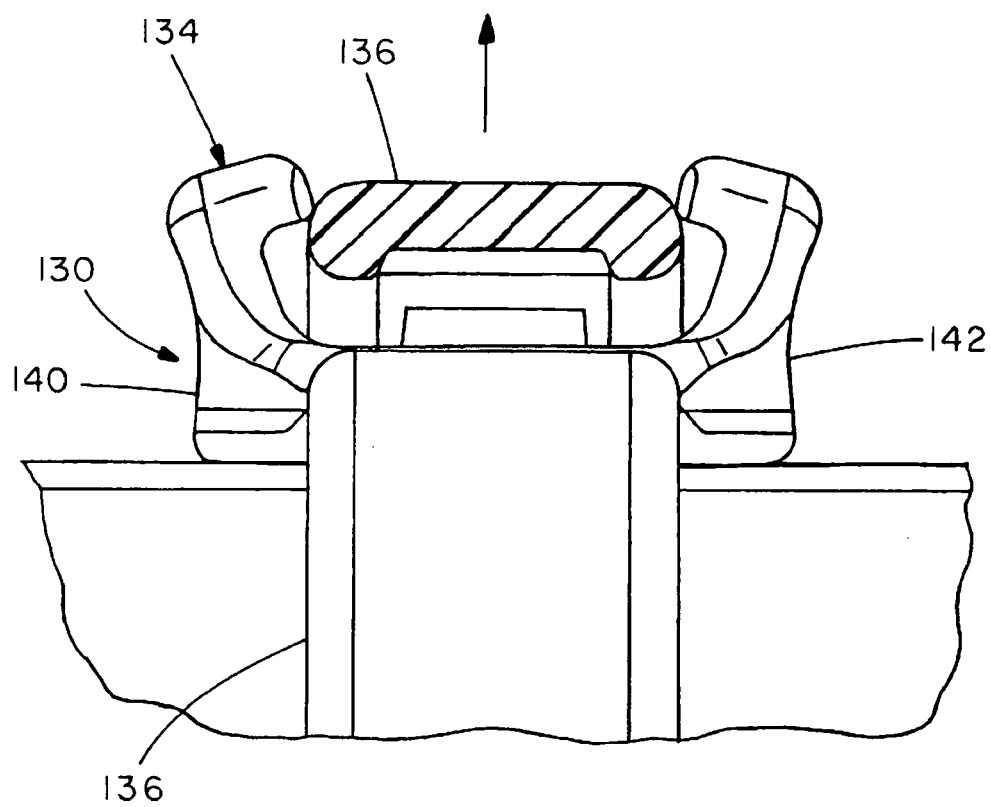
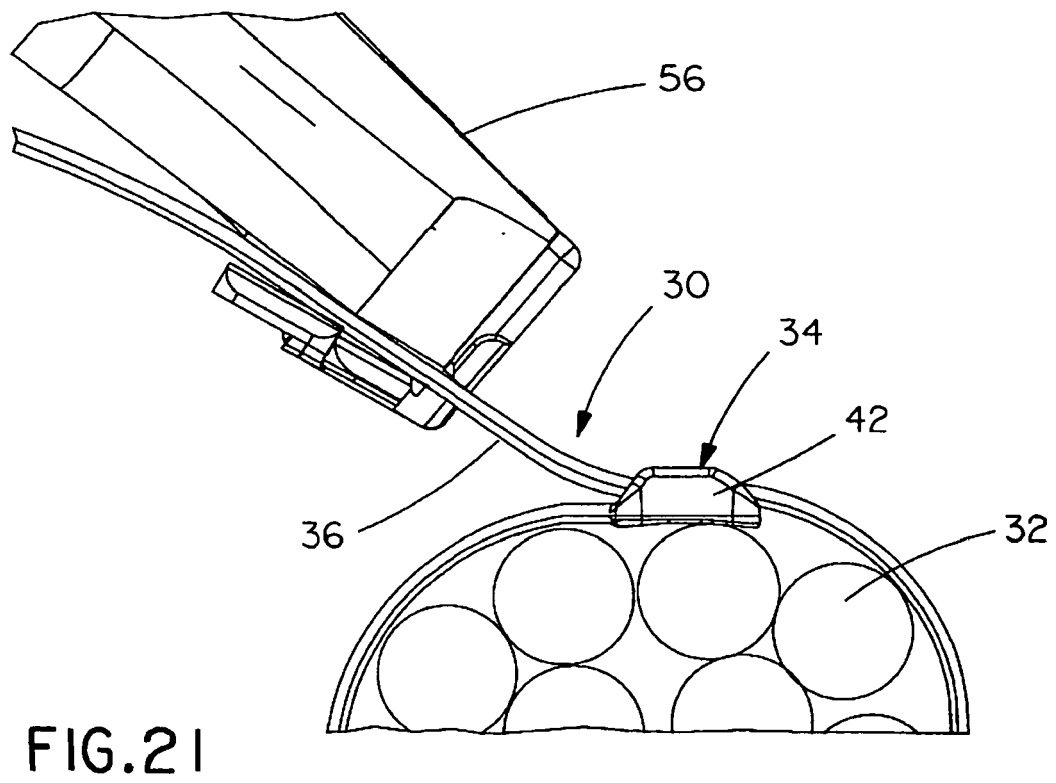
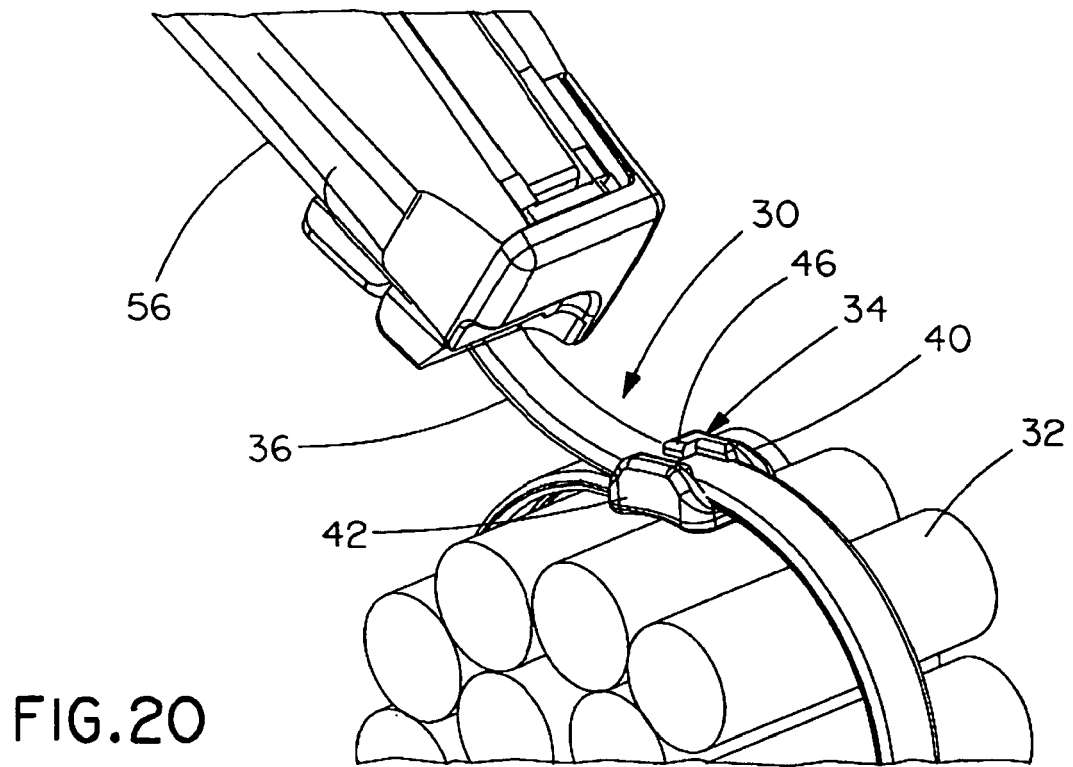


FIG.19



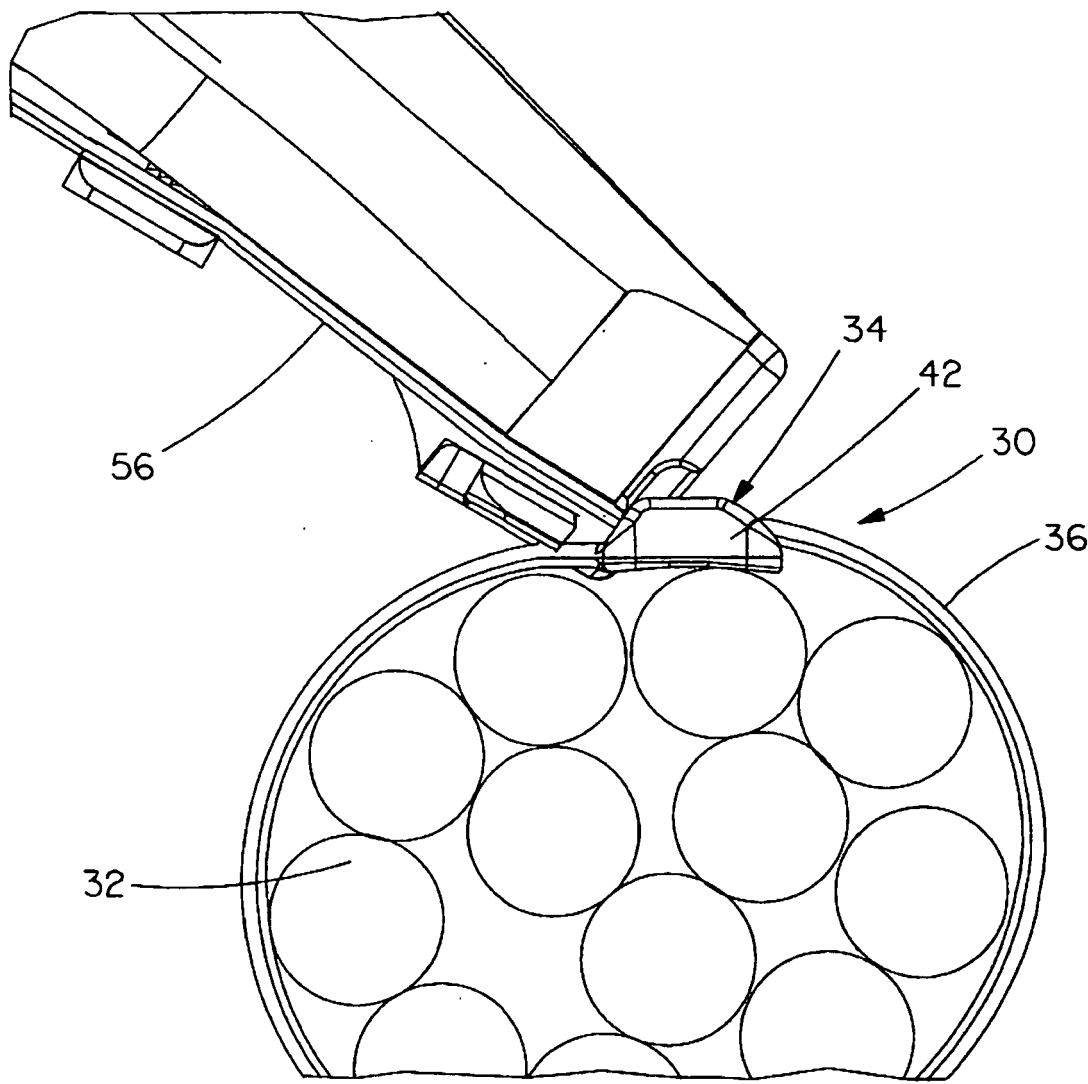


FIG.22

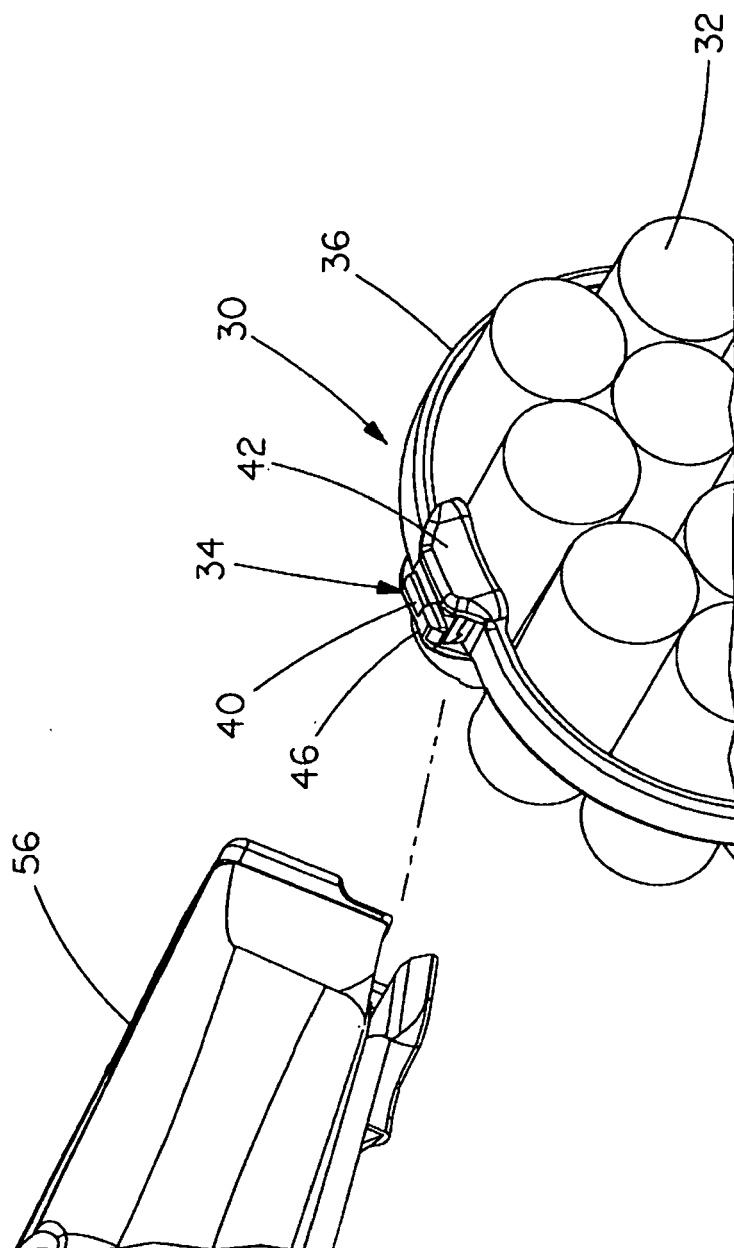


FIG. 23

REFERENCES CITED IN THE DESCRIPTION

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