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(54) Title: CLIP NUTS

(57) **Abstract:** A metal nut (N) is held by a plastic clip-body (12). The clip-body (12) has an open end that includes a cam section for camming a member into the open end. It also includes an annular locator wall that extends upwardly from the bottom wall of the clip-body. The upper end of this locator wall is formed to slope upwardly as it extends inwardly from the open end of the clip-body. The sloping upper end of the locator wall helps to cam the member into the clip-body. The clip-body includes a top wall having a transverse end section (15) and sidewalls that extend upwardly from the top wall between the end section (15) and the free end of the top wall.

Description

CLIP NUTS

Related Application

5 This application claims priority to provisional application Serial No. 60/213,302, filed June 22, 2000, and entitled Clip Nuts.

Technical Field

10 The present invention relates to improvements in clip nuts. More particularly, it relates to the provision of clip nuts that are simple in design, are capable of being mass-produced in an economical manner, and which will not scratch the surfaces or contribute to any corrosion of a metal member upon which they are installed.

Background of the Invention

15 Clip nuts are adapted to clip onto a first member to which a second member is to be joined by use of a connector bolt or screw that extends through openings in the two members and screws into the clip nut. An example clip nut is disclosed by U.S. Patent No. 4,219,064, granted August 26, 1990, to Anthony H. Lozano, and
20 assigned to the Shur-Lok Corporation of Irvine, California. This patent and the patent publications referred to in it provide an adequate background to this invention and are thus hereby incorporated herein for that purpose.

25 There is a need for an easy to manufacture clip nut that will not mar the surfaces of the member on which the clip nut is installed. An object of the present invention is to provide such a clip nut.

Brief Summary of the Invention

30 The present invention provides a plastic clip nut that is easy to install onto an edge portion of a panel and which is constructed to minimize the scratching or marring of the surfaces of the panel.

Another object of the invention is to provide a clip nut having a plastic clip-body and a metal nut secured to the body in a manner permitting the nut to float in an amount sufficient to make
35 it easy to insert a bolt into the nut. The plastic body is

constructed to adequately brace the metal nut and prevent it from turning while the screw is being screwed into the metal nut.

Clip nuts of the present invention are basically characterized by a clip-body constructed from plastic and including a transverse hinge section in its top wall, close to where the top wall joins an end wall. Sidewalls are provided on the top wall. They extend upwardly from the top wall substantially throughout the full extent of the top wall between the hinge section and an open end of the clip-body opposite the end wall. The sidewalls stiffen the top wall and substantially restrict bending of the top wall to the hinge section region of the top wall.

An aspect of the present invention is to provide a clip-body having a top wall and a bottom wall in which the top wall includes an opening in a region of the top wall that is substantially parallel to the bottom wall, and in which the top wall slopes downwardly as it extends from the transverse hinge section to the region in the top wall that includes the opening.

Another aspect of the invention is to provide a cam section at the open end of the clip-body, having a cam surface that slopes upwardly and endwise outwardly at the open end of the clip-body. The cam surface serves to cam a member into the clip-body between the top and bottom walls of the clip-body.

A further aspect of the invention is to provide the bottom wall with an opening and an annular locator wall extending up from the bottom wall around the opening. In preferred form, the annular locator wall has an upper end that is in a plane that slopes upwardly as it extends inwardly of the clip-body from the open end of the clip-body. This end surface of the annular locator wall serves to cam a member into the clip-body between the top and bottom walls of the clip-body.

In one embodiment, the top wall includes a pair of laterally extending fences on opposite sides of the opening in the first end of the top wall. A nut is provided which includes a base having end edges that are substantially parallel to the fences. The width of the base of the nut between the end surfaces is smaller than the distance between the two fences. Preferably also, the base of the

nut includes side edges that are spaced apart a distance smaller than the spacing across the clip-body between the sidewalls.

A further aspect of the invention is to provide a clip-nut having a pair of aligned openings in the sidewalls for receiving
5 tabs that project laterally outwardly in opposite directions from the base of the nut. The openings have widths that are wider than the widths of the tabs.

According to yet another aspect of the invention, the sidewalls include reinforcing arches at the locations of the
10 openings in the sidewalls.

Objects, advantages and features of the invention will become apparent from the description set forth below, from the drawings, and from the principles that are embodied in the specific structures that are illustrated and described.

15 **Brief Description of the Several Views of the Drawing**

Like reference numerals and letters refer to like parts throughout the several views of the drawing, and:

Fig. 1 is a plan view of a preferred embodiment of the invention, such view showing a metal nut member mounted in a
20 plastic clip body;

Fig. 2 is a side elevational view of the clip nut shown by Fig. 1, with the metal nut member disconnected from the plastic clip body and spaced above it;

Fig. 3 is an enlarged scale sectional view taken through an alignment flange portion of the plastic clip body, such view being
25 taken substantially along line 3--3 of Fig. 4;

Fig. 4 is a plan view opposite the Fig. 1 plan view;

Fig. 5 is a view like Fig. 2, but with the metal nut member connected to the plastic clip body, and with the metal nut member
30 and portions of the plastic clip body shown in section, said section being taken substantially along line 5--5 of Fig. 6, such view also showing the clip nut clipped onto a panel;

Fig. 6 is another plan view like Fig. 1 but with a portion of the plastic clip shown in section, such section being taken
35 substantially along line 6--6 of Fig. 5;

Fig. 7 is a pictorial view of a modified form of clip nut, such view being taken from above and looking down towards the top,

the open end and one side of the clip nut, and showing the nut exploded up away from the clip-body;

Fig. 8 is a view like Fig. 7, but showing the nut secured to the clip-body;

5 Fig. 9 is a top plan view of the clip nut shown by Fig. 7 and 8;

Fig. 10 is a side elevational view of the clip nut shown by Figs. 7-9;

10 Fig. 11 is a longitudinal sectional view taken substantially along line 11--11 of Fig. 9;

Fig. 12 is a cross sectional view taken substantially along line 12--12 of Fig. 10;

Fig. 13 is a sectional view taken substantially along line 13--13 of Fig. 12;

15 Fig. 14 is a sectional view taken substantially along lines 14--14 of Fig. 12; and

Fig. 15 is a view like Fig. 12, but showing the nut in the process of being inserted into the place for it in the clip-body.

Detailed Description of the Preferred Embodiment

20 The various concepts or principles which make up the invention can be best understood by considering the following description of example embodiments of the invention.

Referring to Figs. 1, 2 and 4-6, the illustrated clip nut 10 comprises a plastic clip body 12, constructed from a structural 25 plastic, and a metal nut member 14. Plastic clip body 12 comprises a first arm portion 17 connected to a second arm portion 16 by an end wall or bight portion 18. The thickness of the arm 17 is reduced by a transverse groove 15 to form a hinge section at the base of the groove 15. Arm portion 17 includes a through opening 30 20. Arm portion 16 includes a rounded end 19 and an annular alignment flange 22 that projects from arm portion 16 towards the opening 20. End 19 may be of substantially circular curvature. Flange 22 includes a sloping end surface 25 and a circular opening 26 (Fig. 3).

35 End portion 24 of arm 17 extends at an angle from the adjacent region of arm portion 17 in which opening 20 is situated. The sloping end surface 25 on the boss 40 makes an acute angle with the

inner surface 26 of arm 16. The diameter of opening 20 is larger than the outside diameter of the annular flange 22. This allows the arm portion 17 to move relative to the arm portion 16 without there being contact between the annular flange 22 and the boundary
5 of opening 20.

Preferably the plastic clip body 12 of the clip nut 10 is molded or otherwise formed in one piece from Torlon™, or a similar structural plastic material. Torlon™ is both strong and flexible.

Torlon™ is disclosed and claimed in U.S. Patent No. 4,902,180,
10 granted February 20, 1990, to Richard F. Gauron. Torlon™ is manufactured by Amoco Performance Products, Inc. of Ridgefield, CT 08677. Torlon™ is a polymer that is tough enough to replace metal. It is highly resistant to wear and fatigue. It is particularly suitable for use in making the plastic clip bodies of
15 the invention because it is both strong and flexible. Most structural plastics are either strong or flexible but not both.

The metal nut member 14 has a base 28 that may be square or rectangular in plan form, as shown by Fig. 1. Metal nut member 14 is essentially the same as the nut 34 shown in the aforementioned
20 U.S. Patent No. 4,219,064 but longer to provide more base metal outwardly of the tubular part 84. The base 28 of the metal nut member 14 includes a pair of tabs 30, 32 which project in opposite directions from the base 28. An upstanding annular member 34 is connected to the base 38. It includes a center opening 40 that is
25 provided with internal threads 42. The longer base provides nut 14 with a larger footprint in contact with the plastic below it. This guards against the lower edge of part 34 cutting into the plastic when a bolt is tightened in the nut 14.

Arm 17 includes a pair of sidewalls 44, 46 that project
30 upwardly from the arm 17 along its opposite sides. Sidewalls 44, 46 include tab receiving openings 48, 50. A side elevation view of opening 48 is shown by Fig. 2. The opening 50 in sidewall 46 preferably is the same as opening 48 in side elevation. The base
28 of the metal nut member 14 is positioned above the arm 17 and
35 its tab 30 is aligned with opening 48. Then the metal nut member 14 is moved towards sidewall 44 until the outer surface of boss 34

moves into recess 52. At that time, the wall section 54 is bendable outwardly enough to allow tab 32 to slip downwardly into opening 50. The tabs 30, 32 and openings 48, 50 mount the metal nut member 14 so that it can "float" relative to the plastic clip member 12, both lengthwise and crosswise. Ribs 56, 58 may be formed on the upper surface of arm 17 laterally outwardly of the base 28. The front and rear edges of the base 28 will contact these ribs 56, 58 as the metal nut member 14 slides sideways on the upper surface of the arm 17.

10 Referring to Fig. 5, an avenue 60 is formed by and between arms 17 and 16. This avenue 60 receives an edge portion of a panel P. This panel P is inserted through opening 60 between arm portion 16 and arm portion 17. This requires the arm portions 16, 17 to move relatively apart until the panel P is between them and an opening 15 64 in the panel P is in alignment with the annular member 22. The reduced thickness section at the base of groove 15 acts as a hinge and is where bending occurs.

Opening 62 is larger in diameter than the outside diameter of the annular member 22. Thus, when annular boss 22 is aligned with the opening 62, the annular boss 22 quite readily moves into the opening 62 in the panel P. When the panel P is between the arm portions 17, 16, one surface of it is in contact with the inner surface of the upper arm portion 17. Initially, the two inside surfaces of the arm portions 17, 16 may be at a slight angle to each other.

The sidewalls 44, 46 stiffen the upper arm 14 and give it a channel shape cross section throughout most of its length. The surfaces of the plastic clip body 12 that contact the panel P when the panel P is inserted through the avenue 60 are all soft and smooth surfaces that will not mar or scratch the material from which the panel P is made. Sloping surfaces 24, 25 help cam the panel P into the plastic clip body 12. When the clip nut 10 is installed on to a panel P, another panel (not shown) can be moved against arm 16. Then, the threaded shank of a bolt or screw (not shown) is inserted through opening 26 and threaded into the threaded opening 40. When this bolt is tightened, it will firmly secure the two panels together. Typical connections of this type,

using clip nuts of a different construction, are disclosed by the
aforementioned U.S. Patent No. 4,219,064, and by U.S. Patent No.
3,670,796, granted June 20, 1972, to David W. Grimm; by U.S. Patent
No. 4,375,933, granted March 8, 1983, to Donald H. Hassler and Paul
5 V. Pagel and by U.S. Patent No. 4,676,706, granted June 30, 1987,
to Akio Inaba.

When a bolt (not shown) is inserted through opening 26 and
then threaded into opening 40, the upper member 17 will first bend
in the hinge region below groove 15. As the bolt is tightened, the
10 flat region of member 17 which includes the opening 20 is drawn
down into tight engagement with a portion of the panel P (Fig. 5).
In order for this to happen, there may be some distortion of bottom
arm 16 and end wall 18. The sidewalls 44, 46 hold the top arm 17
relatively rigid except in the region of the hinge section 15. As
15 best shown by Fig. 5, the annular wall 78 projects into the opening
62 in panel P and maintains opening 62 aligned with opening 26.

Figs. 7-15 show a second embodiment of the invention. It is
basically the same as the embodiment shown by Figs. 1-6, but it
will be described in its entirety.

20 The embodiment of Figs. 7-15 is designated 60. It comprises a
plastic clip body 62, constructed from a structural plastic, and a
metal nut member 64. Plastic clip body 62 comprises a first arm
portion 66 connected to a second arm portion 68 by an end wall or
bight portion 70. The thickness of the arm portion 66 is reduced
25 by a transverse groove 72 to form a hinge section 74 at the base of
the groove 72. Arm portion 66 includes a through opening 76. Arm
portion 68 includes a rounded end 69 (e.g. circular) and an annular
alignment flange 78 that projects from arm portion 68 towards the
opening 76. Flange 78 includes a sloping end surface 80 (Fig. 10)
30 and a circular opening 82 (Figs. 12, 14 and 15).

End portion 84 (Figs. 10 and 11) of arm portion 66 extends at
an angle (e.g. 45°) from the adjacent region of arm portion 66 in
which opening 76 is situated. The sloping end surface 80 of the
boss 78 makes an acute angle with the inner surface 88 of arm 68.
35 The diameter of opening 76 is larger than the outside diameter of
the annular flange 78. This allows the arm portion 66 to move
relative to the arm portion 68 without there being contact between

the annular flange 78 and the boundary of opening 76. See Fig. 12. End portion 69 (Fig. 10) of arm portion 68 also extends at an angle (e.g. 45°) from the adjacent inner surface of arm 68. Sloped surfaces 84, 69 function to cam the clip onto a plate P. Sloped surface 69 also provides a lip for receiving a removal tool.

Preferably the plastic clip body 62 of the clip nut 60 is molded or otherwise formed in one piece from Torlon™ or a similar structural plastic material. Torlon™ is both strong and flexible.

Torlon™ is disclosed and claimed in U.S. Patent No. 4,902,180, granted February 20, 1990, to Richard F. Gauron. Torlon™ is manufactured by Amoco Performance Products, Inc. of Richfield, CT 08677. Torlon™ is a polymer that is tough enough to replace metal.

It is highly resistant to wear and fatigue. It is particularly suitable for use in making the plastic clip bodies 62 of the invention because it is both strong and flexible. Most structural plastics are either strong or flexible but not both.

The metal nut 64 is like metal nut 14. Metal nut member 64 is essentially the same as the nut 34 shown in the aforementioned U.S. Patent No. 4,219,068. The base 90 of the metal nut member 64 includes a pair of tabs 92, 94 which project in opposite directions from the base 90. An upstanding annular member 96 is connected to the base 90. It includes a center opening 98 that is provided with internal threads 100 (Fig. 12).

When a bolt is inserted through opening 76 and screwed into the threaded opening 98 in the nut 96, the upper arm 66 will be drawn downwardly towards the lower arm 68. Initially, arm 66 will bend in region 74 below the groove 72. Then, when the flat portion of arm 66 through which opening 76 extends is in contact with a panel that has been inserted between the arms 66, 68. Further tightening of the bolt will cause the end portion that includes opening 76 to move flat against the adjacent surface of the panel. In order for this to happen, there is some more give in the regions 68, 70, 72, 74.

In both embodiments, the panel that is inserted between the upper and lower arms may be thicker than the static distance between the upper and lower arms at the open end of the clip member 62. At first, the insertion of the panel between the arms will

spread the arms apart and make them diverge apart somewhat at the open end of the clip member 62. Then, when the bolt is screwed into the nut, the end portion of arm 66 will be drawn down flat against the panel. This will cause some bending in region 74 below the groove 72. It might also cause some distortion of member 68 relative to member 70 and member 70 relative to member 66.

Arm 68 includes a pair of sidewalls 102, 104 that project upwardly from the arm 66 along its opposite sides. Sidewalls 102, 104 include tab receiving openings 106, 108. A side elevation of opening 106 is shown in Fig. 10. A side elevation of opening 108 is shown in Fig. 11. Thus, it can be seen, the two openings 106, 108 are essentially the same in size and shape. Referring to Fig. 13, the upper surface 110 of arm 66 is flat where it surrounds opening 76. Side extensions 112, 114 of surface 110 are substantially coplanar with surface 110. The base 90 of the nut member 64 rests on the surface 110 and the coplanar bottom surfaces of the tabs 92, 94 rest on the surfaces 112, 114. Fig. 15 shows tab 92 being placed in opening 106. Tab 90 is then pushed downwardly until it snaps into opening 108. Once in the openings 106, 108, the tabs 92, 94 mount the metal nut member 64 so that it can "float" relative to the plastic clip member 62. Fences 116, 118 are parallel to the end edges 120, 122 on the base 90 of the nut member 64. Sidewalls 102, 104 present side fence surfaces 124, 126 that are parallel to each other and to the side edge surfaces 128, 130 on the base 90 of nut member 64. When the nut member 64 is connected to the clip body 62, the nut member 64 can float in position on surfaces 110, 112, 114, both endwise and sidewise of the clip body 62. This "float" allows enough movement of the nut member 64 to assure alignment of the bolt or screw through opening 82 and into threaded opening 98. When the bolt or screw is tightened by a screwdriver or wrench, the torque is reacted by contact of the edge surfaces 120, 122, 128, 130 with the fence surfaces.

As clearly shown by Figs. 7, 8, 12, 13 and 15, the arm 66 is widened in the vicinity of the opening 76 so as to provide material outwardly of and below the openings 106, 108, so as to strengthen the clip member 62 in these regions. It also provides reinforced

side regions for the openings 106, 108. These regions are contacted by the tabs 92, 94 when the bolt or screw is screwed into the threaded opening 98.

The illustrated embodiments are only examples of the present invention and, therefore, are non-limitive. It is to be understood that many changes in the particular structure, materials and features of the invention may be made without departing from the spirit and scope of the invention. Therefore, it is my intention that my patent rights not be limited by the particular embodiments illustrated and described herein.

What is claimed is:

1. In a clip nut comprising a clip-body having a top wall with first and second ends, a bottom wall with first and second ends, an end wall connecting the second end of the top wall to the second end of the bottom wall, and forming a closed end for said clip-body, with the opposite end of the clip-body being open, a pair of sidewalls projecting upwardly from the top wall and including a first pair of aligned openings, and a second pair of aligned openings in the first ends of the top and bottom walls; and

a nut having a base, a tubular body extending upwardly from the base and including an internally threaded central opening, said base including a pair of tabs projecting radially outwardly from it on diametrically opposite locations on said base;

wherein the base of the nut sets on the top wall between the sidewalls and the tabs on the nut extend through the first pair of aligned openings and position the opening in said tubular body in substantial coaxially alignment with the second pair of aligned openings, wherein in use a member is received between the top and bottom walls and a bolt is inserted first through the opening in the bottom wall, then through the member, and is then screwed into the threaded central opening and the improvement comprising:

said clip-body being constructed from plastic and including a transverse hinge section in the top wall closely adjacent where the top wall meets the end wall, and wherein the sidewalls extend upwardly from the top wall substantially throughout the full extent of the top wall between the hinge section and the open end of the clip-body, and wherein the sidewalls stiffen the top wall and substantially restrict bending of the top wall to the hinge section region of the top wall when the screw is tightened.

2. The clip nut of claim 1, wherein the first end of the top wall includes a region that is substantially parallel to the bottom wall and includes the opening that is in the first end of the top wall.

3. The clip nut of claim 2, wherein the top wall slopes

downwardly as it extends from the transverse hinge section to the region that includes the opening.

4. The clip nut of claim 3, wherein the top wall includes a cam section at the first end of the top wall presenting a cam surface that slopes upwardly and endwise outwardly at the open end of the clip-body.

5. The clip nut of claim 4, wherein the first end of the bottom wall is rounded.

6. The clip nut of claim 5, wherein the bottom wall includes an annular locator wall extending up from the bottom wall around the opening in the first end of the bottom wall.

7. The clip nut of claim 6, wherein the annular locator wall has an upper end that is in a plane that slopes upwardly as it extends inwardly of the clip-body from the first end of the bottom wall, whereby the cam wall and the end surface of the annular
5 locator wall both serve to cam the member into the clip-body between the top and bottom walls of the clip-body.

8. The clip nut of claim 1, wherein the top wall includes a cam section at the first end of the top wall presenting a cam surface that slopes upwardly and endwise outwardly at the open end of the clip-body.

9. The clip nut of claim 8, wherein the bottom wall includes an annular locator wall extending up from the bottom wall around the opening in the first end of the bottom wall.

10. The clip nut of claim 9, wherein the annular locator wall has an upper end that is in a plane that slopes upwardly as it extends inwardly of the clip-body from first end of the bottom wall, whereby the cam wall and the end surface of the annular
5 locator wall both serve to cam the member into the clip-body between the top and bottom walls of the clip-body.

11. The clip nut of claim 1, wherein said top wall includes a pair of laterally extending fences on opposite sides of the opening in the first end of the top wall, and the base of the nut has end edges that are substantially parallel to the fences, and the width
5 of the base of the nut between the end surfaces is smaller than the distance between the two fences.

12. The clip nut of claim 11, wherein the base of the nut includes side edges that are spaced apart a distance smaller than the spacing across the clip-body between the sidewalls.

13. The clip nut of claim 12, wherein the first pair of aligned openings have widths that are wider than the widths of the tabs that fit into such openings, whereby the nut floats crosswise and lengthwise of the clip-body a small amount that is restrained
5 by the first pair of openings in the sidewalls, by the lateral space between the sidewalls and by the longitudinal space between the fences.

14. The clip nut of claim 13, wherein the first end of the top wall includes a region that is substantially parallel to the bottom wall and includes the opening that is in the first end of the top wall.

15. The clip nut of claim 14, wherein the top wall slopes downward as it extends from the transverse hinge section to the region that includes the opening.

16. The clip nut of claim 15, wherein the top wall includes a cam section at the first end of the top wall presenting a cam surface that slopes upwardly and endwise outwardly at the open end of the clip-body.

17. The clip nut of claim 16, wherein the bottom wall includes an annular locator wall extending up from the bottom wall around the opening in the first end of the bottom wall.

18. The clip nut of claim 1, wherein the bottom wall is substantially straight and flat and includes an annular locator wall extending up from the bottom wall around the opening in the first end of the bottom wall, wherein the top wall includes a first
5 portion, a second portion and a third portion, said second portion being substantially parallel to the bottom wall and being spaced above the bottom wall in the vicinity of the opening in the bottom wall and the annular locator wall that extends up from the bottom wall, and said first section slopes downwardly from the hinge
10 section to the second section, and the third section is a cam section at the first end of the top wall presenting a cam surface that slopes upwardly and endwise outwardly of the clip-body.

19. The clip nut of claim 18, wherein the top wall has a base at its first end that is below and projects laterally outwardly from the first pair of openings that are in the sidewalls.

20. The clip nut of claim 19, wherein the top wall includes a pair of laterally extending fences on opposite sides of the opening in the first end of the top wall, and the base of the nut has end edges that are substantially parallel to the fences, and the width
5 of the base of the nut between the end surfaces is smaller than the distance between the two fences.

FIG. 1

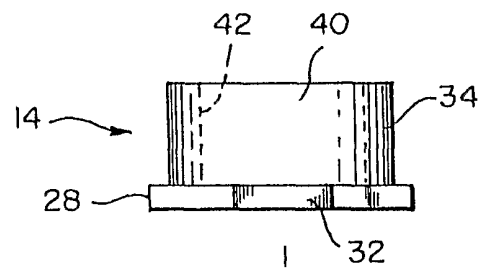
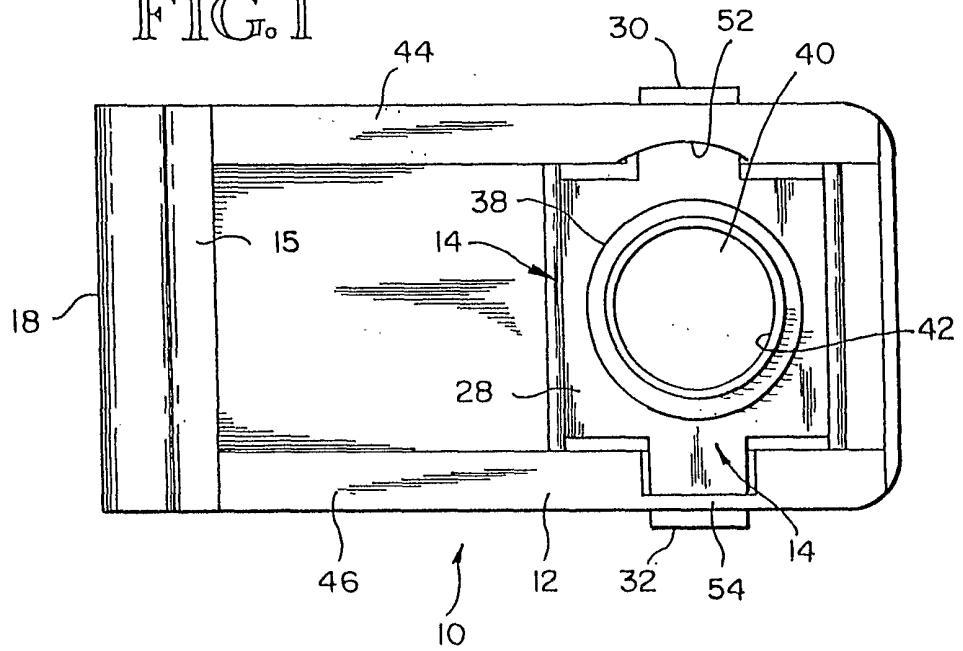


FIG. 2

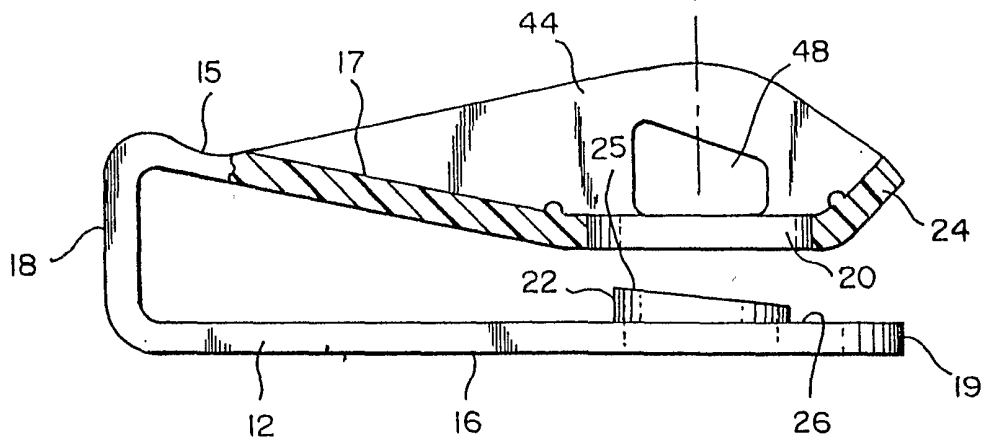


FIG. 3

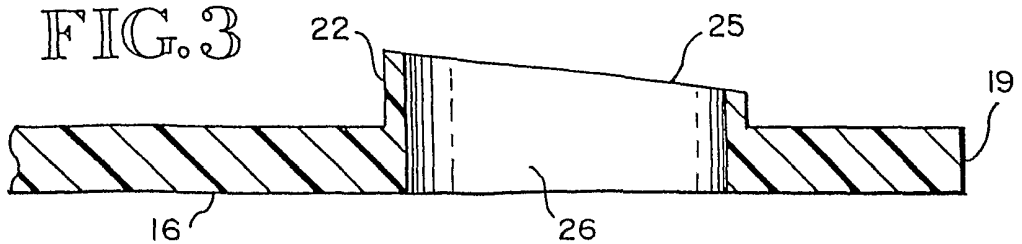


FIG. 4

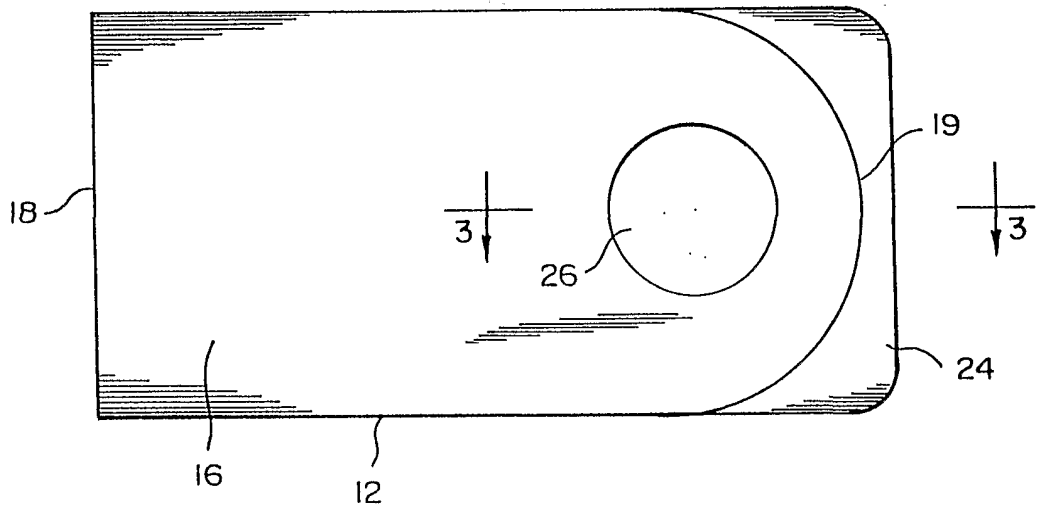


FIG. 5

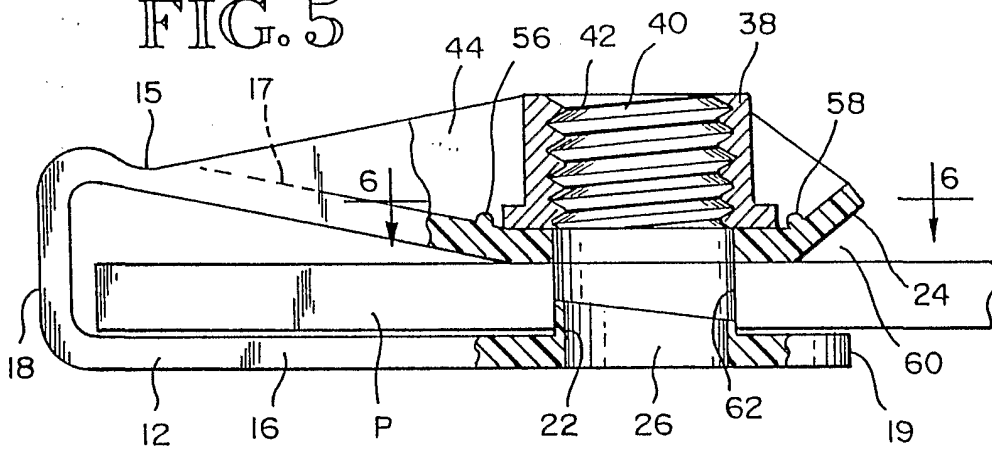
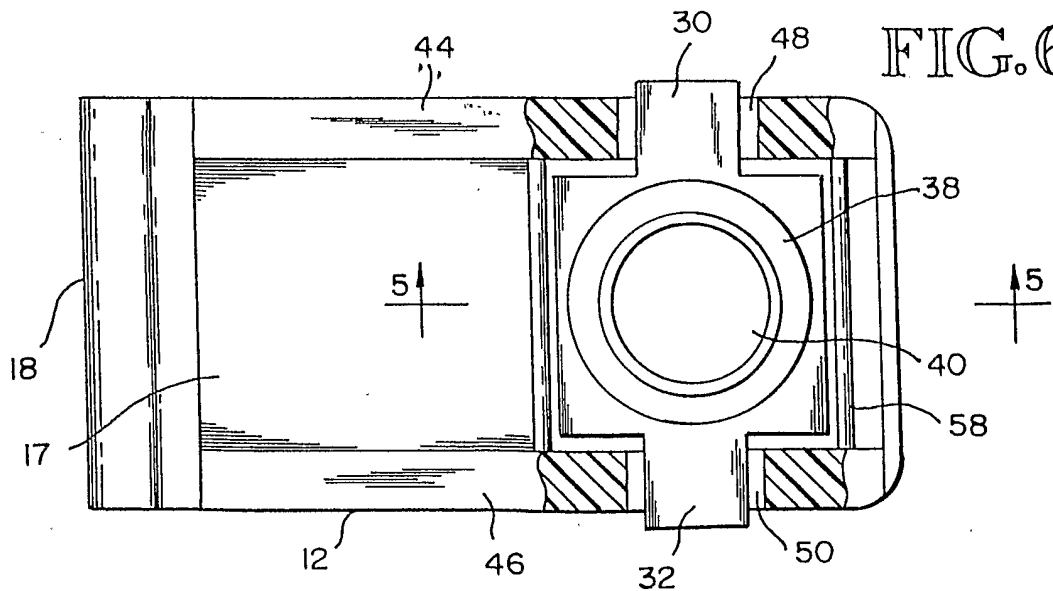


FIG. 6



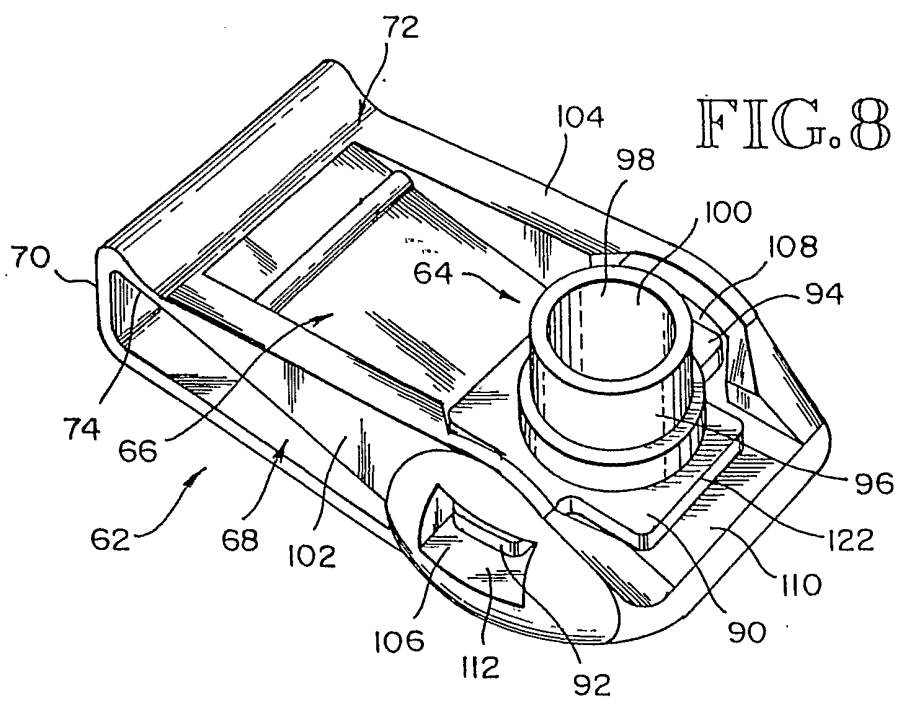
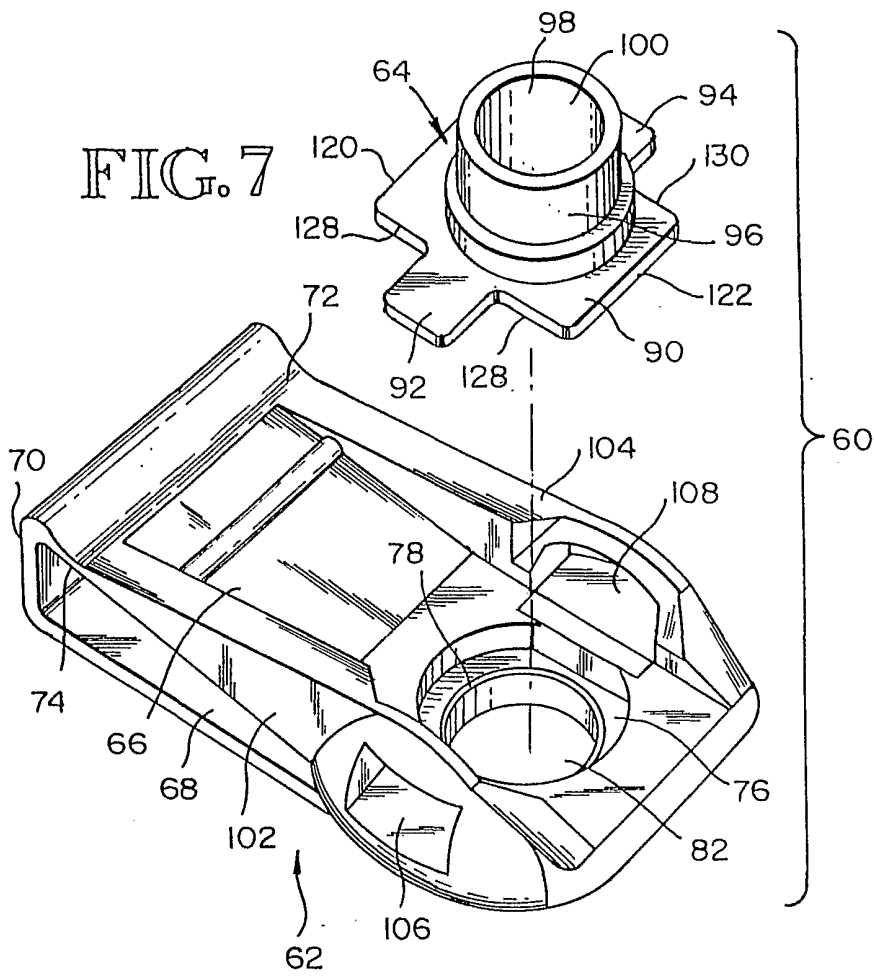


FIG. 9

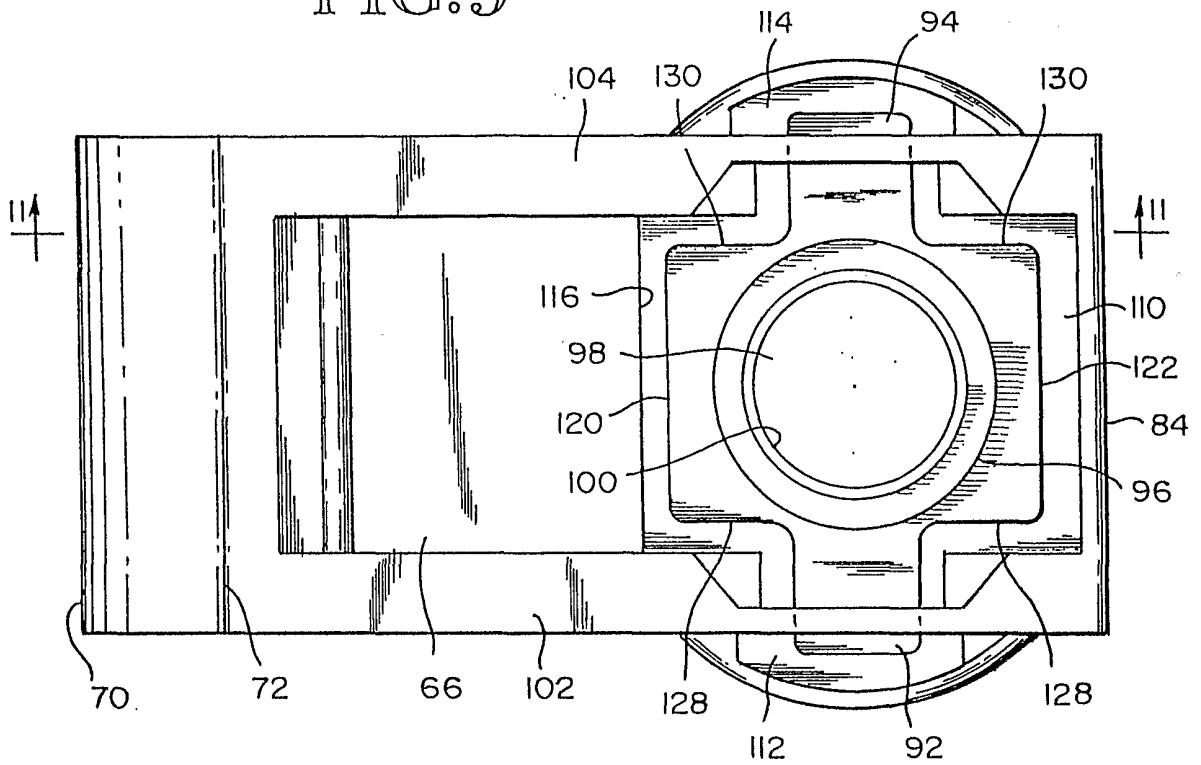
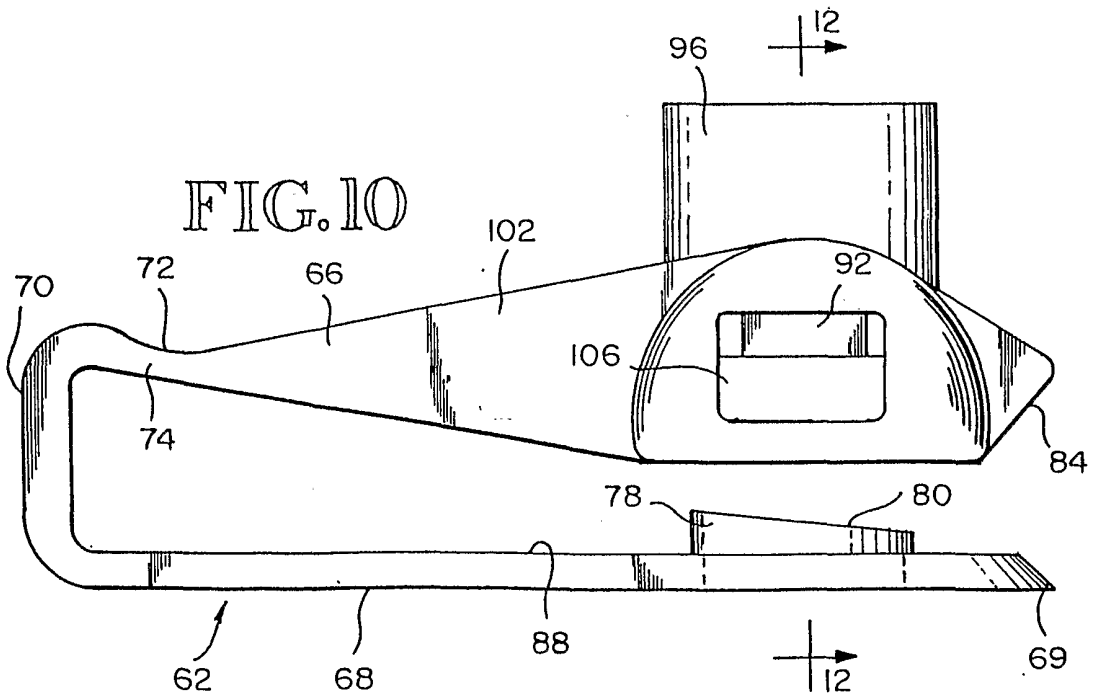


FIG. 10



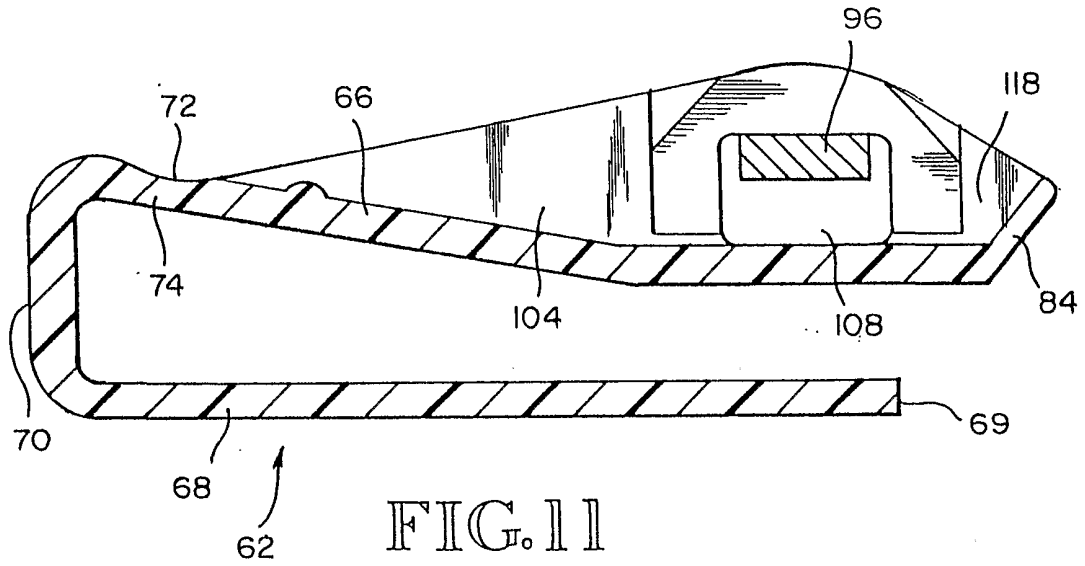


FIG. 12

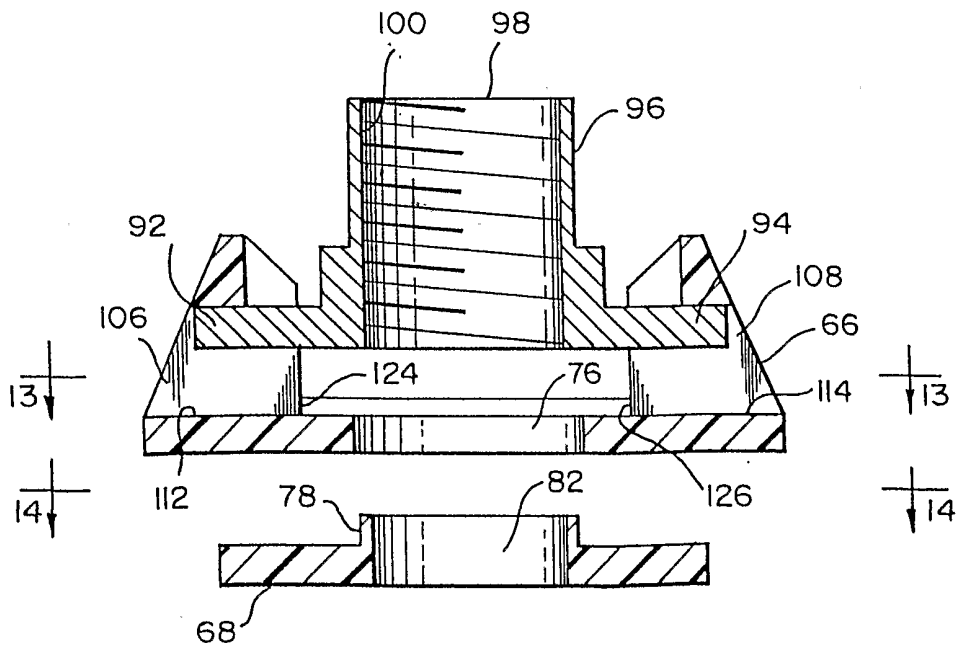


FIG. 13

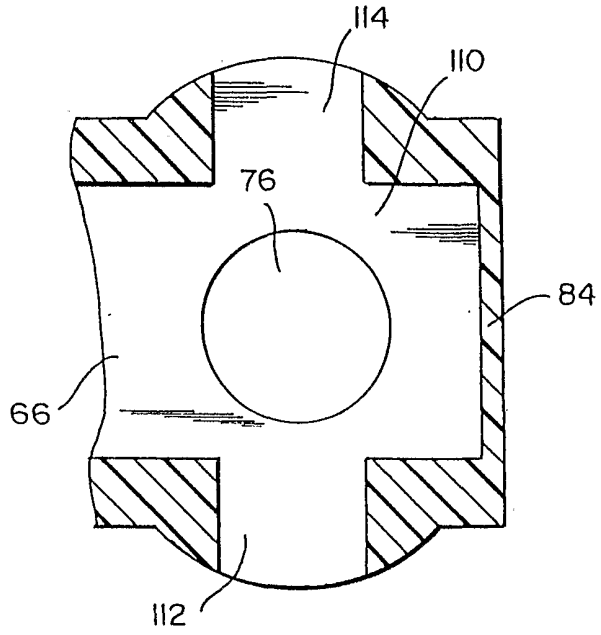


FIG. 14

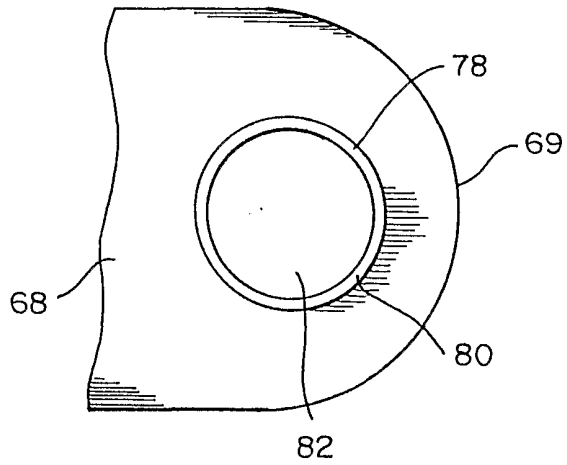


FIG. 15

