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PORTABLE AND LIGHTWEIGHT RAMP STRUCTURE

TO ALL WHOM IT MAY CONCERN:

BE IT KNOWN THAT (1) THEODORE R. ANDERSON, citizen of the United States of America, employee of the United States Government, (2) JAMES R. DONAHUE, citizen of the United States of America and (3) WILLIAM L. MCCOLLUM, citizen of the United States of America and residents of (1) Galway, County of Saratoga, State of New York, (2) Falmouth, County of Barnstable, Commonwealth of Massachusetts and (3) West Warwick, County of Kent, State of Rhode Island, have invented certain new and useful improvements entitled as set forth above of which the following is a specification:

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1 Attorney Docket No. 79059

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PORTABLE AND LIGHTWEIGHT RAMP STRUCTURE

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STATEMENT OF GOVERNMENT INTEREST

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BACKGROUND OF THE INVENTION

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(1) Field of the Invention

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The present invention relates to bridges and related structures and more particularly to gangways, ramps and dock levelers. Still more particularly this invention relates to portable, lightweight and modular ramps.

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(2) Brief Description of the Prior Art

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To address the needs of human access (such as for handicapped people) or general physical access, building owners have been required to construct accessibility structures for their buildings. These structures typically are fixed and made of concrete, steel or wood decking and hand metal rails. The installation of these structures, as required by law or building

1 codes, can be expensive and at times geometrically impossible, as
2 in the case of some historical buildings, which are unalterable
3 by historical preservation laws or standards.

4 The prior art discloses various ramps and similar
5 structures, which include features that are intended to
6 facilitate their rapid and relatively inexpensive construction.

7 U.S. Patent No. 3,301,149 to Box, for example, discloses a
8 portable deck in which each mat has tongues and grooves for
9 mating with adjacent mats. Holes in these tongues align with
10 holes in the grooves. A pin passes through aligned holes to hold
11 the mats together.

12 U.S. Patent No. 3,546,773 to Gerstin discloses a modular
13 structure made of polymer foam blocks held together with cables
14 passing therethrough.

15 U.S. Patent No. 4,807,317 to Quinn et al. discloses a
16 modular and reusable wheelchair ramp capable of ready assembly
17 and disassembly while providing a strong and safe construction.
18 The ramp includes a plurality of leg assemblies fabricated of PVC
19 plumbing components and a plurality of ramp sections each
20 extending between and mounted on a pair of adjacent leg
21 assemblies. Each leg assembly includes a pair of legs and an
22 interconnecting crossbar slidably received thereon for ready
23 height adjustability. The ramp sections are hooked over the

1 crossbars. Handrails also fabricated of PVC plumbing components
2 are also slidably mounted on the legs.

3 U.S. Patent No. 5,214,817 to Allen discloses a modular ramp
4 and landing assembly made from a plurality of similarly sized
5 pre-manufactured concrete filled rectangular panels. The ramp
6 portion is made from the modular panels attached by their shorter
7 sides. A support post with an angularly arranged bracket is
8 placed beneath the corners of adjacent panels to secure them
9 together as well as support them. The landing or horizontal
10 portion of this assembly comprises a similarly sized rectangular
11 panel the long side of which is in abutting relationship with the
12 short side of the end of the ramp. Fastener receivers are equi-
13 spaced in duplicate patterns from each corner through the bottom
14 edge of each panel. The size of the panels and the spacing of
15 the fastener receivers are such that minimum support legs and
16 brackets may be utilized in constructing this assembly at a final
17 site.

18 U.S. Patent No. 5,341,533 to Seitz discloses a modular ramp
19 that comprises multiple sections that, except for height, have a
20 similar cross-section and length along the ramp. Each modular
21 section has a groove on one edge and a lip on the opposed edge
22 that engage mating features of the preceding and following
23 sections. The modular sections are conveniently prefabricated

1 and provided in kit form to the number of sections corresponding
2 to the desired ramp height.

3 U.S. Patent No. 5,457,837 to Zuckerbrod discloses a portable
4 track device for a wheelchair that includes at least two track
5 sections, which can be coupled removably to each other, and each
6 track section has a bottom channel between a right sidewall and a
7 left sidewall, with a reinforcement rod in each sidewall and with
8 transverse supports located in the bottom channel. Each track
9 section is equal to, or greater than the length of the
10 wheelchair. The occupant of the wheelchair can travel safely
11 across difficult terrain, such as a sandy beach.

12 U.S. Patent No. 5,446,937 to Haskins discloses a modular
13 ramp system in which each section is sloped owing to its leg
14 height. The elements may be arranged in various combinations in
15 order to conform to thresholds having offsets of different
16 heights.

17 A need still exists, however, for improved means of
18 providing a ramp where there are disadvantages to the expensive
19 and time-consuming construction of a permanent ramp.

20

21 SUMMARY OF THE INVENTION

22 It is an object of the present invention to provide a
23 portable lightweight ramp which can be used to assist handicapped

1 people at public or other buildings where the alteration of the
2 building into a permanent accessible structure is not permitted
3 or desirable due to economic, geometric, geographic or historical
4 constraints. Such a ramp can have wide application, for example,
5 at military and naval installations as a portable, convenient,
6 expedient and inexpensive way to load and unload buildings and
7 ships.

8 The ramp of the present invention includes a plurality of
9 interconnecting panels. A first panel has a proximate end and a
10 distal end. At the proximate end there is detachable means for
11 connecting the first panel to a step, curb, threshold or other
12 obstruction the ramp is to be used to provide access to. A second
13 panel has a proximate and distal end and at the proximate end
14 there is a detachable means for connecting the second panel to the
15 distal end of said first panel. This modular ramp is adapted to
16 be lightweight and portable.

17 Preferably, this portable ramp will have a rigid
18 polyethylene skin, impregnated with a polymeric foam core. The
19 ramp will consist of a main panel section, a male tongue and
20 female slots with two slots and two holes on two sides. During
21 assembly, there will be a main slot with two holes for
22 interlocking. The slots will interlock with mating parts and be
23 pinned securely. There will be added accessories such as

1 handrails, support legs and end caps, all of which will be
2 installed in the slots and pinned.

3

4 BRIEF DESCRIPTION OF THE DRAWINGS

5 Other objects, features and advantages of the present
6 invention will become apparent upon reference to the following
7 description of the preferred embodiments and to the drawing,
8 wherein corresponding reference characters indicate corresponding
9 parts in the drawing and wherein:

10 FIG. 1 is a front and side perspective view of a ramp
11 representing a preferred embodiment of the present invention;

12 FIG. 2 is a front and side exploded perspective view of the
13 ramp shown in FIG. 1;

14 FIG. 3 is a side elevational view of the ramp shown in FIG.
15 1;

16 FIG. 4 is a top plan view of the ramp shown in FIG. 1;

17 FIG. 5 is a top plan view of a panel used in the ramp used in
18 FIG. 1;

19 FIG. 6 is a cross-section through 6-6 in FIG. 5;

20 FIG. 7 is a proximate end view of the panel shown in FIG. 5;

21 FIG. 8 is a distal end and side perspective view of the panel
22 shown in FIG. 5;

1 FIG. 9 is a distal end view of another preferred embodiment
2 of a panel used in the ramp shown in FIG. 1;

3 FIG. 10 is a cross-section along the plane defined by 10-10
4 in FIG. 9;

5 FIG. 11 is a cross-section through 11-11 in FIG. 10;

6 FIG. 12 is a side elevational view of a support leg used in
7 the ramp shown in FIG. 1;

8 FIG. 13 is a top plan view of the support leg shown in FIG.
9 12;

10 FIG. 14 is a bottom plan view of the support leg shown in
11 FIG. 12;

12 FIG. 15 is a cross-section through 15-15 in FIG. 12 (without
13 the adjustment screw);

14 FIG. 16 is a side elevational view of a lock pin used in the
15 ramp shown in FIG. 1;

16 FIG. 17 is a bottom plan view of the lock pin shown in FIG.
17 16;

18 FIG. 18 is a front and end perspective view of one of the end
19 cap elements of the ramp shown in FIG. 1; and

20 FIG. 19 is a front and end perspective view of the other one
21 of the end cap elements of the ramp shown in FIG. 1.

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1 DESCRIPTION OF THE PREFERRED EMBODIMENT

2 Referring to FIGS. 1-8, the ramp 10 rests on a base surface
3 12 and a step 14 having an upper surface 18. Ramp 10 extends from
4 base surface 12 to upper surface 18 to provide a sloping surface
5 between base surface 12 and upper surface 18. Adjacent a side 20
6 of the step 14 and attached to upper surface 18 of step 14, there
7 is an end cap 22 in which a groove 24 is formed. There is also an
8 end cap 26 with a tongue 28 on the opposed end of the ramp 10.
9 Adjacent the side 20 there is a first proximate panel 30. There
10 is a proximate side tongue 32 that engages groove 24 on the cap
11 22. Tongue 32 has apertures 34 and 36. There are aligned
12 apertures 38 and 40 on the end cap 22 so as to allow the panel 30
13 to be fixed to the cap 22 by means of locking pins 42 and 44. In
14 opposed relation to the tongue 32, there is on panel 30 a distal
15 end groove 46, which is adapted in dimensions to receive a tongue
16 such as tongue 32. Apertures 48 and 50 extend through the panels
17 above and below the groove 46 to facilitate fastening of a mating
18 tongue. The ramp also includes a second intermediate panel 52
19 adjacent to the first proximate panel 30 and a third intermediate
20 panel 54 in distal relation to said second intermediate panel 52.
21 On said third intermediate panel 54 there is a distal groove 56
22 and in distal relation thereto there is a distal panel 58 with a

1 mating proximate side tongue 60. Locking pins 62 and 64 are used
2 to secure this tongue 60 in the groove 56.

3 It will be understood that all the panels used in the ramp
4 are essentially identical. In panel 30, for example, there are
5 opposed lateral sidewalls 66 and 68 in which there are side
6 pockets 70, 72, 74 and 76. Each of these side pockets has in the
7 panel above and below the pocket a side pocket aperture as in
8 aperture 78 in side pocket 74. There is a plurality of rail bases
9 as at rail base 80, which fit into the side pockets as at side
10 pocket 74 in lateral side wall 66. Each of these bases has a rail
11 base aperture as at aperture 82, which align with a side pocket
12 aperture as at aperture 78 to allow the bases to be secured to the
13 side pockets by lock pins 42a, one of which is shown in FIG. 2.
14 The rail bases as at rail base 80 support vertical supports as at
15 vertical support 84. Rail base 86, as a further example, supports
16 vertical support 88. These vertical supports as at vertical
17 support 84 and 88 cooperatively engage a plurality of upper
18 lateral rails as at rail 90 and lower lateral rails as at rail 92
19 so as to provide lateral rail supports along at least one side of
20 the ramp. At the distal end of the distal panel 58 there are
21 support leg apertures 94 and 96, which engage support legs as at
22 support leg 98 which is shown in FIGS. 12-14. Although not shown

1 in the drawings, it will be understood that a similar rail may be
2 positioned on the ramp on the opposed side of the ramp.

3 Referring particularly to FIGS. 12-14, the support leg 98
4 includes an outer housing 100, with an aperture engagement
5 protrusion 102 and a panel support feature 104. The support leg
6 98 also includes a central cavity 106, which has a helical groove
7 and receives adjustment screw 108. At the base of adjustment
8 screw 108 there is a foot 110.

9 Referring to FIGS. 16-17, the lock pin 42 (and similarly for
10 pins 42a, 44, 62 and 64) includes a head 112, a body 114 and a
11 lock 116. There is a recess 118 beneath the lock 116 to
12 facilitate upward and downward movement of the lock 116 on pins
13 120 and 122 to move the lock 116 from an upper unlocked to a lower
14 locked position as shown. Preferably, movement of lock 116 to the
15 locked position wedges lock pin 42 within aperture 34.

16 Referring to FIGS. 9-11, another preferred embodiment for a
17 panel is shown. This panel has a rigid polyethylene top wall 124
18 and bottom wall 126. There is a proximate wall 128 with a
19 proximate end tongue 130. There is a distal end wall 132 with a
20 distal end groove 134. There are opposed lateral walls 136 and
21 138 that have lateral pockets as at pocket 140. As with the panel
22 described above, attachments are by means of a plurality of
23 apertures as at aperture 142 in pocket 140. There are also

1 apertures as at aperture 144 in the proximate end tongue 130.
2 There are also apertures as at aperture 146 adjacent the distal
3 pocket 134. Inside the walls there is a polymeric foam-injected
4 core 148.

5 Referring to FIGS. 18-19, further detail of the end caps 22
6 and 26 is shown. End cap 22 has an upper sloped front end 150
7 with a bottom non-skid surface 152. There are also vertical
8 apertures 154 and 156 to allow end cap 22 to be secured to a panel
9 with suitable fasteners. End cap 26 has an upper sloped front
10 surface 158 and an opposed bottom non-skid surface 160. There are
11 also vertical apertures 162 and 164 through tongue 28 to allow end
12 cap 26 to be secured to a panel with suitable fasteners.

13 The advantages of this invention over permanent fixtures are
14 that this ramp is flexible, lightweight and portable. This new
15 design makes the ramp portable enough for an individual to carry
16 and assemble in minutes. It eliminates the need to permanently
17 deface a building of historical importance or to alter a
18 building, which cannot be changed due to geometric or economic
19 constraints.

20 While the present invention has been described in connection
21 with the preferred embodiments of the various figures, it is to
22 be understood that other similar embodiments may be used or
23 modifications and additions may be made to the described

1 embodiment for performing the same function of the present
2 invention without deviating therefrom. Therefore, the present
3 invention should not be limited to any single embodiment, but
4 rather construed in breadth and scope in accordance with the
5 recitation of the appended claims.

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PORTABLE AND LIGHTWEIGHT RAMP STRUCTURE

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ABSTRACT OF THE DISCLOSURE

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A modular, portable and lightweight ramp of interlocking panels is used to provide a sloping surface between surfaces of differing heights. A first panel has a proximate end and a distal end and at its proximate end there is a tongue for connecting this first panel to a groove on an end cap, which rests on the higher surface. A second panel has a proximate and distal end and at its proximate end there is a tongue for connecting the second panel to a groove on the distal end of the first panel. One or more additional panels may be included in the ramp. The most distal panel rests on the base surface at its distal end. A distal end cap has a tongue that connects with a groove in the distal end of the most distal panel to provide a transition from the ramp to the base surface.

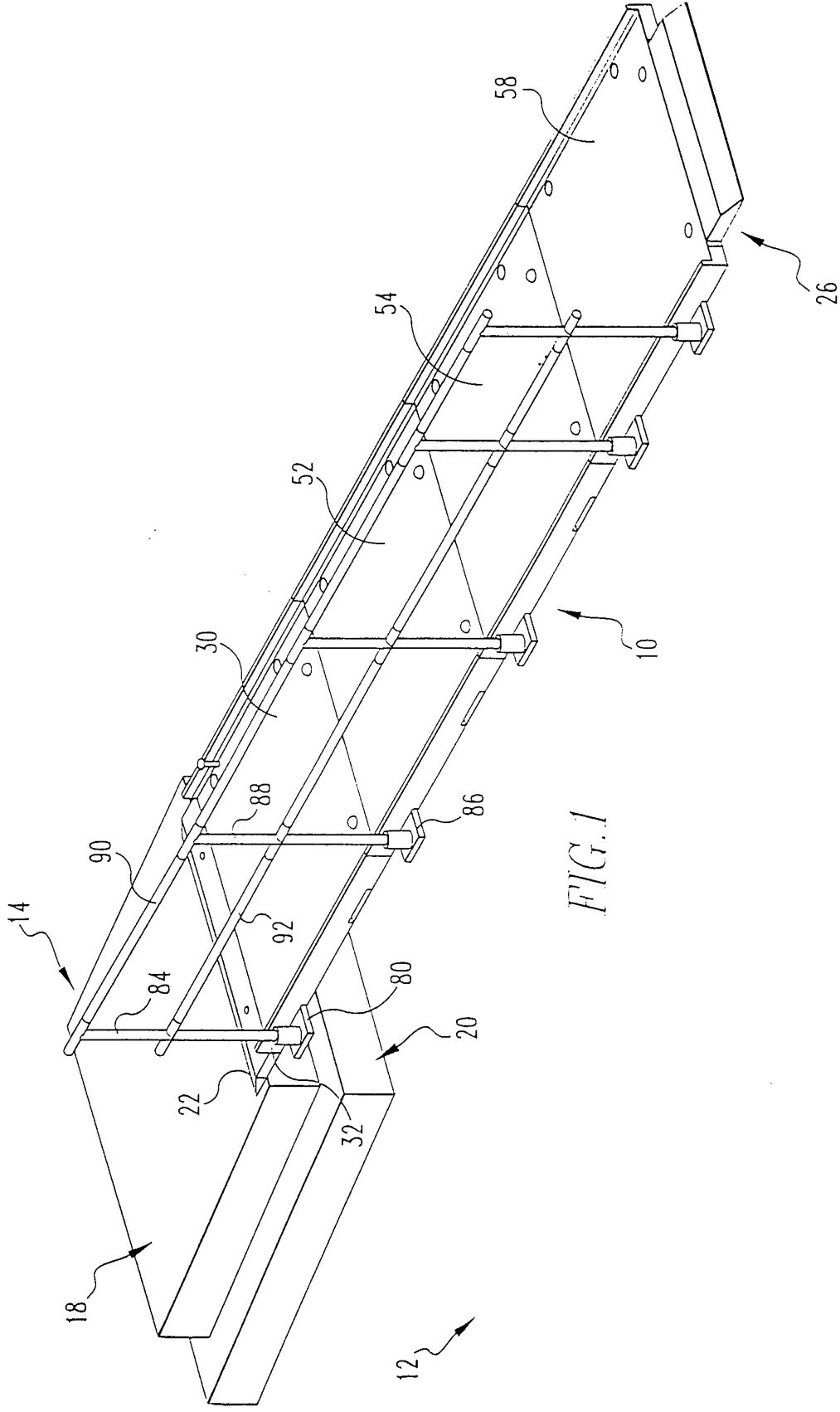


FIG. 1

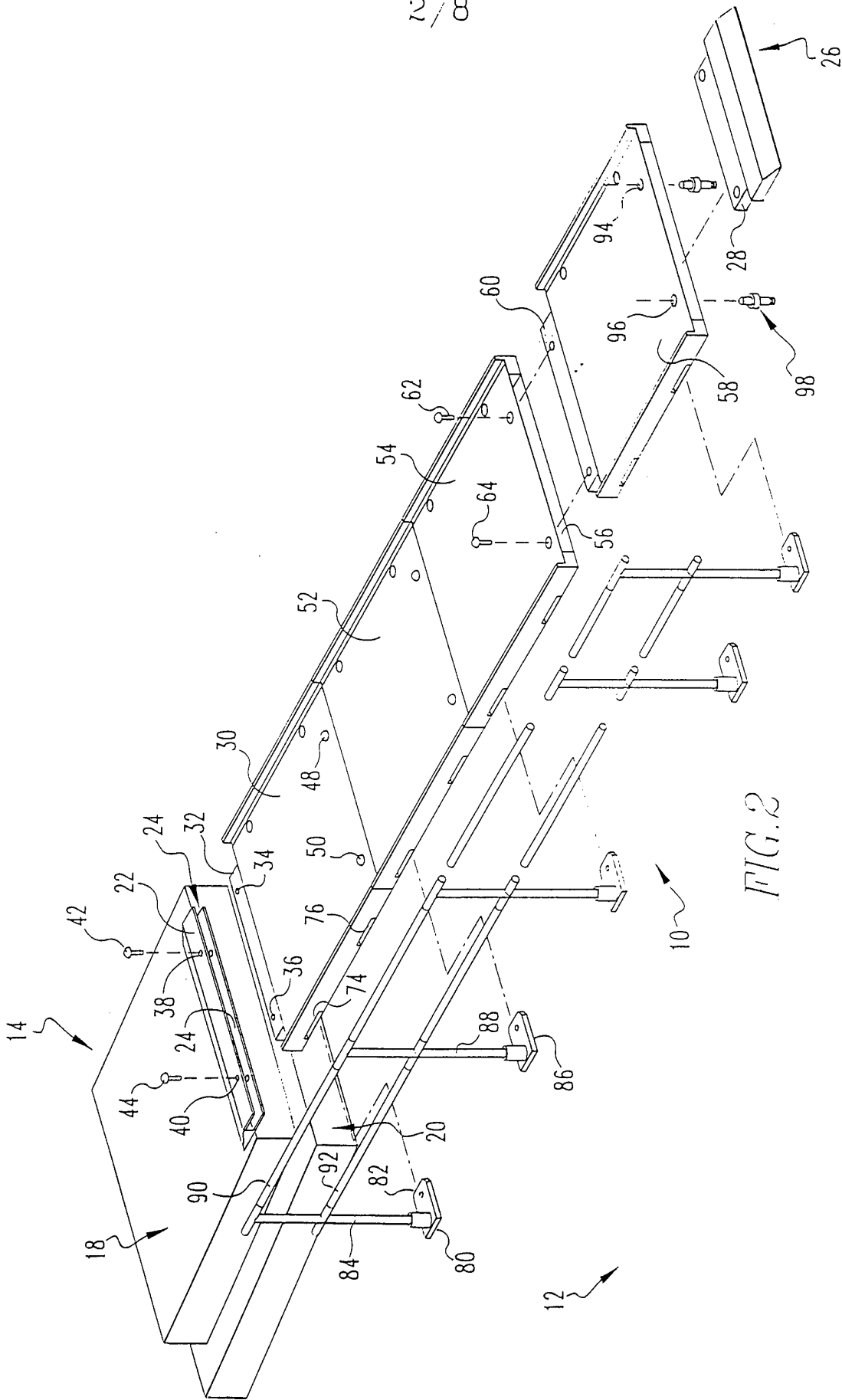
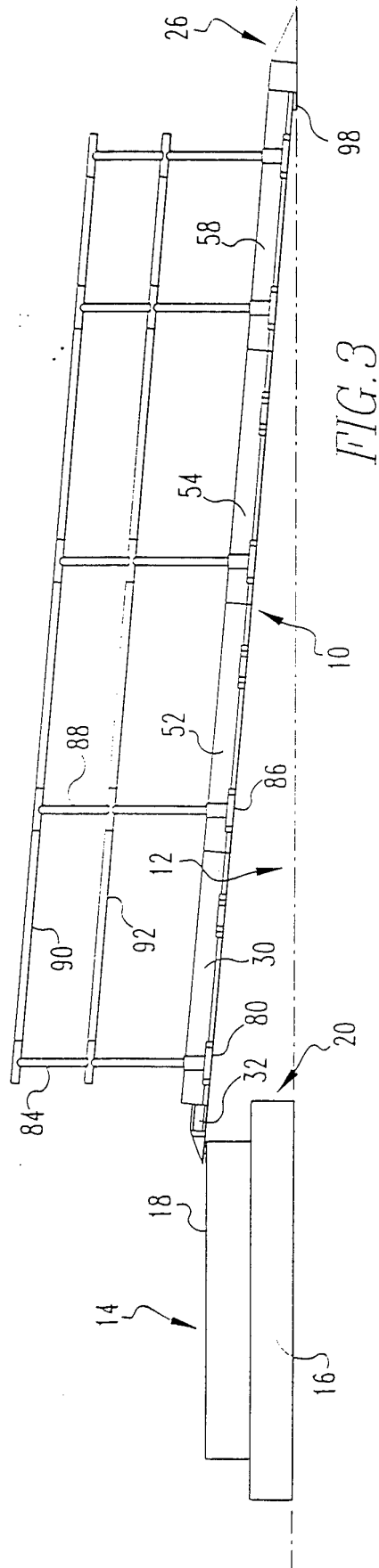
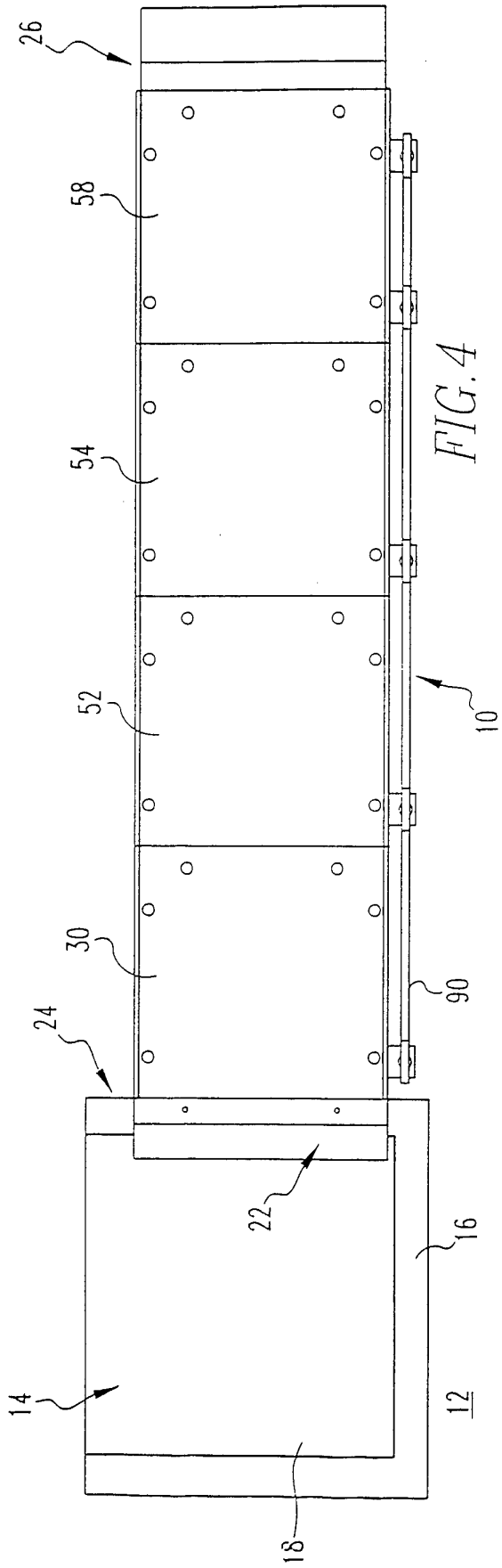


FIG. 2



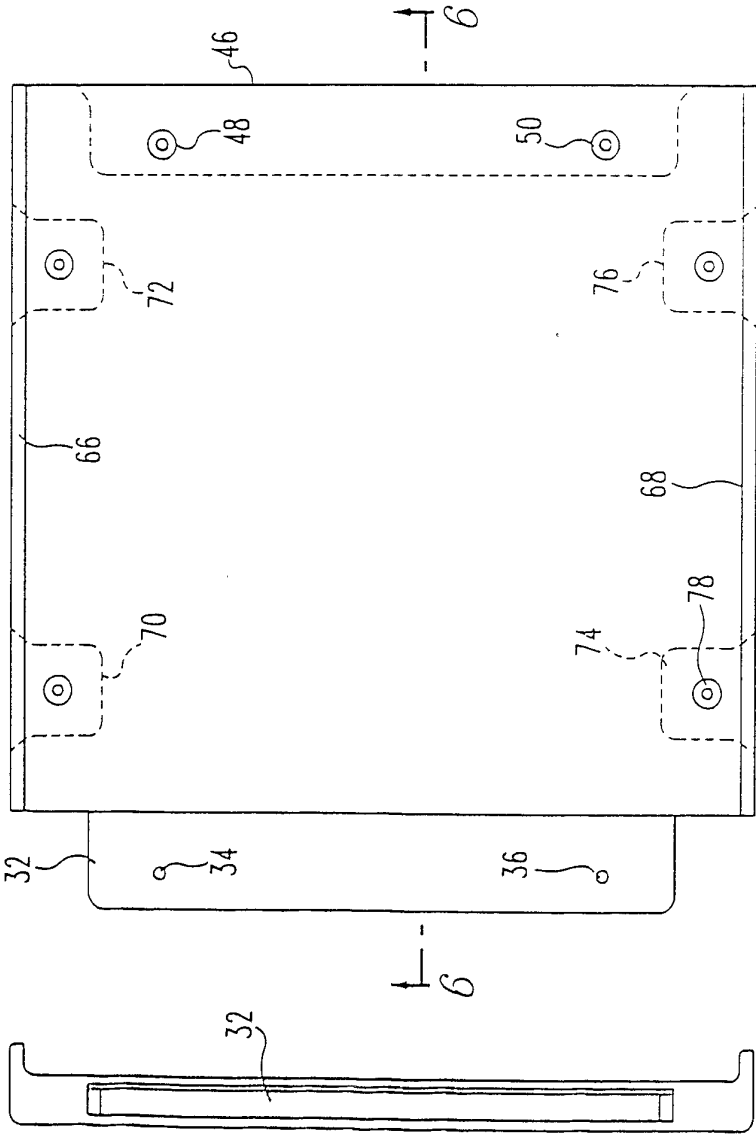


FIG. 5

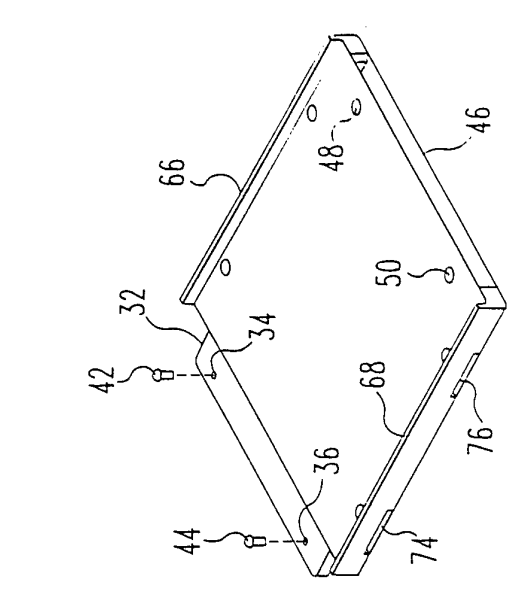


FIG. 6

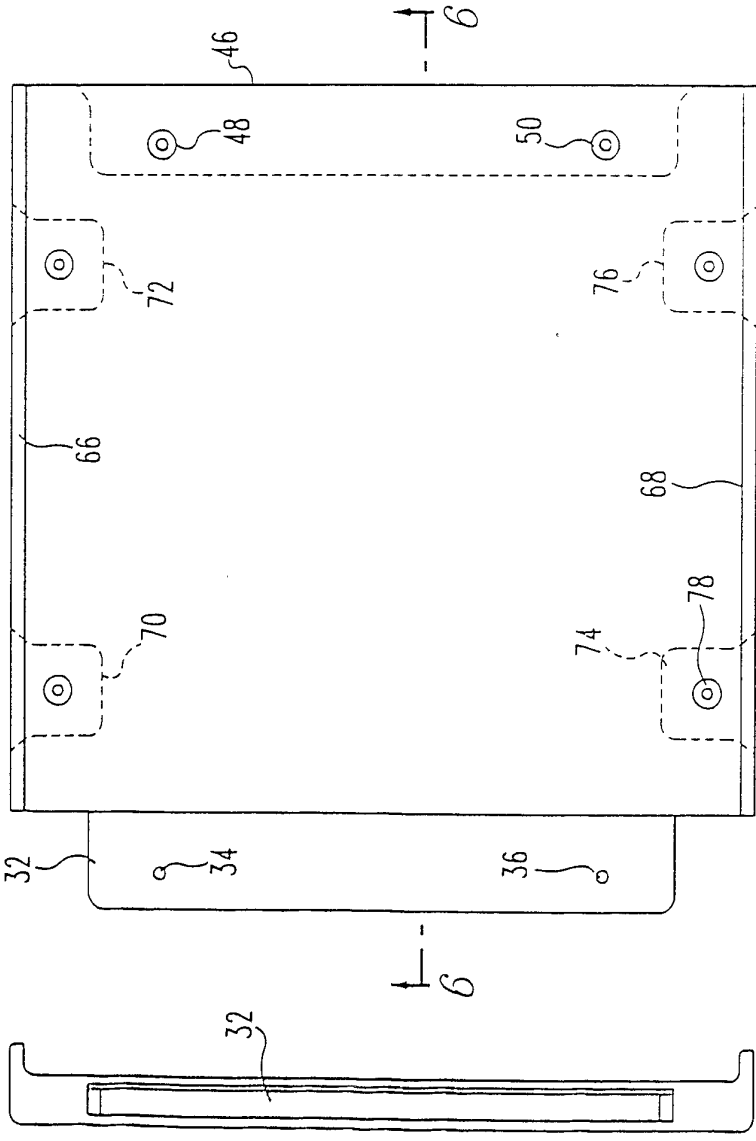


FIG. 7

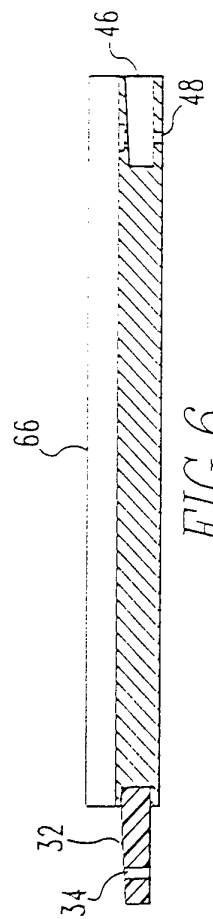


FIG. 8

FIG. 9

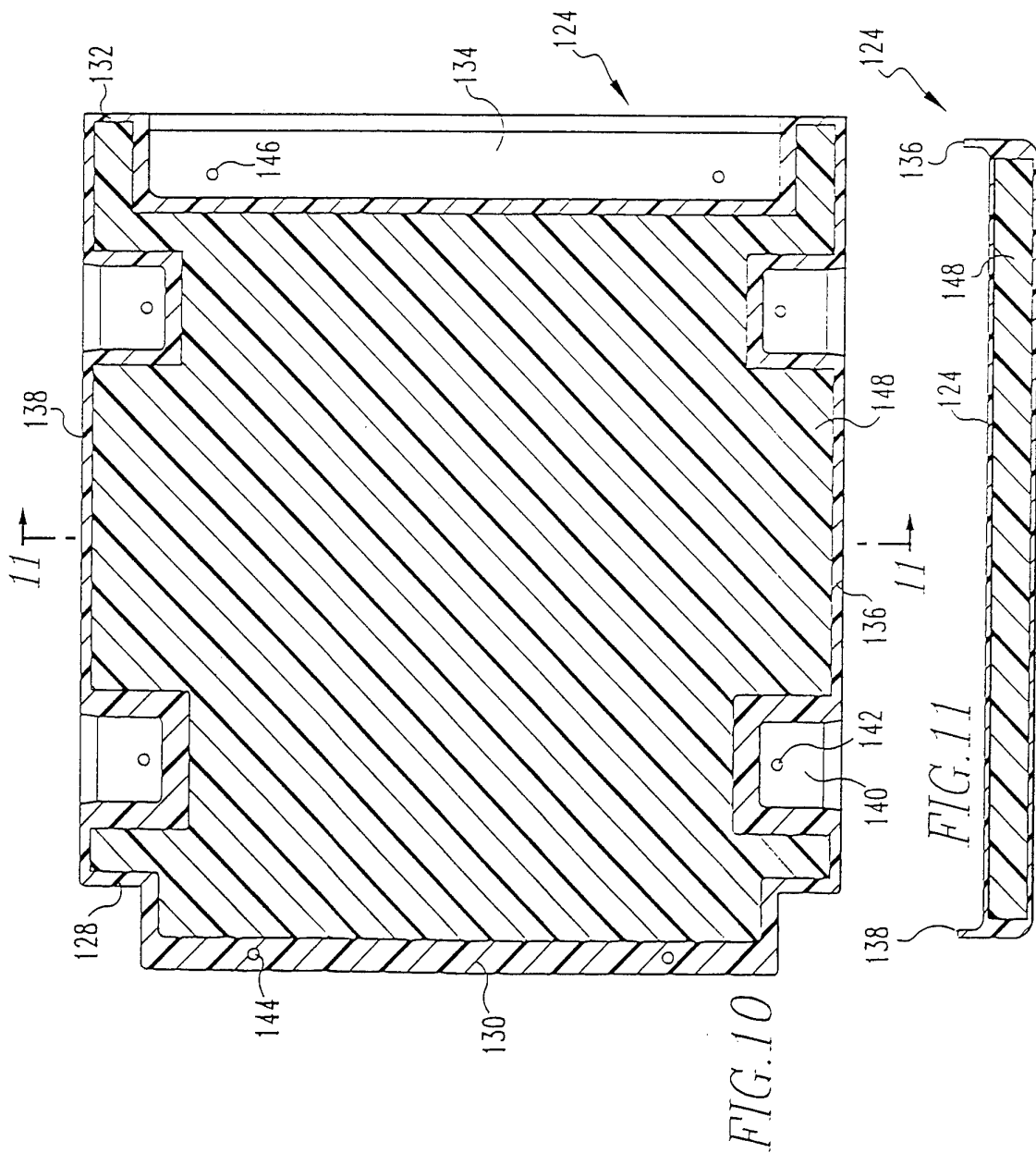
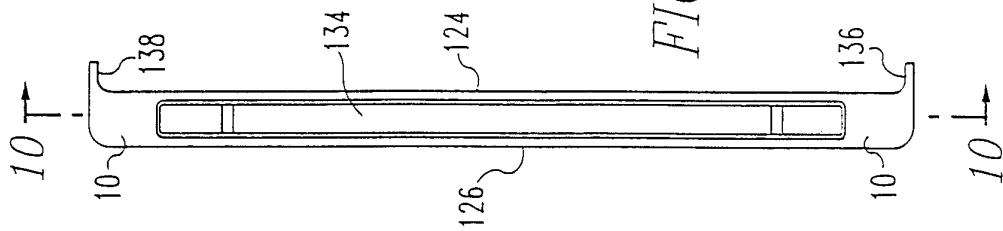


FIG. 10

FIG. 11

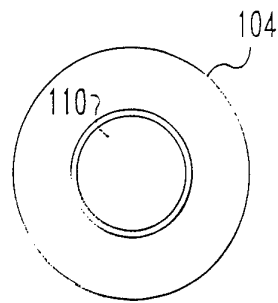
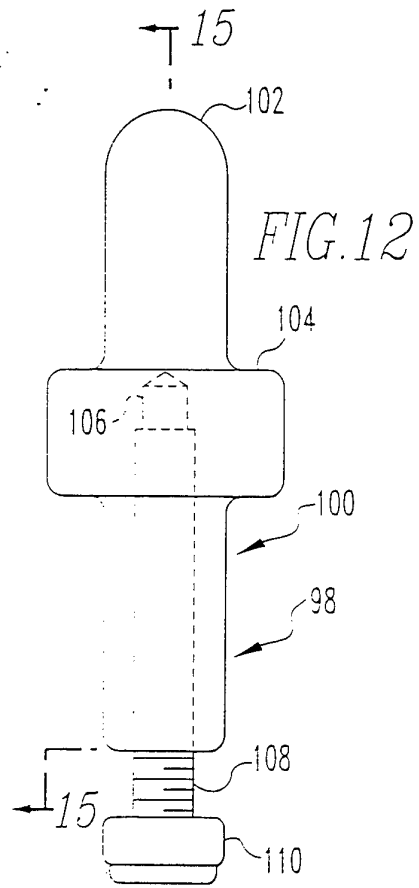
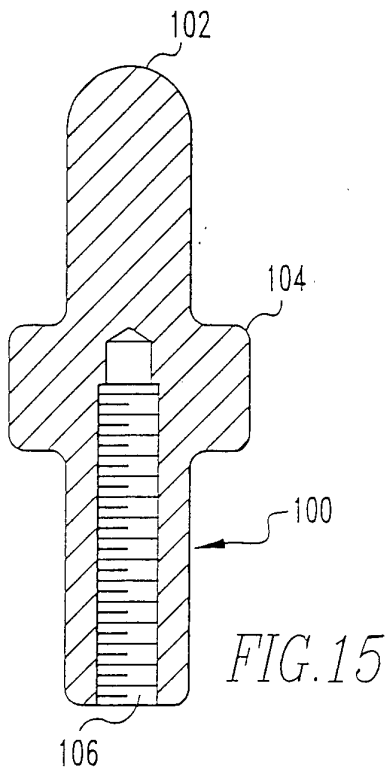
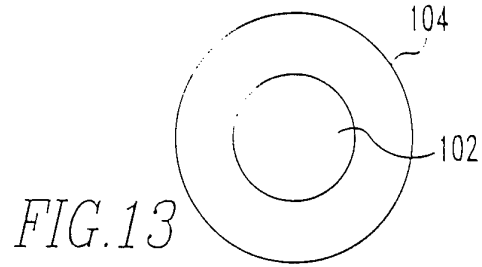


FIG. 14

