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(54) Title: ROTARY LATCH

(57) Abstract: A rotary latch having rotational latching and rotational unlatching actuation is mounted in an aperture formed in a closure panel for releasably retaining the closure panel against a corresponding frame, the pawl latch including a one-piece body with a pawl, a gripping portion, mounting elements, and having a detent feature which facilitates the maintenance of the latch in an opened or closed position.

ROTARY LATCH

CROSS REFERENCE TO RELATED APPLICATION

This application claims the benefit of U.S. Provisional Application No. 60/160,589 filed October 20, 1999.

BACKGROUND OF THE INVENTION

I. Field of the invention

The present invention relates generally to latching devices and more particularly to latches which are operable through rotation of a pawl to selectively release and secure a first member, such as a door or panel, in a closed position relative to a second member, such as a frame or cabinet.

2. Background of the Invention

Presently, there are a number of pawl assemblies known in the art which are operable by rotation of a shaft or the like for securing panels together or against a corresponding frame. Generally, fasteners of this type include a latching pawl which is provided extending from a shaft disposed in a latch housing. In operation, rotation of the shaft corresponds with a movement of the latching pawl to its latched position. Generally, the fasteners of this type require varying degrees of rotation of the shaft for operation of the latch. These latches include one or more fixed members, such as a housing, which is mounted to a panel, and also include movable members which are rotatably provided to turn relative to a fixed member.

One type of latch is a "quarter turn" fastener which requires a 90° rotation for operation. Such latches usually consist of a housing, drive stud, spring and pawl which are installed within an aperture formed in a door panel. However, one problem with such prior art designs is that water, dust and other matter is able to pass freely through the latch and into the interior compartment of the door panel, thus into contact with the contents contained therein. Another problem is that the spring which is positioned proximate the top of the latch between the drive stud and the housing is required during operation to support the load which is being applied by the latch. This increased stress applied by the latch adversely affects the spring's operation and durability.

Furthermore, the designs which have been developed in order to hasten the installation process have proven to adversely affect latch operation. In particular, some

designs allow a mounting nut to be slid over the pawl and onto the housing in order to accommodate installation within a panel aperture. However, these prior art designs require either a necked down section in the pawl, which reduces the strength of the pawl, or an extra loop in the pawl, which is rather difficult to manufacture. These prior art latches generally include several components which must be assembled and installed on a panel. In some cases, prior art type latches include components which must be installed on the panel, and then other components which must be installed on the panel mounted components. The need exists for a latch which can be resistant to debris and dust, and can be readily installed on a panel for operation.

A rotating pawl latch, where a pawl is rotated to one location to close the latch and to another location for releasing the latch are known. These types of latches generally comprise multiple components which must themselves be assembled together before the latch can be installed on a mounting surface. Thus, multiple components are required to regulate the movement of the pawl among latching and releasing positions. In industries, such as, automotive assembly operations, the ease with which latch installation can be accomplished is important. For example, hinged panel, as well as lift-off panel applications are common uses in the automotive industry where securing latches are employed. The panels to be latched, for example, can include closure panels of storage compartments, such as floor compartments of vehicles, as well as mechanical panels to regulate access to engines, and other mechanical systems.

The present invention attempts to provide a latch which is an improvement over prior latch designs, and which provides features of biasing a pawl into engagement with a keeper or corresponding frame, where the latch is rotated to selectively move the pawl into and out of engagement with the keeper or frame, and where the latch can be selectively positioned in one or more positions, such as, for example, open and closed positions through stops provided over the arc of rotation of the latch. The further need of providing a latch which can be readily mounted to a panel is also accomplished.

SUMMARY OF THE INVENTION

The present invention provides a rotary latch which is adapted to be mounted to a first member, such as, for example, a closure panel, for releasably retaining the closure panel against a second member, such as, for example, a corresponding frame. For example, the rotary latch of the present invention can be used in connection with

automobile compartments. The rotary latch of the present invention includes a one-piece body with mounting elements which are adapted for being received within an aperture of the closure panel to rotatably mount the latch to the closure panel. The latch body also includes a pawl member which extends outwardly therefrom to engage a keeper member or corresponding frame of an adjacent panel and secure the closure panel to the frame.

Preferably, a detent feature is provided to maintain the latch in one or more predetermined positions over the range of rotation of the latch. The detent features can comprise a first stop at the closed position, and a second stop at the open position, although other stops, such as between open and closed positions, could be provided if desired. The stops provide positioning of the latch to hold the latch in a corresponding position along the range of rotation, such as an open or closed position.

The rotary latch includes mounting elements and can be snap-fit into a panel aperture for installation. Preferably, a mounting flange is provided for use with the detent feature. The mounting flange can be directly molded with the second member or can be separately provided (not shown) for mounting to the second member.

An object of the present invention is to provide a rotary latch which can be readily installed to a panel by insertion into a panel aperture.

A further object of the present invention is to provide a rotary latch which is durable in use and yet provides a smooth latching operation.

Another object of the present invention to provide a rotary latch which has one-piece construction.

Another object of the present invention is to provide a rotary latch which can be rotated to secure the pawl to a corresponding keeper, and rotated to release the pawl from the keeper.

Another object of the present invention is to provide a rotary latch which includes a detent element for maintaining the pawl in one or more positions along its rotational range, such as the closed position, and the open position.

Another object of the present invention is to provide a rotary latch having a one-piece construction wherein the entire latch is rotated to release the pawl from engagement with a keeper member and to secure the pawl with a keeper .

Another object of the present invention is to provide a rotary latch which can be used for securing one or more panels together, including lift-off panels, sliding panels,

hinged panels, and to secure panels to a compartment frame or other surface.

These and other objects of the present invention will become more readily apparent when taken into consideration with the following description and the attached drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a parallel perspective view of a rotary latch according to the present invention, viewed from the top right side.

Fig. 2 is a front elevation view of the rotary latch shown in Fig. 1.

Fig. 3 is a rear elevation view of the rotary latch of Fig. 1 shown installed on a closure panel, the closure panel being shown in sectional view.

Fig. 4 is a top plan view of the rotary latch of Fig. 1.

Fig. 5 is a rear elevation view of the rotary latch of Fig. 1.

Fig. 6 is a left side elevation view of the rotary latch of Fig. 1.

Fig. 7 is a bottom plan view of the rotary latch shown in Fig. 1.

Fig. 8 is a parallel perspective view of a closure panel adapted to receive the rotary latch according to the present invention for installation thereto, the panel shown with a flange for use with the detent feature.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring now to the drawings figures, there is shown in Fig. 1, a rotary latch 10 according to the present invention, comprising a latch body 11, a knob or gripping portion 12, a latch base 13 forming an upper surface thereof, and a pawl member 14. Mounting means is provided for mounting the latch 10 to a first member, such as the closure panel 100 shown in Fig. 3. The mounting means preferably can comprise retaining elements, such as, for example, the snap legs 15, 16 disposed on the latch body 11. Preferably, as shown, the snap legs 15, 16 each include a free portion 17, 18, and an attached portion 20, 21, respectively. The attached portion 20, 21 of each leg 15, 16 is shown connected to the latch body 11 which preferably comprises a circumferentially configured wall portion extending downwardly from the base 13 of the gripping portion 12. Preferably, the free portion 17, 18 of each leg member 15 ~as a foot 25 with a sloped lower wall 26. A groove or cut-out portion 31 formed in the circumferential latch body 11 surrounds the snap legs as shown in Figs. "and a similar cutout 30 surrounds the snap leg 15 in Fig. 6. While the circumferential latch body 11 is shown comprising a pair of wall portions disposed about the circumference of the latch 10, it will be understood that greater or

lesser numbers of wall portions can be provided. For example, the circumferential walls of the latch body 11 can comprise a single wall portion with appropriate spacing for the pawl member 14.

Referring to Fig. 6, the pawl member 14 is flexibly provided and is shown having an attached end 37 connected to the latch body front wall 32 and a free end 33 having a ridge 34 which is provided to engage a keeper member or adjacent panel surface. The pawl member 14 shown comprising a ridge 34 can also be additionally, or alternately, provided with any suitable means for connecting with a corresponding keeper member or surface which will enable the pawl to secure the latch 10.

As shown best in Figs. 6 and 7, preferably, supporting means is provided to support the pawl 14 against excessive retraction when it encounters a keeper (not shown). The supporting means preferably comprises a rib 35 which is disposed behind the pawl member 14 and connected with the base of the latch and the front wall portion 32. Referring again to Figs 1 and 3, detent means is shown comprising a boss element 40 disposed on the underside of the base 13 and extending downwardly therefrom. The detent means facilitates maintaining the location of the latch 10 in a predetermined position, to hold the latch 10 against moving out of that position from vibrations, and other inadvertent forces which might otherwise operate to disturb the latch 10 and cause it to inadvertently rotate. Preferably, the boss element 40 is disposed at the rear of the latch 10 opposite the pawl end.

Reference now being made to Fig. 8, the detent means is shown further comprising a corresponding flange 50 which is provided on the closure panel 100 to which the latch 10 is to be mounted. The flange 50 can be integrally provided as part of the panel 100, as shown in Fig. 8, or can alternately, be separately provided (not shown) for mounting to a panel.

Fig. 8 shows the flange 50 having a circumferential groove 51 disposed therein. The circumferential groove 51 is shown with two stepped grooves 52,53 which are disposed at each opposite end of the circumferential groove 51. The first stepped groove 52 can correspond to a position where the latch 10 is closed (secured to a keeper), while the second stepped groove 53 can correspond to a position where the latch 10 is open (released from a keeper). While not shown, it will be understood that the arc of the

circumferential groove 51 can be lengthened or contracted as necessary, and that stepped grooves can be provided at other locations, in addition to, or alternative to, those shown. The provision of additional stepped grooves can comprise yet additional predetermined stop positions over the latch's range of rotation.

Referring once again to Fig. 3, the latch 10 there is shown installed on a closure panel 100. The snap legs 15 and 16 clamp the flange 50 of the closure panel 100 between the top 27 of each leg member 15, 16 and the underside of the base 13. The latch 10 is rotatable within the panel aperture 101 from a first or open position, through a range of rotation, to a second or closed position.

The latch 10 operates by rotating the handle 12, which rotates with the entire latch 10 to move the pawl 14 out of alignment and/or engagement with a keeper member. Similarly, the rotation of the latch 10 back to its original position secures the pawl 14 to a keeper. The closed position is reached when the detent boss element 40 engages the first stepped groove 52, and similarly, the open position is reached when the boss element 40 engages the second stepped groove 53. The pawl 14 is preferably provided to comprise a spring member which can be deflected to release the ridge 34 from a keeper member (not shown). Preferably the pawl 14 is resilient over at least a portion, or all, of its length. Supporting ribs, such as the longitudinal pawl rib 55 (Fig. 7) can be provided on the pawl 14 to improve the strength to the pawl 14 when it encounters forces from the keeper .

While not shown, it is further conceivable that means can be preferably provided to stop the closure panel 100 from proceeding past a corresponding frame 200 when the closure panel is pivoted for closing. Keeper means is also provided to secure the pawl member 14 of the latch 10. For example, while not shown, the means for stopping the closure panel and the keeper means can comprise a protruding member provided on the second panel member, which acts to prevent further travel of the closure panel 100. In addition, the gripping portion 12 of the latch 10 preferably can comprise an indented region for facilitating gripping contact by a user's fingers.

Other modifications to the above description can be made consistent with the spirit and scope of the invention disclosed herein. For example, the keeper for example, can comprise any suitable keeper member provided as part of a frame or as a separate member mounted thereto. Thus the pawl member configuration, shown having a ridge 34, can comprise alternate configurations which are suitable for engagement with a corresponding

keeper configuration. In addition, while the closure panel 100 is shown, it will be understood that the present rotary latch can be employed in conjunction with other panels and closure members, including, for example, lift-off panels, sliding panels, joining panels, folding panels, and the like.

These and other advantages of the present invention can be made consistent with the spirit and scope of the invention as disclosed in the Summary of the Invention, the Brief Description of the Drawing Figures, and the Detailed Description of the Preferred Embodiments. While the above description constitutes the preferred embodiment of the present invention, it will be appreciated that the invention is subject to modification, variation and change, without departing from the proper scope or fair meaning of the present invention. In this regard, while the various features of the present invention have been shown and described in relation to a door which operates with a frame, it will be understood that many of these features are suitable in connection with latching of other members.

I claim the following:

1. A rotary latch comprising:

a latch body;
a gripping portion;
a latch base integral on its' bottom side with said latch body and integral on its' top side with said gripping portion; and
a pawl member

2. The rotary latch of claim 1, wherein said pawl member is connected proximally to said latch body and terminates with a pawl tail on its' distal end.

3. The rotary latch of claim 2, wherein said pawl member is substantially u-shaped.

4. The rotary latch of claim 3, wherein said pawl tail has ridged central portion and is substantially perpendicular to said distal end of said pawl member.

5. The rotary latch of claim 1, wherein said latch body comprises mounting means located with corresponding cutouts of said latch body.

6. The rotary latch of claim 5, wherein said mounting means are comprised of a plurality of flexible snap legs.

7. The rotary latch of claim 6, wherein said snap legs have a ramped outer portion.

8. The latch of claim 1, wherein said latch base is substantially circular.

9. The latch of claim 1, wherein said latch base has a centrally located integral rib support having a first end attached to said proximal end of said pawl member and a second end attached to rear wall of said latch body, wherein said support rib is integral in its' top side of said bottom side of latch base.

10. The rotary latch of claim 1, wherein said latch has a detent means attached to said bottom side of said base.

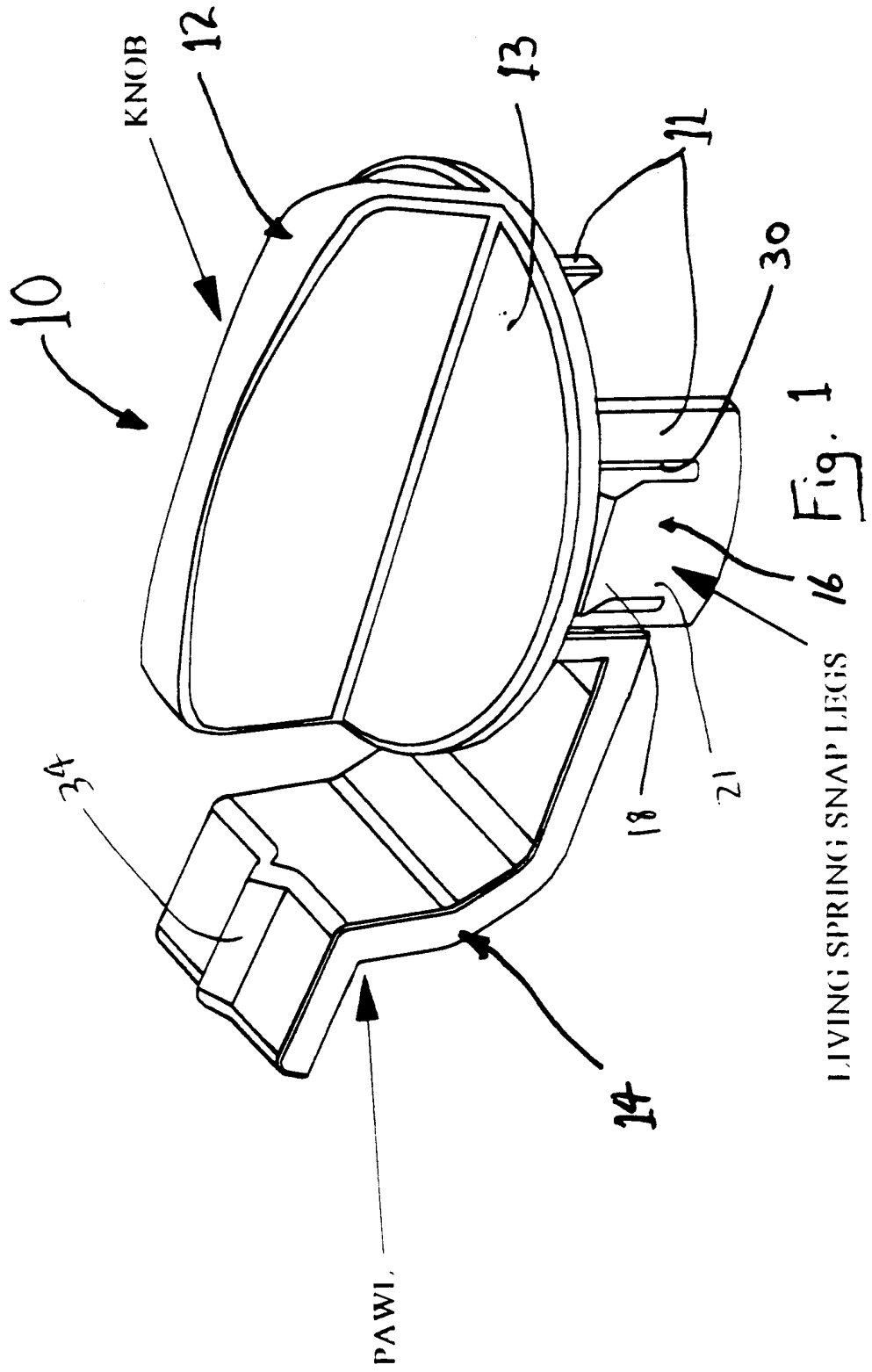
11. The rotary latch of claim 10, wherein said detent means is comprised of a boss element substantially centrally aligned with said rib support, wherein said detent means engages a first stepped groove in the open position and second stepped groove in the closed position of a corresponding panel flange.

12. A rotary latch comprising:

a latch body;
a gripping portion;
a latch base integral on its' bottom side with said latch body and integral on its' top side with said gripping portion;
a pawl member; and

a panel member designed to receive said latch body.

13. The rotary latch of claim 1, wherein said pawl member is connected proximally to said latch body and terminates with a pawl tail on its' distal end.
14. The rotary latch of claim 2, wherein said pawl member is substantially u-shaped.
15. The rotary latch of claim 3, wherein said pawl tail has ridged central portion and is substantially perpendicular to said distal end of said pawl member.
16. The rotary latch of claim 1, wherein said latch body comprises mounting means located with corresponding cutouts of said latch body.
17. The rotary latch of claim 5, wherein said mounting means are comprised of a plurality of flexible snap legs.
18. The rotary latch of claim 6, wherein said snap legs have a ramped outer portion.
19. The latch of claim 1, wherein said latch base is substantially circular.
20. The latch of claim 1, wherein said latch base has a centrally located integral rib support having a first end attached to said proximal end of said pawl member and a second end attached to rear wall of said latch body, wherein said support rib is integral in its' top side of said bottom side of latch base.
21. The rotary latch of claim 1, wherein said latch has a detent means attached to say bottom side of said base.
22. The rotary latch of claim 10, wherein said detent means is comprised of a boss element substantially centrally aligned with said rib support, wherein said detent means engages a first stepped groove in the open position and second stepped groove in the closed position.
23. The rotary latch of claim 12, wherein said panel member comprises a bottom flange having a groove terminating with a step at both ends, wherein said detent feature engages first stepped groove in the open position and second stepped groove in the closed position.



LIVING SPRING SNAP LEGS 16 Fig. 1

FRONT VIEW

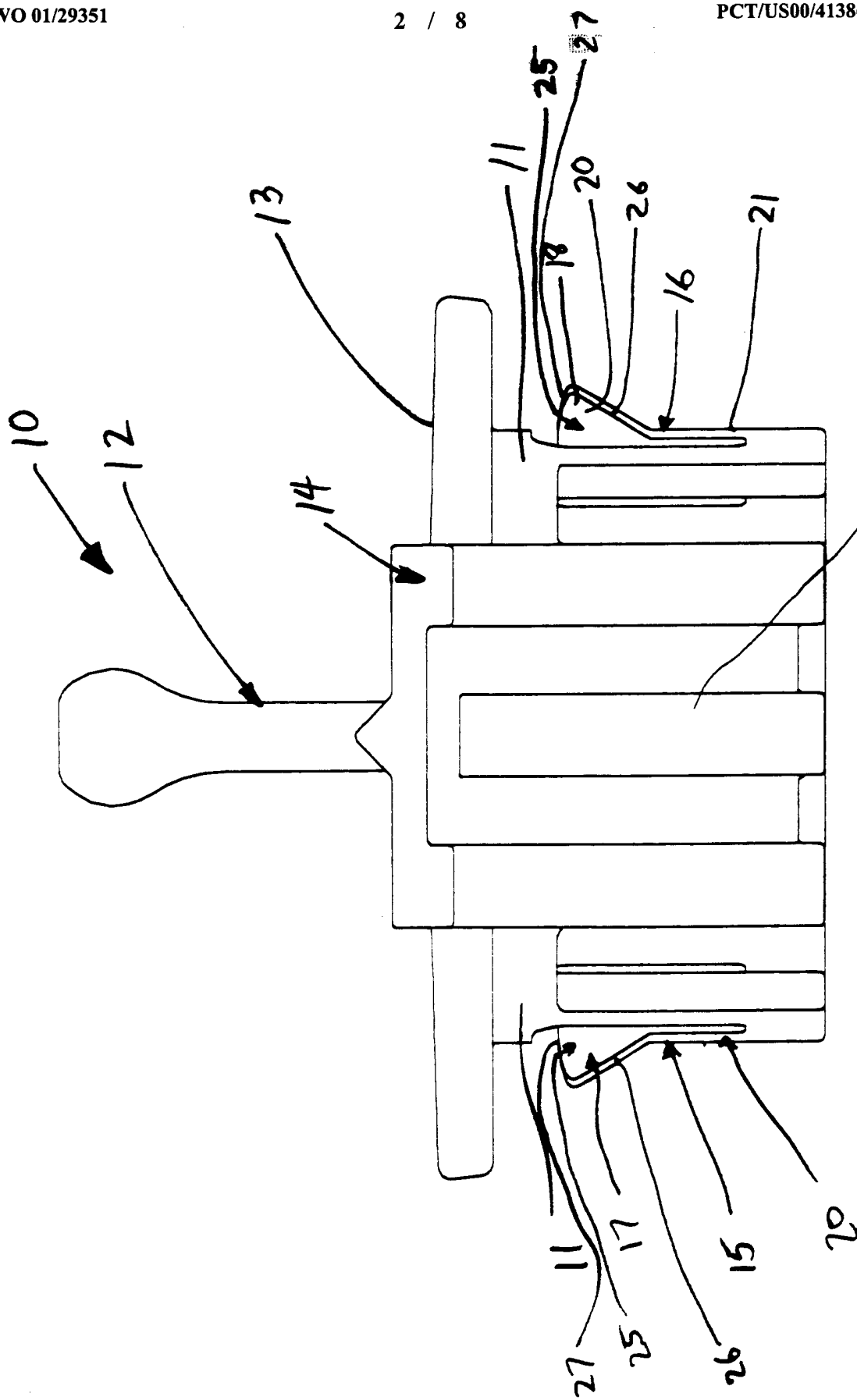
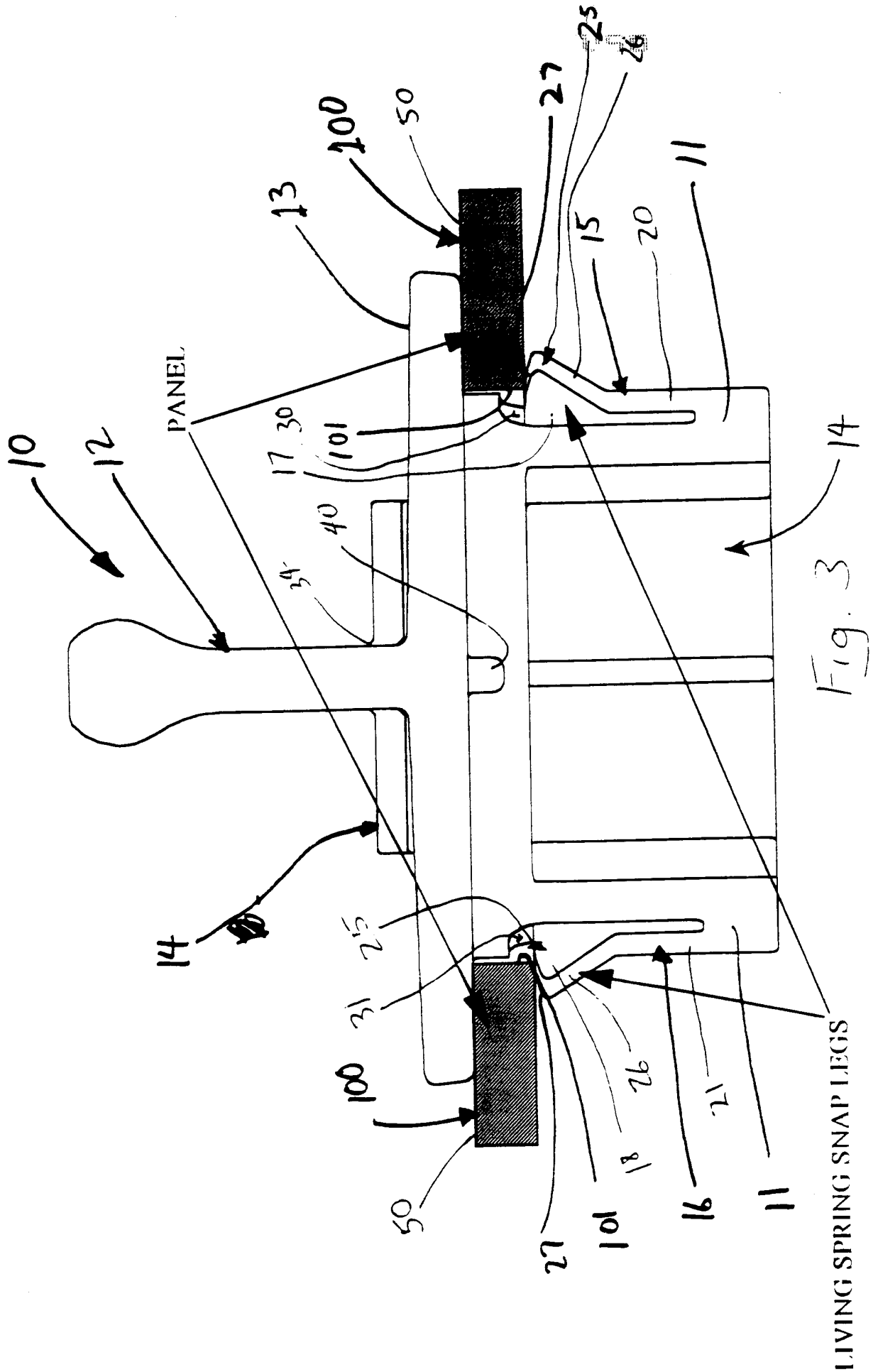


Fig. 2

LIVING SPRING SNAP LEGS



LIVING SPRING SNAP LEGS

TOP VIEW

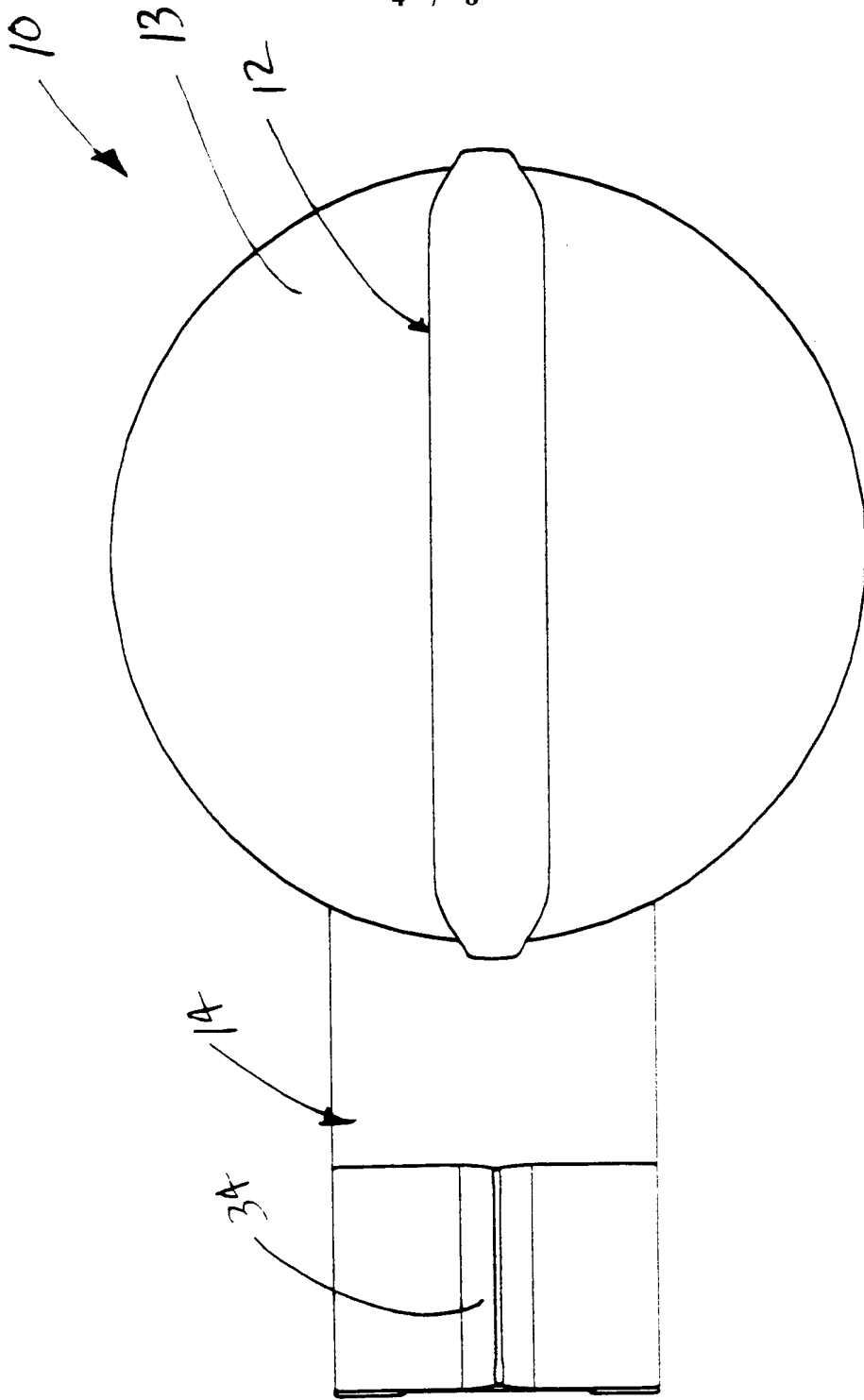


Fig. 4

BACK VIEW

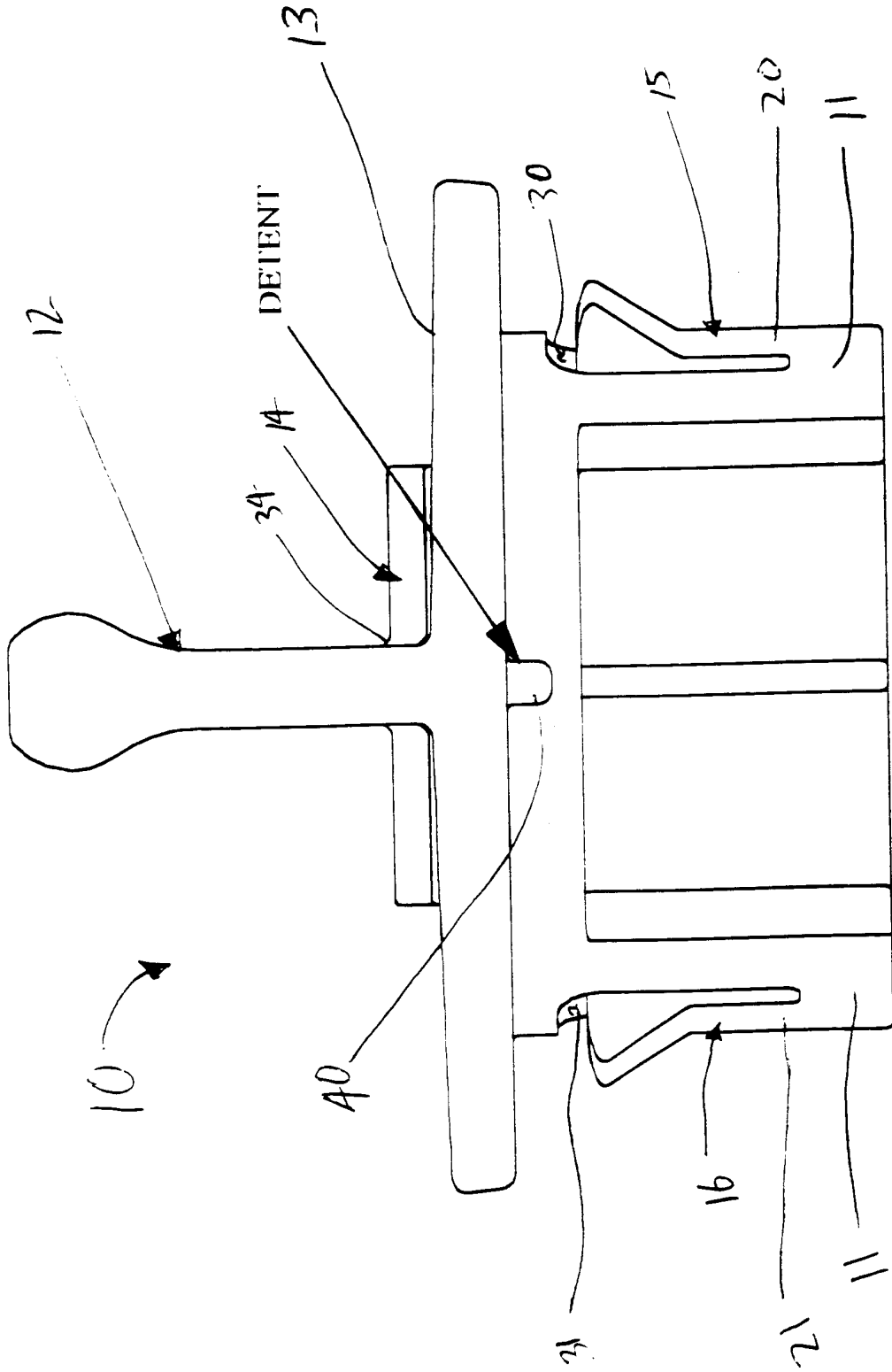
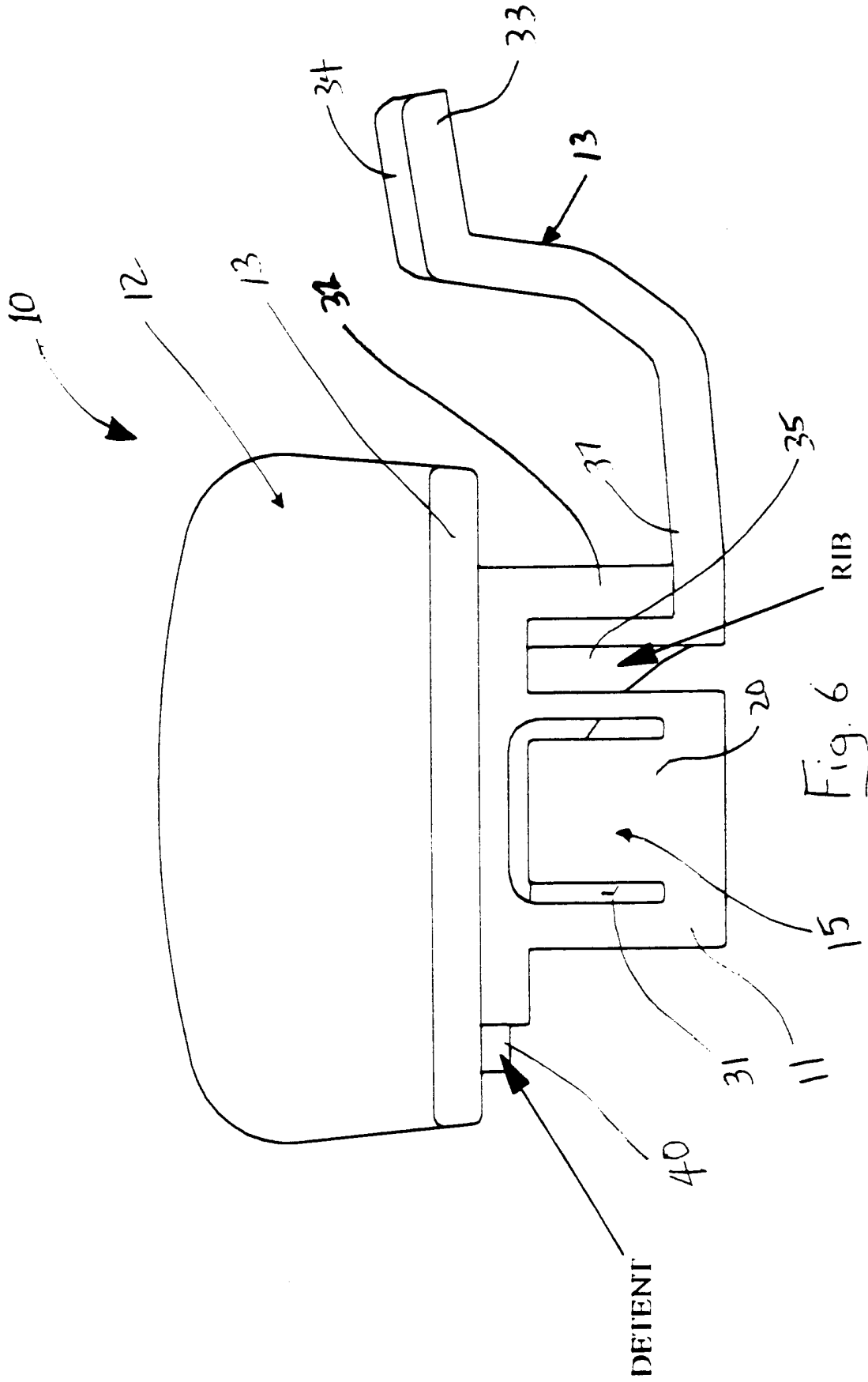


Fig. 5

LEFT VIEW



BOTTOM VIEW

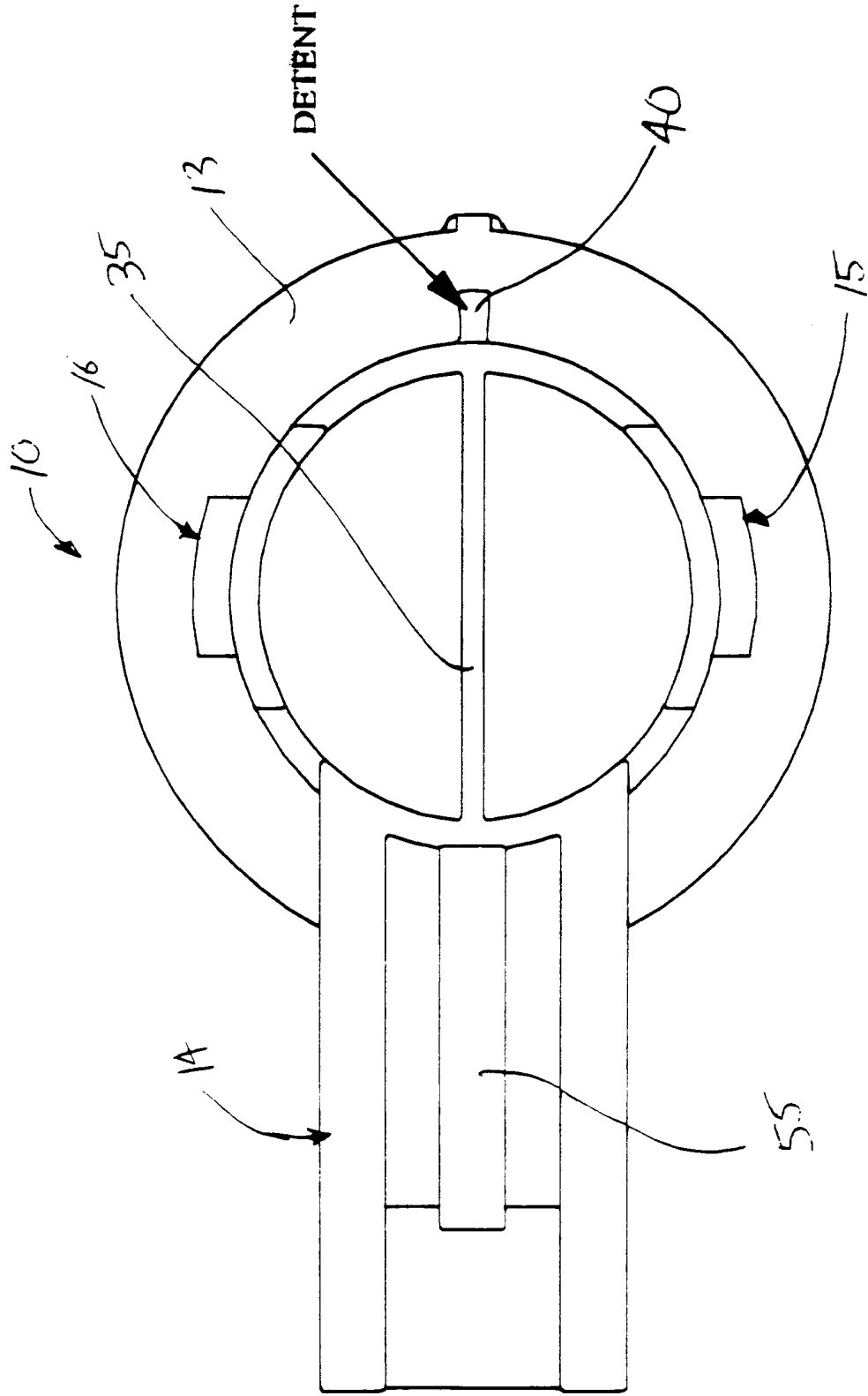


Fig. 7

PANEL PREPARATION

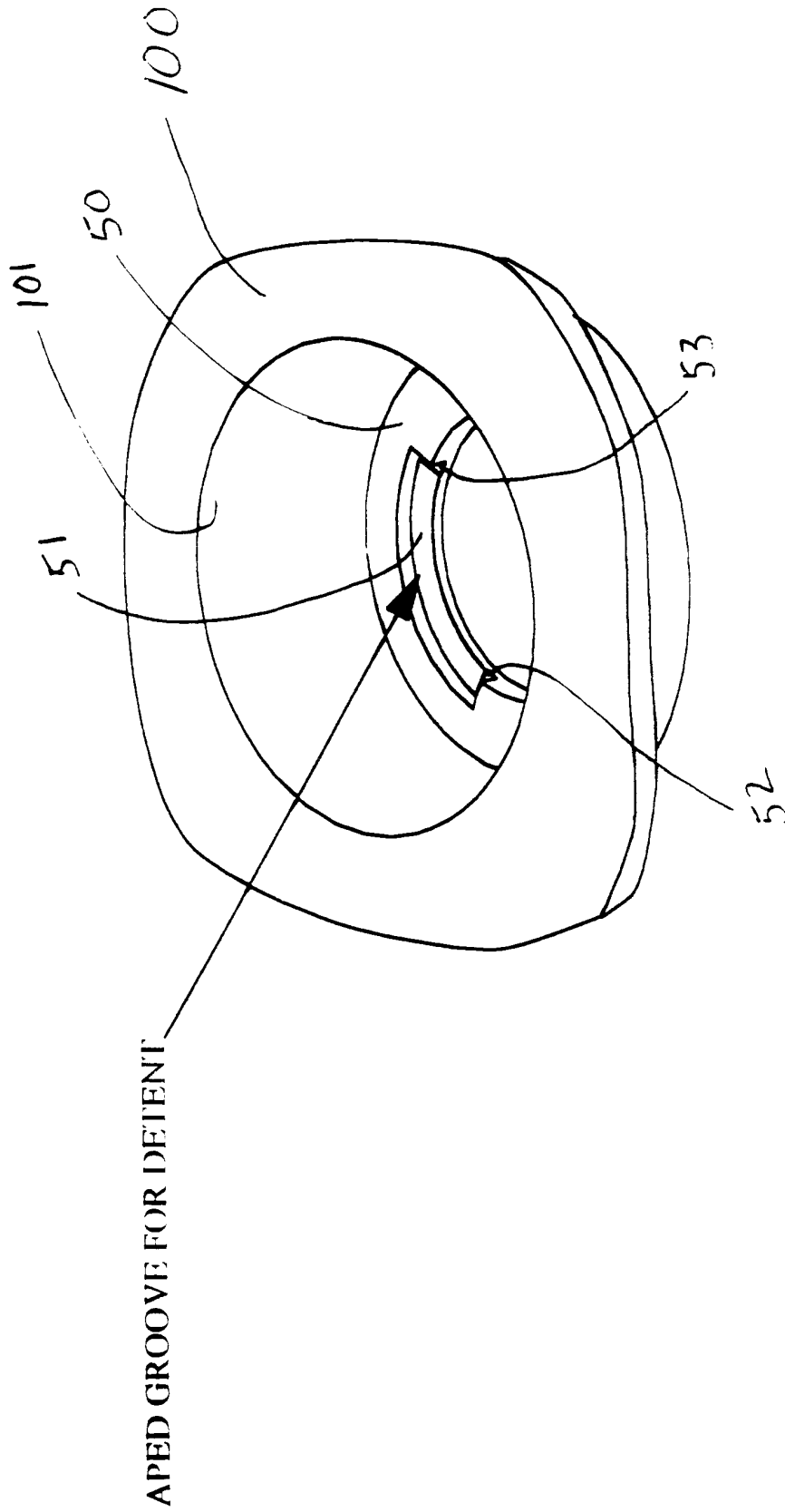


Fig. 8