US 20020096517A1

(19) United States

(12) Patent Application Publication (10) Pub. No.: US 2002/0096517 A1

Gelardi (43) Pub. Date: Jul. 25, 2002

(54) STRONG HOLD, WEAK RELEASE PIVOTING, LIFTING AND SLIDING RECESSED FULCRUM AND LEVER LATCH

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(21) Appl. No.: **10/050,610**

(22) Filed: **Jan. 18, 2002**

Related U.S. Application Data

(63) Non-provisional of provisional application No. 60/262,374, filed on Jan. 19, 2001.

Publication Classification

(51) **Int. Cl.**[7] **B65D 43/16**; B65D 43/22; B65D 45/16

(52) **U.S. Cl.** **220/4.23**; 220/835

(57) **ABSTRACT**

A strong-hold, weak-release container latch holds a lid on a base. A slide is movable in the base. A lever is attached to one end of the slide. A latch top is mounted on one end of the lever and overlies the lid; a fulcrum is provided on an opposite end. Moving the lever flexes and arcs the web and lifts a latching detent which holds the slide in the base. Latching the container includes closing the lid on the container base, sliding the lever, slide and lid latch inward toward the container base, and engaging the lid with the latch. Sliding the slide in the receiver in the base engages the detent. Lifting the lid latch and rotating the lever around the fulcrum flexes the slide and arcs the detent away from the holder, releasing the slide and subsequently releasing the lid.

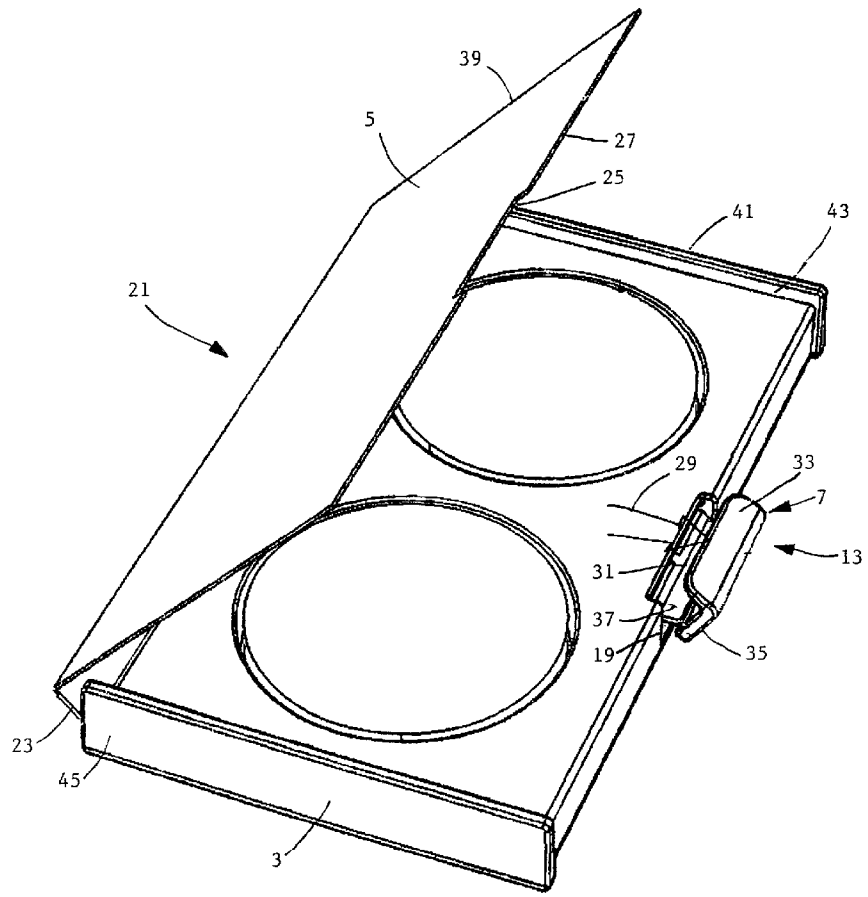
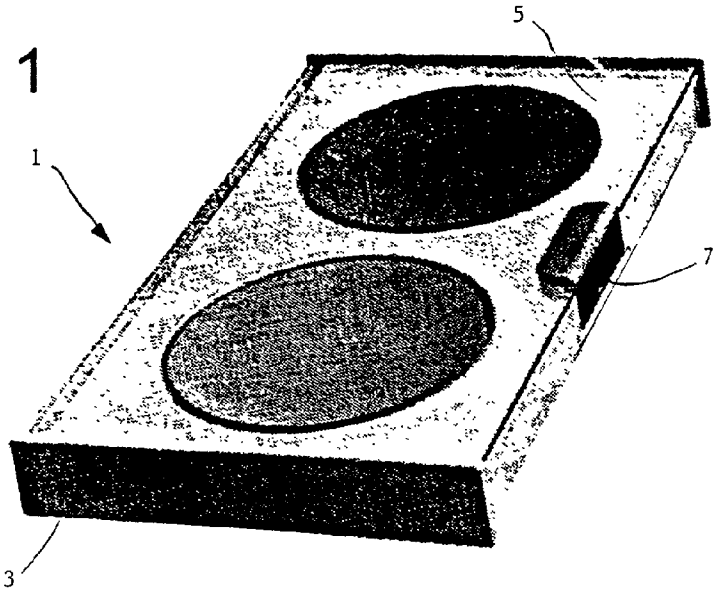


FIG. 1



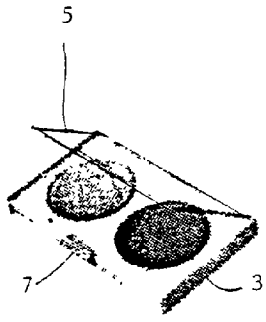


FIG. 2

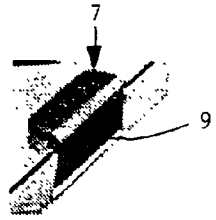


FIG. 3



FIG. 4

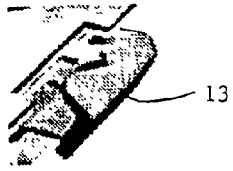
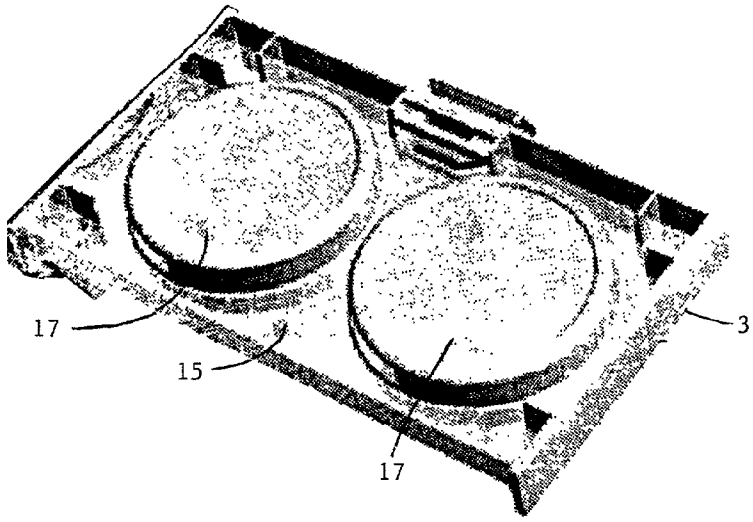


FIG. 5

FIG. 6



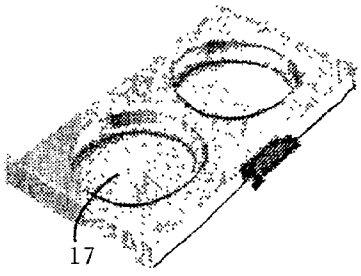


FIG. 7

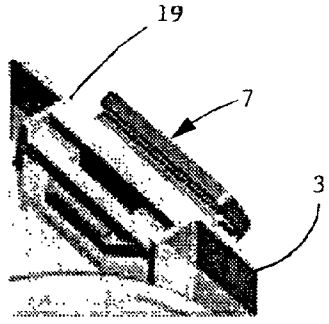


FIG. 8

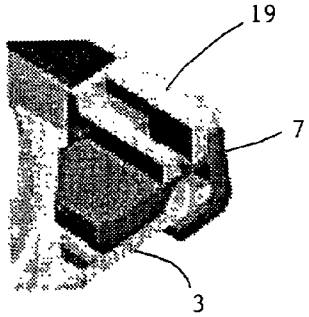


FIG. 9

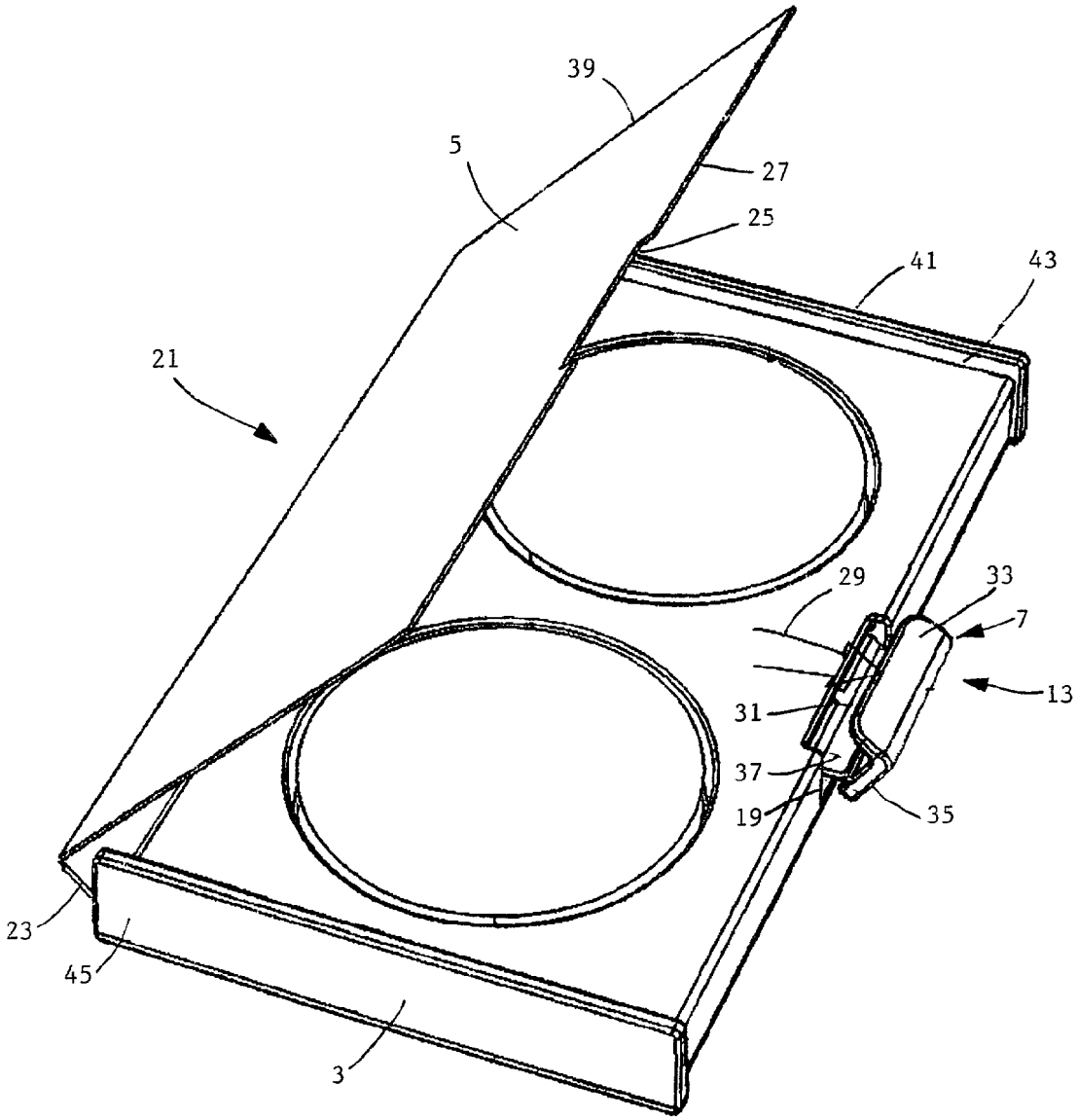


FIG. 10

FIG. 11

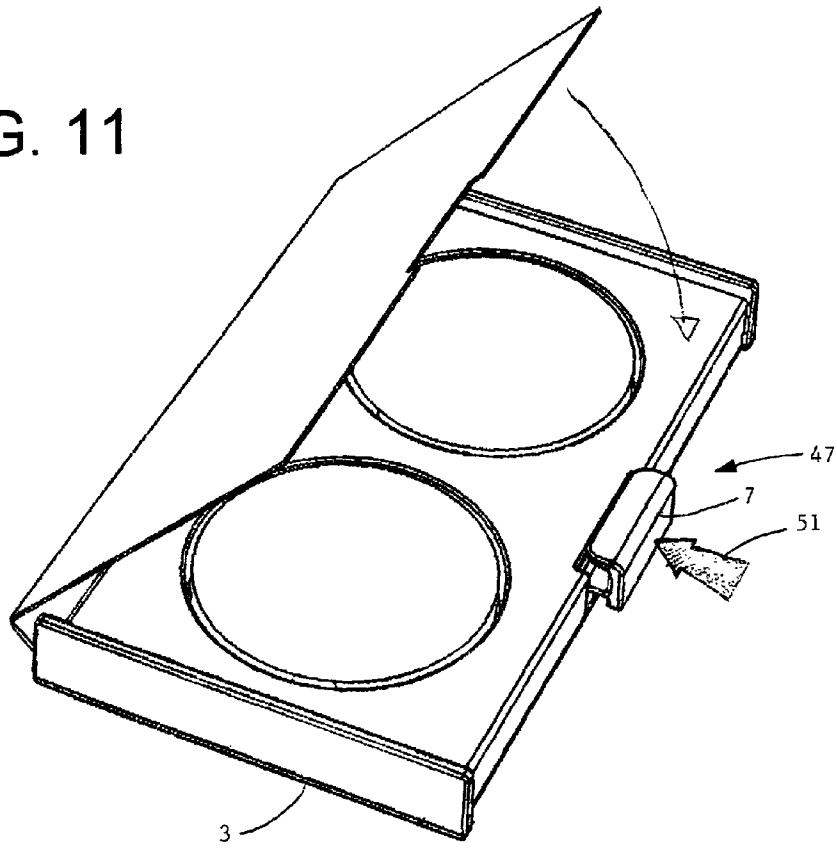


FIG. 12

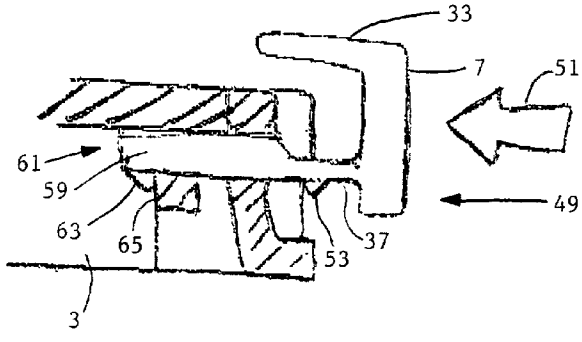


FIG. 13

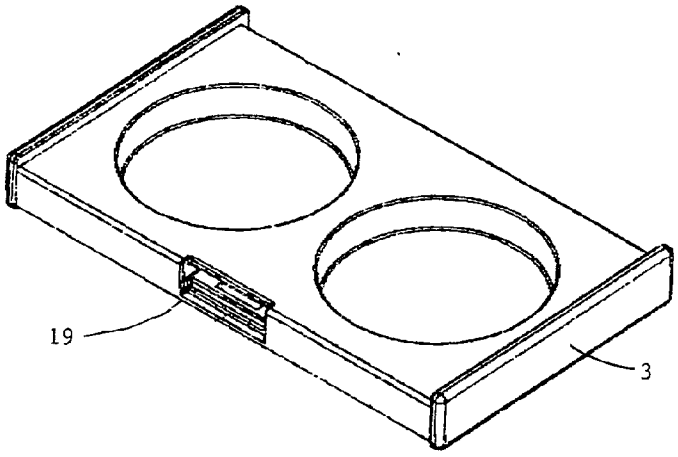


FIG. 14

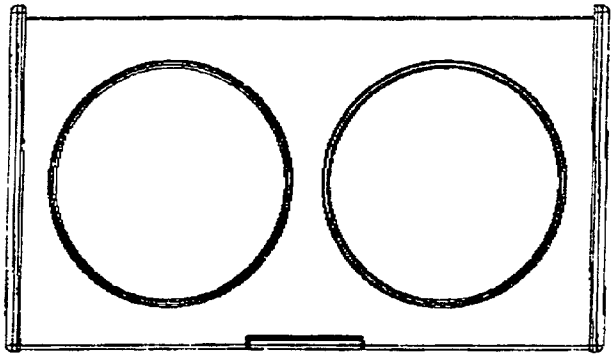
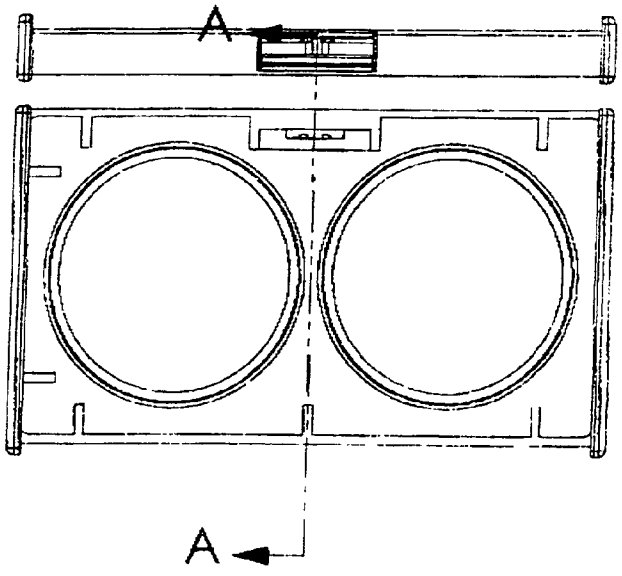


FIG. 16

FIG. 15



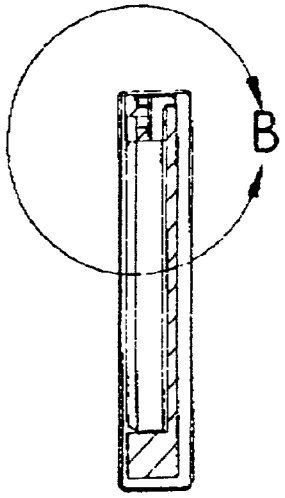


FIG. 17

FIG. 18

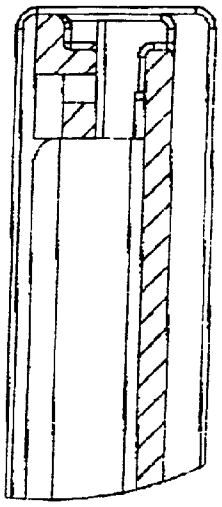


FIG. 19

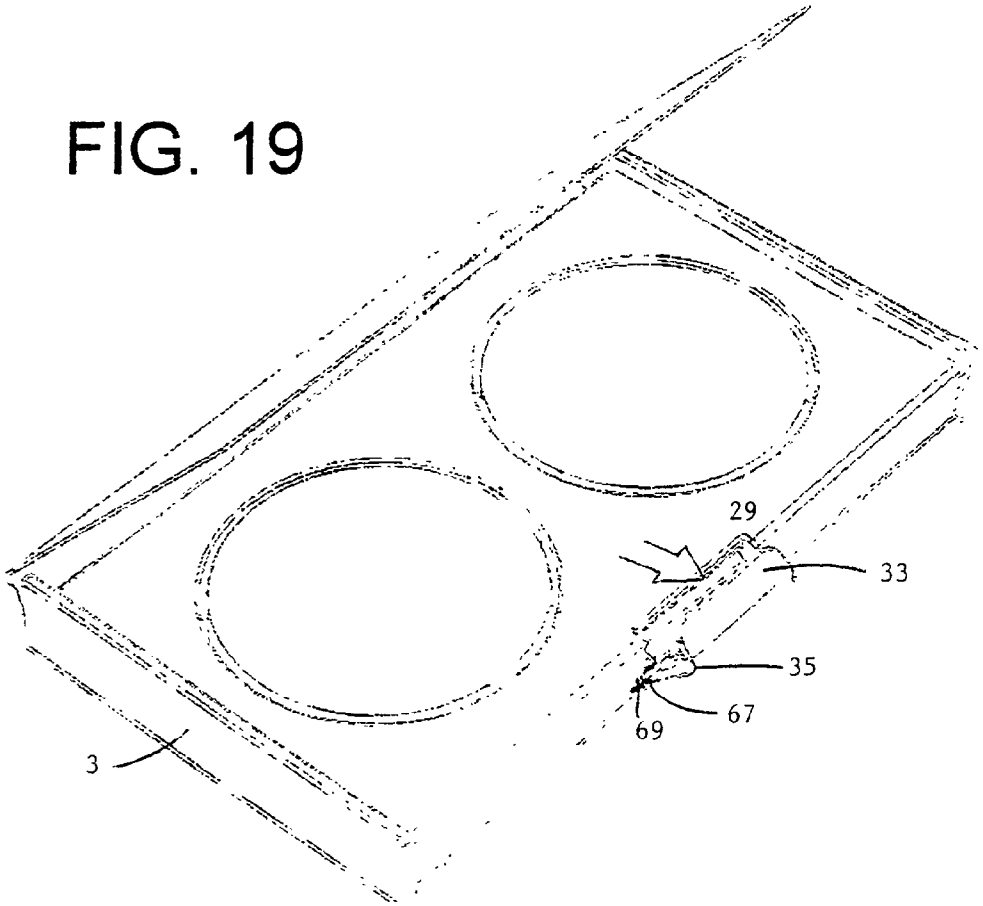
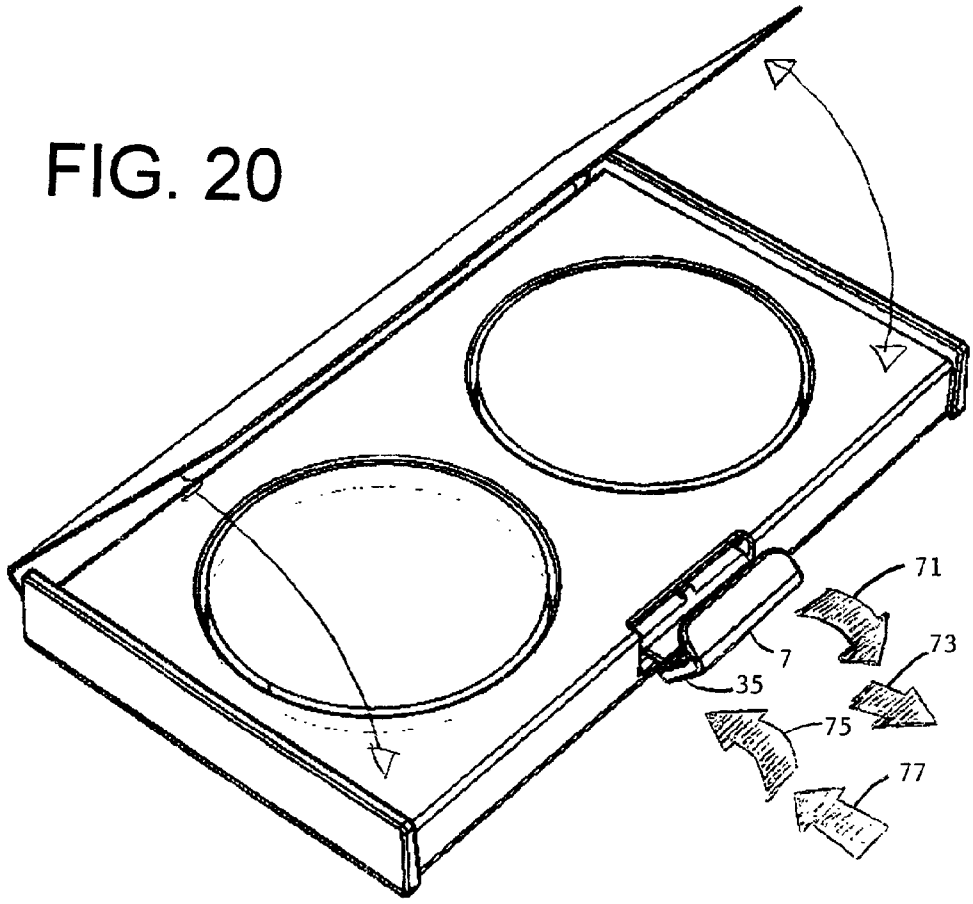


FIG. 20



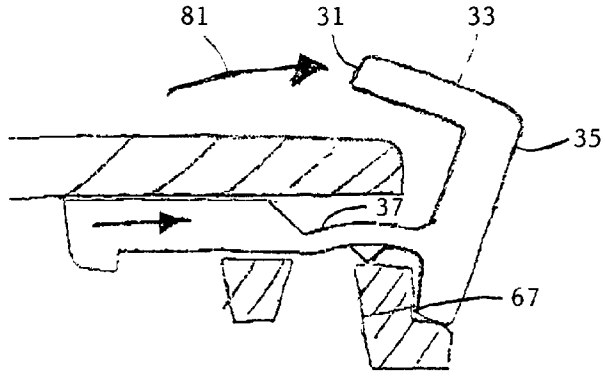


FIG. 21

FIG. 22

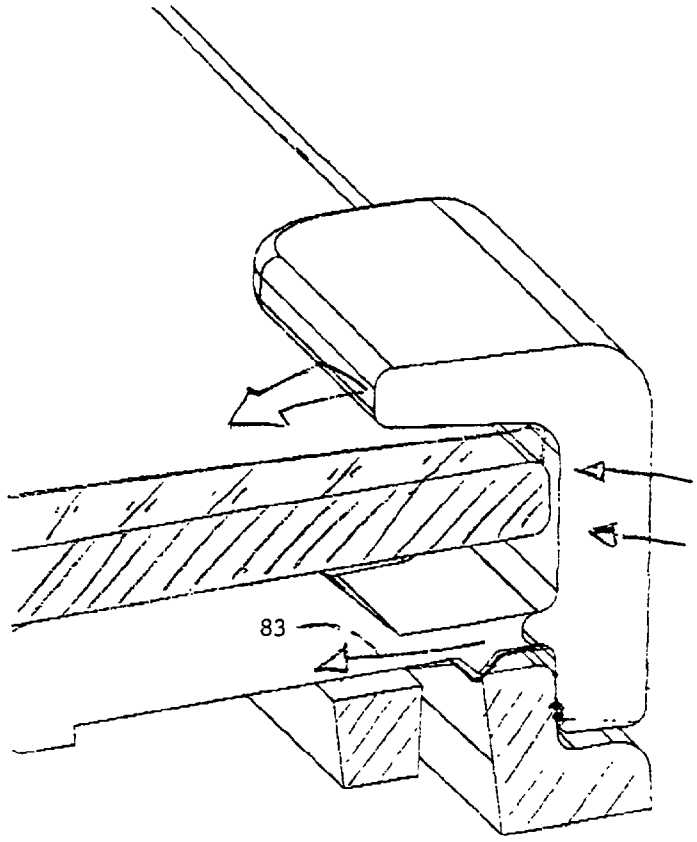
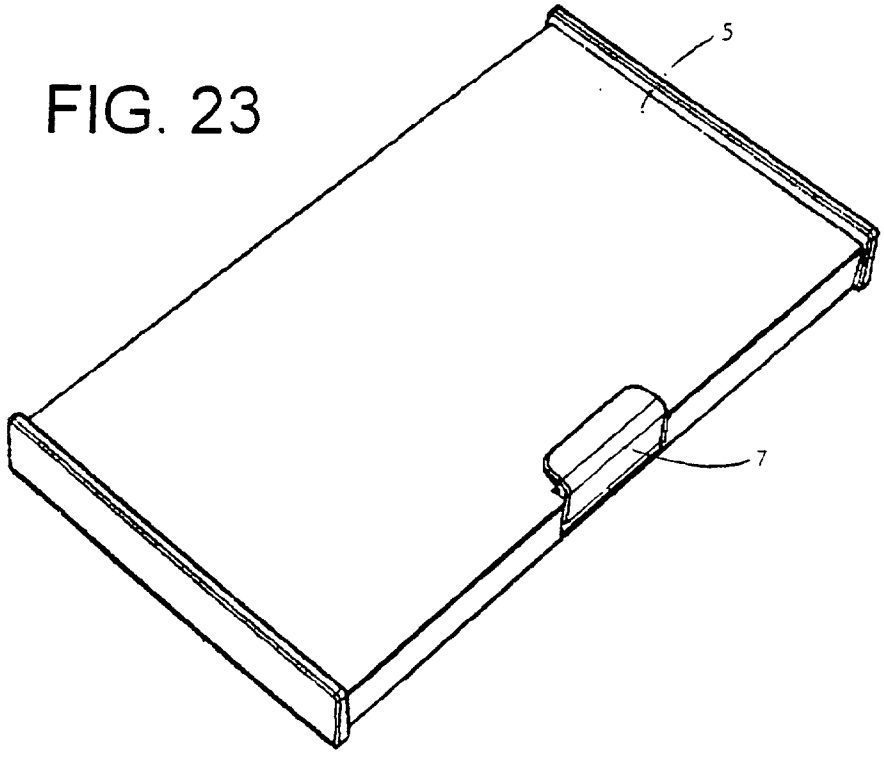


FIG. 23



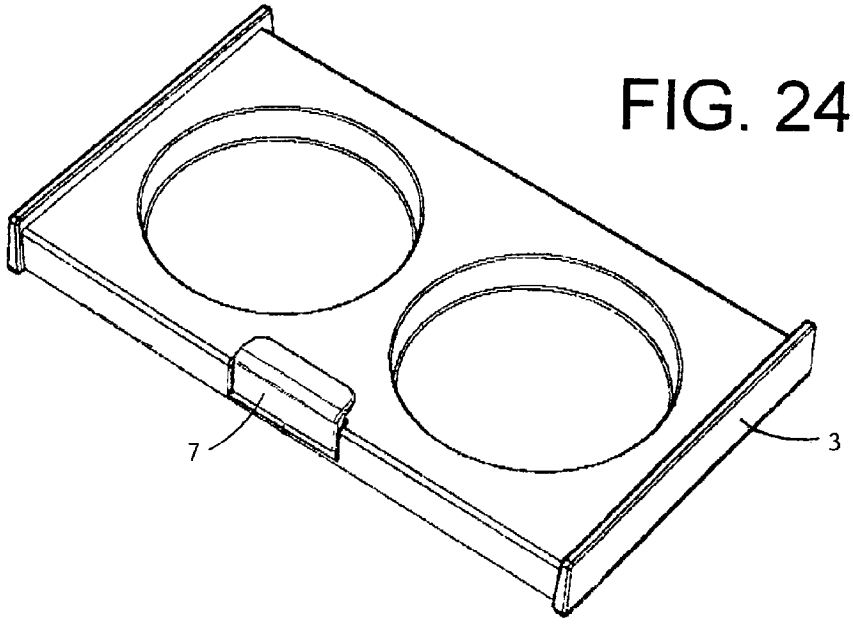


FIG. 24

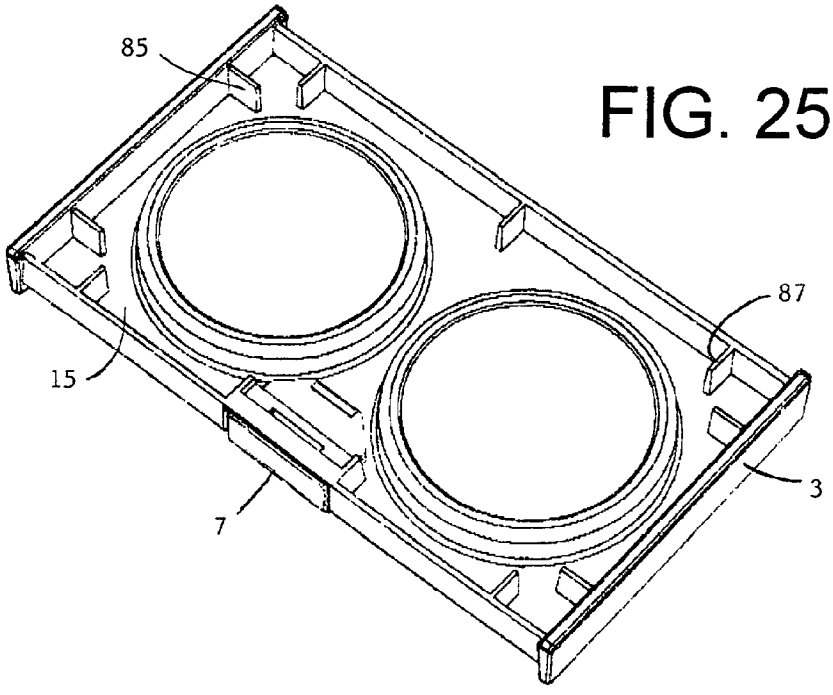


FIG. 25

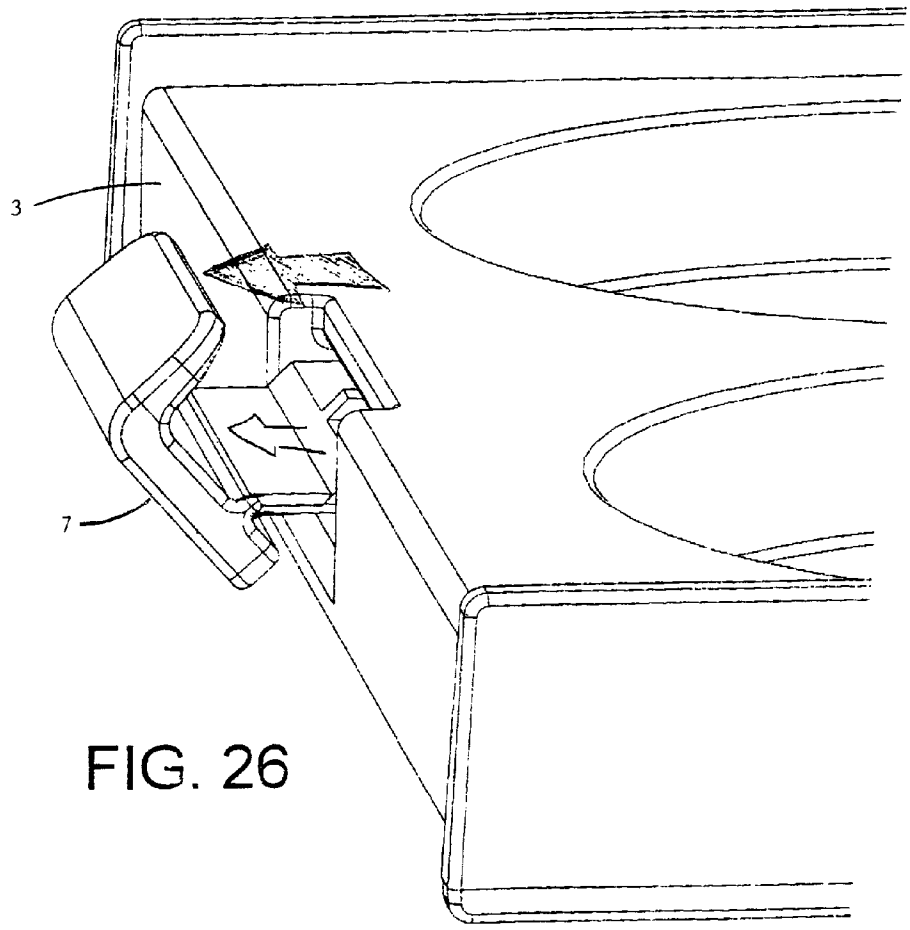


FIG. 26

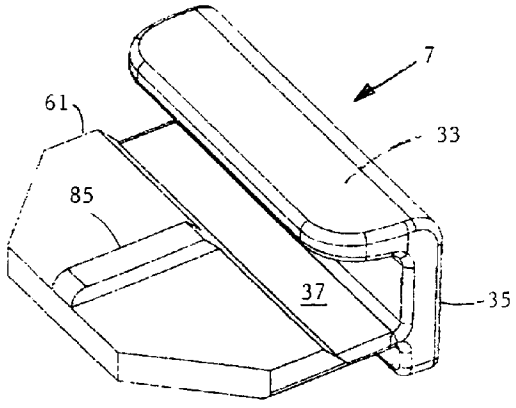


FIG. 27

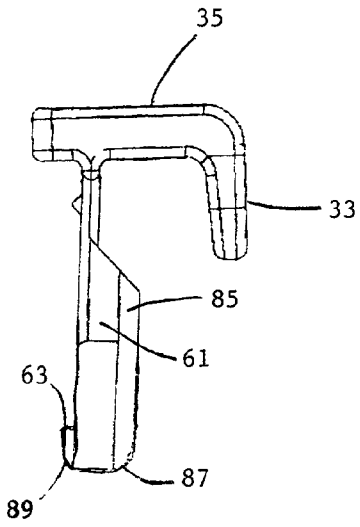


FIG. 28

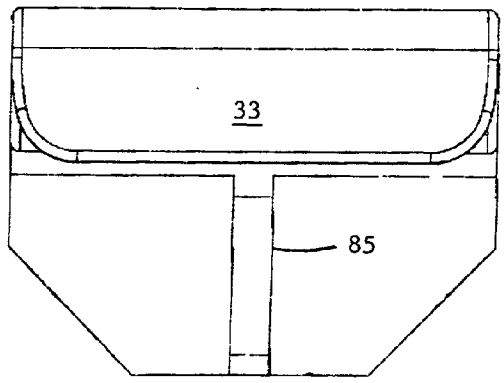


FIG. 29

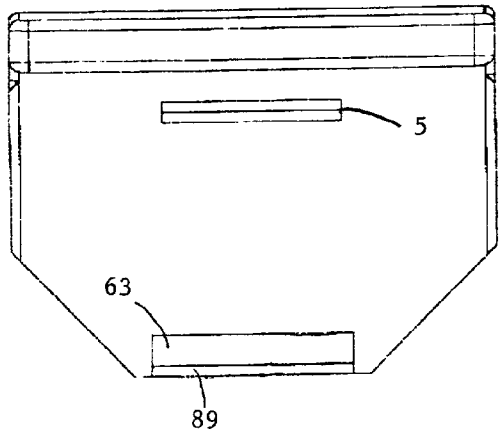
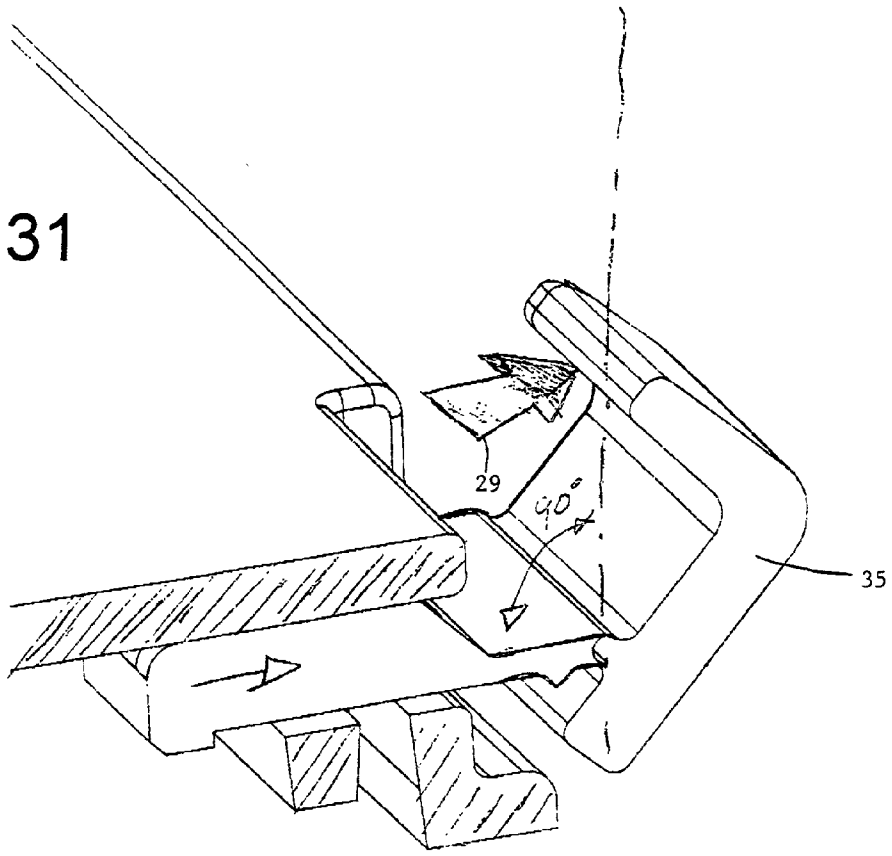


FIG. 30

FIG. 31



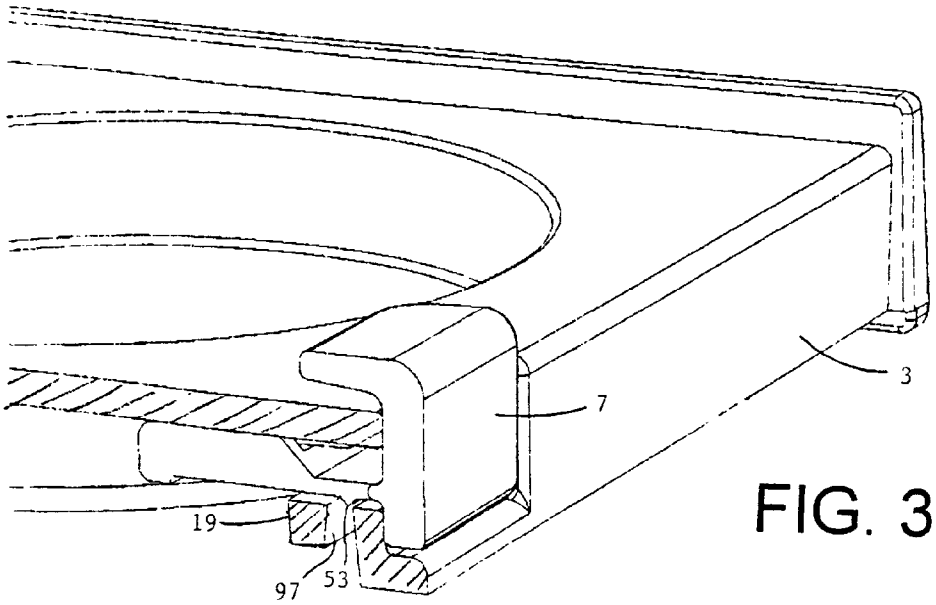


FIG. 32

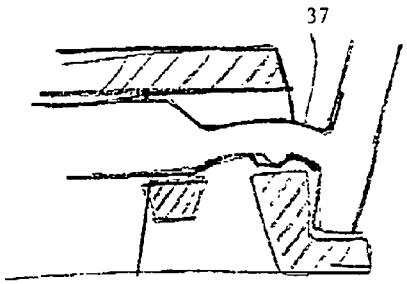


FIG. 33

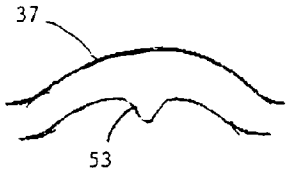


FIG. 34

FIG. 35

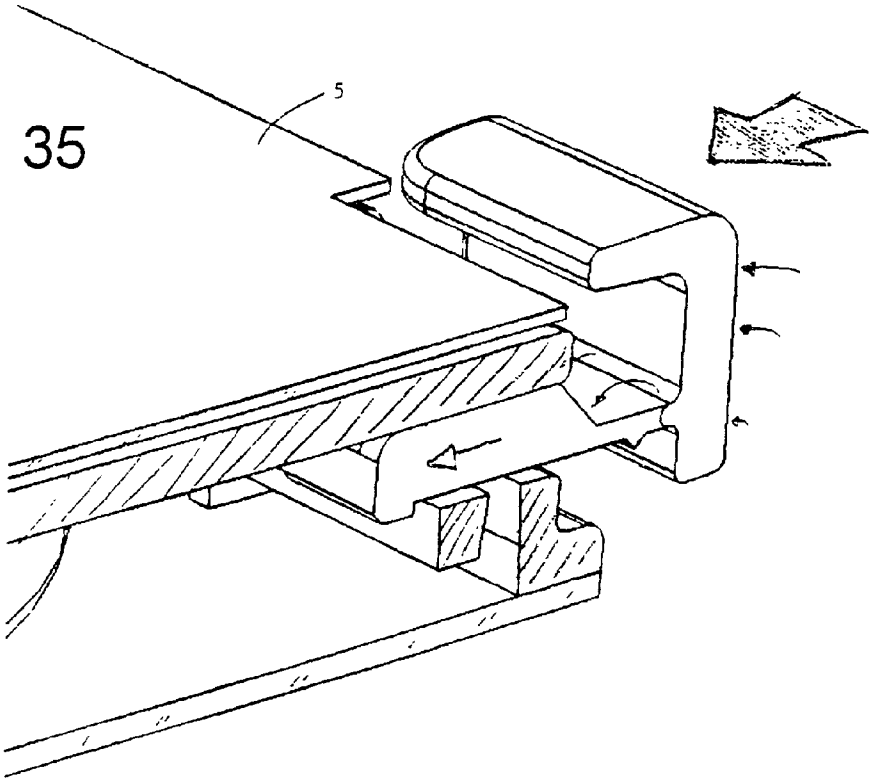
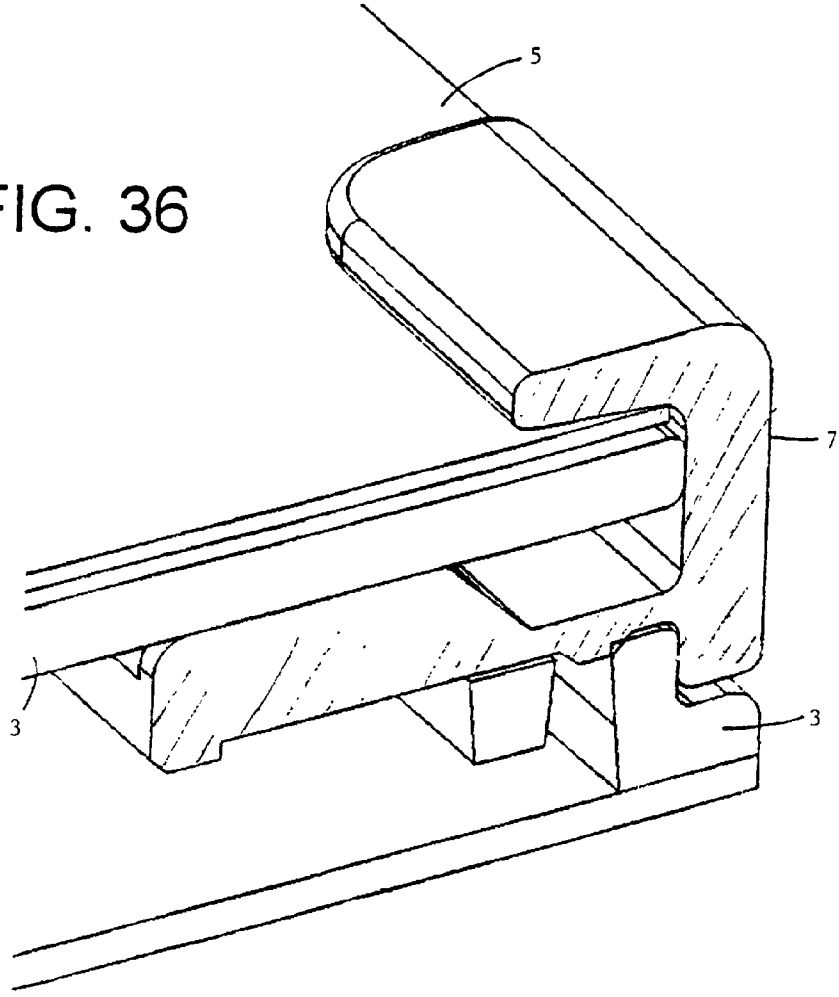


FIG. 36



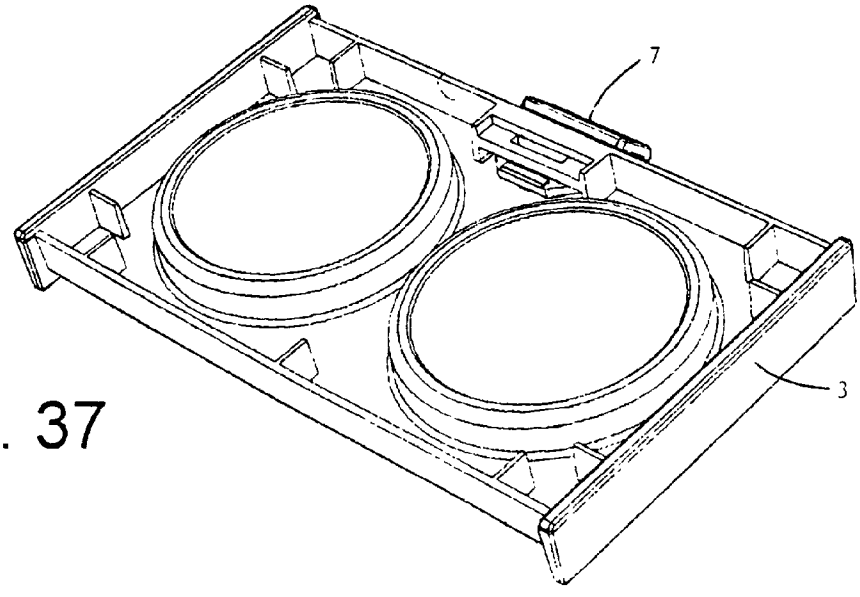


FIG. 37

STRONG HOLD, WEAK RELEASE PIVOTING, LIFTING AND SLIDING RECESSED FULCRUM AND LEVER LATCH

[0001] This application claims the benefit of U.S. Provisional Application No. 60/262,374, filed Jan. 19, 2001.

BACKGROUND OF THE INVENTION

[0002] This invention describes latches and latching methods for containers.

[0003] Containers with attached latches are known. Some latches slide to open and to close. Some latches are pivoted to the containers and rotate to open and close.

[0004] Known latches require similar and reverse movements for opening and closing. The amount of force required to open such a container is similar to the amount of force required to close such a container. The latch holding force often requires a similar opening force to overcome the holding force.

[0005] Needs exist for latches which have significant holding forces but which are easy to open.

SUMMARY OF THE INVENTION

[0006] The present invention is a package that uses a clasp to keep an outer cover (formed from sheet material) in a closed position. The clasp has three major sections, outer, connecting web and inner section. The clasp opens by applying force to the front edge of the clasp. This force creates a motion that starts with an arc and moves to a slide. The clasp's inner section remains parallel to the inner surface of the tray when moving from a locked or unlocked position. The connecting web arcs as it moves in and out of the tray from a locked to unlocked position. The outer section of the clasp has an arcing path that continually changes as the clasp moves from the locked to unlocked position. The clasp is formed such that the web is connected to the outer section of the clasp, such that an extending leg is formed. The leg is used to create a fulcrum point where it contacts the tray and thus allows for less force to move the clasp to an unlocked position than is present to keep the clasp in the closed position. The outer section of the clasp arcs outward when force is applied as it is being moved to the unlocked position, but returns to close in its locked angle when force is removed.

[0007] The latch of the present invention includes a lever which is recessed into a container base and a slide which is hinged to the lever. The top of the lever is recessed into a cover. The upper end of the lever overlies the cover, holding the cover closed. A horizontal portion of the latch slides within a rectangular opening in the recessed front of the base. A detent on the bottom of the relatively thin front portion of the horizontal member engages an inner wall of the base. The horizontal member has a vertical rib which bears against an underside of the top of the tray to allow restrictive movement. A stop on the bottom of the horizontal member prevents excessive outward movement of the horizontal member. To open the latch, the top of the vertical member is rotated outward.

[0008] The vertical member acts as a force-multiplying lever, with the bottom of the vertical member acting as a fulcrum. Rotating the vertical member outward lifts the thin flexible portion of the horizontal member, clearing the detent. Further outward movement of the top of the vertical member to clear the cover slides the horizontal member through the opening. When the top of the vertical member clears the cover, the cover is lifted. After the cover is closed, the vertical member is pushed inward into the recesses and overlying the cover. That pushes the horizontal member inward and causes the detent to flex upward and then downward over the edge of the horizontal slot. The detent provides a strong force to maintain the container closed. The lever and slide provide the opening of the latch with a relatively weak force.

[0009] The present invention provides a strong-hold, weak-release container latch. A container has a container base and a lid hinged to the base. A slide is mounted in the base and is movable with respect to the base. A lever is attached to one end of the slide. A latch top is connected to the lever for securing the cover. The latch top is mounted on one end of the lever and overlies the lid. The slide includes a flexible web, which has a latching detent for holding the slide in the base. The flexible web is attached to a middle portion of the lever.

[0010] The latch of the present invention is released by rotating the latch top away from the lid, rotating the lever about an end remote from the latch top, flexing the web upward. Arcing and releasing the detent allows the slide to move outward in the base until the latch top is clear of the lid. The latch is closed by closing the lid, pressing the lever inward, positioning the latch top over the lid, and sliding the lever, latch top, web and detent inward, which flexes the web and moves and reengages the detent.

[0011] A preferred embodiment of the present invention has a receiver in the base and a detent holder rib in the receiver. The slide is mounted in the receiver. The detent is connected to the slide for engaging and disengaging the rib. The lever connected to an end of the slide has a fulcrum end and a latch end. A latch on the latch end engages the lid. Preferably, the detent is mounted on a flexible portion of the slide. The slide has a relatively rigid portion extending from the flexible portion in a direction opposite a direction of the lever. The slide also has a ridge on the rigid portion perpendicular to the rigid portion and perpendicular to the lever when it is in latched position. A first stop in the receiver and a complementary second stop on the slide limit the outward movement of the slide in the receiver.

[0012] A shelf on the base engages the fulcrum end of the lever. The base has a facial recess that receives the lever in the latched position. The lid has an edge with a recess; the recess receives the latch end of the lever. Preferably, the lid is hinged to the base at a position remote from the lever. The lid has lateral edges, and the base has side walls extending upward for receiving the lateral edges of the lid.

[0013] Latching and unlatching the container includes closing the lid on the container base, sliding the lever, slide and lid latch inward toward the container base, and engaging the lid with the latch. Sliding the slide in the receiver in the base and engaging the detent on the slide with a complementary holder on the base latches the container. Lifting the lid latch and rotating the lever around the fulcrum flexes the slide and arcs the detent away from the holder, releasing the lid.

[0014] The preferred unlatching includes sliding the slide in the receiver and moving the lever and lid latch away from

the container before releasing the lid. A first stop on the slide engages a complementary second stop on the base when the lever and lid latch are moved away from the container. A ridge on the slide engages the base during the flexing, arcing and sliding of the slide.

[0015] The fulcrum engages a shelf on the base during the rotating of the lever and the flexing of the slide.

[0016] The lever is housed in a facial recess in the base when the container is latched.

[0017] The method of latching a lid on a container base includes providing a strong-hold, weak-release latch, providing a container having a container base and a lid hinged to the base, providing a slide mounted in the base and movable with respect to the base, providing the slide with a flexible web and providing the flexible web with a latching detent for holding the slide in the base, providing a lever attached to the slide and providing a latch top mounted on one end of the lever for overlying the lid and securing the cover.

[0018] The web is attached to a middle portion of the lever. The latch is released by rotating the latch top away from the lid, rotating the lever about an end remote from the latch top, flexing the web upward, releasing the detent and allowing the slide to move outward in the base until the latch top is clear of the lid.

[0019] The latch is closed by closing the lid, pressing the lever inward, positioning the latch top over the lid, and sliding the lever, latch top, slide, web and detent inward, flexing the web and moving the detent.

[0020] Another preferred method of the present invention includes latching a container including providing a container having a base and a lid, a receiver in the base and a rib in the receiver, mounting a slide in the receiver, connecting a detent to the slide for engaging and disengaging the rib, connecting a lever to an end of the slide, providing the lever with a fulcrum end and a latch end, and providing a latch on the latch end for engaging the lid.

[0021] The slide has a flexible portion which facilitates the mounting, including mounting the detent on the flexible portion. A relatively rigid portion of the slide extends from the flexible portion in a direction opposite a direction of the lever. A ridge on the rigid portion is located perpendicular to the rigid portion and to the lever in latched position.

[0022] The present invention includes a first stop in the receiver and a complementary second stop on the slide that limit outward movement of the slide in the receiver. A shelf on the base engages the fulcrum end of the lever. A facial recess in the base receives the lever in the latched position.

[0023] These and further and other objects and features of the invention are apparent in the disclosure, which includes the above and ongoing written specification, with the drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

[0024] **FIG. 1** is a perspective view of the new package and clasp with a transparent cover.

[0025] **FIG. 2** is a perspective view of the new package and clasp with the door open.

[0026] **FIG. 3** is a perspective detail of the closed clasp.

[0027] **FIG. 4** is a perspective detail of an initial opening move of the clasp.

[0028] **FIG. 5** is a perspective detail of a full opening position of the clasp.

[0029] **FIG. 6** is a bottom view of the package tray without the sheet material after the clasp has been inserted.

[0030] **FIG. 7** is a top view of the tray with the clasp in open position.

[0031] **FIG. 8** is a bottom detail of the clasp in open position in the tray.

[0032] **FIG. 9** is a cutaway bottom perspective of the clasp in the tray in locked position holding the cover closed.

[0033] **FIG. 10** is a perspective view of the package with the clasp in fully opened position and the cover up.

[0034] **FIG. 11** is a perspective view of the new package after the clasp has been released and before the cover is closed.

[0035] **FIG. 12** is a detail of pushing the clasp into the locked position.

[0036] **FIG. 13** is a perspective view of the tray showing the clasp receiver.

[0037] **FIG. 14** is a top view of the tray showing the clasp receiver.

[0038] **FIG. 15** is a bottom view of the tray showing the clasp receiver.

[0039] **FIG. 16** is a front view of the tray showing the clasp receiver.

[0040] **FIG. 17** is a cross-sectional side view of the tray taken along lines A-A of **FIGS. 15 and 16**.

[0041] **FIG. 18** is a detail of area B of **FIG. 17**.

[0042] **FIG. 19** is a perspective view of the tray showing pivoting of the clasp to open the cover.

[0043] **FIG. 20** is a perspective view of the tray showing movements of the clasp.

[0044] **FIG. 21** is a cross-sectional detail showing initial opening of the clasp.

[0045] **FIG. 22** is a cross-sectional detail showing closing of the clasp.

[0046] **FIG. 23** is a perspective view of the package with the cover closed and locked.

[0047] **FIGS. 24 and 25** show top and bottom views of the tray with the clasp in locked position.

[0048] **FIG. 26** is a detail showing the clasp in fully opened position.

[0049] **FIGS. 27, 28, 29** and **30** respectively are perspective, side, top and bottom views of the clasp.

[0050] **FIG. 31** is a detail of the tray and the clasp in open position.

[0051] **FIG. 32** is a detail of the tray and the clasp in closed position.

[0052] **FIG. 33** is a detail of the tray and the clasp in initial opening position.

[0053] **FIG. 34** is a detail of the arcing of the connecting web to release the detent.

[0054] **FIG. 35** is a detail of the inward sliding of the latch to lock the cover.

[0055] **FIG. 36** is a detail of the tray, cover and latch in locked position.

[0056] **FIG. 37** shows the bottom of the tray.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0057] Referring to the drawings, a package **1** has a tray **3**, a sheet material cover **5** and a latch **7**.

[0058] The cover **5** is shown opened in **FIG. 2**. The cover may be a clear material or a printed board.

[0059] FIGS. **3-5** show latch **7** in closed, locked position **9**, in initial opening position **11**, and in full opened position **13**, respectively.

[0060] **FIGS. 6, 8** and **9** show the bottom **15** of the tray **3** with a latch inserted. The latch is in its full opened position **13** in FIGS. **6-8** and in its locked position **9** in **FIG. 9**.

[0061] The cylindrical recesses **17** in the tray hold the contents of the package, which may range from boots, bags, watches, perfume, gloves, cosmetics and jewelry to compact discs and DVD's, for example.

[0062] The receiver **19** in the tray holds the clasp **7**.

[0063] **FIG. 10** shows the outer sheet material **21**, which includes a base attached to the bottom of the tray **3**, a spine **23** attached to the base by a fold or living hinge, for example, and the cover **5**. The cover has a notch **25** in its front edge **27**. The notch receives the thickness of the front of the clasp.

[0064] Latch **7** is shown in the open position **13** with force **29** applied to the inner edge **31** of the latch top **33**, which overlies the cover, when in locked position. Continued outward movement of the latch top **33** causes the outer section **35** to pull the connecting web **37** outward from the receiver **19**.

[0065] As shown in the drawings, side edges **39** of the cover fit within the upward extensions **43** of side walls **41** of tray **3**. The spine **23** fits within the rearward extensions **45** of the tray side walls **41**.

[0066] **FIGS. 11 and 12** show the latch **7** in the released position **47** after opening the latch to the fully out portion **49** shown in **FIG. 12**. After cover **5** is closed, latch **7** is pressed inward with a force **51**. The thin connecting web **37** which carries detent **53** flexes upward, allowing the detent to ride up over the front indented surface **55** of the tray **3**, so that the detent may be positioned in opening **57**. In **FIG. 11** the inner section **59** of the web **61** is shown fully outward with the stop **63** against the inner ledge **65** of the receiver **19**. The latch **7** is assembled into receiver **19** by pressing the latch inward in the direction shown by arrow **51**. The slope on the inner surface of stop **63** allows the stop to override the ledge **65** during assembly.

[0067] FIGS. **13-18** show details of the tray **3** and the receiver **19**, and show walls **41** and extensions which protect edges of the base spine and cover of the sheet material when the base is mounted on the bottom of the cover.

[0068] **FIG. 19** shows initial opening of the clasp or latch **7** with force **29**, which causes the bottom edge **67** of the outer section **35** to act as a fulcrum against the lower forward wall of the receiver recess **69**.

[0069] **FIG. 20** shows outward **71, 73** and inward **75, 77** movements of the connecting web **37** of the clasp or latch **7**. The opening movements are arc **71** and slide **73**. The closing movements are slide **77** and arc **75**.

[0070] **FIGS. 21 and 22** show movements of the clasp or latch. A first arcing **81** of the inner edge **31** of top **33**, such as with a thumb, causes the outer section **35** to act as a lever. The outer section **35** pivots around its lower edge, acting as a fulcrum which amplifies the user's applied force **81** to unlock locking rib **53**. Connecting web **37** arcs upward as snap rib **53** is pulled from a locked to an unlocked position from the motion of the outer section **35** of the clasp or latch. The thin connecting web **37** allows for bending, deflection and arcing, not hinging or pivoting.

[0071] The locking rib **53** applies an inwardly pulling force on the outer section **35** of the clasp **7**. This force **83** pulls such that the outer section **35** is pulled into and held in the locked position.

[0072] **FIG. 23** shows the cover **5** closed and locked by the clasp **7**.

[0073] **FIGS. 24 and 25** shows the clasp **7** in the closed position in try **3**.

[0074] The inward extending walls **85** shown in the bottom **15** assist in attaching the base of the sheet material to the bottom **15** of the tray, such as by welding or gluing, for example, on the surfaces **87**.

[0075] **FIG. 26** shows clasp **7** in the full outward position.

[0076] FIGS. **27-30** shows the clasp or latch **7** before it is inserted. Outer section **35** has a top **33** which overlies the cover. Relatively thin connecting web **37** is joined to the outer section and carries a snap rib **53** on its lower surface. An inner section **61** is relatively thick and has a longitudinal reinforcing rib **85** which slides on an under surface of the tray top. A stop rib **63** on the end of the bottom surface prevents overtravel of the clasp **7** in an outward direction. Sloped and rounded surfaces **87** and **89** on rearward edges of the stop rib **63** and the longitudinal rib aid in deflecting surfaces of the tray sufficiently to allow assembly of the stop rib beyond a complementary ledge in the tray.

[0077] **FIG. 31** shows a 90° flexure of the outer section **35**, which returns to vertical upon release of opening force **29**.

[0078] **FIG. 32** shows the tray **3** with the clasp **7** in locked position. The rib **53** is held within elongated recess **91** in receiver **19**.

[0079] **FIGS. 33 and 34** show arcing of the connecting web **37** to lift the latching rib **53** for opening the clasp.

[0080] **FIG. 35** shows inward pushing of the latch **7** after the cover **5** has been closed. The sloped inner edge of the latching rib **53** and the flexibility of the connecting web **37** lifts the rib over the edge of the outer face of the clasp-receiving recess.

[0081] **FIG. 36** shows the locked position.

[0082] **FIG. 37** is a bottom view showing the clasp **7** in an unlocked position.

[0083] The clasp **7** and tray **3** may be made of distinct materials. For example, the tray may be made of inexpensive and clear polystyrene. The clasp **7** may be made of relatively flexible polypropylene. Assembly of the clasp in the tray is easy and inexpensive with a simple unidirectional inward pushing.

[0084] While the invention has been described with reference to specific embodiments, modifications and variations of the invention may be constructed without departing from the scope of the invention.

I claim:

1. A strong-hold, weak-release latch apparatus comprising a container having a container base and a lid hinged to the base, a slide mounted in the base and movable with respect to the base, a lever attached to the slide and a latch top connected to the lever for securing the cover.

2. The latch apparatus of claim 1, wherein the latch top is mounted on one end of the lever.

3. The latch apparatus of claim 2, wherein the latch top overlies the lid.

4. The latch apparatus of claim 3, wherein the slide has a flexible web.

5. The latch apparatus of claim 4, wherein the flexible web has a latching detent which holds the slide in the base.

6. The latch apparatus of claim 5, wherein the web is attached to a middle portion of the lever.

7. The latch apparatus of claim 6, wherein the latch apparatus is released by rotating the latch top away from the lid, rotating the lever about an end remote from the latch top, flexing the web upward, releasing the detent and allowing the slide to move outward in the base until the latch top is clear of the lid.

8. The latch apparatus of claim 7, wherein the latch apparatus is closed by closing the lid, pressing the lever inward, positioning the latch top over the lid, and sliding the lever, latch top, web and detent inward, which flexes the web and moves the detent.

9. Latch apparatus comprising a container having a base and a lid, a receiver in the base and a rib in the receiver, a slide mounted in the receiver, a detent connected to the slide for engaging and disengaging the rib, a lever connected to an end of the slide, the lever having a fulcrum end and a latch end, a latch on the latch end for engaging the lid.

10. The latch apparatus of claim 9, wherein the slide has a flexible portion and wherein the detent is mounted on the flexible portion.

11. The apparatus of claim 10, wherein the slide has a relatively rigid portion extending from the flexible portion in a direction opposite a direction of the lever.

12. The apparatus of claim 11, further comprising a ridge on the rigid portion perpendicular to the rigid portion and to the lever in latched position.

13. The latch apparatus of claim 9, further comprising a first stop in the receiver and a complementary second stop on the slide for limiting outward movement of the slide in the receiver.

14. The latch apparatus of claim 9, further comprising a shelf on the base for engaging the fulcrum end of the lever.

15. The latch apparatus of claim 9, wherein the base has a facial recess for receiving the lever in latched position.

16. The apparatus of claim 9, wherein the lid has an edge with a recess for receiving the latch end of the lever.

17. The apparatus of claim 9, wherein the lid is hinged to the base at a position remote from the lever.

18. The apparatus of claim 17, wherein the lid has lateral edges and the base has side walls extending upward for receiving the lateral edges of the lid.

19. A method of latching and unlatching a container comprising closing a lid on a container base, sliding a lever, slide and lid latch inward toward the container base, engaging the lid with the latch, sliding the slide in a receiver in the base and engaging a detent on the slide with a complementary holder on the base, and thereby latching the container, lifting the lid latch and rotating the lever around a fulcrum, flexing the slide and arcing the detent away from the holder, and releasing the lid and thereby unlatching the container.

20. The method of claim 19, further comprising sliding the slide in the receiver and moving the lever and lid latch away from the container before releasing the lid.

21. The method of claim 20, further comprising engaging a first stop on the slide with a complementary second stop on the base when the lever and lid latch are moved away from the container.

22. The method of claim 21, further comprising engaging a ridge on the slide with the base during the flexing, arcing and sliding of the slide.

23. The method of claim 19, further comprising engaging the fulcrum with a shelf on the base during the rotating of the lever and the flexing of the slide.

24. The method of claim 19, further comprising housing the lever in a facial recess in the base when the container is latched.

25. A method of latching a lid on a container base comprising providing a strong-hold, weak-release latch, providing a container having a container base and a lid hinged to the base, providing a slide mounted in the base and movable with respect to the base, providing the slide with a flexible web and providing the flexible web with a latching detent for holding the slide in the base, providing a lever attached to the slide and providing a latch top mounted on one end of the lever for overlying the lid and securing the cover.

26. The method of claim 25, wherein the web is attached to a middle portion of the lever.

27. The method of claim 26, wherein the latch is released by rotating the latch top away from the lid, rotating the lever about an end remote from the latch top, flexing the web upward, releasing the detent and allowing the slide to move outward in the base until the latch top is clear of the lid.

28. The method of claim 27, wherein the latch is closed by closing the lid, pressing the lever inward, positioning the latch top over the lid, and sliding the lever, latch top, slide, web and detent inward, flexing the web and moving the detent.

29. A method of latching a container comprising providing a container having a base and a lid, a receiver in the base and a rib in the receiver, mounting a slide in the receiver, connecting a detent to the slide for engaging and disengaging the rib, connecting a lever to an end of the slide, providing the lever with a fulcrum end and a latch end, providing a latch on the latch end for engaging the lid.

30. The method of claim 29, further comprising providing the slide with a flexible portion and wherein the mounting comprises mounting the detent on the flexible portion.

31. The method of claim 30, further comprising providing a relatively rigid portion of the slide extending from the flexible portion in a direction opposite a direction of the lever.

32. The method of claim 31, further comprising providing a ridge on the rigid portion perpendicular to the rigid portion and to the lever in latched position.

33. The method of claim 29, further comprising providing a first stop in the receiver and providing a complementary second stop on the slide for limiting outward movement of the slide in the receiver.

34. The method of claim 29, further comprising providing a shelf on the base for engaging the fulcrum end of the lever.

35. The method of claim 29, further comprising providing a facial recess in the base for receiving the lever in latched position.

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