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(54) **BOTTLE CAP MADE OF SYNTHETIC RESIN**

FLASCHENKAPPE AUS KUNSTHARZ

CAPSULE EN RESINE SYNTHETIQUE

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Description

TECHNICAL FIELD

[0001] The present invention relates to a stopper integral type bottle cap made of soft and hard synthetic resin, and more particularly to a highly hermetically sealing synthetic resin made bottle cap capable of using without receiving any limitation for carbonated or non-carbonated beverage and which can be used to easily open the bottle without any opener and excellent in sealing effect.

BACKGROUND ART

[0002] It is known to use caps of various beverage bottles or bottles for filling alcoholic liquors made by steel or aluminum.

[0003] In case of caps made of steel, the cap can be taken off from a bottle only having to necessarily use an opener, and in the distributing course, since the cap is easily oxidized and corroded, not only it is bad in hygienic but also unpleasantness is given to a consumer in visual as well and hence value of commodity is fallen.

[0004] And, in case of caps made of aluminum, it has the advantage that the cap can be taken off from the bottle without separate opener, but after the cap is taken off from the bottle, a portion of that cap taken off from the bottle is very sharp and it has a worry about to hurt a finger, and the aluminium itself is expensive but its strength is weak whereby the sealing effect is reduced, therefore it has limitation in use that it is almost not in use for the carbonated beverage bottle and mainly can be used for a cap of non-carbonated beverage or alcohol bottle and the like.

[0005] And, the cap made of steel or aluminium as above is more than one hundred years in all in their oxidising speed and is semi-permanent, therefore in case being thrown away around near place, they have been also a principal offender polluting a peripheral environment or soil.

[0006] French Patent No. 1600882 describes a plastic bottle cap according to the first part of claim 1 having a top surface portion, a side surface portion and a stopper integrally formed at its centre and passing into the interior of a bottle. A cut out portion is provided across the side and top surfaces of the bottle cap with a pulling tab integrally formed at the end of the cut out portion. The sides of the cap pass around the edge of the bottle to define a circular inserting groove between the sides of the cut out portion and the stopper.

[0007] Swiss Patent No. 442056 shows a plastic bottle cap having a top surface portion and a side surface portion which passes around the edge of a bottle to define a circular inserting groove between the side surface portion and an integrally formed stopper passing into the interior of the bottle. A cut out portion is provided across the side surface of the bottle cap with a pulling tab inte-

grally formed adjacent the cut out portion.

[0008] US Patent No. 3405830 shows a plastic bottle cap having a top surface portion and a side surface portion passing around the edge of a bottle to define a circular inserting groove between the side surface portion and an integrally formed stopper passing into the interior of the bottle. A cut out portion is provided across the side surface portion and a pulling tab is integrally formed at the end of the cut out portion. The stopper comprises a skirt which during application of the bottle cap is folded to contact an interior wall portion of the bottle.

[0009] French Patent No. 1539832 shows a plastic bottle cap having a top surface portion and a side surface portion passing around the edge of a bottle to define a circular inserting groove between the side surface portion and an integrally formed stopper passing into the interior of the bottle. A pulling tab is integrally formed with the edge of the side surface portion to allow the bottle cap to be released from the bottle.

[0010] French Patent No. 1201114 shows a number of designs of plastic bottle caps having top surface portions and side surface portions extending around the edge of a bottle to define a circular inserting groove between the side surface portion and a stopper passing into the interior of the bottle. A number of arrangements of cut out portions provided across the side surface portion and top surface portion of the bottle cap together with pulling tabs formed at the ends of the cut out portions are described.

DISCLOSURE OF THE INVENTION

[0011] It is an object of the present invention to provide a bottle cap excellent in sealing effect so as to be able to use commonly without any difference of carbonated beverage or non-carbonated beverage.

[0012] It is a second object to provide a bottle cap having a function capable of preventing imitation of contents material and storing a separate contents.

[0013] The present invention provides a bottle cap made entirely of synthetic resin, having a top surface portion and a side surface portion and including;

- A) a substantially cylindrical stopper integrally formed centrally of the interior of the bottle cap;
- B) a top surface cut out portion and side surface cut out portion formed by a line of reduced thickness of the bottle cap respectively formed in the top surface portion and the side surface portion;
- C) a pulling tab integrally formed at an end of the side cut out portion such that the connection between the stopper and the remainder of the bottle cap by the cut out portions can be released by pulling the pulling tab; and
- D) a circular inserting groove defined between the side surface and the stopper; and characterised by further comprising a separate second element ar-

ranged to co-operate with the stopper to define a spatial portion formed by a circumferential space between the stopper and the second element, and a protrusion portion of either the stopper or the second element being arranged to be deformed by the bottle, in use, into said spatial portion to provide a hermetic sealing promoting means.

BRIEF DESCRIPTION OF THE DRAWINGS

[0014]

FIG. 1 is a perspective view of a bottle cap in accordance with the present invention,

FIG. 2 is a cross sectional view taken along A-A line of FIG. 1,

FIG. 3 is a cross sectional view taken along B-B line of FIG. 1,

FIG. 4 is a cross sectional view of a state that a bottle cap of the present invention is coupled to the bottle,

FIG. 5 and FIG. 6 show a state that a bottle cap of the present invention is being taken off from the bottle,

FIG. 7(A)(B) are respectively a perspective view and a cross sectional view of the bottle cap that a pulling tab is integrally formed at a side surface,

FIG. 8(A)(B) are respectively a perspective view and a cross sectional view of the bottle cap that a pulling tab is integrally formed around the lower side thereof,

FIG. 9 is a perspective view of a bottle cap that a pulling tab is formed in long below the side surface,

FIG. 10(A)(B)(C) are cross sectional views showing a using state of the bottle cap shown in FIG. 9,

FIG. 11 is a perspective view of the bottle cap made the pulling tab to be able to insert to top surface of the bottle cap,

FIG. 12 is a cross sectional view of a bottle cap of a type that a reinforcing ring blocked in its top side is inserted from exterior,

FIG. 13 is a cross sectional view of a state that the reinforcing ring is separated,

FIG. 14 is a cross sectional view of the bottle cap of a type that a reinforcing ring opened in its top side is inserted from exterior,

FIG. 15 is a cross sectional view of a state that the reinforcing ring is separated,

FIG. 16 is a cross sectional view of a bottle of a type that an air tight packing is inserted to a cap portion,

FIG. 17 is a cross sectional view of using state of the bottle cap shown in FIG. 18,

FIG. 18 is a cross sectional view of a state that a cap portion is improved in cross section in order to increase the sealing effect,

FIG. 19 is a cross sectional view which is improved the structure of the cap portion and the reinforcing ring in order to increase the sealing effect,

FIG. 20(A)(B) are respectively a cross sectional view and a view of operating state of the bottle cap suitable in use for a carbonated beverage bottle maintaining a pressure resistance as a bottle cap for increasing the sealing effect,

FIG. 21(A)(B) are cross sectional views of the bottle cap suitable in use for a vacuum packaging container as a bottle cap for increasing the sealing effect, FIG. 22 is a modified embodiment of the bottle cap of the present invention and is a cross sectional view structured so as to store a separate contents material within interior of the bottle cap,

FIG. 23 is a perspective view of a bottle cap in which an imitation preventing band is integrally formed,

FIG. 24 is a diagram showing an effect of the imitation preventing band,

FIG. 25(A)(B) show the bottle cap for preventing an imitation of the contents material, and are respectively a cross sectional view and a view of operating state of a bottle cap manufactured so as to use for carbonated beverage bottle maintaining a pressure resistance,

FIG. 26(A)(B) show the bottle cap for preventing an imitation of the contents material, and are cross sectional views of the bottle cap manufactured so as to use for a vacuum packaging container.

FIG. 27 (A)(B) are a modified example of a second embodiment, and show a state that the pulling tab is integrally formed to a side wall,

FIG. 28(A)(B) are a modified example of the second embodiment, and show a state that the pulling tab is formed at lower side of side wall,

FIG. 29(A)(B) are diagrams of a state that the pulling tab described in the first embodiment is integrally formed at lower side of the side wall,

FIG. 30(A)(B) are diagrams of a state that the pulling tab described in the first embodiment is integrally formed at upper side of the side wall,

FIG. 31(A)(B) are diagrams of a state that the pulling tab is formed at upper side of the side wall and coupled,

FIG. 32(A)(B) are views showing a third embodiment of the present invention, and show that an air discharging path is formed,

FIG. 33 is a view showing a fourth embodiment of the present invention,

FIG. 34 is a cross sectional view taken along A-A line of FIG. 33,

FIG. 35 is a cross sectional view taken along B-B line of FIG. 33,

FIG. 36 is a view of using state of FIG. 33,

FIG. 37(A)(B) are magnified view of essential part of FIG. 33,

FIG. 38 shows a fifth embodiment of the present invention.

[0015] Note that figures 7(A)(B), 8(A)(B), 10(A) to (C), 20(A)(B), 21(A)(B), 22, 25(A)(B), 26(A)(B) and 32(A)(B)

do not show bottle caps according to the invention because these bottle caps do not comprise a spatial portion, and that figures 21-38 are only briefly referred to.

[0016] For the bottle caps shown in figures 23, 24, 27, 28, 29, 30, 31 and 33 the provision of a second element and a spatial portion is not visible.

BEST MODE FOR CARRYING OUT THE INVENTION

[0017] Hereinafter, the present invention will be described more in detail with reference to the accompanying drawings.

[0018] FIG. 1 shows a first embodiment of a synthetic resin bottle cap of the present invention.

[0019] This bottle cap 1 is made of entirely synthetic resin and consists of a side surface portion 3 and a top surface portion 2, and a stopper 4 is integrally formed at interior. And, a reinforcing ring 5 as a second element, made of material being stronger in strength than the cap, is inserted into inner side of the stopper 4, and a band-shaped protrusion 6 is protruded around the external circumference of the stopper 4, and a circular inserting groove 7 to be inserted with the bottle opening and a fastening protrusion 8 to be fastened to outer side of the bottle opening are formed between the side surface portion 3 and the stopper 4 as shown in FIG.2 and FIG.3.

[0020] And, a pulling tab 9 is integrally provided to top surface portion 2, and about 3/4 of the pulling tab is attached in a point contacting form maintaining a predetermined distance at the top edge of the bottle cap, and remaining about 1/4 drops down in slant along the side surface portion 3 of the bottle cap and integrally attached to lower side end of the side surface portion with forming an adhering surface 9'.

[0021] And, side surface cut out portion 10 is formed in two rows from a place that the pulling tab 9 and the side surface portion 3 are integrally attached, and this side surface cut out portion is connected in vertical on the side surface portion 3 and maintains a circular form to right and left at the top surface portion 2 and divided to right and left whereby circular cut out portion 12 having a non-cut out portion 11 is formed. On the other hand, the circular cut out portion 12, as shown in FIG. 3, is made by forming a cut out groove from inside of the circular inserting groove 7 toward the top surface portion 2, and the side surface cut out portion 10 is made by oppositely forming a cut out groove from the outer side of the side surface toward the inner side.

[0022] And, the reinforce ring 5 to be inserted to inner side of the stopper 4 is a hollow tube type and formed with protruded portion 5' at a side end whereby a spatial portion 14 is formed between the reinforce ring 5 and the stopper 4.

[0023] The synthetic resin bottle cap 1 of the present invention constructed as these is covered to a bottle A in a manufactured state as shown in FIG.1, in case of covering it, it is forcibly covered by instantaneously applying a strong force to the bottle cap in a state that the

cap is positioned to the opening of the bottle A, at this moment, the synthetic resin made bottle cap has an elasticity and hence instantaneously expanded whereby covered to the bottle and covered without damage of the cut out portion 12 and the side surface cut out portion 10, and such process is made by a presently using automatic machine.

[0024] Therefore, the stopper 4 portion is inserted into inside of the bottle A and closely contacted to the opening and more tightly contacted by the reinforce ring, and the fastening protrusion 8 at inner side of the side surface portion is hooked up by a fastening groove at outside of the bottle whereby it is not taken off. And, a protrusion 6 is formed at outer side of the stopper 4, and this protrusion 6 is closely contacted to inner side of the bottle by being forcibly pressed as shown in FIG.4, and the protrusion 6 portion is pushed toward the spatial portion 14 formed between the backward reinforce ring 5 and becomes to have a tension whereby more firmly and closely contacted to the opening of the bottle.

[0025] Accordingly, the synthetic resin made bottle cap 1 of the present invention as above makes complete hermetic sealing even if it is used for the carbonated beverage bottle same as using an existing metal made cap.

[0026] FIG.5 and FIG.6 show an operation taking off the synthetic resin made bottle cap 1 of the present invention from the bottle.

[0027] That is, in case of intending to take off the bottle cap 1 for drinking the contents material, firstly the pulling tab 9 is pulled to upward and a portion other than the adhering surface 9' with the side surface portion 3 is separated from the side surface portion 3 of the bottle cap 1. At this moment the pulling tab 9 is adhered in a point contacting form only at few points with the side surface portion 3, therefore it is easily separated even if a little force is applied.

[0028] When the pulling tab 9 is further pulled to upward in this state, the side surface cut out portion 10 is cut out and the cut out portion 3' is lifted up to upward as shown in FIG.5, and when it is continuously pulled, the cut out portion 12 formed to the top surface portion 2 of the bottle cap 1 is cut out in a state that the side surface portion 3 is successively covered around the opening of the bottle and the stopper 4 portion is taken off from the bottle, at this moment, when the cut out portion 12 is completely cut out up to the non-cut out portion 11, the stopper 4 portion is completely removed out from the opening of the bottle, and when it is successively pulled out, the side surface portion 3 is opened to right and left and the bottle cap is completely taken off from the bottle.

[0029] The form of the bottle cap 1 completely taken off from the bottle as this, although showing is deleted, becomes a form that the cut out portion 12 and the side cut out portion 10 is completely cut out and they are connected one another only at the non-cut out portion and the side surface portion 3 is completely cut out in its one

side.

[0030] On the other hand, it is possible to use by changing the form and attached position of the pulling tab 9 in this embodiment, but in the bottle cap 1 formed with the side wall 3 in long, FIG. 7(A) (B) are so constructed that the pulling tab 9 is integrally formed to the side wall but extended from the side surface cut out portion to the cut out portion 9'.

[0031] Accordingly, in case of using, when the pulling tab 9 is pulled up, the cut out portion 9^o is firstly cut out and successively the side surface cut out portion 10 and the cut out portion 12 are cut out in turn and the stopper 4 is taken off from the bottle whereby the whole cap is taken off.

[0032] FIG.8(A)(B) show that the position of the pulling tab 9 is simply placed at lower side of circumference of the side surface portion 3, which is same as a state of FIG.1.

[0033] FIG.9 shows that the pulling tab 9 is formed to be extended long to lower side of the side surface portion 3, and a hole 15 capable of inserting a finger is perforated on the pulling tab 9, and the adhering surface 9' abutting with the side surface portion is made to be free to bend, and a protrusion operating hole 16 is formed to a center portion, a protrusion 17 is formed at the side surface portion 3 confronting with this protrusion operating hole 16, and said protrusion 17 is protruded to lower end of the side surface portion 3.

[0034] FIG.10(A)(B)(C) are cross sectional views of a state that the bottle cap shown in FIG.9 is covered to the bottle, which are cross sectional views for explaining a state of the pulling tab 9.

[0035] That is, the bottle cap 1 covered to the bottle A as shown in figure 10 A firstly by an automatic machine, of which pulling tab 9 is pressed to lower side by a continuous operation of the machine, and the pulling tab 9 becomes a state of aligned with the side surface portion 3 of the bottle cap, at this moment, the protrusion operating hole 16 formed to the pulling tab 9 forcibly pushes and turns over the protrusion 17 formed to the side surface portion 3 as figure 10 B, and thereafter since a length of the protrusion 17 itself is slightly longer than a length of the protrusion operating hole 16, the pulling tab is hooked up by the protrusion 17 and it can not be returned to original position, and becomes maintained in a state of aligned with the side surface portion 3 of the bottle cap 1 to up and downward as figure 10 C.

[0036] FIG.11 is a diagram constructed so as to be able to cover the pulling tab 9 on the top surface of the bottle cap 1. That is, the pulling tab 9 is integrally formed from a point terminating with the cut out portion 10 to the connecting portion, which is made to cover the pulling tab 9 portion to the top surface of the bottle cap 1, in case of taking off the bottle cap, it is taken off as same as the previously mentioned method only when pulling the pulling tab 9 to upward.

[0037] That is, FIG.12 and FIG.13 are structures made to couple the reinforce ring 5 at the top surface

portion of the bottle cap, which is so made that thickness of the stopper 4 portion of the bottle cap is made a little thick and simultaneously an inserting groove 19 is formed to this and a reinforce ring 5 of hermetically sealed form in top side is inserted to this so that a spatial portion 14 is formed between the external wall of the cap and the reinforce ring 5. At this moment, a hooking groove 20 and a hooking protrusion 21 are formed to the inserting groove 19 and the reinforce ring 5 and they are made not to be taken off in a state of being once coupled, and in a state covered to the bottle, the protrusion portion 6 is pushed in toward the spatial portion 14 and a tension is produced and further closely contacted to the opening of the bottle whereby a hermetically sealing effect can be increased.

[0038] FIG.14 and FIG.15 are similar system with FIG.13, in which the reinforce ring 5 coupled at the top surface portion of the bottle cap is a form of opened to up and downward, and it has a difference that a reinforcing rib 22 is formed to inner side surface whereby a hermetical sealing effect and aesthetic sense are improved a little.

[0039] FIG. 16 is a system inserting a separate sealing cap 23 as second element to outer side of the stopper 4 of inner side of the bottle cap. That is, a hooking protrusion 28 is formed at outer circumference of the stopper 4, a wing portion 24 is formed to the sealing cap 23, an annular band 25 is formed at a side surface 29, and a spatial portion 26 is formed to opposite side of the annular band 25 while a hooking groove 27 is formed to its upper side. Accordingly, when the sealing cap 23 is inserted to the stopper portion 4 and then covered to the bottle, as shown in FIG. 17, the wing portion 24 of the sealing cap 23 seals by surrounding the bottle opening, the annular portion 25 is pushed to the spatial portion 26 whereby a tension is produced, and further closely contacted to the inner surface of the bottle opening, therefore an entire sealing effect is further increased.

[0040] FIG. 18 is a structure so made that a wall body of the stopper 4 of the bottle cap is formed to a crease portion 30 so as to make a spatial portion 35 to be defined between the reinforce ring 5 and to have a tension when the stopper 4 contacts closely to the bottle whereby a sealing effect is further increased, and FIG. 19 is a structure in which a spatial portion 32 is defined at inner side surface of the protrusion 6 formed at outer side of the stopper and a reinforce ring 5 formed with to protruded shoulders 31 is inserted to couple, and the protrusion 6 received a tension by the spatial portion 32 whereby a closely contacting force with the wall is increased.

[0041] FIG. 20(A)(B) are structure in which a lower portion 33 of the bottle cap stopper is hermetically sealed but protruded roundly to lower side and the reinforce ring 5 is inserted into interior of the stopper at the top side of the bottle cap so as to be suitable for carbonated beverage.

Claims

1. A bottle cap (1) made entirely of synthetic resin, having a top surface portion (2) and a side surface portion (3) and including;
 - A) a substantially cylindrical stopper (4) integrally formed centrally of the interior of the bottle cap (1);
 - B) a top surface cut out portion (12) and side surface cut out portion (10) formed by a line of reduced thickness of the bottle cap (1) respectively formed in the top surface portion (2) and the side surface portion (3);
 - C) a pulling tab (9) integrally formed at an end of the side surface cut out portion (10) such that the connection between the stopper (4) and the remainder of the bottle cap (1) by the cut out portions (10, 12) can be released by pulling the pulling tab (9); and
 - D) a circular inserting groove (7) defined between the side surface (3) and the stopper (4); and characterised by further comprising a separate second element (5;23) arranged to co-operate with the stopper (4) to define a spatial portion (14;26;35) formed by a circumferential space between the stopper (4) and the second element (5;23), and a protrusion portion (6;25) of either the stopper (4) or the second element (5;23) being arranged to be deformed by the bottle, in use, into said spatial portion (14) to provide a hermetic sealing promoting means.
2. A bottle cap (1) as defined in claim 1, wherein the protrusion portion (6) is protruded at outer circumference of the stopper (4), the second element (5) is a reinforcing ring (5) inserted on an inner side of the stopper (4), and the spatial portion (14) is defined between the inner side of the protrusion portion (6) and the reinforcing ring (5).
3. A bottle cap (1) as defined in claim 1, wherein said pulling tab (9) is integrally formed with a terminal end of the side surface cut out portion (10) at one side (9') while another side is fixed with point contact manner around an upper end of the side surface portion (3).
4. A bottle cap (1) as defined in claim 1, wherein said pulling tab (9) is integrally formed with a terminal end of the side surface cut out portion (10) at one side (9') and another side is fixed with point contact manner around the side surface portion.
5. A bottle cap (1) as defined in claim 1, wherein said pulling tab (9) is integrally formed to a cut out portion (10) at the bottle cap side surface itself by the cut out portion.
6. A bottle cap (1) as defined in claim 1, wherein said pulling tab (9) is integrally formed at the terminal end of the side surface cut out portion (10) and has a fixing means.
7. A bottle cap (1) as defined in claim 6, wherein said fixing means is an operating hole of the protrusion protruded to lower side of the side surface portion (3) and the protrusion formed to the pulling tab (9).
8. A bottle cap (1) as defined in claim 1, wherein it is manufactured in a cap form capable of covering the pulling tab (9) to the top surface of the bottle cap (1) and connected with the side surface cut out portion (10) by a connecting portion (18).
9. A bottle cap (1) as defined in claim 1, wherein said second element (5) is made in a sealed form in upper portion and inserted into interior of the inserting hole (19) formed at upper portion of the bottle cap (1), and a spatial portion (14) is defined between the outer side of the stopper (4) and the second element (5).
10. A bottle cap (1) as defined in claim 9, wherein a top side of the second element (5) is made in an open form.
11. A bottle cap (1) as defined in claim 1, wherein said second element (23) is situated on an outer side of the stopper (4) and the spatial portion (14) is defined between the exterior of the stopper (4) and the second element (23).
12. A bottle cap (1) as defined in claim 1, wherein said stopper (4) is formed with a crease portion (30) in the wall body of the stopper (4), which crease portion (30) defines the spatial portion (35) and forms the protrusion portion (6).
13. A bottle cap (1) as defined in claim 1, wherein bottom surface (33) of the stopper (4) is made to be recessed deeply and roundly downward as a sealing means, and when receiving a pressure resistance, the bottom surface (33) of the stopper (4) is raised so as to cause the side surface of the stopper (4) to be strongly and closely contacted.
14. A bottle cap (1) as defined in claim 1, wherein the bottom surface (33) of the stopper (4) is made to be protruded roundly upward as a sealing means, and when it becomes a vacuum state, the bottom surface (33) of the stopper (4) descends so as to cause the side surface of the stopper (4) to be strongly and closely contacted to the bottle inner surface.
15. A bottle cap (1) as claimed in claim 1, wherein the top surface (37) of the bottle cap is made to be pro-

truded upwardly whereby wide space is provided to store a separate contents material (39) within the interior of the bottle cap (1).

16. A bottle cap (1) as defined in claim 1, wherein an imitation preventing band (19) is integrally formed around the lower side of the bottle cap side surface portion (3) as an imitation preventing means. 5
17. A bottle cap (1) as defined in claim 1, wherein a top surface portion (40) of the stopper (4) of the bottle cap (1) is made to be deeply and roundly recessed downward as an imitation preventing means, and a tension piece (41) is integrally provided at the top surface so as to make the top surface itself have a restoring force. 10 15
18. A bottle cap (1) as defined in claim 1, wherein a stopper top surface portion (40) is made to be roundly protruded upward, and a tension piece (41) is integrally provided to its lower surface so as to make the top surface itself have a restoring force as an imitation preventing means. 20
19. A bottle cap (1) as defined in any preceding claim, wherein a spiral groove is formed at an inner surface of the side surface portion (3). 25
20. A bottle cap (1) as defined in claim 19, wherein a pulling tab (9) is directly formed to the side surface portion (3) of the bottle cap (1) by a cut out groove (50), and said cut out groove (50) is connected to the top surface cut out groove (51) and the side surface cut out groove (52). 30
21. A bottle cap (1) as defined in claim 19, wherein said pulling tab (9) is formed by contacting with the lower end of the side cut out groove (55), and a coupling protrusion (56) is formed to the pulling tab (9) while a coupling groove (57) is formed at the top side of the side surface portion (3). 40
22. A bottle cap (1) as defined in claim 19, wherein said pulling tab (9) is formed by contacting to a lower end of the side surface cut out groove (55) connected with the cut out groove (51) of the top surface (2), and a fixing means (16, 17) is provided. 45
23. A bottle cap (1) as defined in claim 19, wherein said pulling tab (9) is formed by abutting to the cut out groove (51) of the top surface (2) and a fixing means (16, 17) is provided. 50
24. A bottle cap (1) as defined in claim 22 or 23, wherein said fixing means (16, 17) is a protrusion (17) protruded to downward of the side surface portion (3) and a protrusion operating hole (16) formed to the pulling tab (9). 55

25. A bottle cap (1) as defined in claim 19, wherein said pulling tab (9) is made to a same magnitude as a diameter of the bottle cap (1) and connected to the bottle cap (1) and the connecting portion (58, 59) so as to be able to insert to the protrusion (60) of the bottle cap (1).

26. A bottle cap (1) as defined in claim 1, wherein a gas discharging groove (61) is formed to the outer surface of the stopper (4) and the circumference of the inserting groove (7) but a closely contacting portion (62) is formed to the centre portion of the inserting groove (7) and the lower end of the stopper portion (4).

27. A bottle cap (1) as defined in any preceding claim, wherein a crescent shaped fixing piece (75) is integrally formed to the lower circumference of the side surface portion (3), and a holding portion (70) provided with an elastic portion (71) is integrally formed at a lifting operation hole (16) of the pulling tab (9).

28. A bottle cap (1) as defined in claim 28, wherein a cut out film (85) having a pulling hook (84) is integrally formed to the lower surface of the stopper (4) and a cut out portion (83) is formed to the circumference of the cut out film (85), and a shaping portion reinforcing ring (86) defined with a spatial portion (79) is coupled to a top portion groove (80) of the stopper (4).

Patentansprüche

1. Flaschendeckel (1), vollständig hergestellt aus Kunstharz, mit einem oberen Flächenabschnitt (2) und einem seitlichen Flächenabschnitt (3) und umfassend:
 - A) einen im wesentlichen zylindrischen Stöpsel (4), der im zentralen Bereich des Inneren des Flaschendeckels (1) integral ausgebildet ist;
 - B) einen Ausschnittabschnitt (12) der oberen Fläche sowie einen Ausschnittabschnitt (10) der seitlichen Fläche, die durch eine jeweils in dem oberen Flächenabschnitt (2) und dem seitlichen Flächenabschnitt (3) ausgebildete Linie reduzierter Dicke des Flaschendeckels (1) gebildet sind;
 - C) ein Zuganhängsel (9), das an einem Ende des Ausschnittabschnitts (10) der Seitenfläche integral derart ausgebildet ist, daß die Verbindung zwischen dem Stöpsel (4) und dem Rest des Flaschendeckels (1) durch die Ausschnittabschnitte (10, 12) durch Ziehen des Zuganhängsels (9) gelöst werden kann; und
 - D) eine ringförmige Einsatznut (7), die zwischen der Seitenfläche (3) und dem Stöpsel (4)

begrenzt ist;

und gekennzeichnet durch ein separates, zweites Element (5; 23), das dazu vorgesehen ist, mit dem Stöpsel (4) zusammenzuwirken, um einen räumlichen Abschnitt (14; 26; 35) zu begrenzen, der durch einen Umfangsraum zwischen dem Stöpsel (4) und dem zweiten Element (5; 23) gebildet ist, und wobei ein Vorsprungsabschnitt (6; 25) des Stöpsels (4) oder des zweiten Elements (5; 23) dazu vorgesehen ist, im Gebrauch durch die Flasche in den räumlichen Abschnitt (14) verformt zu werden, um eine hermetische Dichtung förderndes Mittel vorzusehen.

2. Flaschendeckel (1) nach Anspruch 1, wobei der Vorsprungsabschnitt (6) am äußeren Umfang des Stöpsels (4) vorsteht, das zweite Element (5) ein Verstärkungsring (5) ist, der an einer Innenseite des Stöpsels (4) eingesetzt ist, und der räumliche Abschnitt (14) zwischen der Innenseite des Vorsprungsabschnitts (6) und dem Verstärkungsring (5) begrenzt ist.
3. Flaschendeckel (1) nach Anspruch 1, wobei das Zughängsel (9) mit einem Abschlußende des Ausschnittabschnitts (10) der Seitenfläche an einer Seite (9') integral ausgebildet ist, während eine andere Seite in einer Punktkontaktweise um ein oberes Ende des Seitenflächenabschnitts (3) fixiert ist.
4. Flaschendeckel (1) nach Anspruch 1, wobei das Zughängsel (9) mit einem Abschlußende (9') des Ausschnittabschnitts (10) der Seitenfläche integral ausgebildet ist und eine andere Seite in Punktkontaktweise um den Seitenflächenabschnitt fixiert ist.
5. Flaschendeckel (1) nach Anspruch 1, wobei das Zughängsel (9) integral ausgebildet ist mit einem Ausschnittabschnitt (10) an der Seitenfläche des Flaschendeckels, und zwar durch den Ausschnittabschnitt selbst.
6. Flaschendeckel (1) nach Anspruch 1, wobei das Zughängsel (9) an dem Abschlußende des Ausschnittabschnitts (10) der Seitenfläche integral ausgebildet ist und ein Fixierungsmittel besitzt.
7. Flaschendeckel (1) nach Anspruch 6, wobei das Fixierungsmittel ein Betätigungsloch desjenigen Vorsprungs ist, der zu der unteren Seite des Seitenflächenabschnitts (3) vorsteht, und der Vorsprung an dem Zughängsel (9) ausgebildet ist.
8. Flaschendeckel (1) nach Anspruch 1, der in einer Deckelform hergestellt ist, die dazu geeignet ist, das Zughängsel (9) an der oberen Fläche des Flaschendeckels (1) abzudecken und mit dem Aus-

schnittabschnitt (10) der Seitenfläche durch einen Verbindungsabschnitt (18) verbunden ist.

9. Flaschendeckel (1) nach Anspruch 1, wobei das zweite Element (5) in einer abgedichteten Form in einem oberen Abschnitt gebildet ist und in das Innere des Einsatzlochs (19) eingesetzt ist, welches am oberen Abschnitt des Flaschendeckels (1) ausgebildet ist, und ein räumlicher Abschnitt (14) zwischen der Außenseite des Stöpsels (4) und dem zweiten Element (5) begrenzt ist.
10. Flaschendeckel (1) nach Anspruch 9, wobei eine obere Seite des zweiten Elements (5) in einer offenen Form gebildet ist.
11. Flaschendeckel (1) nach Anspruch 1, wobei das zweite Element (23) sich an einer Außenseite des Stöpsels (4) befindet und der räumliche Abschnitt (14) zwischen dem Äußeren des Stöpsels (4) und dem zweiten Element (23) begrenzt ist.
12. Flaschendeckel (1) nach Anspruch 1, wobei der Stöpsel (4) mit einem Fältelabschnitt (30) im Wandungskörper des Stöpsels (4) ausgebildet ist, wobei der Fältelabschnitt (30) den räumlichen Abschnitt (35) begrenzt und den Vorsprungsabschnitt (6) ausgebildet.
13. Flaschendeckel (1) nach Anspruch 1, wobei die untere Fläche (33) des Stöpsels (4) tief und rund nach unten ausgenommen als ein Dichtmittel ausgebildet ist, und wobei beim Aufnehmen eines Druckwiderstands die untere Fläche (33) des Stöpsels (4) derart angehoben wird, daß ein starkes und dichtes Inkontakttreten der Seitenfläche des Stöpsels (4) bewirkt wird.
14. Flaschendeckel (1) nach Anspruch 1, wobei die untere Fläche (33) des Stöpsels (4) rund nach oben vorstehend als ein Dichtmittel ausgebildet ist, und wobei beim Annehmen eines Vakuumzustands die untere Fläche (33) des Stöpsels (4) sich derart absenkt, daß ein starkes und dichtes Inkontakttreten der Seitenfläche des Stöpsels (4) mit der Innenseite der Flasche bewirkt wird.
15. Flaschendeckel (1) nach Anspruch 1, wobei die obere Fläche (37) des Flaschendeckels nach oben vorstehend gebildet ist, wodurch ein ausgedehnter Raum vorgesehen wird, um ein separates Inhaltsmaterial (39) im Inneren des Flaschendeckels (1) zu lagern.
16. Flaschendeckel (1) nach Anspruch 1, wobei eine Nachbildung verhinderndes Band (19) integral um die untere Seite des Seitenflächenabschnitts (3) des Flaschendeckels als eine Nachbildung ver-

hinderndes Mittel ausgebildet ist.

17. Flaschendeckel (1) nach Anspruch 1, wobei ein oberer Oberflächenabschnitt (40) des Stöpsels (4) des Flaschendeckels (1) tief und rund nach unten ausgenommen als ein eine Nachbildung verhinderndes Mittel ausgebildet ist, und ein Zugteil (41) integral an der oberen Fläche vorgesehen ist, um der oberen Fläche selbst eine Rückstellkraft zu verleihen. 5
18. Flaschendeckel (1) nach Anspruch 1, wobei ein oberer Flächenabschnitt (40) des Stöpsels rund nach unten vorstehend ausgebildet ist, und ein Zugteil (41) als ein eine Nachbildung verhinderndes Mittel integral mit seiner unteren Oberfläche vorgesehen ist, um der oberen Fläche selbst eine Rückstellkraft zu verleihen. 10
19. Flaschendeckel (1) nach einem der vorangehenden Ansprüche, wobei eine Spiralnut an einer Innenfläche des Seitenflächenabschnitts (3) ausgebildet ist. 15
20. Flaschendeckel (1) nach Anspruch 19, wobei ein Zuganhängsel (9) direkt an dem Seitenflächenabschnitt (3) des Flaschendeckels (1) durch eine Ausschnittnut (50) ausgebildet ist, und die Ausschnittnut (50) mit der Ausschnittnut (51) der oberen Fläche und der Ausschnittnut (52) der Seitenfläche verbunden ist. 20
21. Flaschendeckel (1) nach Anspruch 19, wobei das Zuganhängsel (9) durch Inkontaktstehen mit dem unteren Ende der seitlichen Ausschnittnut (55) ausgebildet ist, und ein Kopplungsvorsprung (56) an dem Zuganhängsel (9) ausgebildet ist, wobei eine Kopplungsnut (57) an der oberen Seite des Seitenflächenabschnitts (3) ausgebildet ist. 25
22. Flaschendeckel (1) nach Anspruch 19, wobei das Zuganhängsel (9) durch Inkontaktstehen mit einem unteren Ende der Ausschnittnut (55) der Seitenfläche ausgebildet ist, die mit der Ausschnittnut (51) der oberen Fläche (2) verbunden ist, und ein Fixierungsmittel (16, 17) vorgesehen ist. 30
23. Flaschendeckel (1) nach Anspruch 19, wobei das Zuganhängsel (9) durch Anlage an der Ausschnittnut (51) der oberen Fläche (2) ausgebildet ist und ein Fixierungsmittel (16, 17) vorgesehen ist. 35
24. Flaschendeckel (1) nach Anspruch 22 oder 23, wobei das Fixierungsmittel (16, 17) ein Vorsprung (17) ist, der von dem Seitenflächenabschnitt (3) nach unten vorsteht und ein Vorsprungsbetätigungsloch (16) an dem Zuganhängsel (9) ausgebildet ist. 40
25. Flaschendeckel (1) nach Anspruch 19, wobei das 45

Zuganhängsel (9) mit einer gleichen Größe wie ein Durchmesser des Flaschendeckels (1) gebildet und mit dem Flaschendeckel (1) und dem Verbindungsabschnitt (58, 59) derart verbunden ist, daß ein Einsetzen des Vorsprungs (60) des Flaschendeckels (1) möglich ist.

26. Flaschendeckel (1) nach Anspruch 1, wobei eine Gasauslaßnut (61) an der Außenfläche des Stöpsels (4) und dem Umfang der Einsatznut (7) ausgebildet ist, wobei jedoch ein in engen Kontakt tretender Abschnitt (62) an dem Mittelabschnitt der Einsatznut (7) und dem unteren Ende des Stöpselabschnitts (4) ausgebildet ist. 10
27. Flaschendeckel (1) nach einem der vorangehenden Ansprüche, wobei ein sichelförmiges Fixierstück (75) integral an dem unteren Umfang des Seitenflächenabschnitts (3) ausgebildet ist, und ein Halteabschnitt (70) mit einem elastischen Abschnitt (71) integral an einem Hebebetätigungsloch (16) des Zuganhängsels (9) ausgebildet ist. 15
28. Flaschendeckel (1) nach Anspruch 28, wobei ein Ausschnittfilm (85) mit einem Zughaken (84) integral an der unteren Fläche des Stöpsels (4) ausgebildet ist und ein Ausschnittabschnitt (83) an dem Umfang des Ausschnittfilms (85) ausgebildet ist, und ein Formabschnittverstärkungsring (86), der mit einem räumlichen Abschnitt (79) begrenzt ist, mit einer Oberabschnittsnut (80) des Stöpsels (4) gekoppelt ist. 20

Revendications

1. Capsule de bouteille (1) entièrement faite en résine synthétique, 25
comportant une partie formant surface supérieure (2) et une partie formant surface latérale (3), et comprenant :

A) un bouchon (4), sensiblement cylindrique et formé d'un seul tenant avec la capsule de bouteille (1), au centre de l'intérieur de celle-ci ;
B) une partie à découper (12) située dans la surface supérieure et une partie à découper (10) présente dans la surface latérale, qui sont formées par une ligne d'épaisseur réduite de la capsule de bouteille (1), respectivement dans la partie formant surface supérieure (2) et dans la partie formant surface latérale (3) ;
C) une languette à tirer (9), formée d'un seul tenant au niveau d'une extrémité de la partie à découper (10) de la surface latérale, de telle manière que la liaison, assurée par les parties à découper (10, 12), entre le bouchon (4) et le reste de la capsule de bouteille (1), puisse être 30

rompue lorsque l'on tire la languette à tirer (9) ;
et

D) une rainure circulaire d'insertion (7), définie entre la partie formant surface latérale (3) et le bouchon (4) ; et caractérisée en ce qu'elle comprend en outre un second élément distinct (5 ; 23) prévu pour coopérer avec le bouchon (4) afin de définir une partie d'espace (14 ; 26 ; 35), formée par un espace circonférentiel entre le bouchon (4) et le second élément (5 ; 23), et une partie formant protubérance (6 ; 25), présente soit sur le bouchon (4) soit sur le second élément (5 ; 23), étant destinée à être déformée par la bouteille, en utilisation, afin de rentrer dans ladite partie d'espace (14) pour constituer un moyen facilitant une obturation hermétique.

2. Capsule de bouteille (1) selon la revendication 1, dans laquelle la partie formant protubérance (6) fait saillie au niveau de la circonférence extérieure du bouchon (4), dans laquelle le second élément (5) est un anneau de renforcement (5) inséré sur un côté intérieur du bouchon (4), et dans laquelle la partie d'espace (14) est définie entre le côté intérieur de la partie formant protubérance (6) et l'anneau de renforcement (5).

3. Capsule de bouteille (1) selon la revendication 1, dans laquelle ladite languette à tirer (9) est formée d'un seul tenant, par un côté (9'), avec une partie d'extrémité de la partie à découper (10) située sur la surface latérale, tandis qu'un autre côté est fixé, par contact ponctuel, autour d'une extrémité supérieure de la partie formant surface latérale (3).

4. Capsule de bouteille (1) selon la revendication 1, dans laquelle ladite languette à tirer (9) est formée d'un seul tenant, par un côté (9'), avec une partie d'extrémité de la partie à découper (10) située sur la surface latérale, tandis qu'un autre côté est fixé, par contact ponctuel, autour de la partie formant surface latérale.

5. Capsule de bouteille (1) selon la revendication 1, dans laquelle ladite languette à tirer (9) est formée d'un seul tenant sur une partie à découper (10) au niveau de la surface latérale elle-même de la capsule de bouteille, par la partie à découper.

6. Capsule de bouteille (1) selon la revendication 1, dans laquelle ladite languette à tirer (9) est formée d'un seul tenant au niveau de la partie d'extrémité de la partie à découper (10), située dans la surface latérale, et comporte un moyen de fixation.

7. Capsule de bouteille (1) selon la revendication 6, dans laquelle le moyen de fixation est un trou de passage de la protubérance en saillie vers le côté

inférieur de la partie formant surface latérale (3) et dans laquelle la protubérance est formée sur la languette à tirer (9).

5 8. Capsule de bouteille (1) selon la revendication 1, dans laquelle elle est fabriquée sous la forme d'une capsule propre à recouvrir la languette à tirer (9) sur la surface supérieure de la capsule de bouteille (1), et reliée à la partie à découper (10) de la surface latérale par une partie formant jonction (18).

10 9. Capsule de bouteille (1) selon la revendication 1, dans laquelle ledit second élément (5) est fait sous une forme scellée dans la partie supérieure et est introduit à l'intérieur du trou d'insertion (19) formé au niveau de la partie supérieure de la capsule de bouteille (1), et dans laquelle une partie d'espace (14) est définie entre le côté extérieur du bouchon (4) et le second élément (5).

15 10. capsule de bouteille (1) selon la revendication 9, dans laquelle un côté supérieur du second élément (5) est fait sous une forme ouverte.

20 11. Capsule de bouteille (1) selon la revendication 1, dans laquelle ledit second élément (23) est situé sur un côté extérieur du bouchon (4), et dans laquelle la partie d'espace (14) est définie entre l'extérieur du bouchon (4) et le second élément (23).

25 12. capsule de bouteille (1) selon la revendication 1, dans laquelle ledit bouchon (4) comporte une partie plissée (30) dans le corps de paroi du bouchon (4), laquelle partie plissée (30) définit la partie espace (35) et constitue la partie formant protubérance (6).

30 13. Capsule de bouteille (1) selon la revendication 1, dans laquelle la surface inférieure (33) du bouchon (4) est découpée de manière profonde et ronde vers le bas, en tant que moyen d'étanchéité et, lorsque la surface inférieure (33) du bouchon (4) reçoit une résistance à la pression, elle est soulevée de manière à provoquer une mise en contact fort et intime de la surface latérale du bouchon (4).

35 14. Capsule de bouteille (1) selon la revendication 1, dans laquelle la surface inférieure (33) du bouchon (4) présente une protubérance ronde vers le haut, en tant que moyen d'étanchéité et, lorsqu'elle est soumise à une dépression, la surface inférieure (33) du bouchon (4) descend de manière à amener la surface latérale du bouchon (4) en contact fort et étroit avec la surface interne de la bouteille.

40 45 50 55 15. Capsule de bouteille (1) selon la revendication 1, dans laquelle la surface supérieure (37) de la capsule de bouteille présente une protubérance vers le haut, laissant ainsi un large espace pour loger, à

l'intérieur de la capsule de bouteille (1), une matière séparée (39).

16. Capsule de bouteille (1) selon la revendication 1, dans laquelle une bande de prévention d'imitation (19) est formée d'une seule pièce autour du côté inférieur de la partie formant surface latérale (3) de la capsule de bouteille, en tant que moyen de prévention d'imitation.

17. Capsule de bouteille (1) selon la revendication 1, dans laquelle une partie de surface supérieure (40) du bouchon (4) de la capsule de bouteille (1) présente un évidement profond et rond vers le bas, en tant que moyen de prévention d'imitation, et dans laquelle un élément de tension (41) est prévu, d'un seul tenant, au niveau de la surface supérieure de telle manière que la surface supérieure ait elle-même une force de rappel.

18. Capsule de bouteille (1) selon la revendication 1, dans laquelle une partie de surface supérieure (40) du bouchon est en saillie ronde vers le haut, et dans laquelle un élément de tension (41) est prévu, d'un seul tenant, au niveau de la surface inférieure de telle manière que la surface supérieure ait elle-même une force de rappel, en tant que moyen de prévention d'imitation.

19. Capsule de bouteille (1) selon l'une quelconque des revendications précédentes, dans laquelle une rainure en spirale est formée au niveau d'une surface interne de la partie formant surface latérale (3).

20. Capsule de bouteille (1) selon la revendication 19, dans laquelle une languette à tirer (9) est formée directement sur la partie formant surface latérale (3) de la capsule de bouteille (1) par une rainure à découper (50), et dans laquelle ladite rainure à découper (50) est reliée à la rainure à découper (51) située dans la surface supérieure et à la rainure à découper (52) présente dans la surface latérale.

21. Capsule de bouteille (1) selon la revendication 19, dans laquelle ladite languette à tirer (9) est formée directement en contact avec l'extrémité inférieure de la rainure latérale à découper (55), tandis qu'une protubérance de liaison (56) est formée sur la languette à tirer (9) et qu'une rainure réceptrice (57) est formée dans le côté supérieur de la partie formant surface latérale (3).

22. Capsule de bouteille (1) selon la revendication 19, dans laquelle ladite languette à tirer (9) est formée directement en contact avec une extrémité inférieure de la rainure latérale à découper (55), présente dans la surface latérale et reliée à la rainure à découper (51) située dans la surface supérieure (2),

et dans laquelle il est prévu un moyen de fixation (16, 17).

23. Capsule de bouteille (1) selon la revendication 19, dans laquelle ladite languette à tirer (9) est formée en about avec la rainure à découper (51) de la surface supérieure (2), et dans laquelle il est prévu un moyen de fixation (16, 17).

24. Capsule de bouteille (1) selon la revendication 22 ou 23, dans laquelle ledit moyen de fixation (16, 17) est une protubérance (17) faisant saillie vers le bas de la partie formant surface latérale (3), et un trou de logement de protubérance (16), formé dans la languette à tirer (9).

25. Capsule de bouteille (1) selon la revendication 19, dans laquelle ladite languette à tirer (9) est formée de manière à présenter une même taille qu'un diamètre de la capsule de bouteille (1) et est reliée à la capsule de bouteille (1) et à la partie de jonction (58, 59) pour pouvoir ainsi être placée sur la protubérance (60) de la capsule de bouteille (1).

26. Capsule de bouteille (1) selon la revendication 1, dans laquelle une rainure d'évacuation de gaz (61) est formée dans la surface extérieure du bouchon (4) et à la circonférence de la rainure d'insertion (7), mais dans laquelle une partie de contact étroit (62) est formée dans la partie centrale de la rainure d'insertion (7) et dans l'extrémité inférieure de la partie formant bouchon (4).

27. Capsule de bouteille (1) selon l'une quelconque des revendications précédentes, dans laquelle un élément de fixation en forme de croissant (75) est formé d'un seul tenant avec la circonférence inférieure de la partie formant surface latérale (3), et une partie maintien (70), pourvue d'une partie élastique (71), est formée d'un seul tenant au niveau d'un trou (16), permettant de lever la languette à tirer (9).

28. Capsule de bouteille (1) selon la revendication 28, dans laquelle une pellicule à découper (85), présentant un crochet à tirer (84) est formée d'un seul tenant avec la surface inférieure du bouchon (4) et une partie à découper (83) est formée sur la circonférence de la pellicule à découper (85), tandis qu'un anneau de renforcement de forme (86), défini avec une partie espace (79), est relié à une rainure (80) située dans la partie supérieure du bouchon (4).

FIG 1

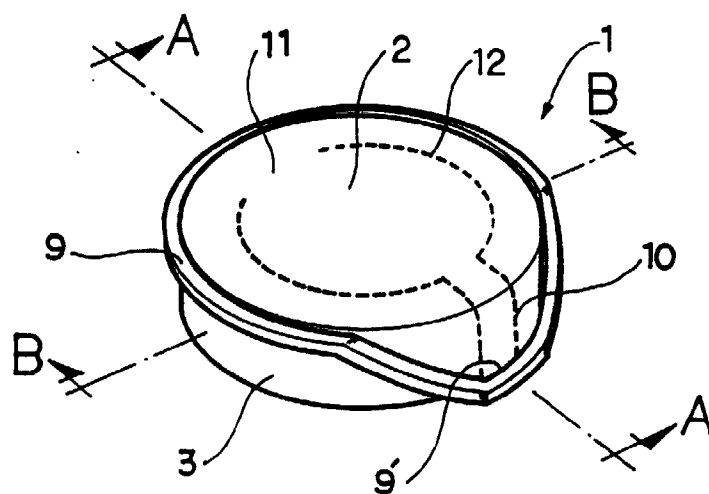


FIG 2

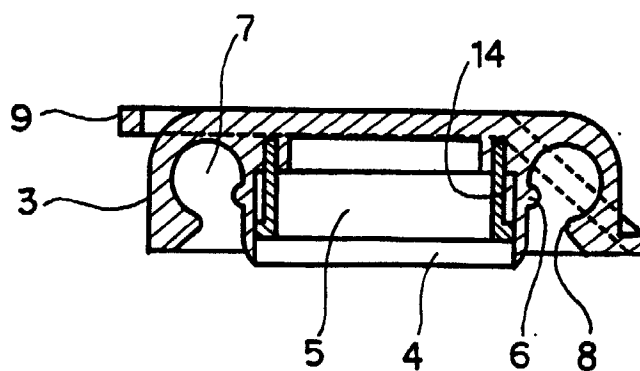


FIG 3

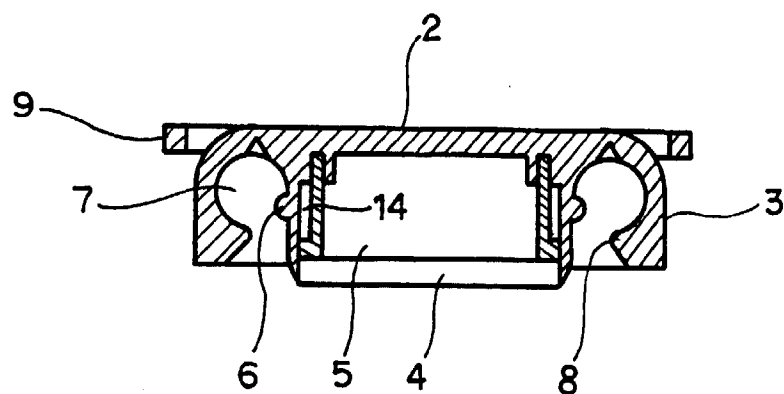


FIG 4

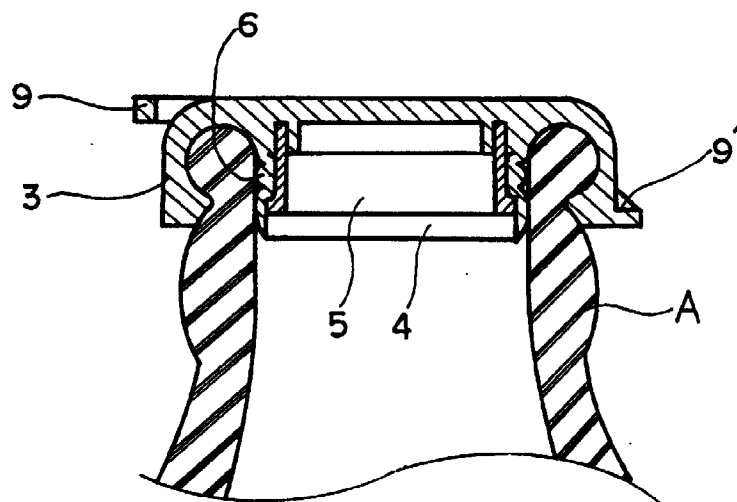


FIG 5

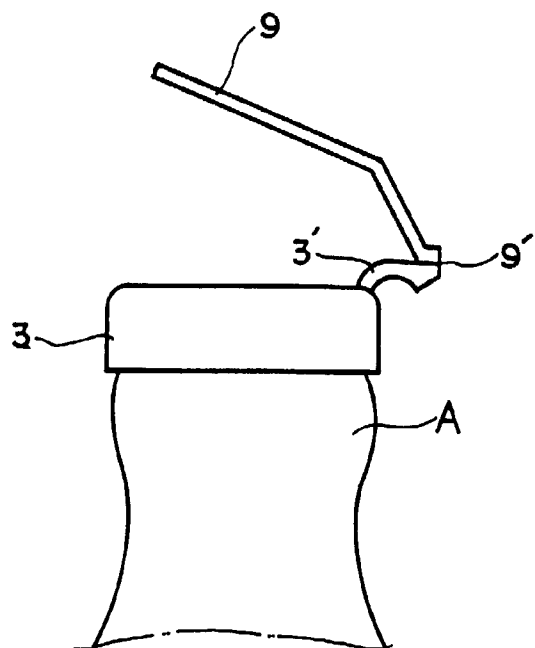


FIG 6

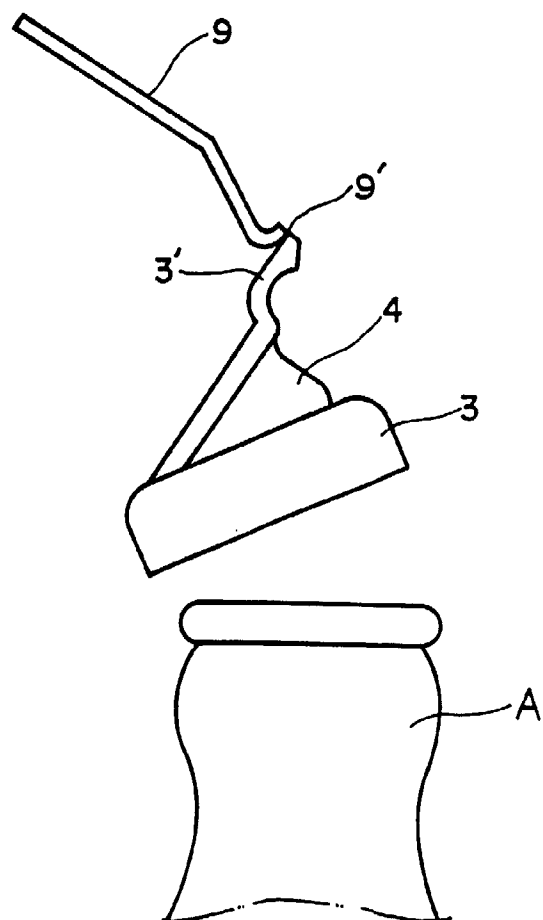


FIG 7(A)

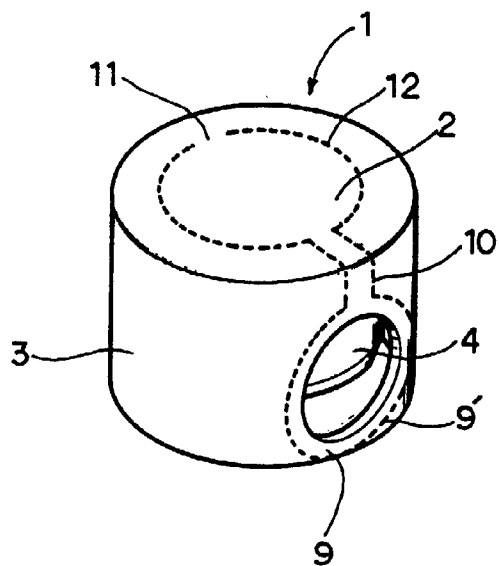


FIG 7(B)

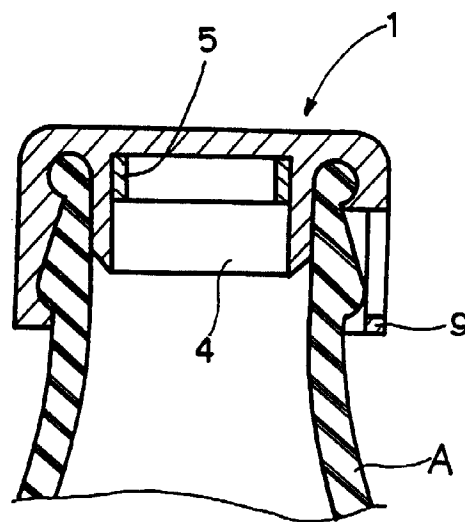


FIG 8(A)

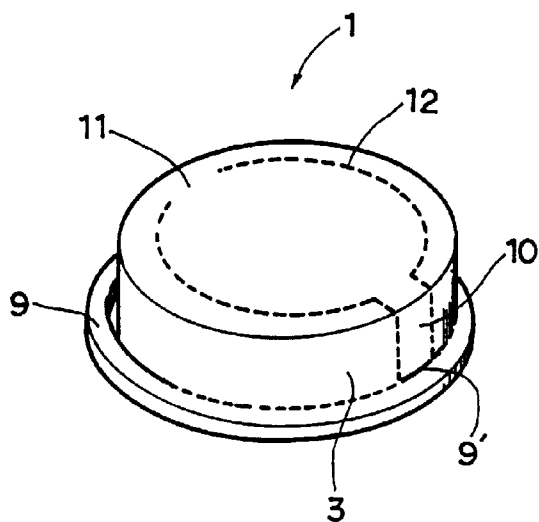


FIG 8(B)

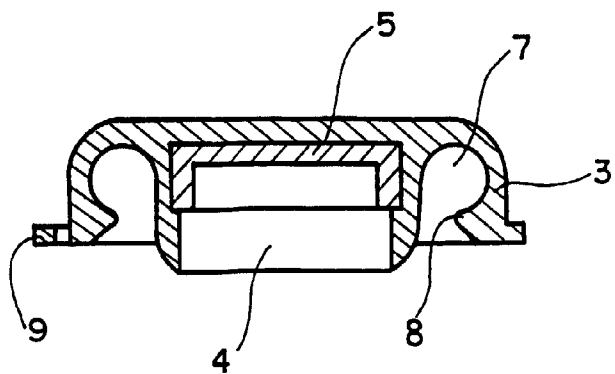


FIG 9

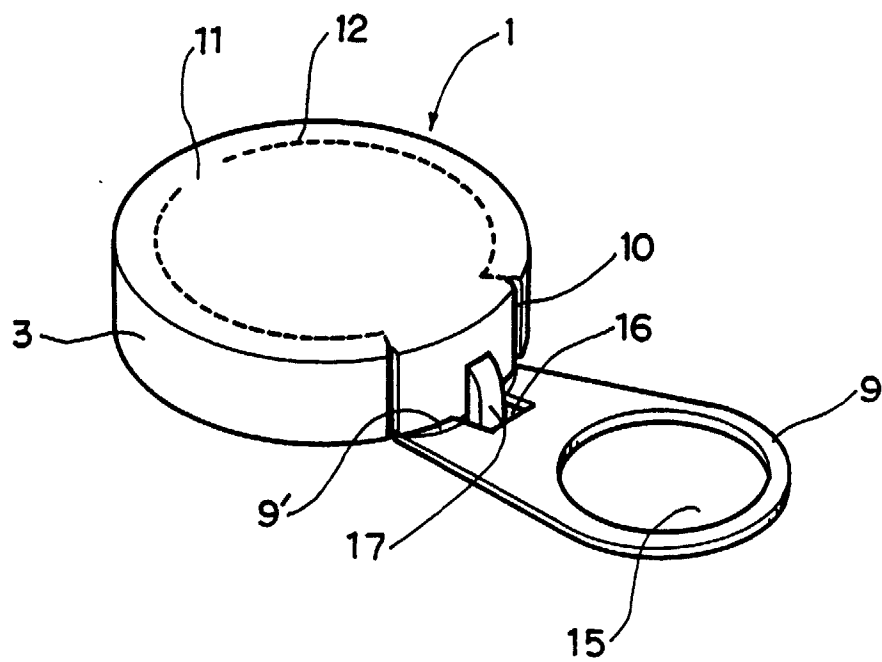


FIG 10(A)

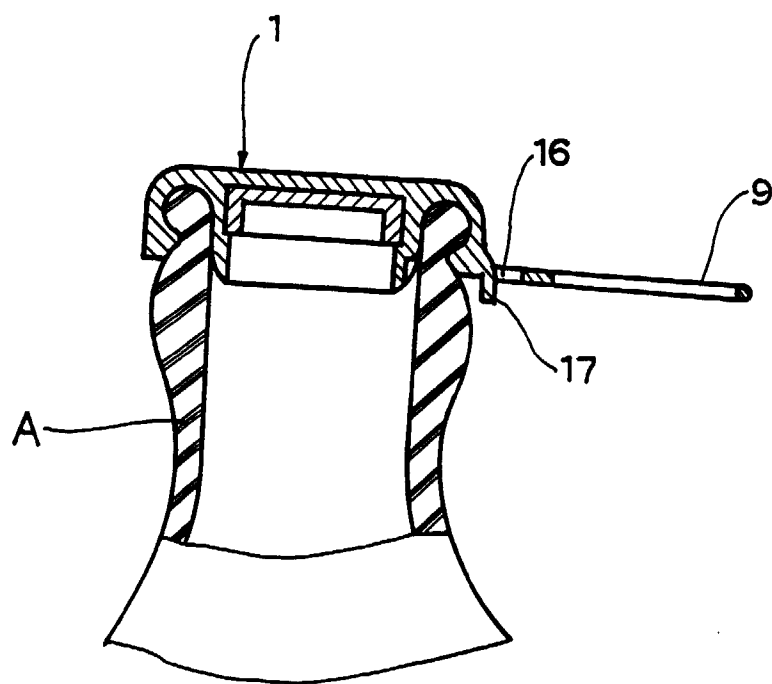


FIG10(B)

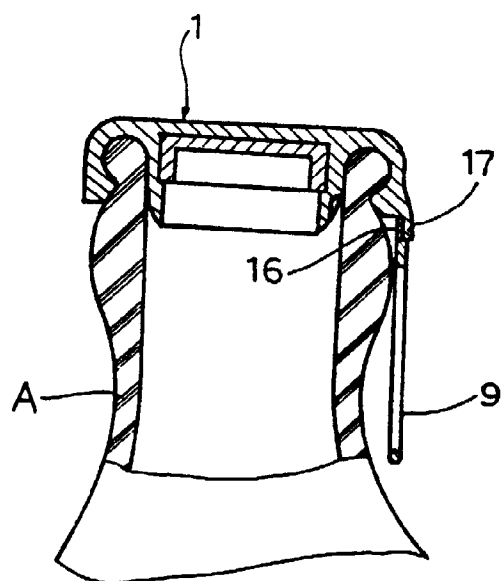


FIG10(C)

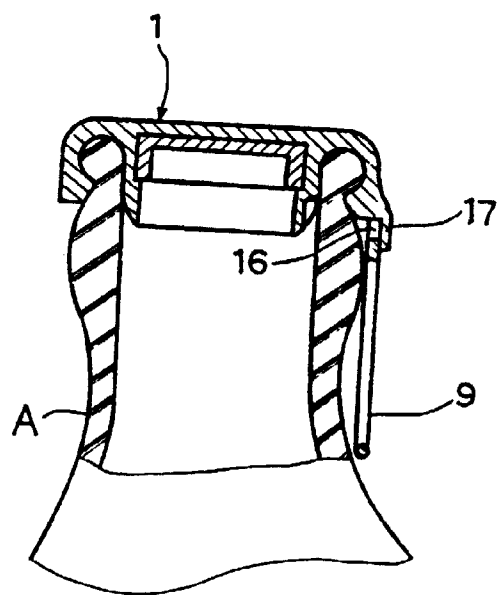


FIG11

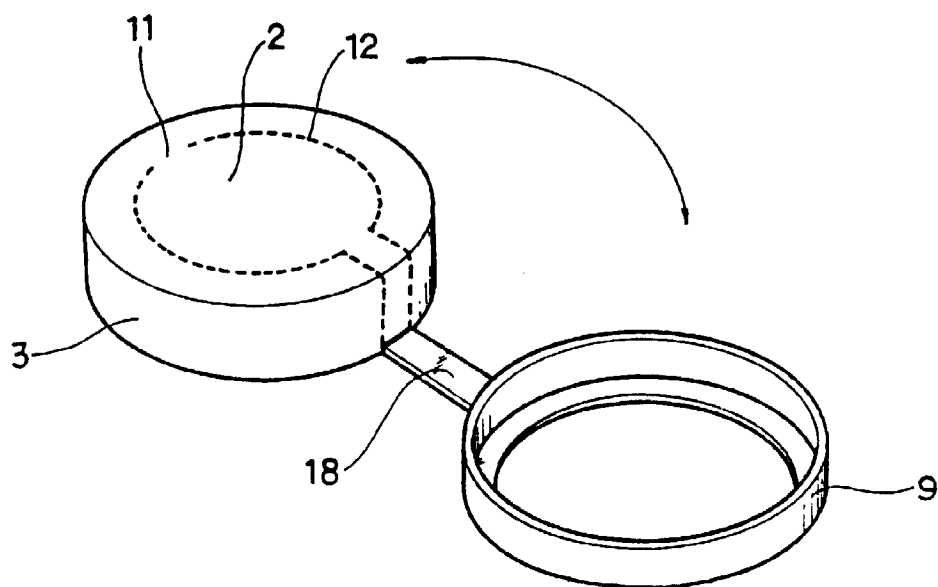


FIG12

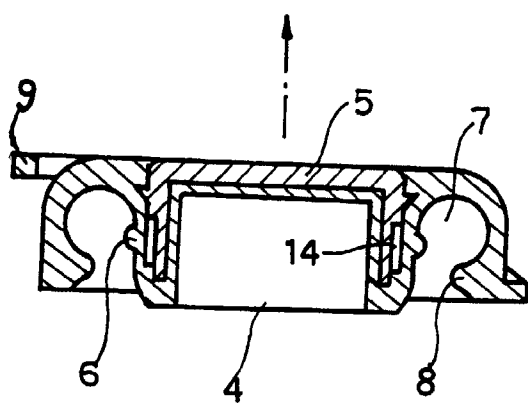


FIG13

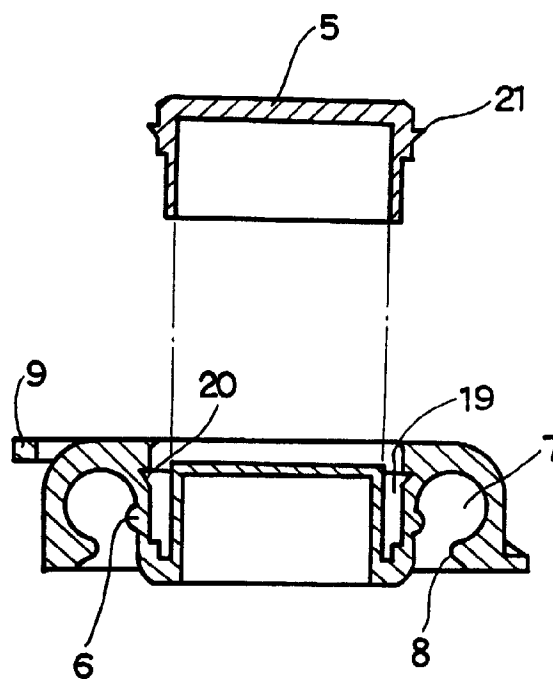


FIG14

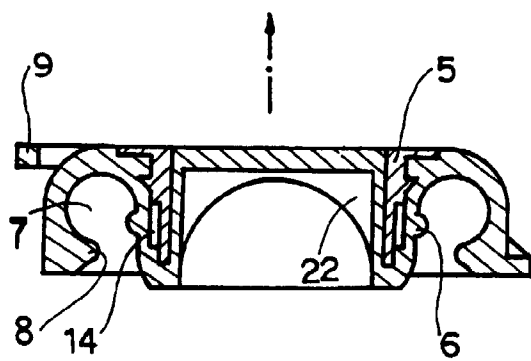


FIG15

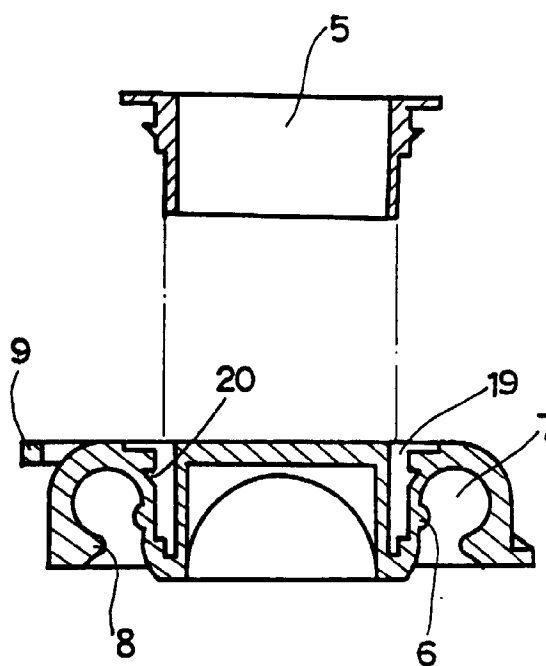


FIG 16

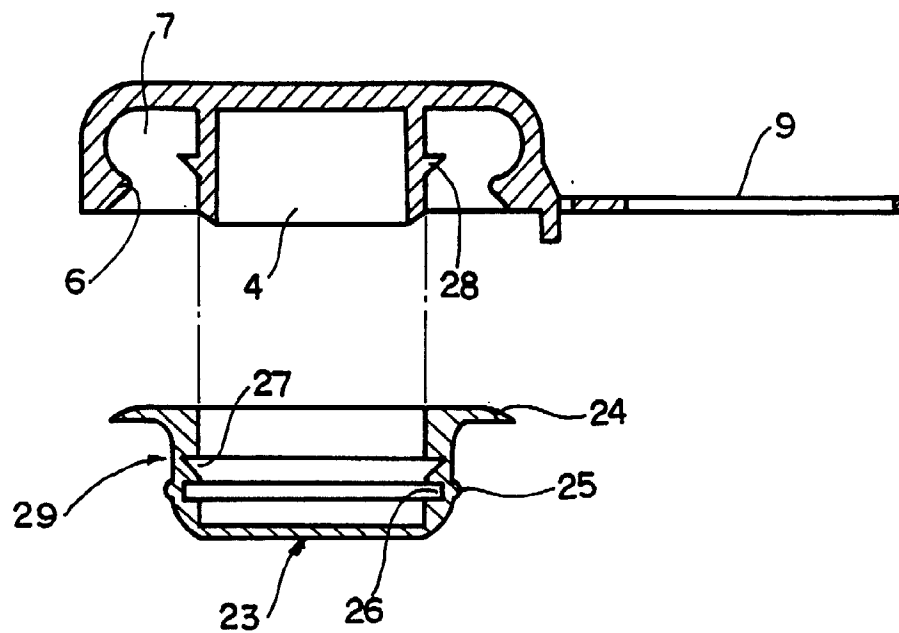


FIG 17

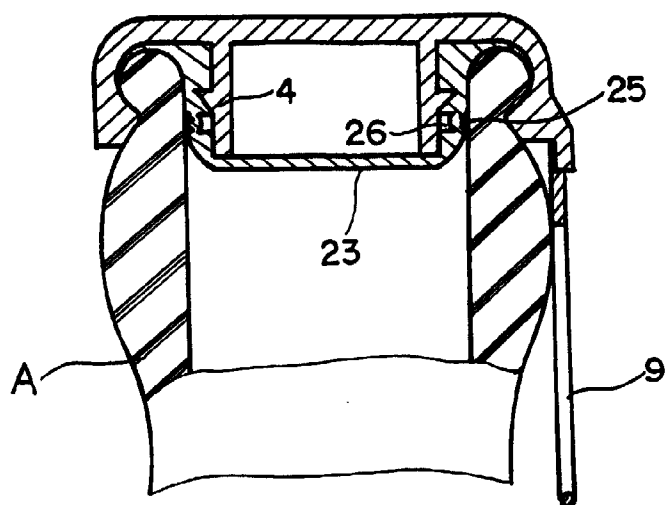


FIG18

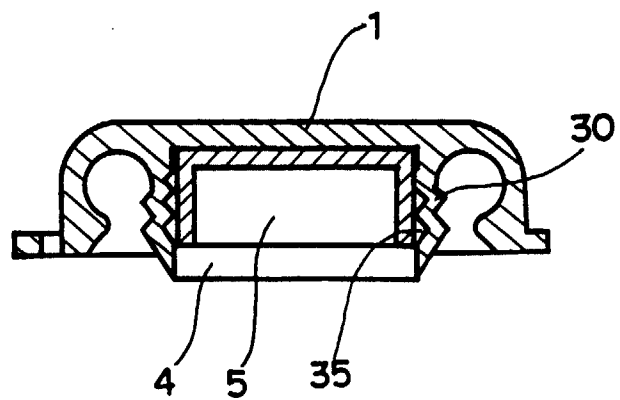


FIG19

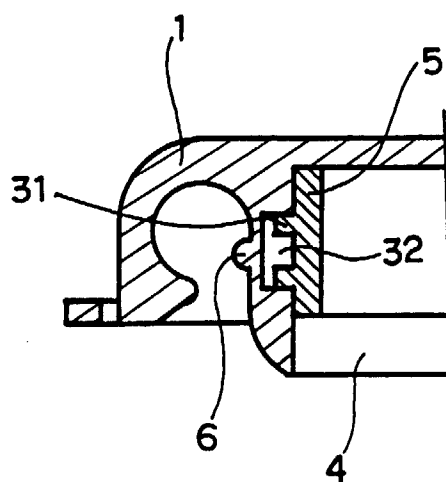


FIG 20(A)

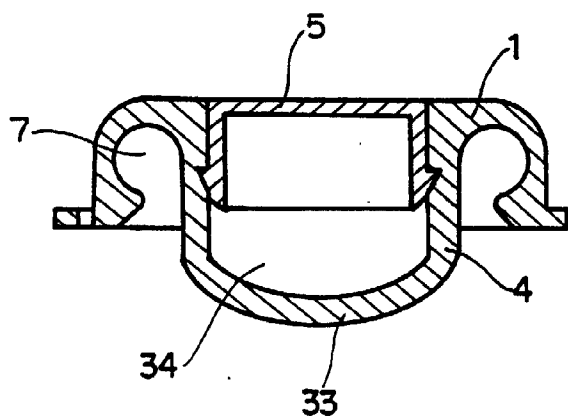


FIG 20(B)

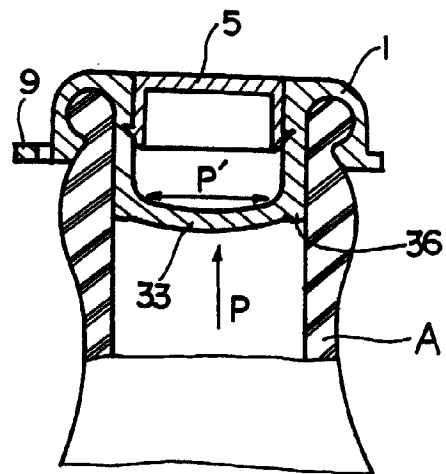


FIG 21(A)

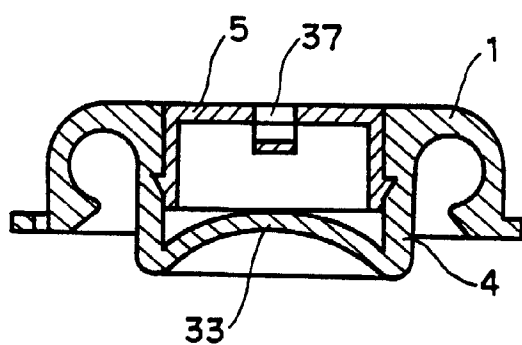


FIG 21(B)

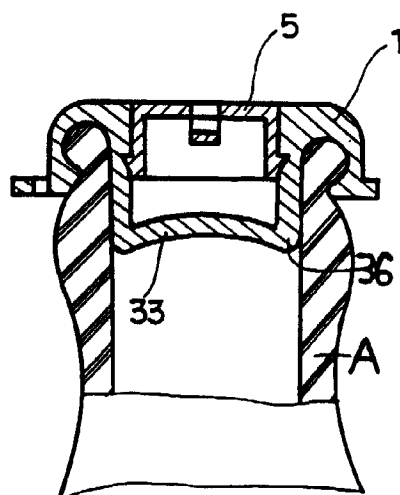


FIG 22

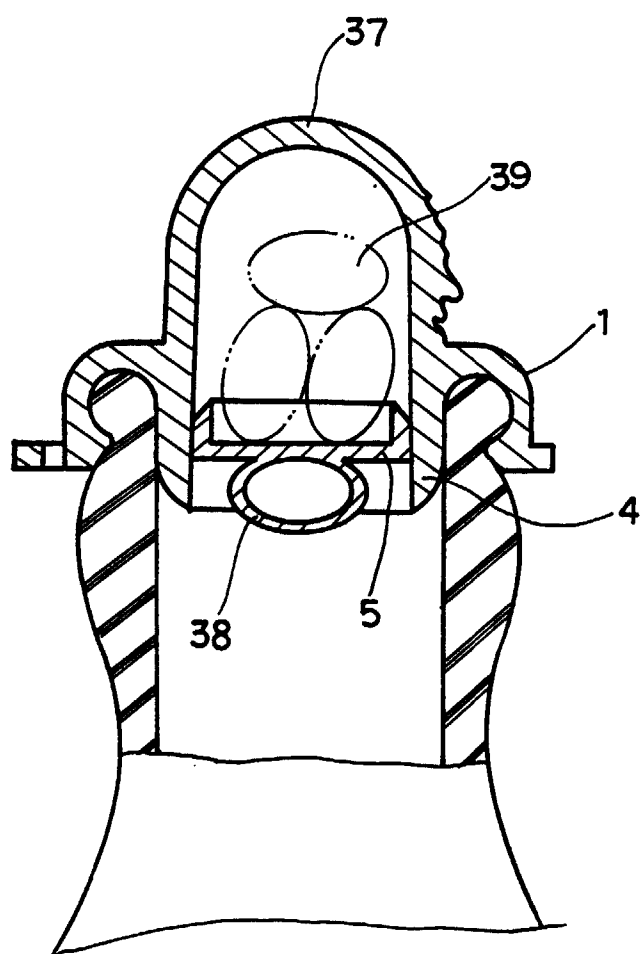


FIG 23

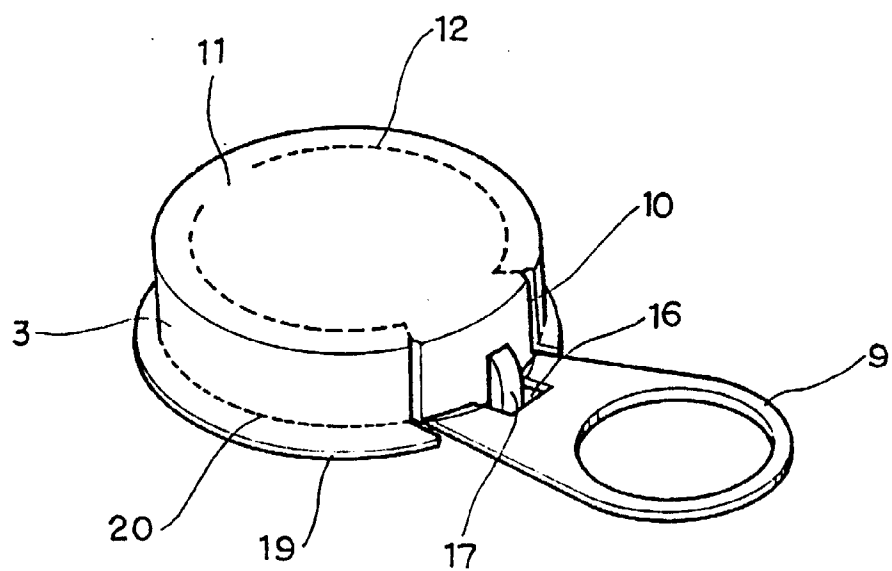


FIG 24

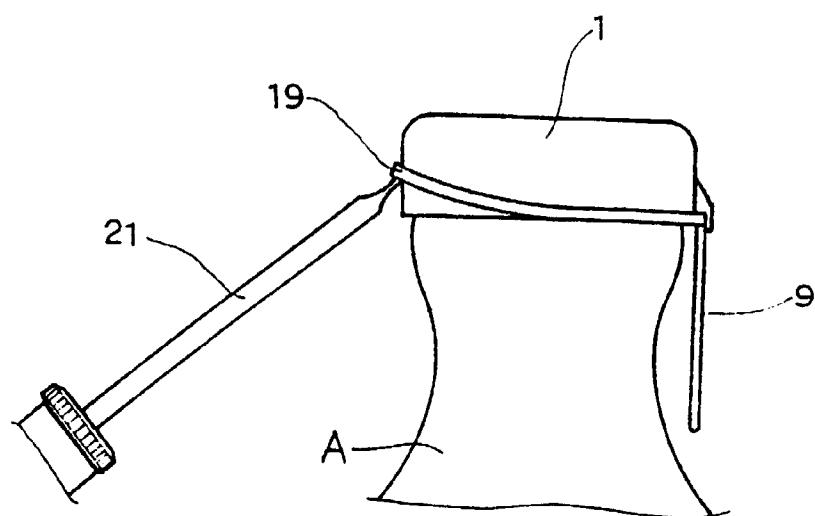


FIG 25(A)

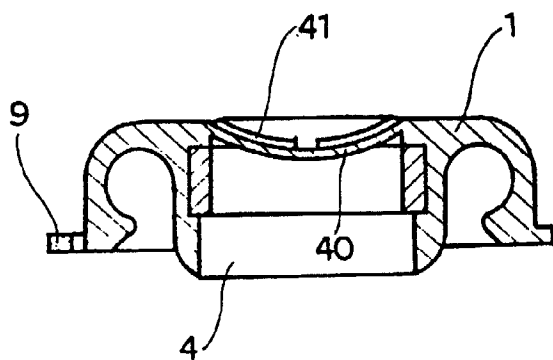


FIG 25(B)

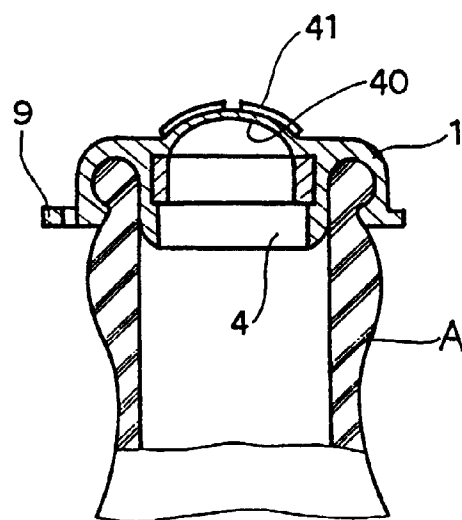


FIG 26(A)

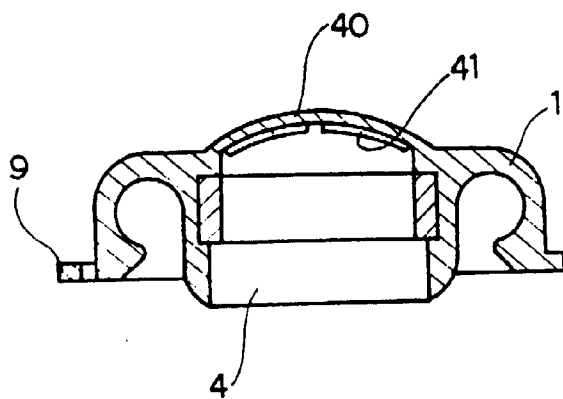


FIG 26(B)

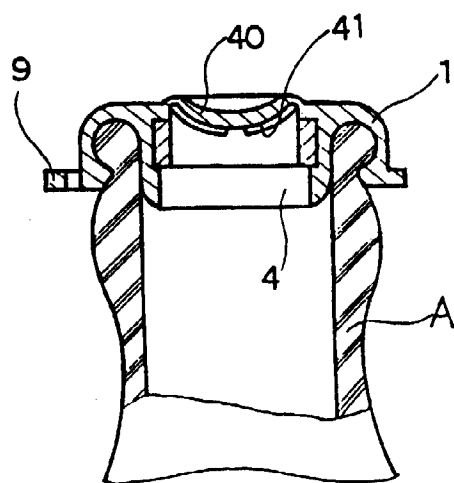


FIG 27(A)

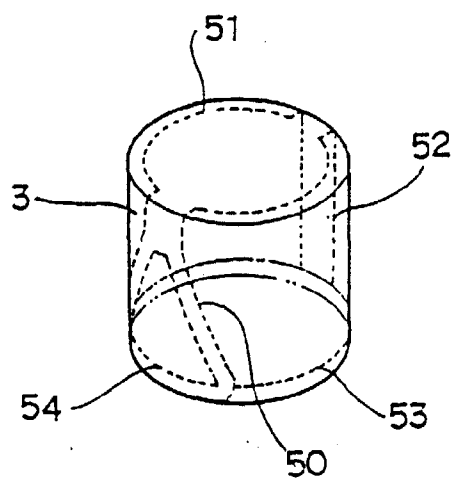


FIG 27(B)

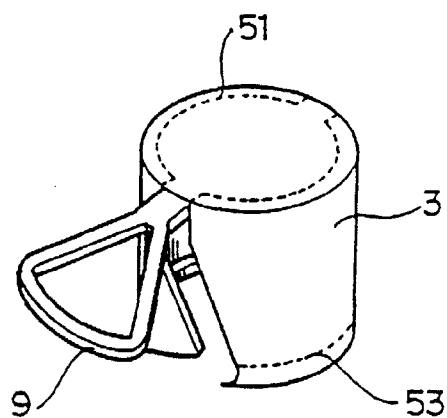


FIG 28(A)

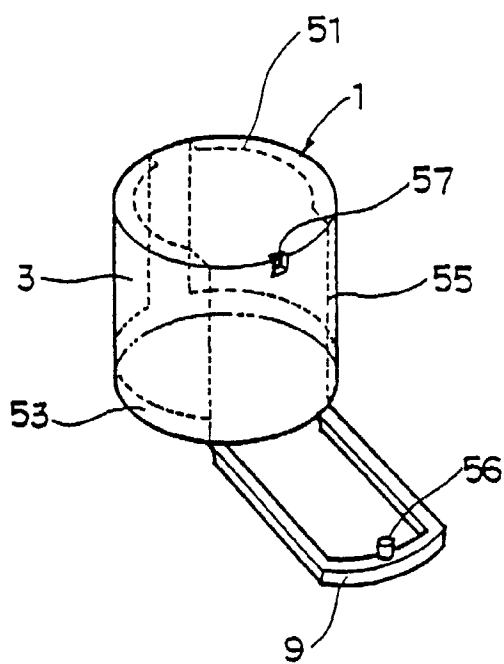


FIG 28(B)

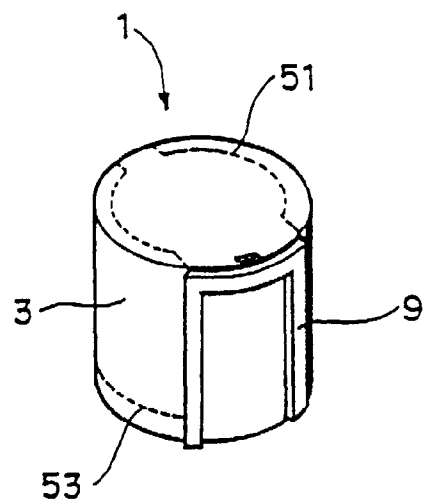


FIG 29(A)

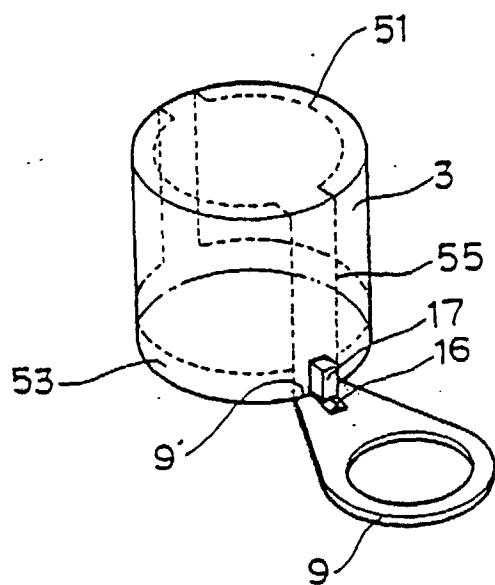


FIG 29(B)

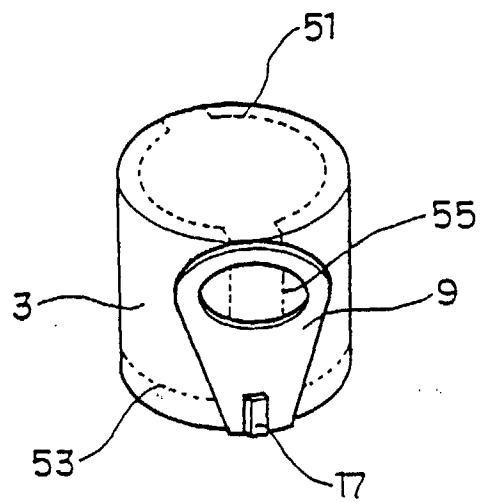


FIG 30(A)

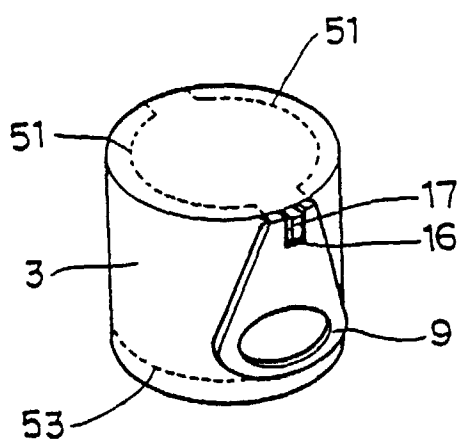


FIG 30(B)

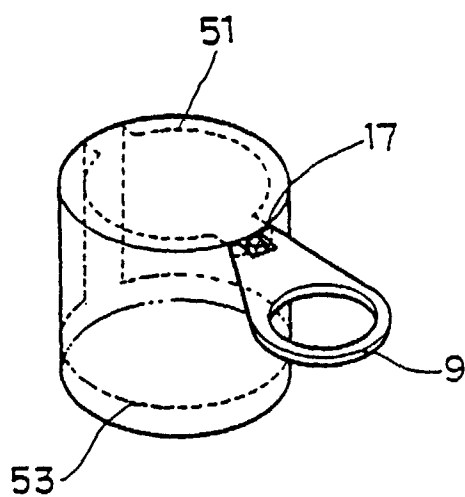


FIG 31(A)

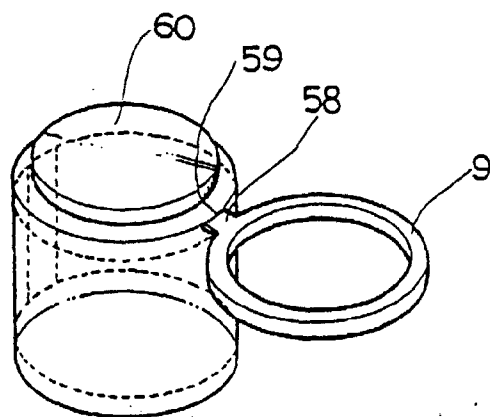


FIG 31(B)

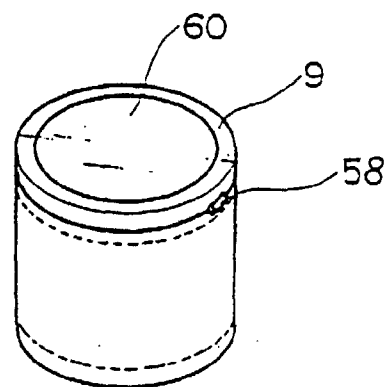


FIG 32(A)

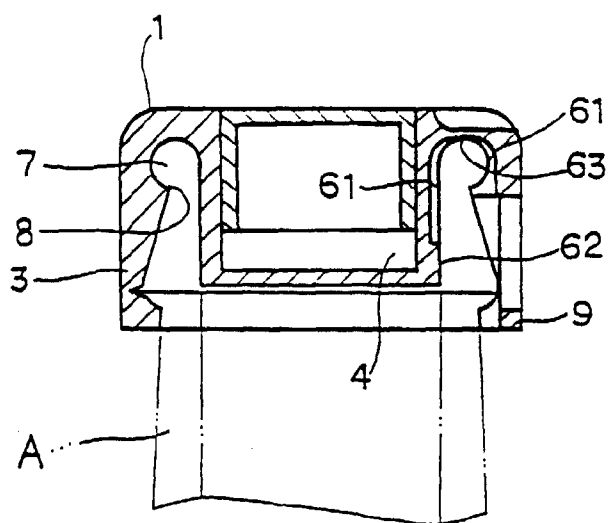


FIG 32(B)

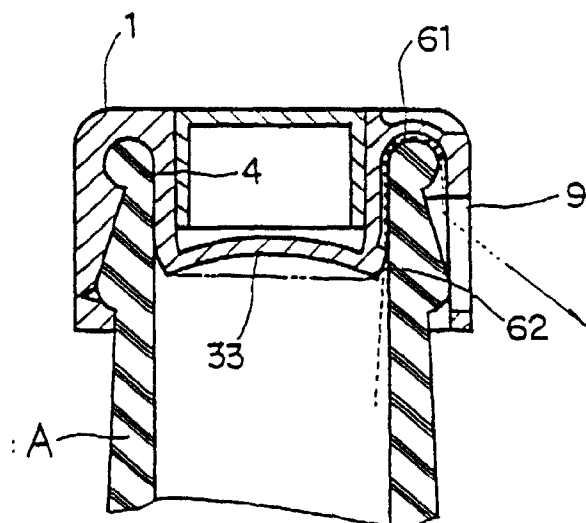


FIG 33

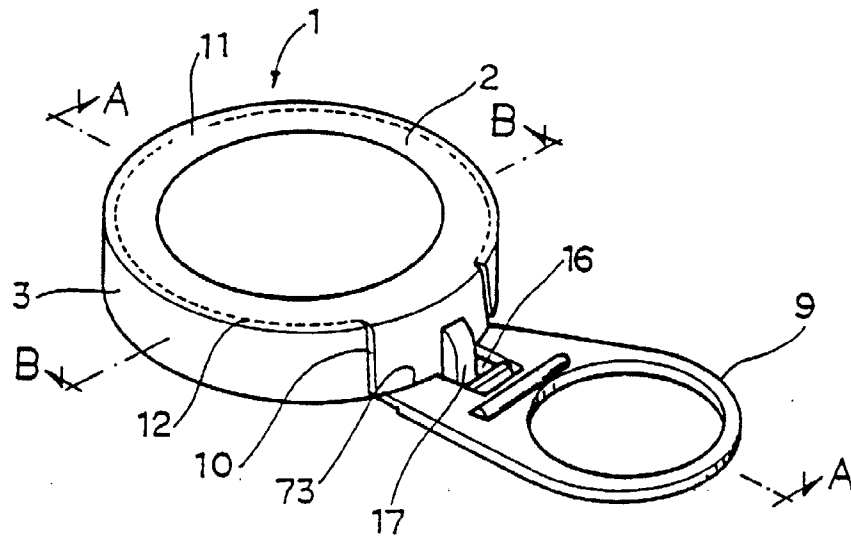


FIG 34

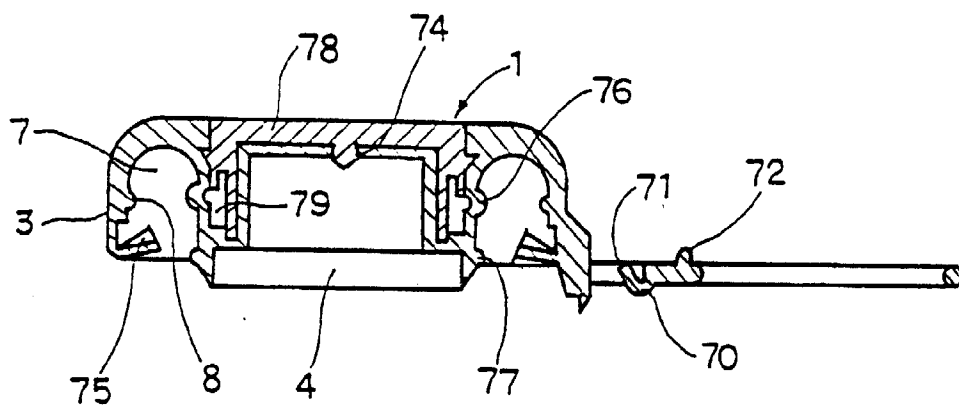


FIG 35

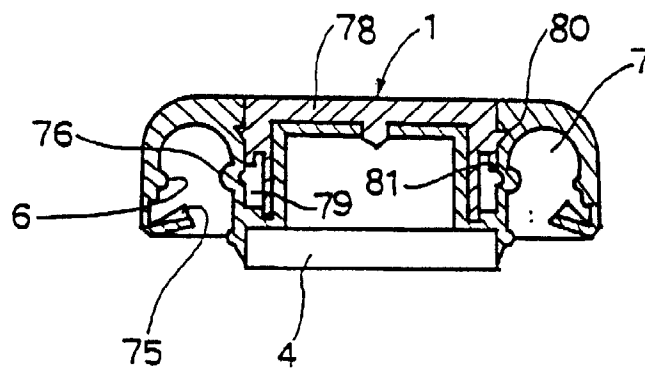


FIG 36

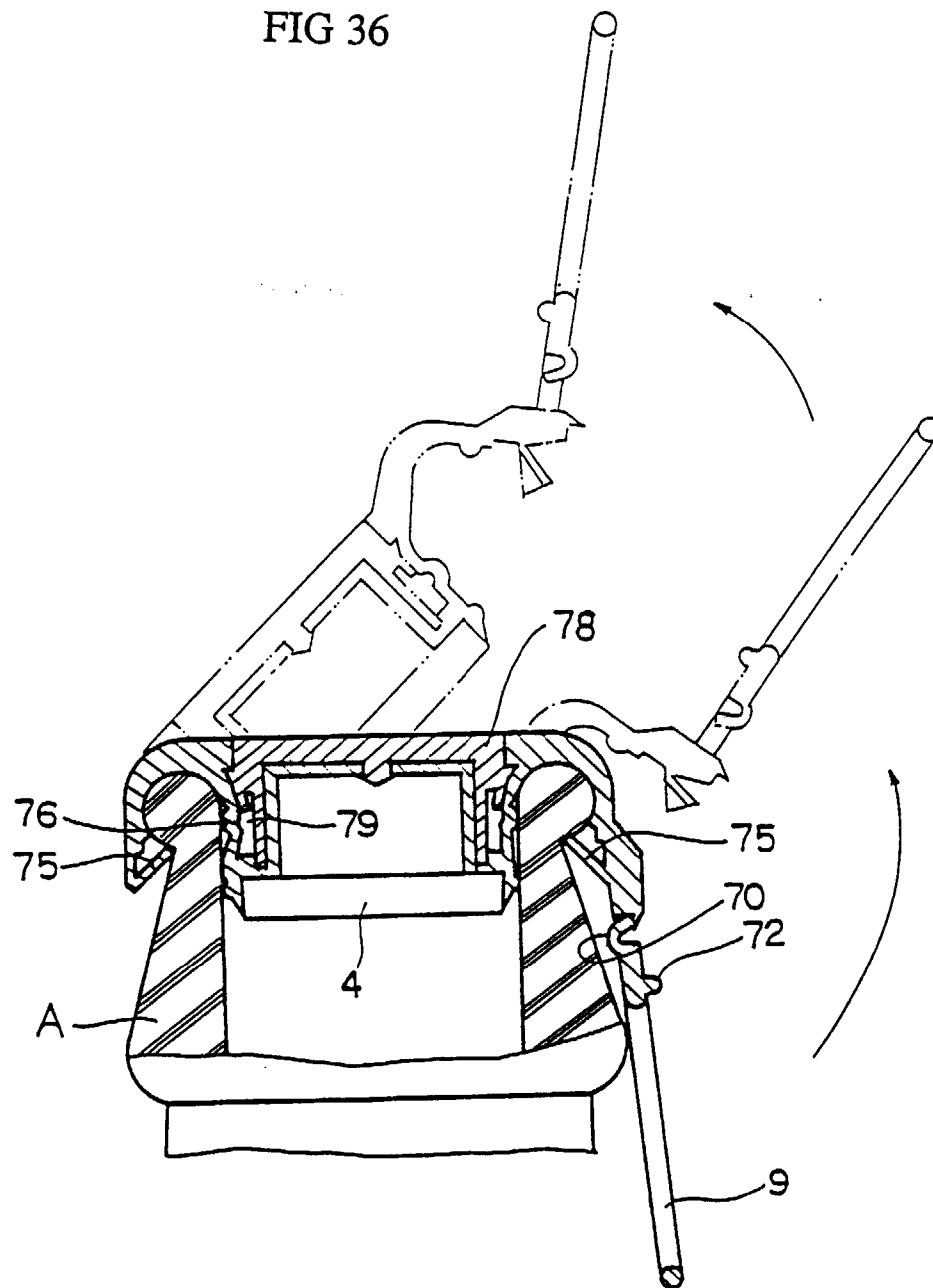


FIG 37(A)

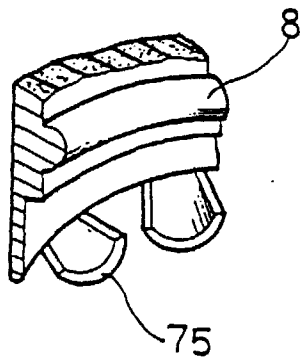


FIG 37(B)

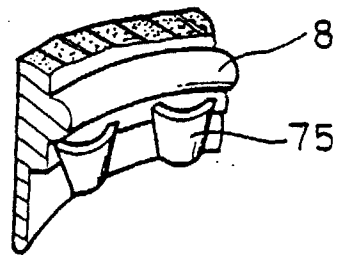


FIG 38

