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EUROPEAN PATENT APPLICATION

(21) Application number: 89106715.9

(51) Int. Cl. 4: **B65D 83/06 , B65D 47/36 ,
B65D 47/10 , B65D 81/24**

(22) Date of filing: 14.04.89

(30) Priority: 15.04.88 JP 50626/88
15.04.88 JP 50627/88

(43) Date of publication of application:
18.10.89 Bulletin 89/42

(84) Designated Contracting States:
CH DE ES FR GB LI

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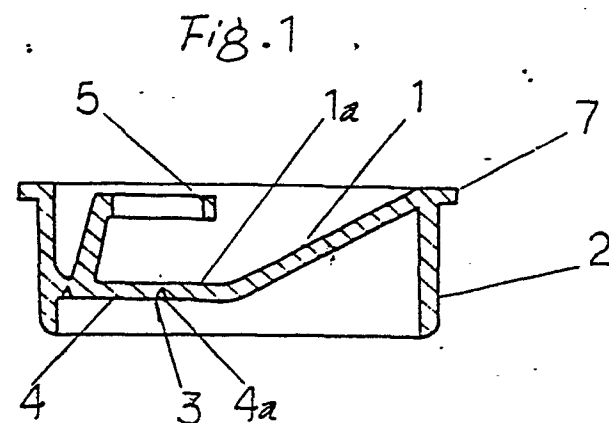
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(54) **Inner plug of synthetic resin container for dried powders.**

(57) The present invention relates to an inner plug of a synthetic resin container for dried powders integrally molded of a thermoplastic synthetic resin which is composed of a planar circular top board (1) and a cylindrical circumferential wall (2) extending downward from the peripheral rim of said top board (1). The top board (1) is formed in a concave shape bulged downward, with an aperture (3), for letting out the contents of the container, located in proximity to the peripheral rim of the top board (1).



Inner Plug of Synthetic Resin Container for Dried Powders

Background of the invention

The present invention relates to an inner plug of a wide mouth container made of a synthetic resin adapted for being filled with dried powder such as instant coffee or dried powder milk, etc., and particularly pertains to an inner plug put in a mouth of a wide mouthed synthetic resin container and having a function of hermetically closing said mouth part as well as a function for permitting its contents to be discharged.

Generally, glass containers excellent in anti-oxygen-and-moisture permeability are widely utilized as wide mouthed containers to be filled with dried food powders, but because they are heavy and vulnerable to impact, etc., laminate containers formed of synthetic resin materials excellent in oxygen permeability, including polyethylene terephthalate resin and ethylene vinyl alcohol resin, etc., have been developed in recent years.

In relation to this, the principal object of the present invention is to provide an inner plug adapted to be put in the mouth of a wide mouthed container made of a synthetic resin and having a function of hermetically closing the container during the period after it is packed with a specified powder and until it is delivered to the user and allows a function of permitting its contents to be discharged for use.

From an economic standpoint, it is advantageous if such an inner plug shall be formed as thin as possible within the thickness range in which its shape is well maintained.

Further, for facilitating the discharge of its contents, the aperture formed through the inner plug should desirably be as small as possible from its sealing and strength view-point. Too large an aperture will permit too large an amount of content to be let out at once, whereas too small an aperture will offer large resistance to flow-out of powder, detracting from its smooth streaming. It is, therefore, advantageous to permit its contents to be let out smoothly at a desirable flow rate without stagnation, while making the aforementioned opening as small as possible.

It is further advantageous if the inner plug according to the present invention has a construction which permits its manufacture by integral molding at a low cost.

Summary of the invention

The object of the present invention is solved by an inner plug of a synthetic resin container for

dried powders integrally molded of a thermoplastic resin, which is composed of a planar circular top board and a cylindrical circumferential wall extending downward from the peripheral rim of said top board, said top board being formed in a concave shape bulged downward, with an aperture for letting its contents out thereof located in proximity to the peripheral rim of said top board.

Brief Description of the drawings

FIG. 1 is a sectional view of an inner plug with a feature embodying this invention;

FIG. 2 is its plan view;

FIG. 3 is its sectional view as it is put in a container;

FIGS. 4 to 6 are enlarged sectional views of flanged portions with a feature embodying this invention;

FIG. 7 is a sectional view of another inner plug with the feature embodying this invention;

FIG. 8 is a sectional view of still another inner plug with the feature embodying this invention;

FIG. 9 is a back view of the inner plug of FIG. 8;

FIG. 10 is a sectional view of further another inner plug with the feature embodying this invention;

FIG. 11 is a cross-sectional view of the inner plug shown in FIG. 10;

FIG. 12 is a sectional view of an inner plug mounted in a container;

FIG. 13 is a sectional view of another inner plug of this invention;

FIG. 14 is a sectional view of another inner plug with a feature embodying this invention;

FIG. 15 is a sectional view of the inner plug of the embodiment of FIG. 14, as being put in a container;

FIG. 16 and 17 are sectional views of still other inner plugs with a feature embodying this invention; and

FIG. 18 is a sectional view of further other inner plug with the features embodying this invention.

Description of the preferred embodiment

In the following, embodiments of this invention are described in conjunction with the accompanying drawings: FIGS. 1 and 2 show a first embodiment of this invention; this inner plug is integrally

molded of a thermoplastic synthetic resin material and is composed of a planar circular top board 1 and a cylindrical circumferential wall 2 extending from the peripheral rim of said top board. Said top board 1 is formed in a concave shape bulged downward. This concave shape is a little eccentric so that the lowest portion 1a of the concave surface is brought toward the peripheral rim side of the top board. And at this lowest part, an aperture 3 for letting its content out is formed.

In this first embodiment, the aforementioned aperture 3 is closed with a membrane cap surrounded by a thin circular groove 4a which permits its tearing-off. And to the aforementioned membrane cap 4, a ringed tag 5 for its tearing-off is contiguously provided. This tag should not necessarily be formed in a ring shape, but it may be in string or other shapes.

And at the upper end edge of the aforementioned circumferential wall, a large diameter flange part 7 which works as a packing for the outside cover B is formed, whereby favorable sealing is ensured, as the container has been hermetically closed. As shown in FIGS. 4, 5 and 6, by forming ring shape protrusions 7a along the upper or lower or both upper and lower surfaces of this flange, still higher sealing effect may be achieved. Or this flanged part 7 may be omitted, as shown in FIG. 7.

And if, as shown in FIGS. 8 and 9, a weir 6 extending downward around the aforementioned aperture 3 is formed on the bottom surface of the aforementioned top board 1, powder will come abutting on this weir, to be branched, when letting its content to flow out, whereby the resistance to flow at the opening is relieved, assuring smooth streaming without stagnation. It should be noted that divided weir parts may be formed at an appropriate distance apart. Or in place of this weir 6, a baffle plate 15 which shields the part downward of the membrane cap 4 may be formed, extending from the top board 1, as shown in FIGS. 10 and 11, whereby like the aforementioned weir 6, the resistance to flow-out through this opening may be relieved.

Further, as shown in FIG. 13, it is possible to accommodate an oxygen adsorber 8 or drier 9 or both in the upper space formed by the concavity of the aforementioned top board 1. In this instance, the oxygen and moisture inside the container penetrates the thin groove part of the top board 1, to be absorbed by this oxygen absorber 8 or drier 9, so that the amount of oxygen inside the container or the water content of the powder therein may be suppressed low. Furthermore, the oxygen and moisture penetrated from the outside of the cover B may be suppressed low, and after the membrane cap was opened, increase of the oxygen or moisture in the powder may be suppressed low.

And in the embodiment shown in FIG. 14, a covering plate 16 which overspreads upward of the membrane cap 4 is provided at the perimeter of the upper surface of the top board 1, the space between this covering plate 16 and the concave upper surface of the top board 1 forming a quantitative measuring chamber 17. In this quantitative measuring chamber 17, an opening 18 is formed, looking toward the top board center. In this embodiment, since the powder may be stored in the aforementioned quantitative measuring chamber 17, as shown in FIG. 15, by tilting this container for letting its content out, it may be let flow out through the opening 18 by tilting the container to the opposite direction by the next operation. At this time, part of the powder inside the quantitative measuring chamber may fall down into the container through the opening formed by removal of the membrane cap 4; if this falling amount has been calculated beforehand, a quantitative discharge will become possible to some degree. With such powdered beverages as powdered coffee or milk, etc., which do not require strictly quantitative discharge, their handling may be adequately exercised by such a mechanism embodying this invention.

The aforementioned inner plug may be used in a wide mouthed container A injection-molded with a synthetic resin material, as shown in FIG. 3, by putting the plug in its mouth, after filling powder therinto. In this instance, the plug may be either closely fit in the aforementioned mouth or bonded thereto by welding with high frequency.

It should be noted that the synthetic resin container in which the inner plug of this invention is used shall be one whose gas barrier property is well taken into account. As an example, an injection-molded container formed of a laminate of an intermediate layer 10 being ethylene-vinyl alcohol copolymer resin and inner and outer layers 11 and 12 being polyethylene terephthalate resin is preferable. In this instance, it is advantageous from strength as well as gas barrier viewpoint that the aforementioned intermediary layer 10 is located within 1/2 of the total thickness from the side wall surface.

According to this invention, if, as shown in FIG. 12, a stepped portion 13 is provided on the inner surface of the mouth of the container A, on which the flanged portion 7 of the inner plug is engagingly fit, and the mouth's upper opening is sealed with an aluminum film 14, then, still more positive hermetic closing can be achieved.

FIG. 16 shows another embodiment of this invention, wherein the aperture 3 is opened beforehand; a cylindrical wall 19 is provided along the peripheral rim of this aperture and on the top of this cylindrical wall, a cap 20 for closing said aperture is removably put.

It is also permissible to provide the weir 6, as shown in FIG. 17, and the baffle plate 15 as shown in FIG. 18, on the inner plug shown in FIG. 16, similarly as in the aforementioned embodiments.

According to this invention, because of the top board being formed in concave shape, the top board strength can be increased, permitting the material thickness to be reduced as much as possible for economy; and when letting any powdery content of the container flow out, it will flow to the low part on the perimeter at the back of the top board, to be led to the aperture formed in proximity to the perimeter of the top board, so that even if the aperture is formed small, the powder may be smoothly let out through this aperture; in addition, since a tearing knob 4 may be housed in the top space formed by the concavity of the top board, it is not only possible to form the container compact and smart in its external appearance, but to contain oxygen absorber and drier in said space. Particularly, as shown in FIGS. 1 through 15, if the aperture 3 is formed and closed with a membrane cap 4 to be torn off, the aperture may be opened only after tearing off part of the top plate before using the powder; therefore, the container is proofed against tampering, or its virginity ensured.

Claims

1. An inner plug of a synthetic resin container for dried powders integrally molded of a thermoplastic synthetic resin, which is composed of a planar circular top board (1) and a cylindrical circumferential wall (2) extending downward from the peripheral rim of said top board (1), the aforementioned top board (1) being formed in a concave shape bulged downward, with an aperture (3) for letting its content out thereof located in proximity to the peripheral rim of the top board (1).

2. The inner plug of a synthetic resin container for dried powders according to the aforementioned claim 1, wherein the aforementioned aperture (3) is integrally molded with the top board (1) and closed by a membrane cap (4) surrounded by a circular thin groove (4a), which permits tearing-off, with a knob (5) for tearing off this membrane cap (4) contiguously formed therewith.

3. The inner plug of a synthetic resin container for dried powders according to claim 2, wherein a weir (6) extending downward at least at a position around the aforementioned membrane cap (4) and looking toward the center of the top board (1) is formed on the lower surface of the aforementioned top board (1).

4. The inner plug of a synthetic resin container for dried powders according to claim 2, wherein a baffle plate (15) which shields the part downward of the aforementioned membrane cap (4) is extended from the top board (1).

5. The inner plug of a synthetic container for dried powders according to the aforementioned claims 2 to 4, wherein a covering plate (16) which overspreads upward of the membrane cap (4) is formed at the perimeter of the upper surface of the top board (1) so as to form a quantitative measuring chamber (17) between the concave upper surface of the top board (1) and the covering plate (16) said quantitative measuring chamber (17) being provided with an opening (18) looking toward the top board (1) center.

6. The inner plug of a synthetic resin container for dried powders according to claim 1, wherein the aforementioned aperture (3) is provided with a cylindrical wall (19) projecting upward and a cap (20) for closing said aperture (3) removably fitted on the top of this cylindrical wall (19).

7. The inner plug of a synthetic resin container for dried powders according to the aforementioned claims 1 to 6, wherein an oxygen absorbent (8) or a drier (9) or both are accommodated in the concavity of the aforementioned upper surface of the top board (1).

8. The inner plug of a synthetic resin container for dried powder according to the aforementioned claims 1 to 7, wherein the concave shape of the top board (1) is a little eccentric so that the lowest portion of the concave surface is brought toward the peripheral rim side of the top board (1) and said aperture (3) being formed at the lowest portion.

Fig. 1

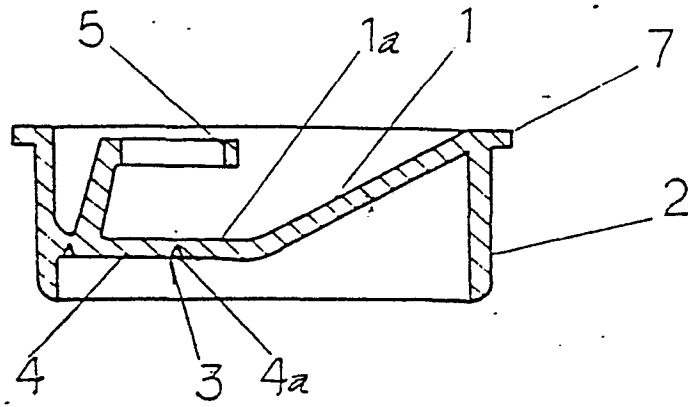


Fig. 2

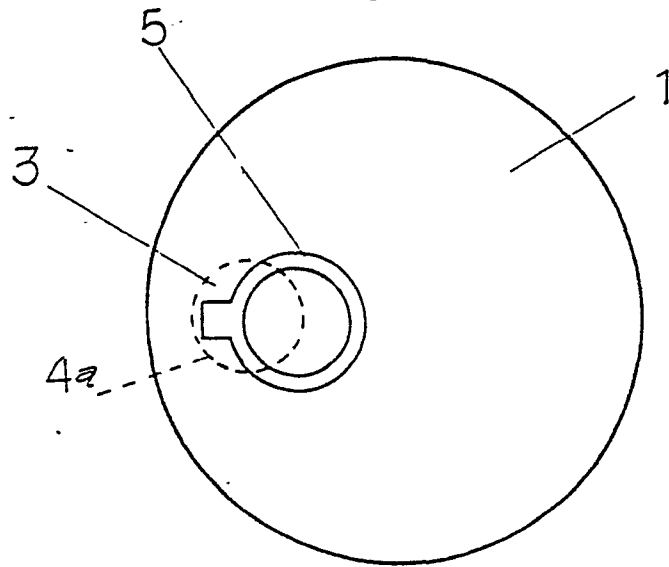


Fig. 3

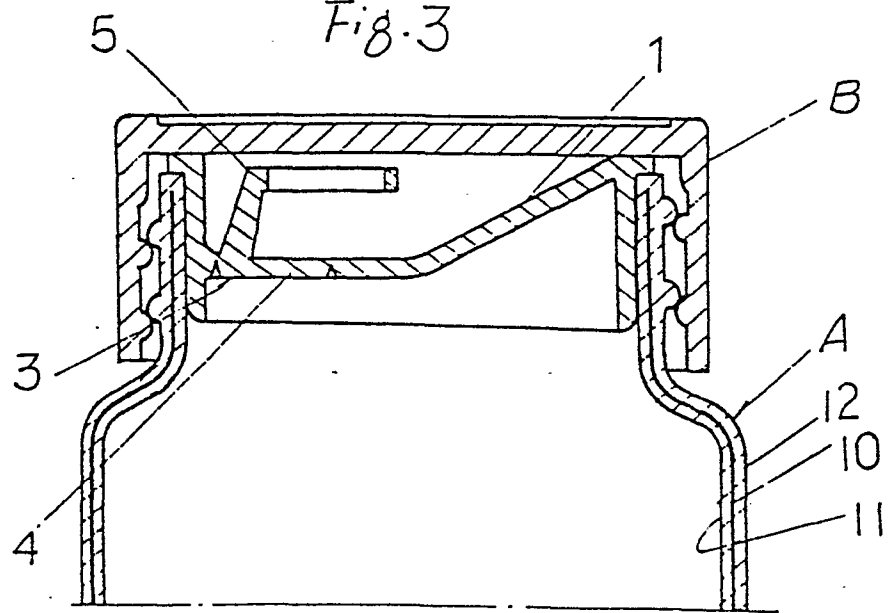


Fig. 4

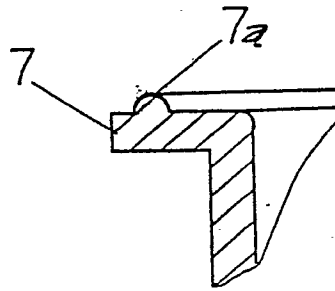


Fig. 5

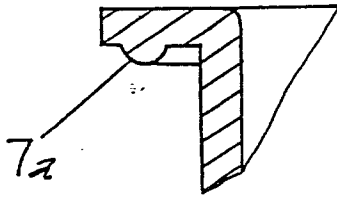


Fig. 6

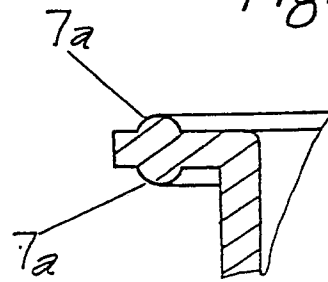


Fig. 7

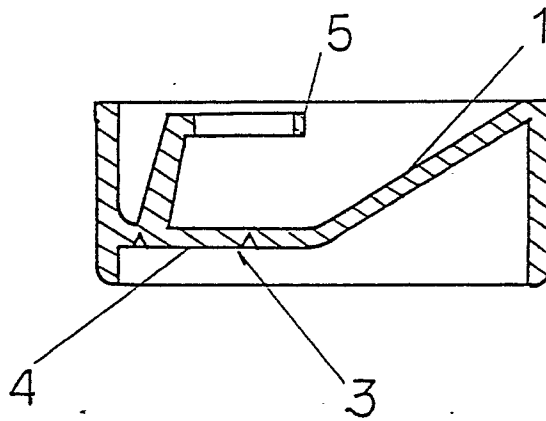


Fig. 8

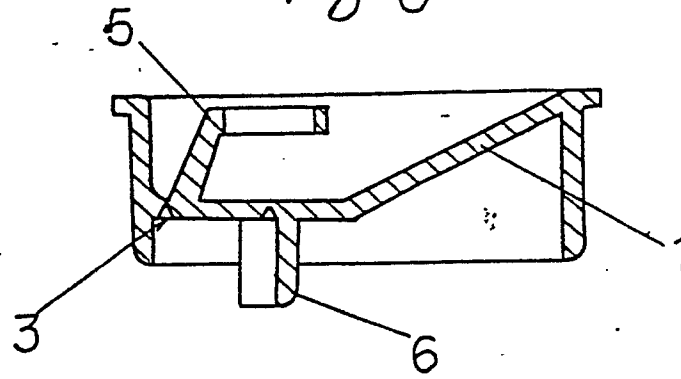


Fig. 9

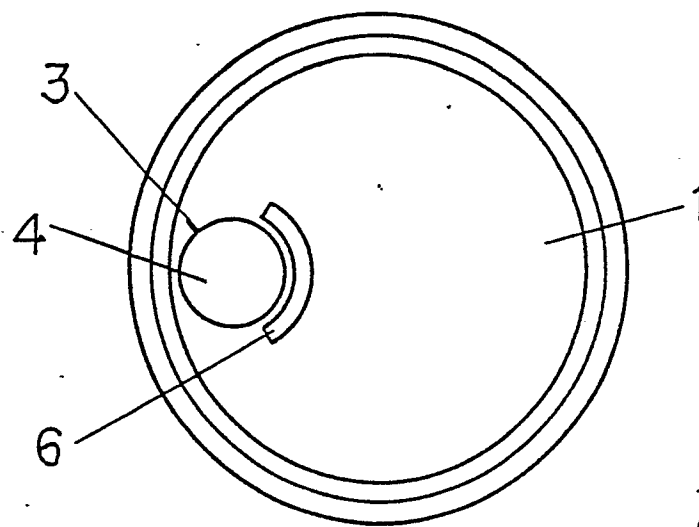


Fig. 10

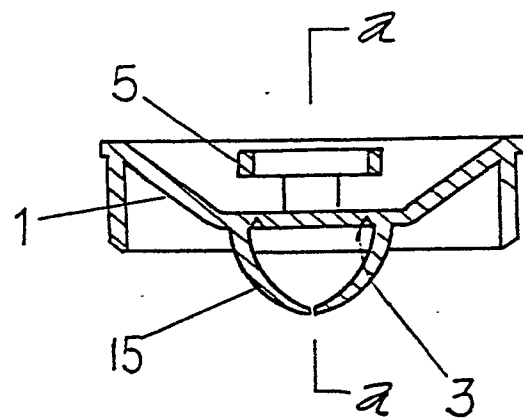


Fig. 11

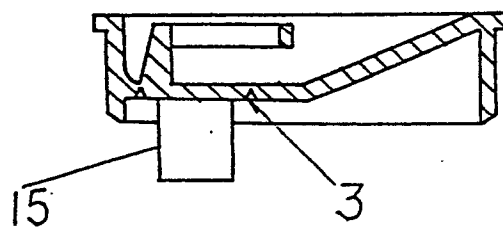


Fig. 12

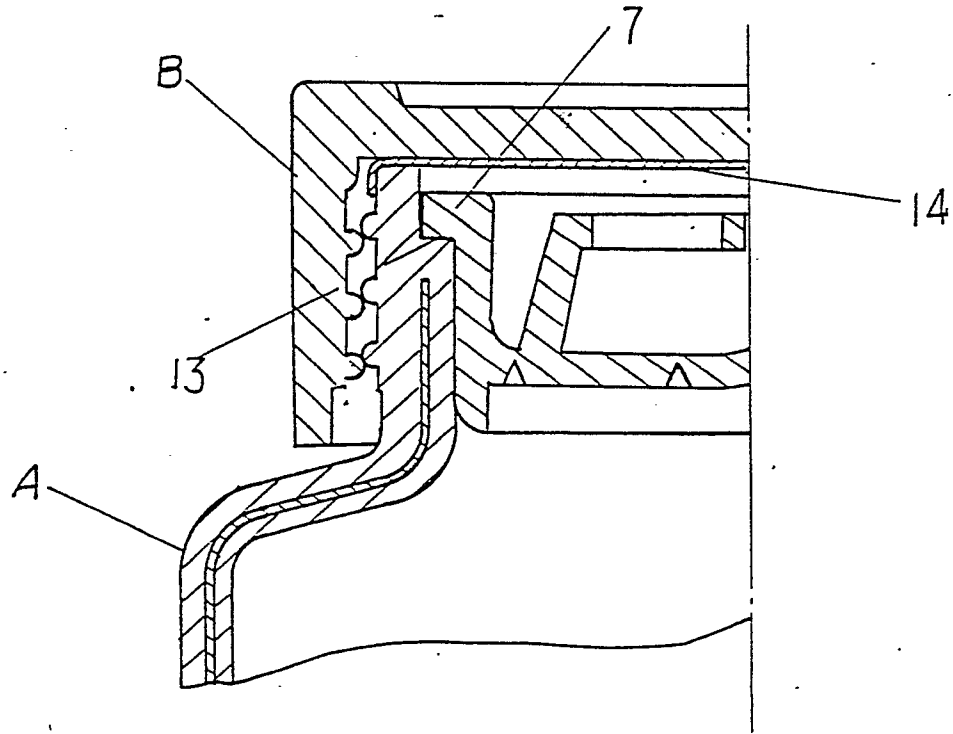


Fig. 13

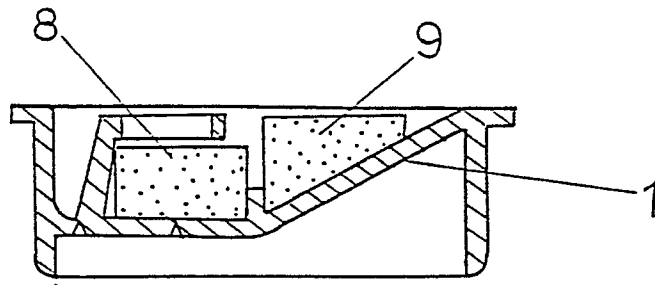


Fig. 14

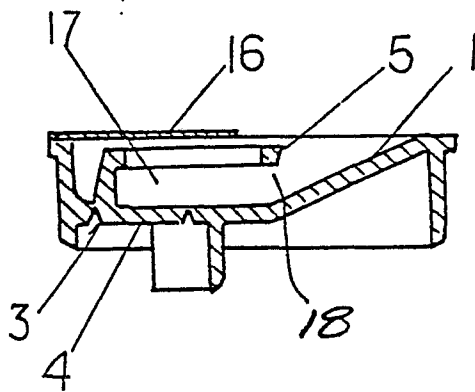


Fig. 15

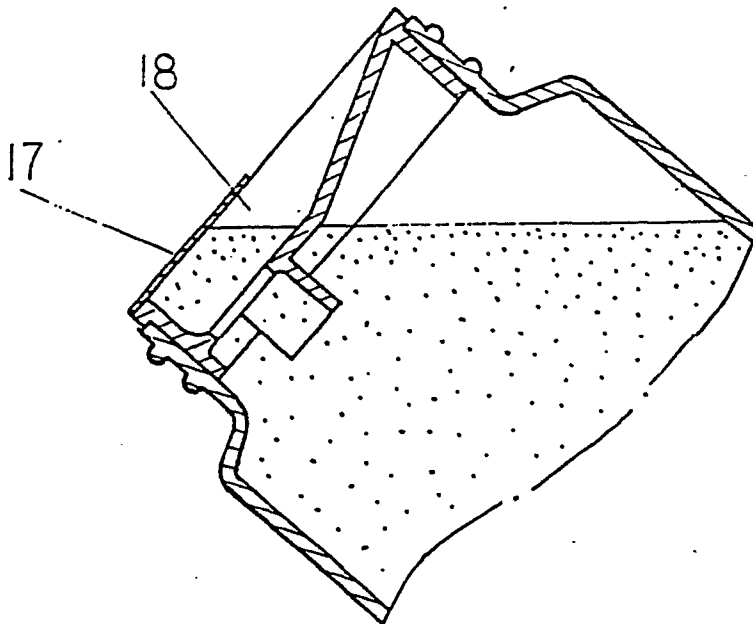


Fig. 16

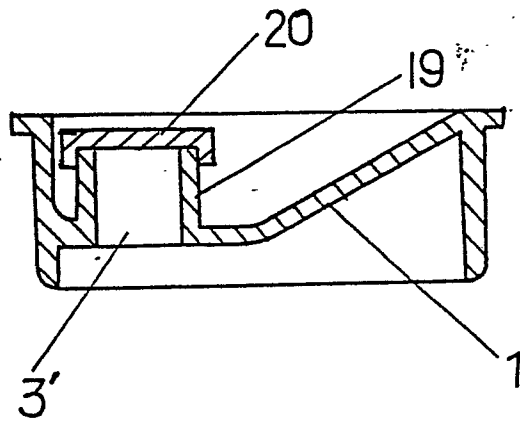


Fig. 17

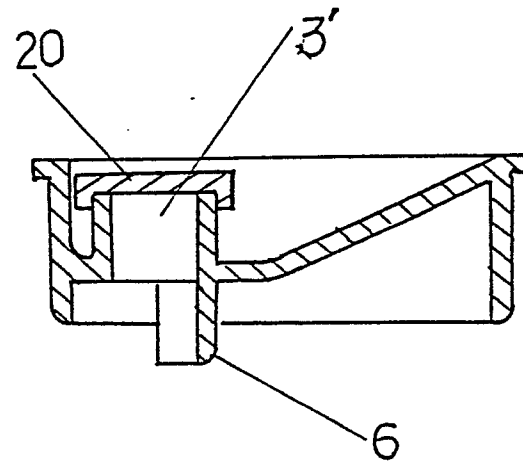
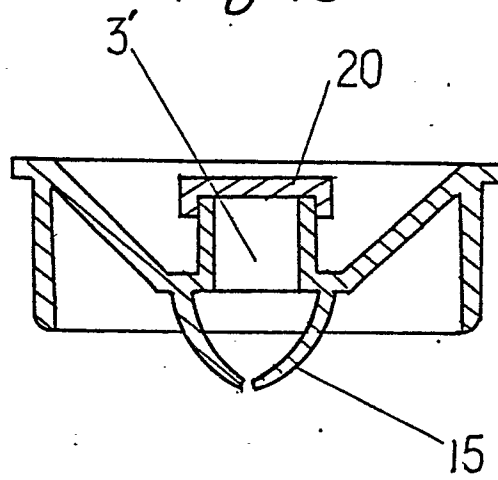


Fig. 18





DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.4)
Y	US-A-4 706 838 (HOLDT) * Column 2, line 32 - column 3, line 17; figures 1-3 * ---	1,2	B 65 D 83/06 B 65 D 47/36 B 65 D 47/10 B 65 D 81/24
Y	DE-A-1 536 175 (MAUSER) * Page 3; figures * ---	1,2	
A	US-A-3 773 232 (HIDDING) * Abstract; figures 1-4 * ---	3,4	
A	GB-A- 698 633 (UNIVERSAL METAL) * Page 1, lines 57-66; figure 1 * ---	3,4	
A	EP-A-0 133 264 (HENKEL KOMMANDITGESELLSCHAFT) * Abstract; figures 5,6 * ---	5	
A	DE-A-1 486 350 (FREYA) * Figures * ---	6	
A	DE-A-2 948 264 (MITSUBISHI) * Claim 1; figures * -----	7	TECHNICAL FIELDS SEARCHED (Int. Cl.4) B 65 D
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 13-07-1989	Examiner NEWELL P.G.
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			