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**A cap for a container holding a liquid the cap having an integral space for housing a sealed blister pack with a substance to be mixed with the liquid prior to use**

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(71) Applicant(s)  
**Kambouris Shares Pty Ltd**

(72) Inventor(s)  
**Bruce, Kambouris**

(74) Agent / Attorney  
**LESICAR MAYNARD ANDREWS PTY LTD, PO BOX 2545, KENT TOWN, SA, 5071**

(56) Related Art  
**US 2013/0186779**  
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**US 6679375**

**ABSTRACT**

A cap for use with a drinking container. The cap includes a cylindrical body having an opening and a lid adapted to seal over said opening, the body further having an inner lip disposed circumferentially around the inside of the body and adapted to house a blister pack. The blister pack houses a tablet or powder and has a base that can be broken under sufficient pressure to eject the tablet or powder through the opening, the dimensions of the body and lid being such to accommodate the blister pack.

**A cap for a container holding a liquid the cap having an integral space for housing a sealed blister pack with a substance to be mixed with the liquid prior to use**

## **FIELD OF THE INVENTION**

[0001] The present invention relates generally to a sealing cap for a container incorporating a substance to be mixed with the liquid in the container prior to use.

## **BACKGROUND TO THE INVENTION**

[0002] Sealing methods for food and beverage containers are well known and varied, the most common being a cap or lid. Drinks which include another component or second component, such as a tablet or powder which is added to the liquid are growing in popularity. Usually this includes a blister pack contained in the lid which is adapted to store material separately from the liquid in the container.

[0003] It is preferable for the second component to be added immediately prior to consumption, especially when ingredients to be added are UV sensitive or do not have a long shelf life when mixed. Adding ingredients at the point of consumption also simplifies the production and filling of the beverages.

[0004] It is therefore known for a container to include a cap and powder or tablet holder, or blister pack, so that when pressure is exerted on the blister pack it allows the tablet to be mixed with the liquid in the container.

[0005] However, there are various disadvantages in the known prior art, for example, wherein the blister pack is completely broken by the initial force to release the material, and therefore does not remain sealed whilst the two components are being mixed. Furthermore, the container cannot be resealed once the tablet holder is broken and therefore the container cannot be reused. In many designs, the remains of the tablet holder, once broken, cannot be easily removed from the container, which may affect the drinking of the beverage and its reusability. In addition where the tablet or powder are effervescent it may cause the container to experience a rise in internal pressure causing the container to rupture or the cap to be ejected.

[0006] It is an object of the present invention to overcome these disadvantages or at least provide the public with a useful alternative.

[0007] It is an object of the present invention to overcome these disadvantages or to provide the public with a useful alternative.

## **SUMMARY OF THE INVENTION**

[0008] Therefore in one form of the invention there is proposed a cap for use with a container, said cap including a cylindrical body having an opening and a lid adapted to seal over said opening, the body further having an inner lip disposed circumferentially around the inside of the body and adapted to house a blister pack, the blister pack adapted to house a tablet or powder and having a base that can be broken under sufficient pressure to eject the tablet or powder through the opening, the body further including a plurality of teeth disposed below the lip to assist in piercing of the base, the dimensions of the body and lid being such to accommodate the blister pack.

[0009] In preference the blister pack includes as a base aluminium foil.

[0010] In preference the blister pack is attached to the body by glue.

[0011] In preference the blister pack is attached to the body by a ring that overlaps the blister pack and the lip and is bonded to both the blister pack and the body lip.

[0012] In preference the lid is elastomeric allowing pressure to be applied to the blister pack without opening the lid.

## **BRIEF DESCRIPTION OF THE DRAWINGS**

[0013] Preferred features, embodiments and variations of the invention may be discerned from the following Detailed Description which provides sufficient information for those skilled in the art to perform the invention. The Detailed Description is not to be regarded as limiting the scope of the preceding Summary of the Invention in any way. The Detailed Description will make reference to a number of drawings as follows.

[0014] Reference will now be made, by way of example only, to the accompanying drawings.

[0015] Figure 1 is a perspective view of a cap having an integral lid in an open state to be used with a drink container;

[0016] Figure 2 is the cap as in Figure 1 but when in a closed state;

[0017] Figure 3 is an exploded view of the cap as in figure 1 including a blister pack;

- [0018] Figure 4 is the cap as in Figure 3 illustrating the housing of the blister pack;
- [0019] Figure 5 illustrates an exploded perspective view of a cap including a seal;
- [0020] Figure 6 is the cap of Figure 5 when assembled;
- [0021] Figure 7 is a perspective view of the cap without a lid including piercing teeth;
- [0022] Figure 8 is a more detailed view of the teeth;
- [0023] Figure 9 is a cross section view of an assembled cap and including a pressure relief capillary;
- [0024] Figures 9 (a) to (e) illustrate details of the cap of Figure 9; and
- [0025] Figure 10 is an alternate embodiment of a cap including a sheath instead of a lid

#### **DRAWING LABELS**

- [0026] The drawings include items labeled as follows:

- 10 cap
- 11 body
- 12 opening
- 13 cylindrical skirt
- 14 internal threads
- 15 internal lip
- 16 hinged lid
- 17 blister pack
- 18 plastic film
- 19 flange
- 20 aluminium film
- 21 bottle neck
- 22 male thread
- 23 plastic ring
- 24 piercing teeth
- 25 tablet
- 26 capillary pathway
- 27 side wall
- 28 protrusion

- 29 circular indent
- 30 side wall
- 31 elastomer

## DETAILED DESCRIPTION OF THE INVENTION

[0027] The following detailed description of a preferred embodiment of the invention refers to the accompanying drawings. Wherever possible, the same reference numbers will be used throughout the drawings and the following description to refer to the same and like parts. As used herein, any usage of terms that suggest an absolute orientation (e.g. "top", "bottom", "front", "back", "horizontal", etc.) are for illustrative convenience and refer to the orientation shown in a particular figure. However, such terms are not to be construed in a limiting sense as it is contemplated that various components may in practice be utilized in orientations that are the same as, or different than those, described or shown. Dimensions of certain parts shown in the drawings may have been modified and/or exaggerated for the purposes of clarity or illustration. In particular the present invention relates to a ceiling system which inherently includes long elements with relatively small features. Such elements have been shown shortened to aid clarity.

[0028] Referring to Figures 1 and 2 there is shown a cap 10 having a body 11 with an opening 12 and a cylindrical skirt 13. Internal threads 14 are used to screw the cap onto a drink container. An internal lip 15 is provided to house a blister as is discussed below. A hinged lid 16 is integrally attached to the body 11 so that when closed it seals the opening 12.

[0029] As illustrated in Figures 3 and 4 the dimensions of the lid 16 are such that the body 11 can accommodate a blister pack 17 defined by a plastic film 18 and having a flange 19. The blister pack flange 19 is supported by internal lip 15 and the dimensions of the lid and the body are such that the blister cap is accommodated when the lid is closed.

[0030] A tablet or powder is blister packed using standard tablet and powder packaging processes. The blister consists of the formed plastic laminate film 18 that is designed to modify the atmosphere inside the blister. After the tablet/powder is loaded into the formed plastic blister, the blister is lidded using thin aluminium foil 20. The foil is coated with a heat sensitive adhesive and the edge of the blister is welded to the film to isolate the atmosphere in the blister. The packed blister is cut out so that it is generally circular in elevation shape.

[0031] The blister pack is glued to the internal lip of the body so that the tablet sits over the opening 12. The adhesive is generally a pressure sensitive adhesive or hot melt adhesive

[0032] In an alternate embodiment and as illustrated in Figures 5 to 9 instead of using glue a plastic ring 23 lies on top of the flange 19 and is of a diameter slightly larger than that of the blister pack flange so that it can be welded to the outer surface of lip 15. This can be seen in Figure 9 where the ring 23 is welded both to the flange 19 and to a portion of the lip 15.

[0033] The lid 16 with the assembled blister prevents inadvertent activation of the press release of the tablet 25. This protects during handling, filling and post-consumer purchase. The lid may not be hinged but may, as shown in Figure 9, be a separate cap that engages with the body in a snap-type arrangement where protrusion 28 engages indent 29. The lid may also include well known features to provide evidence of tampering.

[0034] As illustrated in Figure 7 and 8 the body may include piercing teeth 24 to assist in the piercing of the aluminium lidding foil. This helps to reduce the blister activation loads.

[0035] In a further embodiment and as illustrated in Figure 10, the lid or dust cap 16 may be replaced by an elastomer or flexible skin 31, the skin being integrally attached to the cap. This would enable the compression of the blister pack to release the tablet through a screw down upper cap that is threaded to the bottom cap, allowing dispensing during cap removal.

[0036] The reader will now appreciate that in use, the user simply removes the lid and applies pressure to the top of the blister pack that results in the table or powder falling into the container that has been pre-filled with liquid.

[0037] Whilst the present invention as so far described can be used with any sorts of tablets or powders there has been an increased demand for the use of effervescent tablets or powders. However this causes a reaction of citric acid and sodium bicarbonate that results in release of gas. Given that the solubility of gas in a liquid may vary a pressure may be produced in a closed vessel. The pressure can also be affected by the temperature of the liquid.

[0038] For example a probiotic tablet weighing around four grams will produce around 300 ml of carbon dioxide. In 100 ml of water and at 20 degrees around 90 ml of the

gas is dissolved. In some 250 ml of water or juice that equates to some 220 ml being dissolved with some 80 ml of carbon dioxide remaining undissolved. At this temperature the increase in pressure is just over 5 psi. For 350 ml of water or juice there is really no change in the pressure. At lower temperatures, such as at 4 degrees C all of the carbon dioxide is dissolved resulting in no change in pressure.

[0039] If two tablets were to be used at 20 degrees the change in pressure would be some 25 psi for 250 ml and 14 psi for 350 ml. At 4 degrees that changes to 15 psi and 4 psi respectively. Accordingly for a drink container using one effervescent tablet one has several options:

- (a) Either use a volume where there is net production of CO<sub>2</sub> due to saturation of gas solubility and include a capillary pressure release design cap; or
- (b) Increase the volume of the liquid container so that what is produced by the one tablet is dissolved within the liquid. At 20 C, a 350ml container would dissolve all the CO<sub>2</sub> gas produced. However a 250 ml container can be used if the liquid remains at 4 C.

[0040] When the number of tablets increases to 2, then the pressure will not be manageable with temperature and it is essential to include a pressure release mechanism in the cap. In one embodiment and as illustrated in Figure 9 (e) a capillary groove or pathway 26 is formed between the body 11 and side wall 30 extending from lip 15 that allows excess pressure to escape the container but is of a size that is not large enough for any fluid to pass there through. The capillary groove overcomes pressure accumulation that can risk the blister from being pushed off either gently or violently. Alternatively a pressure release valve may be provided.

[0041] The reader will now appreciate the advantage of the present invention. Since the blister pack is an integral part of the cap the tablet can be ejected to the drink container whilst the bottle remains sealed. The cap is simply unscrewed to access the liquid and can be screwed back to the drink container to once again seal the bottle. The blister pack may contain multiple tablets and the tablets themselves may be moulded with sharp facets to assist in breaking through the aluminium bottom.

[0042] Further advantages and improvements may very well be made to the present invention without deviating from its scope. Although the invention has been shown and described in what is conceived to be the most practical and preferred embodiment, it is recognized that departures may be made therefrom within the scope and spirit of the



invention, which is not to be limited to the details disclosed herein but is to be accorded the full scope of the claims so as to embrace any and all equivalent devices and apparatus. Any discussion of the prior art throughout the specification should in no way be considered as an admission that such prior art is widely known or forms part of the common general knowledge in this field.

[0043] It is to be understood that the present invention, although described by way of example when used for a drink container, may equally well be used for other purposes such as but not limited to glues, pesticides, paints and many other applications where it is necessary or desirable to mix either tablet(s) or granules with a liquid prior to use.

[0044] In the present specification and claims (if any), the word "comprising" and its derivatives including "comprises" and "comprise" include each of the stated integers but does not exclude the inclusion of one or more further integers.

## CLAIMS

1. A cap for use with a container, said cap including a cylindrical body having an opening and a lid adapted to seal over said opening;  
the body further having an inner lip disposed circumferentially around the inside of the body and adapted to house a blister pack, the blister pack adapted to house a tablet or powder and having a base that can be broken under sufficient pressure to eject the tablet of powder through the opening;  
the body further including a plurality of teeth disposed below the lip to assist in piercing of the base, the dimensions of the body and lid being such to accommodate the blister pack; and  
wherein the lid is elastomeric allowing pressure to be applied to the blister pack without opening the lid.
2. A cap as in claim 1 wherein the blister pack includes as a base aluminium foil.
3. A cap as in claim 1 wherein the blister pack is attached to the body by glue.
4. A cap as in claim 1 wherein the blister pack is attached to the body by a ring that overlaps the blister pack and the lip and is bonded to both the blister pack and the body lip.

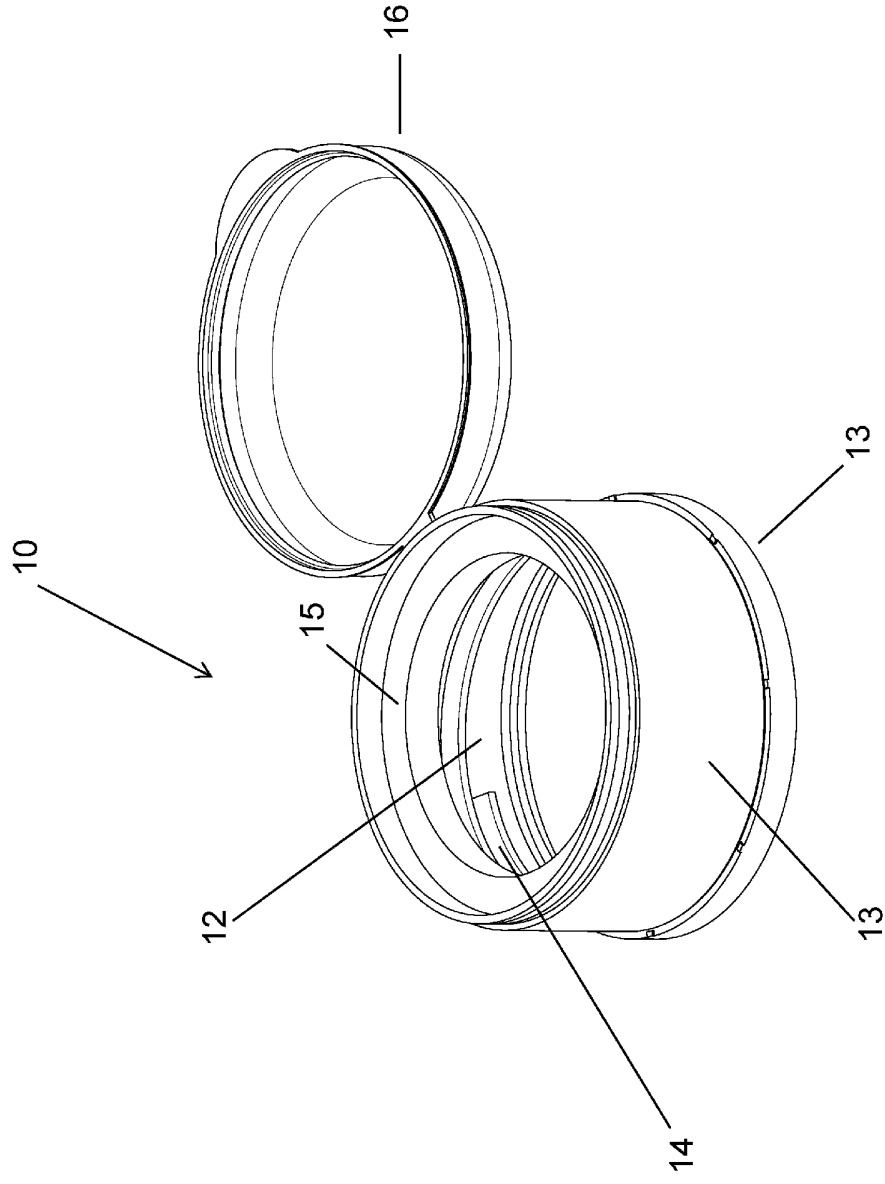


FIG 1

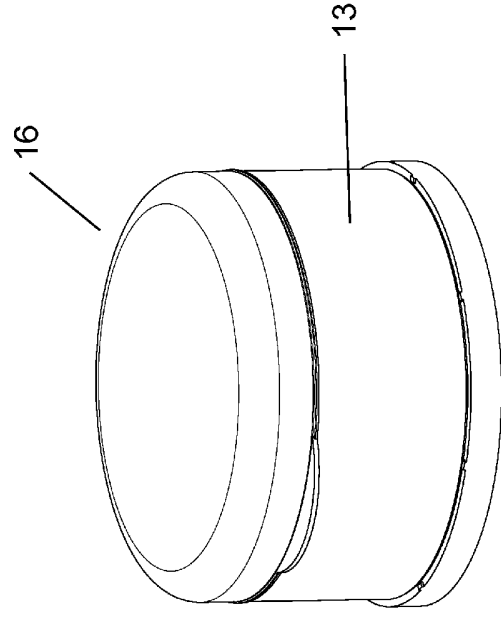


FIG 2

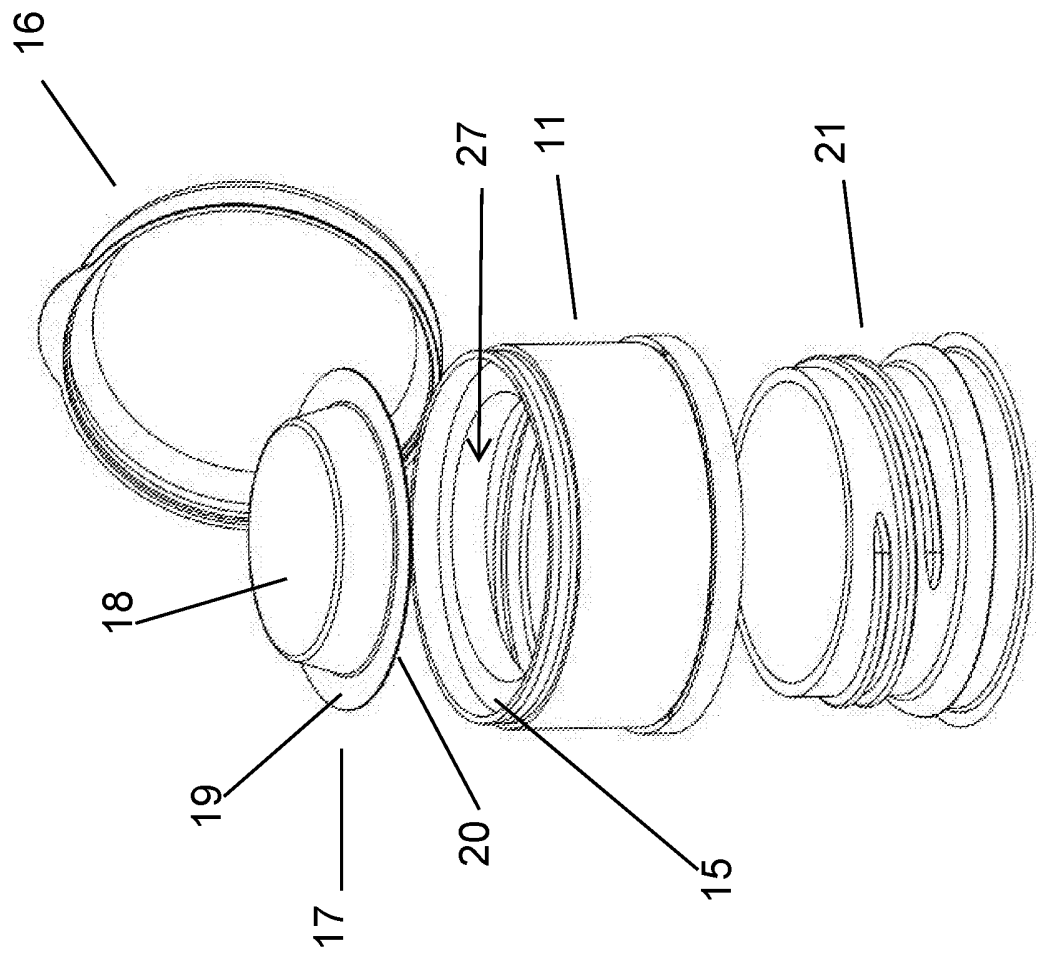


FIG 3

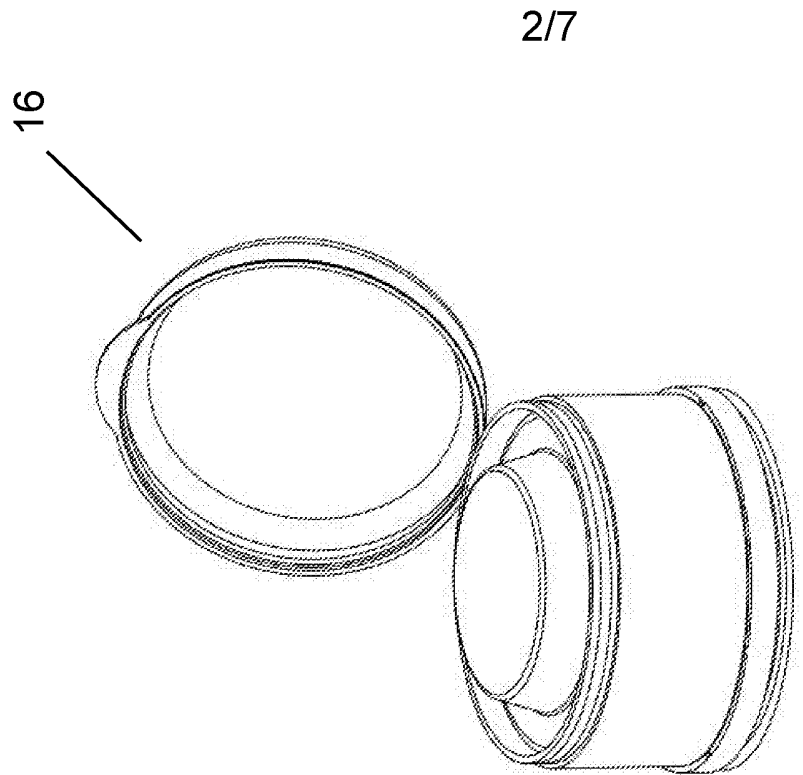


FIG 4

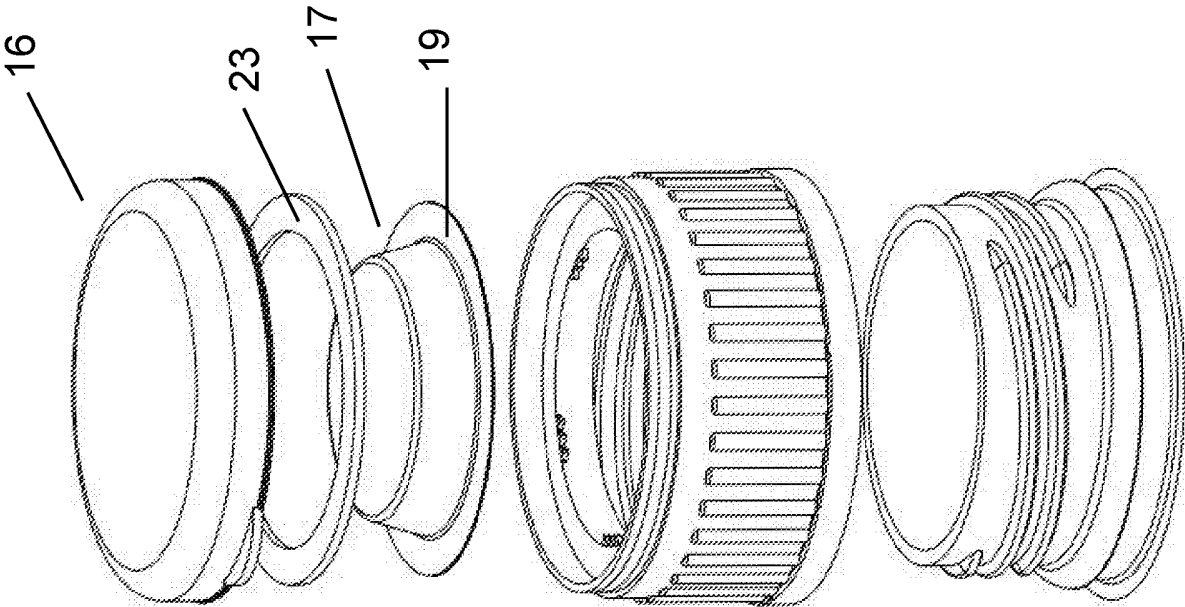


FIG 5

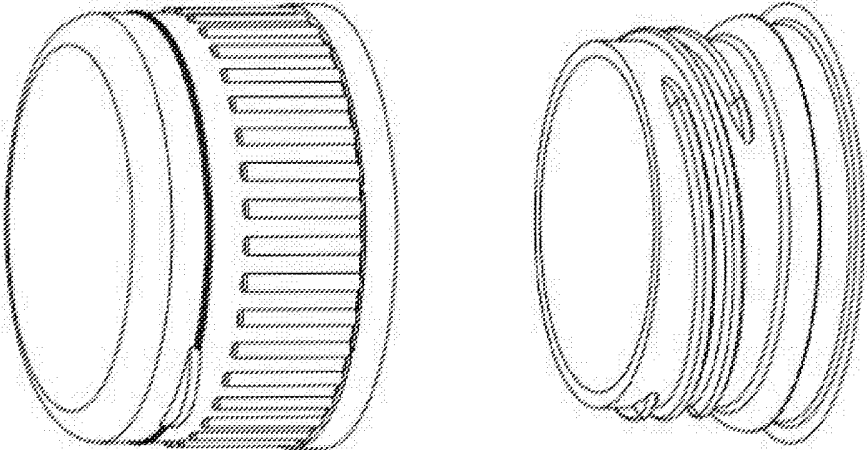


FIG 6

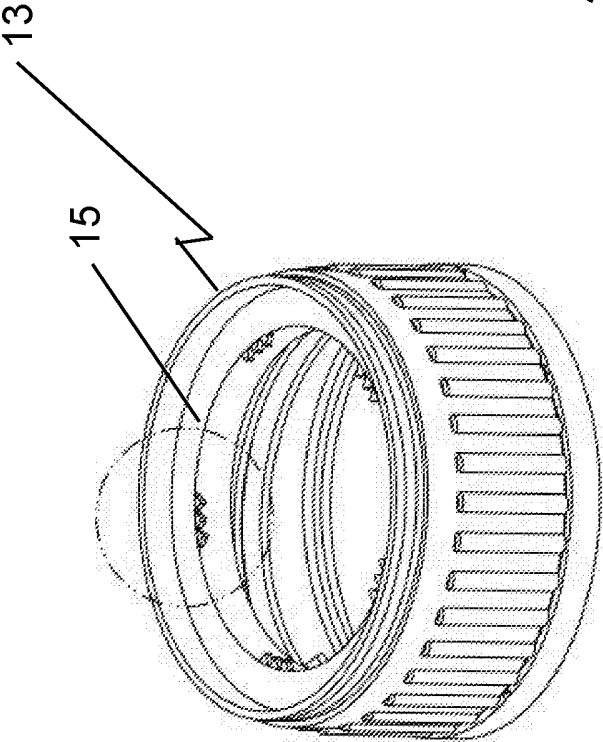


FIG 7

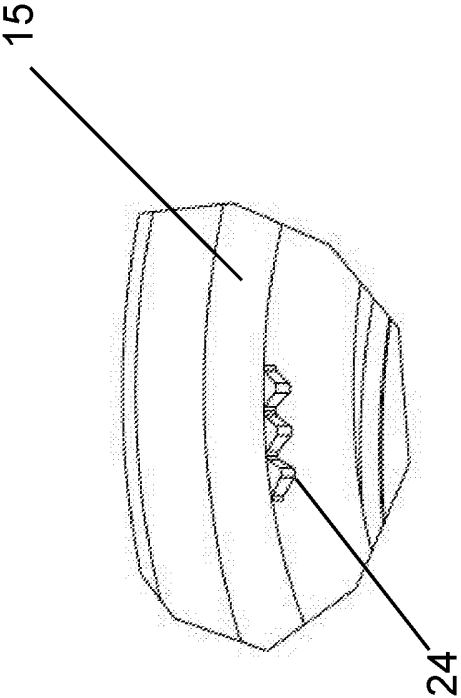


FIG 8

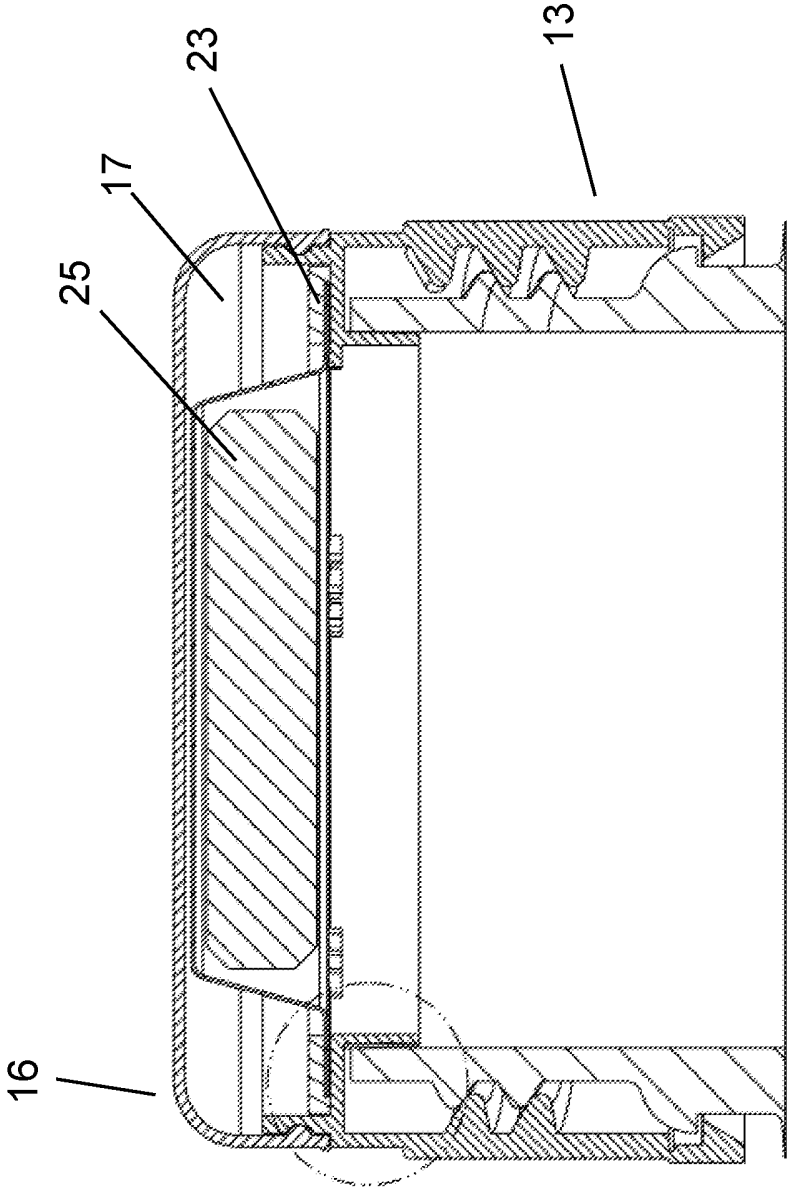


FIG 9

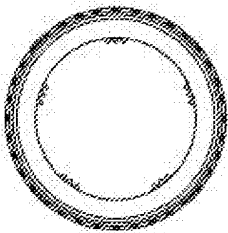


FIG 9a

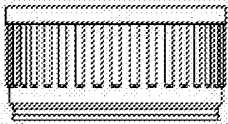


FIG 9b

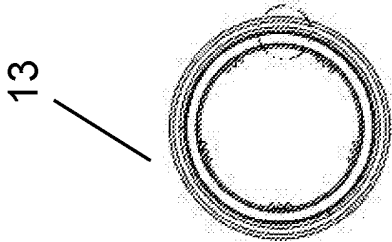


FIG 9c

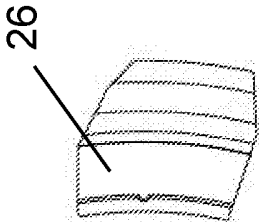


FIG 9d

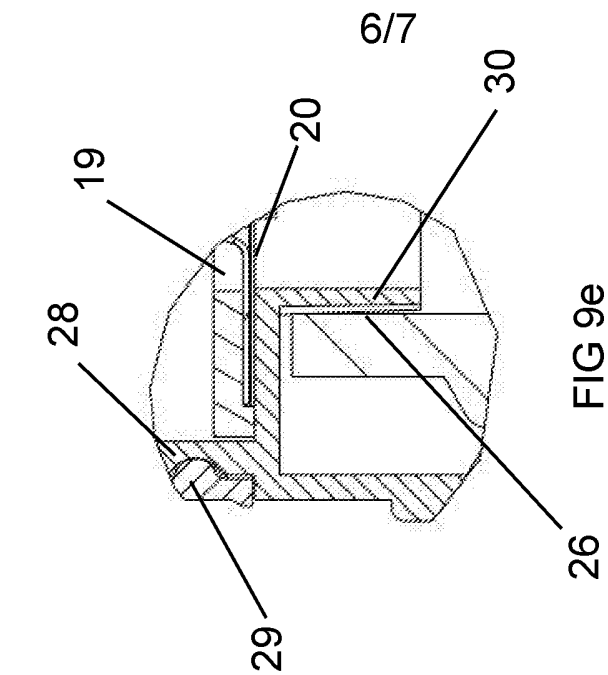


FIG 9e



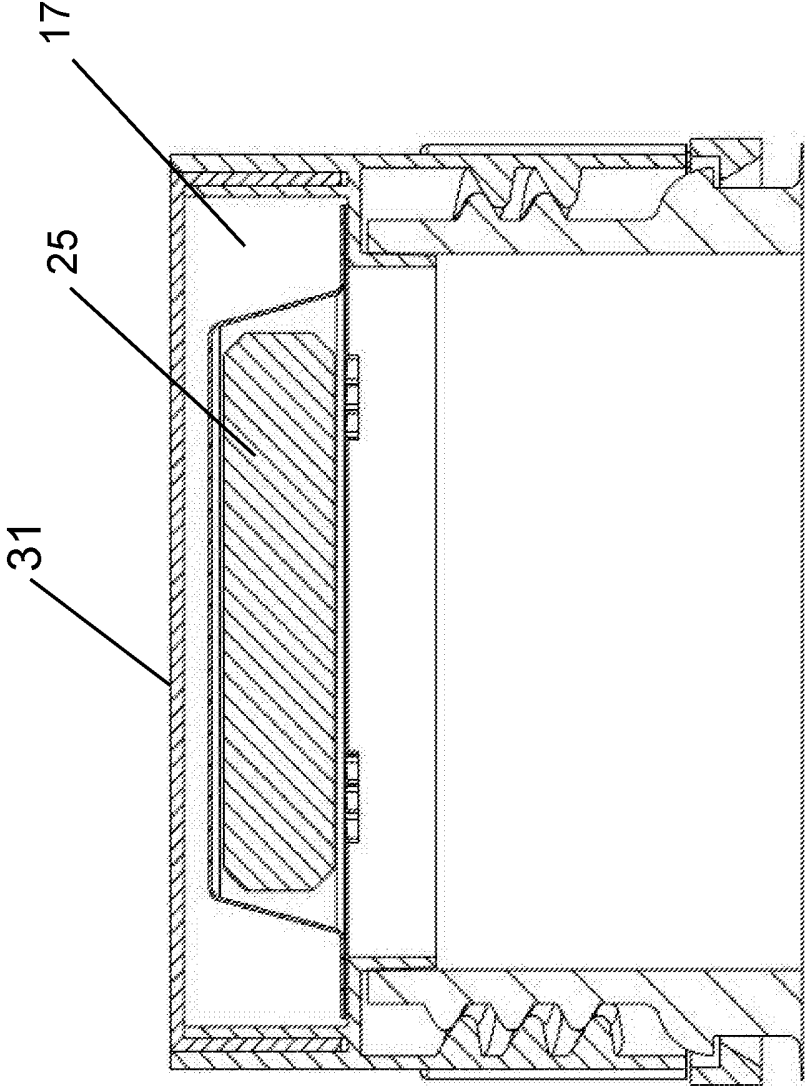


FIG 10