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(54) **VENTING BOTTLE CLOSURE**

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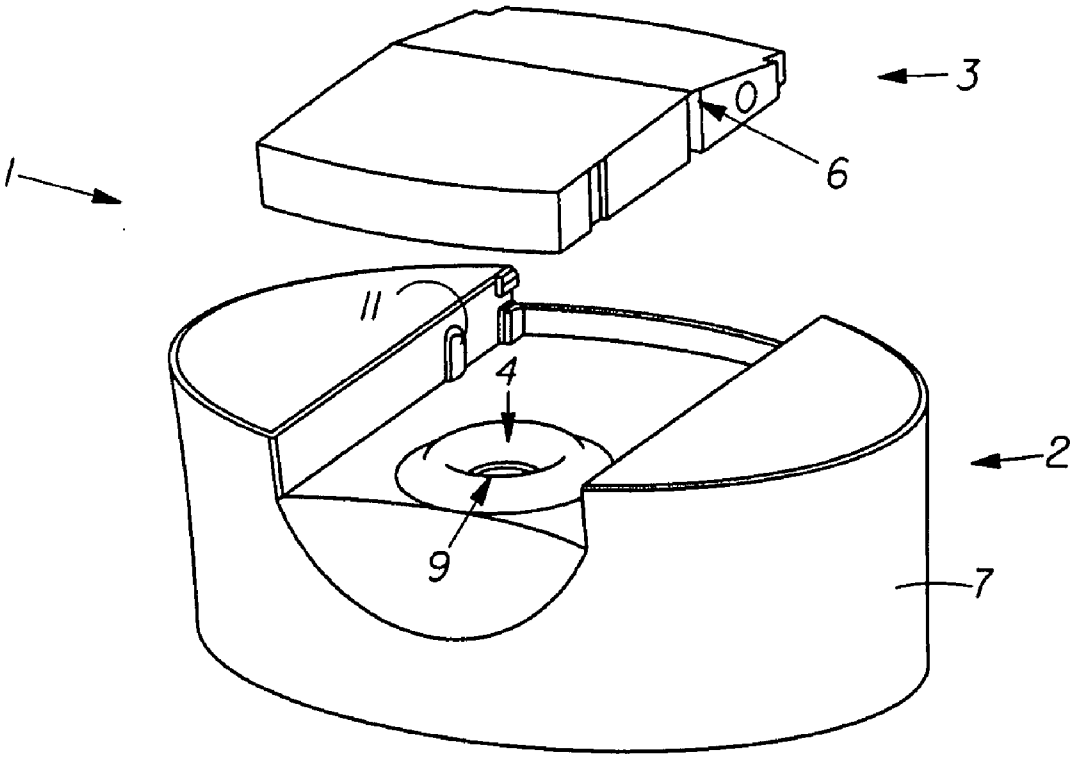
(57) **ABSTRACT**

A closure assembly which comprises an orifice which comprises a venting material, and wherein said venting material is substantially permeable to gases and wherein said venting material is substantially impermeable to liquids.



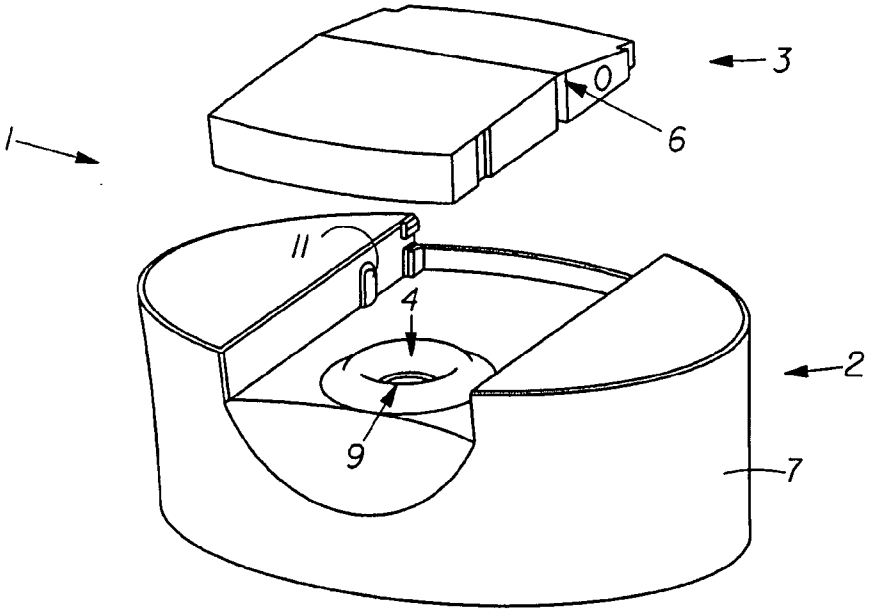


Fig. 1

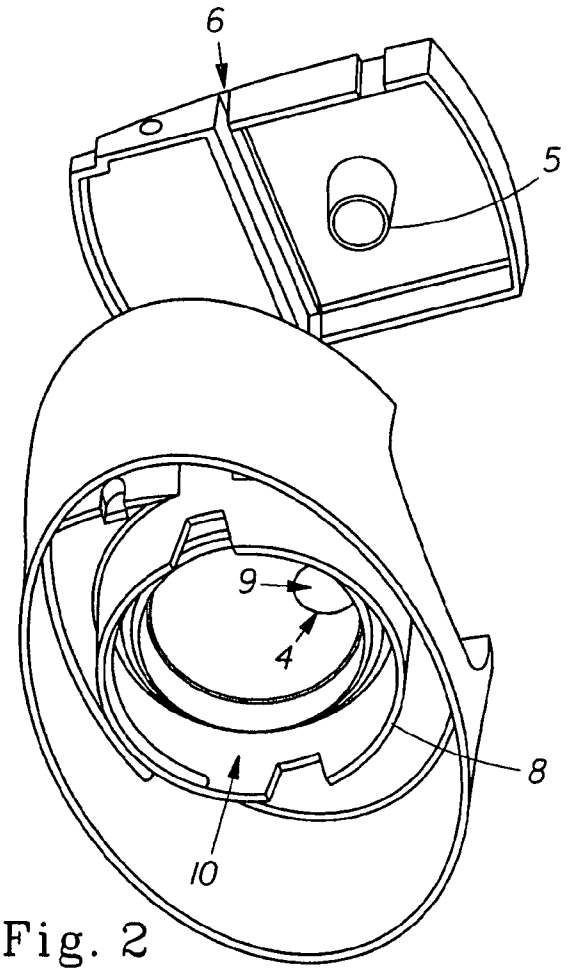


Fig. 2

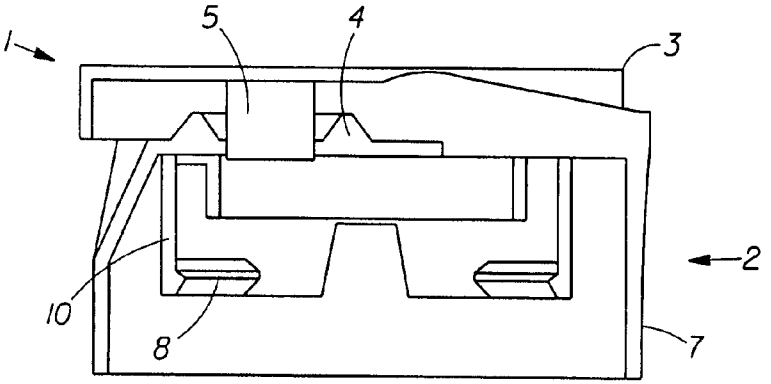


Fig. 3

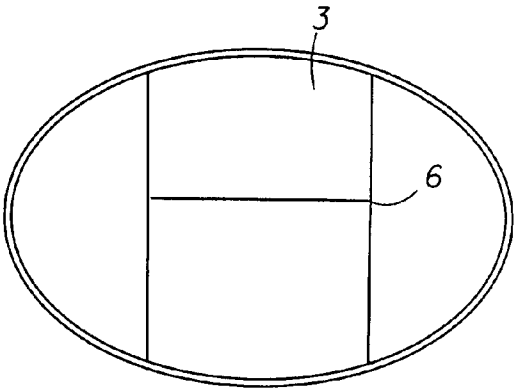


Fig. 4

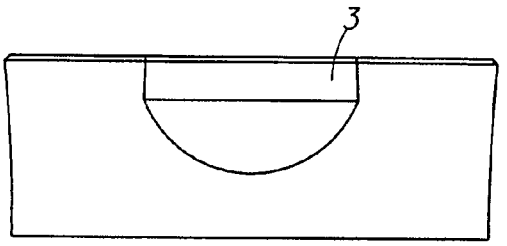


Fig. 5

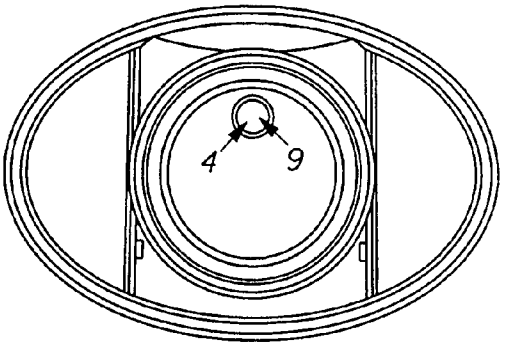


Fig. 6

VENTING BOTTLE CLOSURE

CROSS REFERENCE TO RELATED APPLICATION

[0001] This application claims the benefit of U.S. Provisional Application No. 60/834,873 filed Aug. 2, 2006.

FIELD OF THE INVENTION

[0002] The present invention relates generally to a venting closure. More specifically, the present invention relates to a venting closure assembly useful for venting gases and dispensing liquids.

BACKGROUND OF THE INVENTION

[0003] As liquid compositions are packaged into consumer ready packages, air is often times trapped at the top of the container before it can be sealed. The air trapped at the top of the container (headspace) often results in an air bubble, which disrupts the composition within the bottle if the bottle is rotated. In instances where a specific design is created within the liquid composition in the container, the air bubble can cause damage to the design during shipping. Additionally, many liquids are sensitive to gases, such as oxygen. When containers are filled with such liquids, the presence of atmospheric gases reduces shelf-life, and thereby increases costs to the manufacturer. Headspace can generally be reduced by "topping off" the container with a sufficient amount of the composition as to prevent air from remaining at the top of the container. However, this technique is difficult to automate, and therefore must typically be performed by hand. Additionally, "topping off" often results in overflow of the liquid composition, which creates a hazardous condition on a production line.

[0004] A known method for eliminating headspace is to vent liquid-filled containers. One technique involves a pressure system comprising pieces of rubber, metal springs, and/or soft films (preferably vinyl chloride) being used to lift and open vent orifices in a closure when internal pressure reaches a given threshold value. Another technique is to provide elaborate passages in a closure whereby gases may leave the system but liquid losses are minimized. A third system, which may be called the pinorifice system, employs one or more tiny orifices in rubber, metal or plastic diaphragms which render the material permeable to gases. Yet another system, commonly called a positive displacement pump, or piston system, employs a mechanism which pushes a composition to the top of a container via a rising piston or pump. However, none of the aforementioned methods effectively eliminates headspace from a container.

[0005] Therefore, a need still exists for a closure which allows for venting of gases during packaging, while eliminating escape of liquid contents and also eliminates headspace in a container. A need also exists to allow easy dispensing, from the same venting closure, of the contents of the package by a consumer. Additionally, a need exists for a closure which allows venting of gases in mass.

SUMMARY OF THE INVENTION

[0006] The present invention meets the aforementioned needs by providing a closure assembly which comprises an orifice which comprises a venting material, and wherein said venting material is substantially permeable to gases and wherein said venting material is substantially impermeable to liquids.

[0007] The present invention is also directed to a method of venting gases comprising the steps of filling a container with a composition, expelling gases through a venting material, and sealing the closure after headspace is eliminated.

[0008] While the invention will be described in connection with certain embodiments, it will be understood that the invention is not limited to these embodiments. On the contrary, the invention includes all alternatives, modifications, and equivalents as may be included within the spirit and scope of the present invention.

BRIEF DESCRIPTION OF THE DRAWINGS

[0009] The accompanying drawings illustrate embodiments of the invention and, together with a general description of the invention given above, and the detailed description given below, serve to explain the invention.

[0010] FIG. **1** is an exploded view of the closure assembly angled from above;

[0011] FIG. **2** is an exploded view of the closure assembly angled from below;

[0012] FIG. **3** is a lateral cross sectional view of the closure assembly;

[0013] FIG. **4** is a view of the top of the closure assembly;

[0014] FIG. **5** is a front view of the closure assembly;

[0015] FIG. **6** is a lateral cross sectional view of the top of the closure assembly.

DETAILED DESCRIPTION

[0016] While the specification concludes with claims that particularly point out and distinctly claim the invention, it is believed the present invention will be better understood from the following description.

[0017] As used herein, the term "substantially gas-permeable," means that the material described generally allows gases to pass through it.

[0018] As used herein, the term "substantially liquid-impermeable," means that the material described generally resists the movement of liquids through the material. Therefore, the material behaves as a barrier to liquids.

[0019] As used herein, the term "substantially air-tight," means that the seal generally resists the entry and escape of air/gases around the seal.

[0020] Referring to the figures, and specifically FIGS. **1** and **2**, a closure assembly **1** comprises a base **2**, and lid **3**. The lid **3** is capable of sealing an orifice **4** in the base **2**. It is also contemplated that the base **2** may be designed by employing more than one orifice. The lid **3** may also comprise a sealing means **5** to reinforce the integrity of the seal around the orifice **4**. The sealing means **5** may be a plug comprising a material selected from the group consisting of plastic, rubber, cork, or other material known in the art

capable of creating a seal when applied to an orifice. Preferably, the seal is substantially air-tight when the lid **3** is in the closed position.

[**0021**] The base **2** may be knurled or serrated on its outside surface **7** for ease of handling, and it is illustrated as having a securing means such as threads **8**, for securing to a matching means, such as threads, on a container. Preferably, the lid **3** is removable from the orifice **4**, while remaining attached to the base **2** at a bending means **6**. The bending means **6** may attach to the base **2** with an attaching means comprising an adhesive, a hinge, a hooking mechanism, a matching means wherein an extension of the lid is inserted into the base at a coplanar location **11** on the base, or by another attaching means known in the art. The lid may also be molded directly to the base.

[**0022**] The average diameter of the orifice **4** is preferably about 20% to about 60% of the average diameter of the inside wall **10** of the base **2**. The venting material **9** comprises a material which is substantially gas-permeable and substantially liquid-impermeable. Non-limiting examples of venting materials **9** are woven or non-woven fabrics, thin flexible plastics such as polyethylene, polypropylene, mylar, and polytetrafluoroethylene. Polytetrafluoroethylene is most preferred. The venting material **9** has a preferred thickness of from about 10% to about 25% of the diameter of the orifice **4**.

[**0023**] The orifice **4** also comprises a means for securing the venting material in place. The venting material **9** may be secured to the surface surrounding the orifice **4**, either above or below the orifice **4**, by applying an adhesive material to the edges of the venting material **9** and affixing the venting material **9** to the base **2**, either above or below the orifice **4**. Where the venting material **9** is secured either above or below the orifice **4**, the venting material **9** is slightly larger in average diameter than the orifice **4**. Alternately, the venting material **9** may be secured inside the orifice **4** by lodging the venting material **9** in between threads, or by using an adhesive where the venting material **9** comes into contact with the inside wall **10** of the orifice **4**. Where the venting material **9** is secured inside the orifice **4**, the venting material **9** is preferably slightly less than the diameter of orifice **4**. However, threads may also be cut into the inner walls of orifice **4**, so that the venting material **9** is not smaller in average diameter than the average diameter of the orifice **4**. Also, in another embodiment, the venting material **9** may be molded into the orifice **4** during fabrication of the closure assembly **1**.

[**0024**] In operation, after a container is filled with a composition, the closure assembly **1** is secured to a container. Pressure within the container is increased by various means, and gases are released through the venting material **9**, and expelled through the orifice **4**, which eliminates headspace. After gases are expelled, the orifice **4** is sealed by the lid **3**. In a preferred embodiment, the lid comprises a sealing means **5** which is operable to puncture the venting material when the lid **3** is closed to seal the orifice **4**. Pressure may be increased internal to the orifice **4** by build up of gases produced during reaction of various ingredients of the liquid composition, by applying a force to the exterior of the container to physically force gases/air through the orifice **4**, or by other methods known in the art to create a pressure differential inside and outside of the container. In one embodiment, atmospheric pressure may be reduced external to the container to vent gases via a vacuum.

[**0025**] The dimensions and values disclosed herein are not to be understood as being strictly limited to the exact numerical values recited. Instead, unless otherwise specified, each such dimension is intended to mean both the recited value and a functionally equivalent range surrounding that value. For example, a dimension disclosed as "40 mm" is intended to mean "about 40 mm."

[**0026**] All documents cited herein are, in relevant part, incorporated herein by reference; the citation of any document is not to be construed as an admission that it is prior art with respect to the present invention. To the extent that any meaning or definition of a term in this written document conflicts with any meaning or definition of the term in a document incorporated by reference, the meaning or definition assigned to the term in this written document shall govern.

[**0027**] While particular embodiments of the present invention have been illustrated and described, it would be obvious to those skilled in the art that various other changes and modifications can be made without departing from the spirit and scope of the invention. It is, therefore, intended to cover in the appended claims all such changes and modifications that are within the scope of this invention.

What is claimed is:

1. A closure assembly comprising a base, wherein said base comprises at least one orifice which comprises a venting material, and wherein said venting material is substantially gas-permeable and wherein said venting material is substantially liquid-impermeable.

2. A closure assembly according to claim 1, further comprising a lid.

3. A lid according to claim 2, wherein said lid comprises a sealing means which is operable to seal said orifice.

4. A lid according to claim 3, wherein said sealing means extends through said venting material when said lid is in the closed position.

5. A closure assembly according to claim 1, wherein said venting material is selected from the group consisting of a woven or non-woven fabric, polyethylene, polypropylene, mylar, and polytetrafluoroethylene.

6. A method of venting gases comprising the steps of filling a container with a composition, expelling gases through a venting material, and sealing the closure after headspace is eliminated.

7. A method of venting gases with the closure assembly of claim 1 comprising the steps of:

a) affixing said closure assembly to a container,

b) increasing internal pressure inside of the container to expel gases through said orifice, and

c) sealing said orifice after gas is expelled.

8. A method of venting gases with the closure assembly of claim 1 comprising the steps of:

a) affixing the closure assembly to a container,

b) decreasing atmospheric pressure outside of the container to expel gases through said orifice, and

c) sealing said orifice after gas is expelled.

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