United States Patent

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[54] **VENTED CLOSURE**
11 Claims, 3 Drawing Figs.

[52] **U.S. Cl.** **215/56,** 215/40
[51] **Int. Cl.** **B65d 23/00,** B65d 51/16
[50] **Field of Search** 215/40, 56; 220/44

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ABSTRACT: A closure is provided for use with a container of the type having a neck extending outwardly from a body member defining an opening into the container interior. The closure includes a circular cover member adapted to be positioned over the opening and means for securing the cover to the body member. At least one vent hole is provided extending through the cover. A liner adapted to be positioned between the neck and cover member is also provided. The liner comprises a generally flat disc formed of a resilient material having a bottom surface adapted to seat on top of the container neck and seal the neck opening. The top surface of the liner includes rib means coupled to the disc extending upwardly from the disc top surface. The rib means includes a plurality of radially extending ribs spaced outwardly from a segmented circular rib.

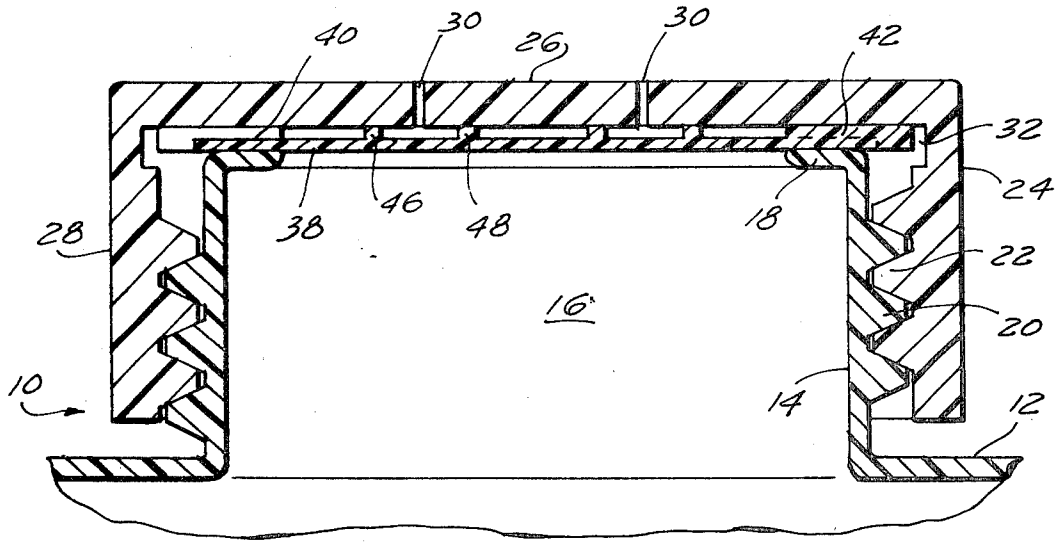
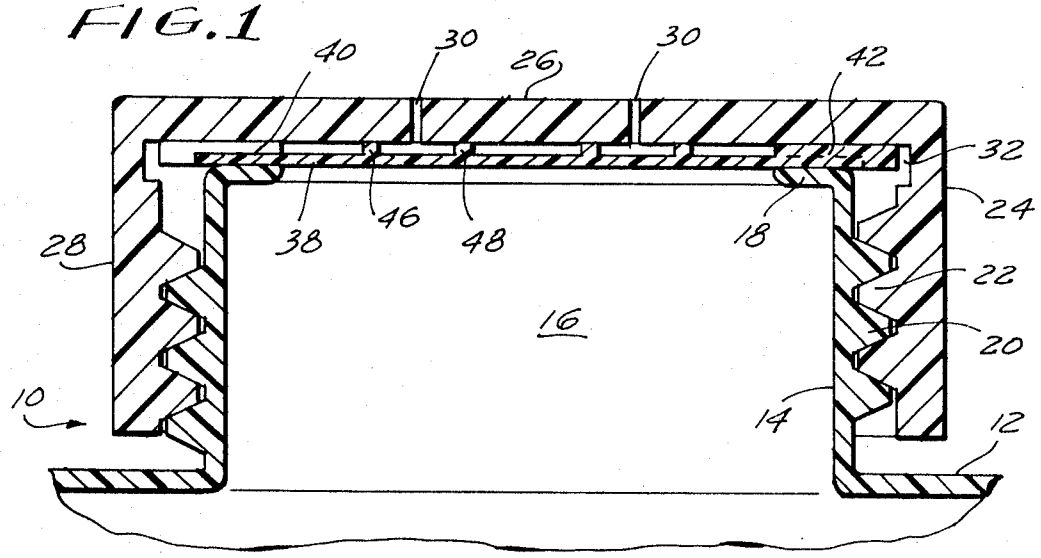


FIG. 1



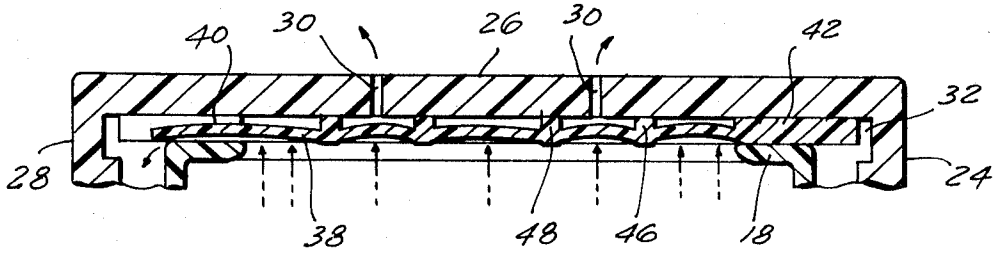
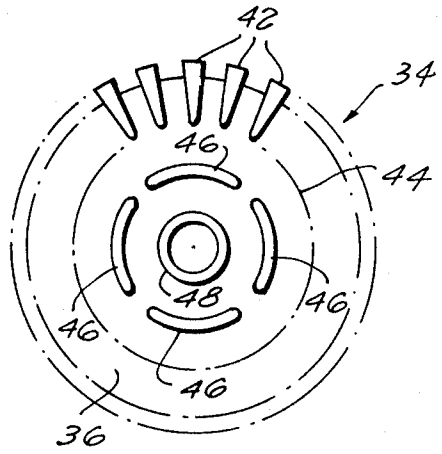


FIG. 2

FIG. 3



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VENTED CLOSURE

BACKGROUND OF THE INVENTION

In the packaging of certain types of materials, a serious difficulty arises as a result of the tendency of such materials to liberate gases under particular conditions of shipment or storage because of chemical or physical changes in the materials. As such gases are liberated, the pressure within the container increases and, if the liberation of gases is sufficient, the pressure may increase toward or past the limit the container or container closure can endure whereupon the container may rupture or the closure seal may be destroyed with the result that the contents of the container may be spoiled and persons in the vicinity of the container are liable to injury.

With the above problem in mind it is the principal object of the present invention to provide an improved container closure which serves to effectively seal the contents of the container under normal pressure conditions within the container but which, in the event the pressure within the container rises above a predetermined level, is provided with means for relieving such gas pressure by allowing a quantity of gas to escape.

SUMMARY OF THE INVENTION

These and other beneficial objects and advantages are attained in accordance with the present invention by providing a liner for use with a container of the type comprising a body member having an outwardly extending cylindrical neck defining an opening into the interior of the container and the closure therefore. The closure includes a circular cover member having at least one vent hole extending therethrough and means for securing the cover to the container. The liner which is adapted to be positioned between the cover and the body member neck comprises a generally flat disc formed of a resilient material having a bottom surface adapted to seat on top of the neck and effectively seal the neck opening and a top surface provided with rib means extending upwardly therefrom. The rib means include a plurality of radial ribs extending outwardly beyond the periphery of the disc and a fragmented circular rib spaced inwardly of the radial ribs.

In use the bottom surface of the liner is maintained in sealing relation across the neck opening by the container closure under normal conditions. However, if the pressure within the container builds up sufficiently, the force exerted on the liner will cause the liner to flex about the ribs, thereby providing passageways between the neck, liner and closure for the gas to work its way through to the vent hole thereby relieving the pressure within the container.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a fragmentary side elevational sectional view depicting a container provided with a liner and closure in accordance with the present invention, illustrating the state of the liner under normal pressure conditions;

FIG. 2 is a fragmentary side elevational sectional view similar to FIG. 1 illustrating the state of the liner when pressure builds up within a container; and

FIG. 3 is a top plan view of the liner of the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

The present invention is illustrated in the accompanying drawing wherein similar components bear the same reference numerals throughout the several views. Reference is now made to the drawings and to FIG. 1 in particular wherein a portion of a container body member 10 is illustrated including a top 12 and a neck 14 extending upwardly from the top. Neck 14 serves to define an opening 16 into the interior of the container. An inwardly directed lip 18 extends about neck 14 at the open mouth end. The outer surface of neck 14 carries threads 20 which are designed to receive the complementary threads 22 of closure 24. The actual size and shape of the container may vary and are immaterial for purposes of the present invention.

Closure 24 comprises a generally tubular member having one end closed by cover member 26 which is designed to be positioned over the open mouth of neck 14. Apron 28 depends from the periphery of cover member 26. The inner surface of apron 28 carries thread 22. A pair of vent holes 30 extend completely through cover member 26. The vent holes are disposed along a diameter of the cover on opposite sides of the cover center. An outwardly directed groove 32 extends about the inner surface of the closure apron at the interface of the cover and apron.

In accordance with the present invention a liner 34 is also provided adapted to seat on top of neck 14 between the neck and closure cover member. The liner, illustrated in FIG. 3, comprises a generally flat, circular disc 36 formed of plastic or other resilient material. In a successful practice of the invention liner 30 was molded of polyethelyne with both the disc and ribs being integrally formed.

The bottom face 38 of liner 34 is substantially flat. The top face 40 is provided with a plurality of integral raised ribs 42 extending radially outwardly, sprocketlike, beyond the periphery of disc 36. Each rib 42 comprises an elongated generally triangular member which extends outwardly from a circle 44 concentric with the center of the disc. The triangular ribs 42 are substantially identical to one another and the bottom surface of the portion of each rib 42 that extends beyond the periphery of disc 36 is flush with the bottom of disc 36.

A raised, segmented circular rib 46 is also provided extending upwardly from the top surface of disc 36. Segmented circular rib 46 is concentric about the center of disc 36 and is divided into four substantially equal, spaced-apart accurate segments. A raised closed circular rib 48 is also provided extending upwardly from the top surface of disc 36. Closed circular rib 48 is also concentric about the center of disc 36 and is spaced inwardly from segmented rib 46. The diameter of closed circular rib 48 is less than the spacing between vent holes 30 of cover member 26 and the diameter of segmented circular rib 46 is greater than the spacing between vent holes 30 so that the projection of the vent holes on the liner will fall between the segmented circular rib 46 and closed circular rib 48.

The diameter of disc 36 is slightly greater than the diameter of neck 14 so that the disc will seat on the container neck. The triangular grooves 42 are sufficiently long to extend slightly into groove 32 on the interior of the apron thereby providing convenient means for securing the liner to the cover. In this connection, the resiliency of the plastic liner is such as to enable the liner to be snapped into position in the closure groove. The height of each of the ribs (42, 46 and 48) is substantially equal so that the ribs will each engage the underside of cover 26 when the closure is positioned on neck 14.

In use, the container interior will be sealed when the contents of the container are under little or no pressure by virtue of the bottom surface of liner 36 completely covering the open mouth of neck 14. Closure 24 serves to maintain the liner in position about the container neck. This situation is illustrated in FIG. 1. If sufficient pressure develops within the container, the resilient liner will flex in the manner illustrated in FIG. 2, that is, about the ribs. As shown, when the liner is so flexed, passageways are formed between adjacent triangular ribs 42 through which the contained gas may work its way to the top 40 of liner 36. The gas may then pass through the space between adjacent segments of the segmented circular rib 46 and thence out of the container through vent holes 30. In this connection, the solid circular rib 48 prevents the internal gas pressure from forcing the disc flush against the underside of the closure thereby closing the vent holes. The force required to cause the venting illustrated in FIG. 2 to occur will be dependent on the thickness of liner 36, as well as the number and

spacing of the triangular ribs 42. Thus, some degree of control over the pressure required for venting to occur may be maintained by altering the liner construction by modifying the rib arrangement.

Having thus described the invention what we claim is:

1. An improved container comprising: a body member; a neck extending from said body member defining an opening into the interior thereof; a closure for said body member including a circular cover member adapted to be positioned over said neck opening, at least one vent hole extending through said cover member, and means for securing said cover member to said body member; a liner adapted to be positioned between said neck and said cover member, said liner comprising a generally flat disc formed of resilient material having a bottom surface adapted to seat on the top of said neck and effectively close said neck opening and a top surface; and rib means coupled to said disc extending upwardly from said top surface, said rib means including a plurality of ribs extending radially and a segmented circular rib spaced inwardly from said radial ribs.

2. The invention in accordance with claim 1 wherein said radial rib means comprises a plurality of identical spaced apart elongated members extending beyond the periphery of said disc from a circle spaced outwardly from said circular rib and concentric with said disc center.

3. The invention in accordance with claim 2 further comprising a closed circular rib disposed on said liner top surface wherein said segmented circular rib is spaced radially outwardly of the projection of said cover vent hole on said liner and said closed circular rib is spaced radially inwardly of said vent hole projection whereby said vent hole projection is disposed between said closed circular rib and said segmented circular rib.

4. The invention in accordance with claim 3 comprising two vent holes extending through said cover member, said vent holes being spaced substantially equidistant from the center of said cover on opposite sides of a diameter thereof wherein said segmented circular rib and said solid circular rib of said liner are aligned concentric with the center of said cover whereby said vent hole projections are disposed between said circular ribs.

5. A closure for a container of the type having a body member and a neck extending from said body member defining an opening into the interior thereof, said closure comprising a circular cover member adapted to be positioned over said opening, at least one vent hole extending through said cover member, means for securing said cover to said body member and a liner adapted to be positioned between said neck and said cover member, said liner comprising a generally flat disc formed of resilient material having a bottom surface adapted to seat on the top of said neck and effectively close said neck opening, a top surface, and rib means coupled to said disc extending upwardly from said top surface, said rib means including a plurality of ribs extending radially and a segmented circular rib spaced inwardly from said radial ribs.

6. The invention in accordance with claim 5 wherein said radial rib means comprises a plurality of identical spaced-apart elongated members extending beyond the periphery of said disc from a circle spaced outwardly from said circular rib and concentric with said disc center.

7. The invention in accordance with claim 6 further comprising a closed circular rib disposed on said liner top surface wherein said segmented circular rib is spaced radially outwardly of the projection of said cover vent hole on said liner and said closed circular rib is spaced radially inwardly of said vent hole projection whereby said vent hole projection is disposed between said closed circular rib and said segmented circular rib.

8. The invention in accordance with claim 7 comprising two vent holes extending through said cover member, said vent holes being spaced substantially equidistant from the center of said cover on opposite sides of a diameter thereof wherein said segmented circular rib and said solid circular rib of said liner are aligned concentric with the center of said cover whereby said vent hole projections are disposed between said circular ribs.

9. A liner for use with a container of the type having a body member having an outwardly extending cylindrical neck defining an opening into the interior thereof and a closure including a circular cover adapted to be positioned over said opening, at least one vent hole extending through said cover member, and means for coupling said cover member to said body member, said liner being adapted to be positioned between said neck and said cover member and comprising a generally flat disc formed of resilient material having a bottom surface adapted to seat on the top of said neck and effectively close said neck opening, a top surface, and rib means coupled to said disc extending upwardly from said top surface, said rib means including a plurality of ribs extending radially and a segmented circular rib spaced inwardly from said radial ribs.

10. The invention in accordance with claim 9 wherein said radial rib means comprises a plurality of identical spaced-apart elongated members extending beyond the periphery of said disc from a circle spaced outwardly from said circular rib and concentric and said disc center.

11. The invention in accordance with claim 10 further comprising a closed circular rib disposed on said liner top surface wherein said segmented circular rib is spaced radially outwardly of the projection of said cover vent hole on said liner and said closed circular rib is spaced radially inwardly of said vent hole projection whereby said vent hole projection is disposed between said closed circular rib and said segmented circular rib.