

[54] **VENTED CLOSURE**

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[22] Filed: **Feb. 12, 1971**

[21] Appl. No.: **114,830**

[52] U.S. Cl. **215/40, 215/42, 215/46 A, 215/56, 220/44 A, 220/54**

[51] Int. Cl. **B65d 41/20, B65d 51/16**

[58] Field of Search **215/42, 46 A, 56, 40; 220/44 C, 54, 44 A**

[56] **References Cited**

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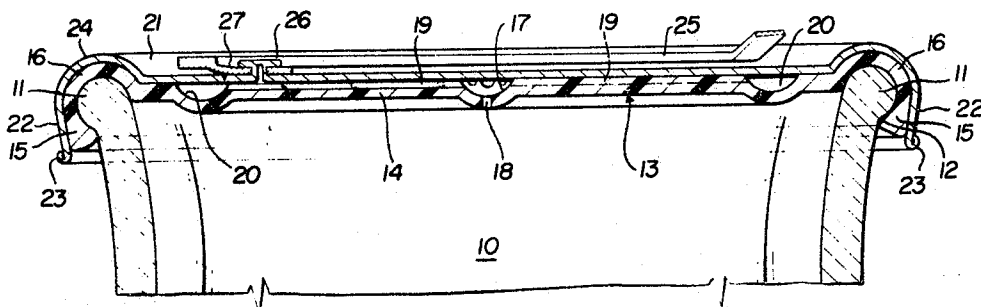
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[57] **ABSTRACT**

This invention relates to a venting plastic liner cap and a two-piece closure for pressurizable containers packaging products such as beer, carbonated beverages and the like. The liner serves to seal the mouth of the container under an outer metal cap provided with a pull tab and tear strip for removal. Pressure is vented through a central aperture of the liner top and into radial channels that extend as the spokes of a wheel. Effective release of internal pressure, upon opening the closure, is provided regardless of where the tear strip of the outer cap is initiated. This construction obviates registration or index of the two parts in closure assembly on the container. Two channel embodiments comprise: (1) a series of depressed radial channels and an outer annular channel interconnected therewith, or (2) a series of radial ribs or projections on the cap that provide radial passageways from the center of the cap; either of these venting gas passing through the center aperture.

14 Claims, 6 Drawing Figures



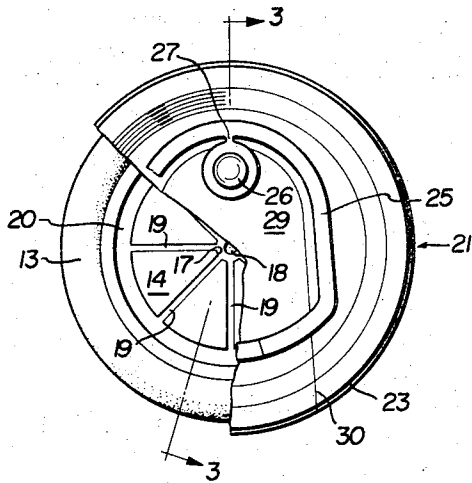


FIG. 1

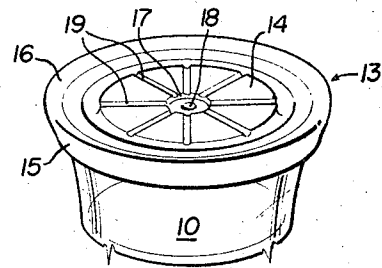


FIG. 2

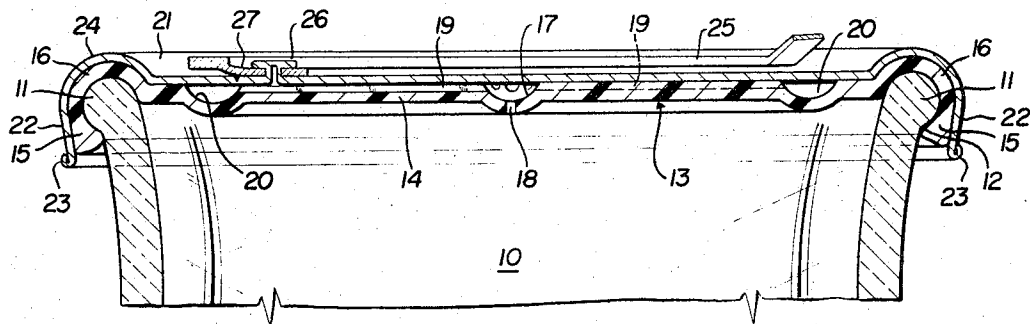


FIG. 3

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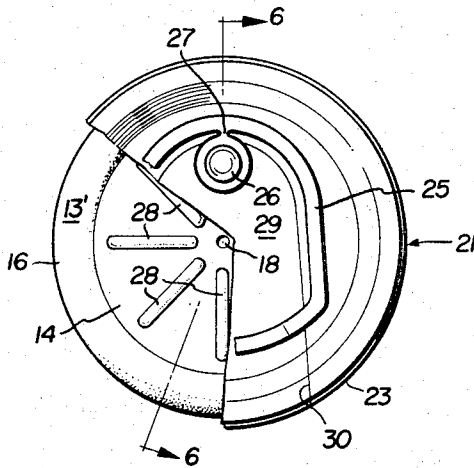


FIG. 4

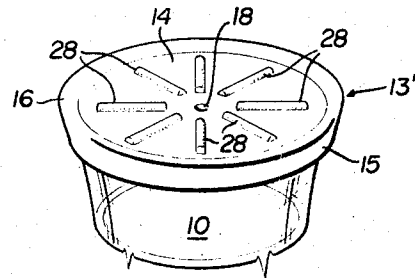


FIG. 5

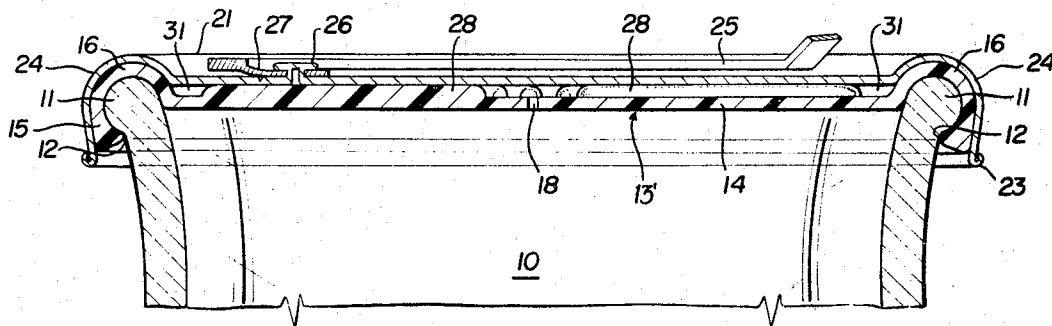


FIG. 6

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VENTED CLOSURE

BACKGROUND OF THE INVENTION

The invention relates to two-piece closures of the so-called convenience or "easy-open" variety.

In this closure, a full fitment plastic liner serves as a gasket or seal and is covered by a metal closure that is fastened onto the finish of the container, such as a glass bottle. The metal outer closure is a prescored, convenience type having a tearable top manipulated for opening by an attached pull ring or pull tab of a known variety.

Containers packaging some products, beer and carbonated beverages being examples, are to be sealed and thereafter retain certain amounts of gas pressure generated as a beneficial or inherent feature of the product. Upon opening the container for access to the product, the pressure within the container will be reduced to atmospheric or nearly so. It is extremely important to be able to control the initial release of gas pressure in the function of opening this type of closure. It is to this aspect of packaging and closure constructions that this invention is aimed.

In the use of a full liner plastic fitment, proper venting is very important to the function of the closure. For example, upon opening a tightly sealed container filled with a carbonated beverage, the accumulated gas pressure (maybe as high as seven volumes) in the head space between liner and product is exhausted. If the accumulated pressure is released all at once, such force may be expended as to spray product from the mouth of the container, and may propel the closure metal cap and liner as a projectile endangering the user. This projectile reaction may be likened to the flying cork of a champagne bottle when opened.

SUMMARY OF THE INVENTION

The venting features of the invention prevent such inconvenience and hazards from occurring in the opening of this type packaged product.

As an object of the invention, the liner cap provides vent features for an efficiently controlled, gradual release of gas pressure and eliminates hazards and inconveniences in use of closures of this type.

Another object of this invention is to provide a liner cap with such venting function that is simple, efficient, and easy and economical to manufacture and assemble.

DESCRIPTION OF THE DRAWINGS

On the drawings:

FIG. 1 is a top plan view, partly broken away and sectioned, of the two-piece closure of the invention applied onto a glass bottle;

FIG. 2 is a perspective view of one embodiment of plastic liner cap on a bottle finish;

FIG. 3 is a sectional elevational view, taken along line 3—3 on FIG. 1;

FIG. 4 is a top plan view, partly broken away and sectioned, of a two-piece closure like FIG. 1, but illustrating a second embodiment of the liner cap for the invention;

FIG. 5 is a perspective view like FIG. 2, but showing the liner cap of this second embodiment; and

FIG. 6 is a sectional elevational view taken along line 6—6 on FIG. 4.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring to the drawings, FIGS. 1-6, a two-piece closure cap assembly according to the preferred embodiments of the invention is illustrated as employed in sealing the mouth opening of a glass container 10. The mouth is defined by a top rim or bead 11 providing an enlarged side wall flange portion 12 that is sloped downwardly and inwardly along the outside of the container finish. The closure assembly comprises an inner liner cap 13 made of an elastomeric material, such as polyethylene, plastic composition or rubber composition. Cap 13 includes a disc-like top panel portion 14 covering the mouth area inwardly of rim 11. Liner cap 13 is retained on the rim finish by a radial skirt portion 15 that has a smallest diameter on its inside surface slightly less in dimension than the exterior diameter of the finish under bead 11 of the container. The skirt portion 15 of liner cap 13 is integrally joined with the periphery of top portion 14 at the corner radius portion 16, and in the embodiments shown on the drawings, the combination of skirt 15 and corner radius 16 forms a groove or seat receiving the rim 11 of the container adapted for sealing the mouth of the container along the top and underside surfaces of the finish 11.

Referring now to FIGS. 1-3, the first embodiment of the closure is shown. The disc-like portion 14 of liner cap 13 includes a central area 17 which is dished concavely and centrally therein is a port or aperture 18 providing a vent means through the wall of portion 14 of liner cap 13. Outwardly adjacent the perimeter of central area 17 is provided a channel means for conducting gas pressure radially from aperture 18. The channel means in this embodiment comprises radial grooves 19 molded in the disc-like portion 14 of the liner cap. The grooves 19 radiate from the central area 17 in a series as the spokes of a wheel. The number and size of grooves 19 may be a variable factor in the closure design, but they should be of sufficient number and size to provide a satisfactory release of gas pressure in the container when opened to conduct any pressure gas passing through aperture 18 regardless of tear strip location or direction on the outer cap which will be presently described.

As a practical example of this in the invention embodiment of FIGS. 1-3, it has been found through trials that the grooves 19 need not exceed sixty thousandths of an inch in depth and width to function suitably. The central aperture 18 is relatively small in size (diameter) and serves to direct and convey the gas pressure into the channel means (grooves 19) in the outer surface of disc-like portion 14, which, in turn, provides immediate and effective release of any gas pressure in the container regardless of where in the outer metal cap the breakthrough of the tear strip opening device is initiated. In other words, satisfactory release of gas pressure may occur at any place around the periphery of the top area of the metal cap.

An additional feature of the liner cap includes the continuous annular channel or grooves 20. This groove 20 connects with each of the radial grooves 19 and serves to equalize gas pressure effectively and rapidly within the channel means network. If for any reason a groove 19 may become obstructed, the annular channel 20 equalizes pressure in all of the grooves.

The channel grooves may be molded in the liner cap during its formation or otherwise provided by casting, cutting, stamping, etc.

As shown on the drawings, FIGS. 1, 3, 4 and 6, the outer cap member 21 is preferably made of metal, such as aluminum or tin plate of appropriate gauge or thickness, adapted to be crimped or secured around bead 11 of the container and sealingly attach the liner cap and outer cap members about the container mouth. Outer cap 21 has a peripheral skirt 22 ending in a rolled lower edge or wire 23. The wire 23 may be bumped or formed in an initial assembly of liner cap 13 into outer cap 21 so as to retain the two for feeding closures onto the containers in capping them. The skirt 22 integrally joins with corner radius portion 24 and it in turn is integrally joined with periphery of the top panel of outer closure cap 21. A tear strip 29 is formed in top panel 21, across corner radius 24 and skirt 22 by a continuous score line 30 (FIG. 1). The score line is formed by working the metal to reduce the thickness along a line. The score will increase the tendency of the metal to shear along the line so that the strip 29 may be peeled back by a pull tab or ring 25. The pull ring 25 is fastened to tear strip 29 by a rivet means 26 near the forward end of the tear strip, and a yoke portion 27 of the pull ring receives the rivet.

Liner cap 13 fits beneath the outer cap 21 and the skirt 22 is compressed in capping to seal the skirt 15 against the finish bead 11, as shown on FIGS. 3 and 6. After sealing the container 10, pressure builds internally which bleeds through aperture 18 and fills the network of grooves 19, 20 to pressurize the space in the channels at substantially the same pressure as the container. Outer cap 21 need not be oriented to liner cap 13 to register the vent opening and tear strip 29 opening area. In the present invention, the network of grooves 19 will connect under the tear strip 29 opening point and rupture of the tear strip at the rivet or "pop" area releases the pressure in the grooves and conducts further gas pressure from the container to atmosphere. With pressure being equalized in initial opening, tear strip 29 may be torn from outer cap 21 to release it from the container; whereupon liner cap 13 is removed and container product is ready for use.

Another embodiment of the invention is shown on FIGS. 4-6. The same outer cap 21 may be employed. The liner cap 13' has on its outer surface of the disc-like portion 14 a series of spoke oriented raised ribs 28. Between the adjacent pairs of ribs 28 there is formed a channel conveying pressure gas from aperture 18 into these spaces and underlying the point for opening the tear strip 29. The ribs preferably do not extend to the corner radius 16 and thereby create an annular passageway 31 interconnecting all of the spaces between ribs for pressure gas flow. In this respect, the function provided by the groove 20 (FIGS. 1-3) is similarly accomplished. The inner ends of the radial ribs 28 are spaced radially slightly from aperture 18 and the inner ends of the spacing between ribs are each interconnected.

It is suitable, although not shown on the drawings, to achieve the venting aspect of the invention by providing in place of the radial ribs 28 a series of knobs or projections extending upwardly from the portion 14 of the liner cap. These, as do the ribs 28, hold the outer

metal cap 21 spaced from the portion 14 of the liner cap 13' and provide passages through the top mouth area of the container closure for venting release of gas pressure conducted through the central aperture 18 as the metal outer convenience cap is being opened and removed.

The channel means structures herein described are easily formed in the plastic of liner cap 13 or 13'. The ribs or knobs, as the case may be, on the outer surface of the liner cap top panel 14 need not exceed sixty thousandths of an inch in height.

While a number of specific embodiments of the invention have been described in detail or shown on the drawings, it should be apparent that various other modifications could readily be made. Further, specific elements of the described embodiments could readily be combined in different configurations than those illustrated or described without departing from the spirit of the invention.

Accordingly, while preferred embodiments have been illustrated, it should be understood that it is not intended the invention be necessarily restricted solely thereto, but we intend to include all embodiments thereof which would be apparent to those skilled in the art, and which come within the spirit of the scope of our invention as claimed.

We claim:

1. A liner cap for a container closure adapted to telescope over the annular mouth defining rim of a container, said cap comprising a top portion, an annular skirt and a corner radius portion integrally, peripherally joining the top portion and the upper end of said annular skirt portion, a vent aperture through said top portion and disposed in the central area of said top portion, radial channel means on the outer surface of said top portion extending radially toward said corner radius portion and connecting with said aperture for conducting vented pressure media from said aperture radially outwardly of said top portion, said radial channel means comprising plural radial grooves depressed in the outer surface of said top portion, and an annular groove formed in the outer surface of said top portion and disposed in the outer peripheral area of said top portion, the plural grooves being connected into said annular groove and having each of their radially inwardly disposed ends connected to said vent aperture to receive vented media therefrom.

2. the liner cap defined in claim 1, wherein said aperture is located at the center of said top portion.

3. The liner cap defined in claim 1, wherein said plural radial grooves are disposed at equal angular intervals about said top portion.

4. The liner cap defined in claim 1, including a depressed well area in the outer surface of said top portion, said aperture extending through the top portion in said well area, and each of the radial grooves connecting into said well area.

5. The liner cap defined in claim 4, wherein said well area comprises a circular well and the aperture is centrally located therein.

6. The liner cap defined in claim 1, in which said cap is formed from a plastic material.

7. The liner cap defined in claim 6, wherein said plastic material comprises polyethylene.

8. A liner cap for a container closure adapted to telescope over the annular mouth defining rim of a container, said cap comprising a top portion, an annular skirt and a corner radius portion integrally peripherally joining the top portion and the upper end of said annular skirt portion, a vent aperture through said top portion and disposed in the central area of said top portion, and plural, spaced, radial ribs on the outer surface of said top portion, said ribs forming a spaced therebetween from said aperture outwardly and radially therefrom for passage of vented media from the aperture, said ribs at their outer radial ends being spaced inwardly in said top portion from said corner radius portion of the cap.

9. The liner cap defined in claim 8, wherein said plural ribs define plural channels along the outer surface of said top portion, the ribs being spaced at their inner radial ends from said aperture and each other, said channels being interconnected to each other near said aperture.

10. A closure for sealing the mouth opening of a container, said mouth being formed by a finish rim of the container, comprising a liner cap having a disc-like portion covering the mouth opening of the container, said liner being comprised of an elastomeric material, a vent means in the central area of said disc-like portion for conducting vented media relative to the interior of the container, plural radially extending grooves in the outer surface of said disc-like portion extending from the proximity of said vent means and extending radially toward the perimeter of said disc-like portion, an endless annular groove in said disc-like portion disposed near the outer ends of said radial grooves, said annular groove and said radial grooves being interconnected for transmission of vented media, a cap having a top portion overlying the disc-like portion of said liner cap and a radial annular integral skirt portion surrounding the finish rim and securing the closure on the container, and a rupturable convenience-opening tear strip formed in said top portion of the cap, said strip traversing at least one of said plural radial grooves in the underlying liner cap.

11. The closure defined in claim 10, wherein each

said groove is formed in said disc-like portion outer surface and is semi-circular in cross-sectional configuration.

12. The closure defined in claim 10, wherein said radial grooves are disposed at equal angular intervals about said disc-like portion.

13. The closure defined in claim 10, wherein the elastomeric liner cap is comprised of polyethylene and the outer said cap is comprised of aluminum.

14. A closure for sealing the mouth opening of a container, said mouth being formed by a finish rim of the container, including an inner snap cap of elastomeric material comprising a top portion for covering the mouth opening of the container, an annular skirt portion for encircling said rim, and a corner radius portion defining a rim receiving groove, the radius portion being raised from said top portion and integrally joining said top and skirt portions, a vent means in the central area of said top portion for conducting vented media therethrough relative to the interior of the container, plural, spaced, radial ribs on the outer surface of said top portion, said ribs forming a space therebetween from the vent means, radially outwardly for conducting vented media from said vent means, the outer radial ends of the ribs being spaced inwardly from the corner radius portion of the liner cap, an outer metal cap overlying said liner cap and comprising a top panel and an annular integral skirt portion surrounding the finish rim and securing the closure on the container, and a rupturable convenience-opening tear strip formed in said top portion of the outer cap including means for tear removal of said tear strip from said top portion, said plural ribs of the liner cap being engageable with the underside of the top panel of said outer cap providing radial channel passages connected to said vent means and an annular channel provided about the outer periphery of the top portion of the liner cap, all of said radial passages being connected with the annular channel and said vent means, said tear strip traversing at least one of said radial passages, whereupon the tear removal of said tear strip immediately vents the media between said liner and outer caps to atmosphere.

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