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LINERLESS VENTING CLOSURE

Filed March 14, 1962

Fig. 1

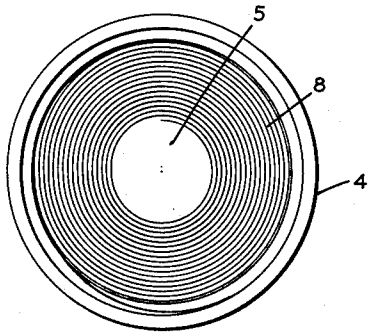
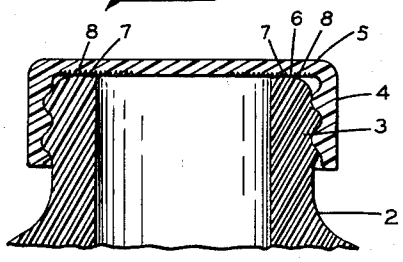


Fig. 2



INVENTORS
CHARLES M. MILLER, JR
GERALD L. ROY

BY George L. Horn

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LINERLESS VENTING CLOSURE

Charles M. Miller, Jr., East Lampeter Township, Lancaster County, and Gerald L. Roy, Lancaster Township, Lancaster County, Pa., assignors to Armstrong Cork Company, Lancaster, Pa., a corporation of Pennsylvania

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This invention relates to a package, and more particularly to a container-cap arrangement in which there is provided means for the passage of gases through the sealing zone while at the same time preventing the passage of liquids through the sealing zone.

It has been common practice in the packaging of gas generating materials such as bleaches, etc., to provide means for venting the gases generated within the container through escape passages in the liner positioned between the cap and the container. With the advent of the plastic container, it has become necessary to provide a closure which reliably vents gases at very low pressures. The conventional venting liners composed of a paper-based material are disintegrated when they come into contact with bleach-type products. In order to provide adequate venting means, it has been found possible to alter the design of the cap or the container in the sealing zone so that venting can be accomplished without the establishment of passages through which the liquid contents of the container can leak. By the term "sealing zone" is meant the area in which the bottom surface of the cap dome engages the sealing surface on the container.

In the invention here under consideration, this venting is accomplished by placing a spiral groove in the under surface of the dome of a cap so that this spiral groove passes through the sealing zone, providing passage for gases from the interior of the container through the spiral groove to the exterior or thread area of the cap or vice versa.

It is an object of this invention to provide a container and cap assembly in which means are provided to permit equalization of pressure between the interior and exterior of the sealed container.

In order that this invention may be more readily understood, it will be described in connection with the attached drawing in which

FIG. 1 is a plan view looking into the open portion of the cap showing the spiral groove arrangement to provide venting means; and

FIG. 2 is a cross-sectional view showing the cap of this invention in position on a container.

Referring to FIG. 2 there is shown a container 2 which is preferably made of a resilient thermoplastic material such as linear polyethylene or the like having a threaded neck portion 3 for the reception of a cap 4 designed to seal the contents of the container against leakage while at the same time permitting an equalization of pressure between the interior of the container and the surrounding atmosphere. The cap 4 is provided with a top or dome area 5 which extends over the sealing portion of the container finish 6 and forms a liquid-tight seal with this sealing portion. The under surface of the dome area 5 in the region 7 which overlies the sealing finish of the container is provided with a spiral groove 8 which starts in the center and progresses toward the outer circumference of the under side of the dome portion. This spiral groove 8 extends over the sealing zone.

This groove 8 is of a cross-sectional size and shape so that it will permit the passage of gases therethrough, but will prevent the passage of liquids. The groove should be so arranged at least that one full turn of the spiral is provided in the sealing zone where the cap

engages the container and, if possible, more than one full turn should be provided. It has been found that spiral grooves ranging within 20 to 100 turns per inch are satisfactory for carrying out this invention. The number of lines is a function of the bottle sealing surface width. In conventional containers, these widths range from .080" to .130". It will be understood that the wider the container finish, the fewer turns per inch are required to yield the desired amount of grooves for a proper venting seal.

The cap can be formed of any of the well-known plastic materials, either thermosetting or thermoplastic, and the groove can be cut in the cap after the cap is formed, or may be molded into the cap at the time the cap is manufactured. Molding is preferred because it eliminates the necessity for a subsequent processing step. The groove should preferably be from two to six mils deep so that it will not permit the passage of the liquids which, by their nature, are more viscous than the gases generated by the contents within the container or air from the exterior bleeding into the container.

It will be understood, of course, that the smaller the groove, the more difficult the venting, and conversely the larger the grooves the more likelihood there is for the liquid contents of the container to leak through the spiral groove and escape onto the threaded area and eventually onto the outside of the container.

It will be obvious from the foregoing that we have developed a simple means for venting a cap and container assembly which means can be easily formed in the cap during the molding operation and remains in the cap during its continued use, and adequately vents the normal gases generated within container of this type.

We claim:

1. In a package comprising a container and cap in liquid-tight sealing relationship, the elements comprising a resilient plastic container having a flat sealing surface on a plane substantially normal to the longitudinal axis of the container, a cap adapted to fit in sealing relationship with said container, said cap being provided with a spiral groove on the underside in the area lying in juxtaposition to said sealing surface of the container, said spiral groove being of a pitch to provide at least one full 360° turn in engagement with the sealing surface of the container.

2. In a package comprising a container and cap in liquid-tight sealing relationship, the elements comprising a resilient plastic container having a flat sealing surface on a plane substantially normal to the longitudinal axis of the container, a cap adapted to fit in sealing relationship with said container, the interface between said cap and said container being provided with a spiral groove of such pitch as to provide at least one turn on the circumference of the container sealing surface.

3. In a package comprising a container and cap in liquid-tight sealing relationship, the elements comprising a resilient plastic container having a flat sealing surface on a plane substantially normal to the longitudinal axis of the container, a cap adapted to fit in sealing relationship with said container, said cap being provided with a domed portion with a spiral groove on the underside of the dome in juxtaposition to said sealing surface on the container, said spiral groove being of a pitch to provide at least one full 360° turn in engagement with the sealing surface of the container and of a depth ranging between two to six mils.

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