United States Patent

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[54] **MOLDED-IN LINER FOR A CLOSURE**
5 Claims, 2 Drawing Figs.

[52] **U.S. Cl.** **215/40,** 264/274
[51] **Int. Cl.** **B65d 53/06**
[50] **Field of Search** ..... 215/40, 43, 44, (Fins); 264/250, 268, 274, (Inquired Kucia)

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ABSTRACT: A closure for containers having the lining material held in place by a retaining ring. The retaining ring is positioned in the area of the raised portion of the lining material that forms the sealing surface of the liner. The retaining ring has a contour which will permit the retaining of the liner in the closure.

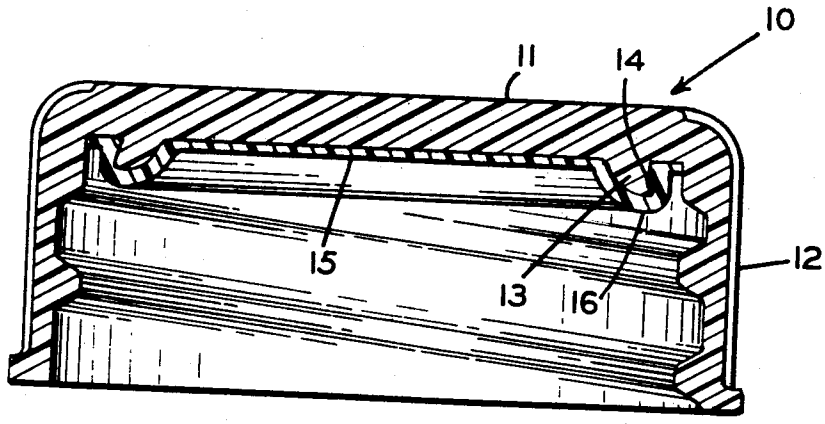


Fig. 1

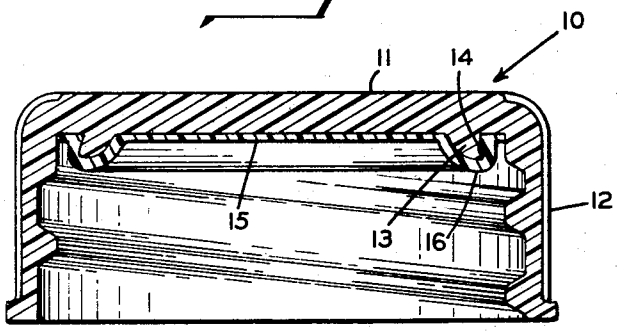
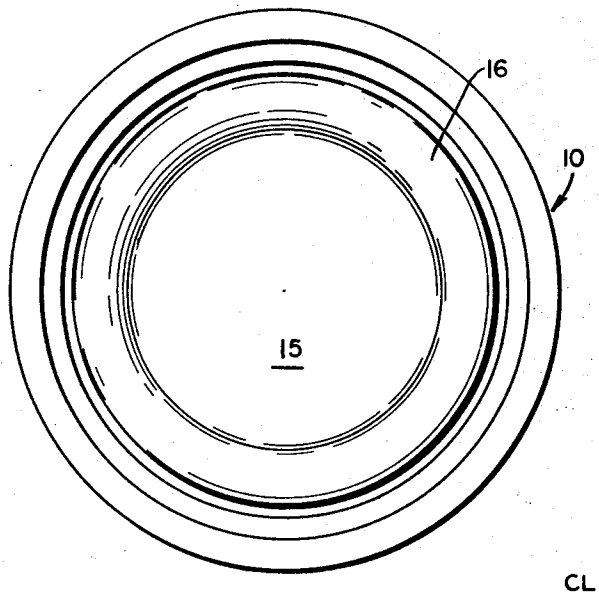


Fig. 2



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MOLDED-IN LINER FOR A CLOSURE

CROSS-REFERENCE TO RELATED APPLICATION

This application is a continuation of application Ser. No. 665,908 filed 9/6/67 now abandoned. This application is directed to an improvement over the closure set forth in copending application Ser. No. 493,486, filed Oct. 6, 1965, now abandoned.

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to closures and more particularly to closures having the lining material molded in place in the closure.

2. Description of the Prior Art

Many closures of the prior art have means for securing liners to their sealing surfaces. Many of these closures employ adhesive to secure the liner material to the closure, but the use of the adhesive has limitations in that it requires an additional process operation. Further, care must be taken to insure that the adhesive does not spoil the material in the container to which the closure is applied. Many problems have been encountered with adhesives to secure a bond between the liner material and the inside of the closure under varying conditions of temperature and pressure. The particular material which is stored in the container to which the closure is applied may have undesirable effects upon the liner material and adhesive therein.

Some closures have been developed which utilize the use of a retaining member to mechanically hold the liner inside of the closure. However, many of these devices with retaining means were difficult to handle during process operations. Special machines and skilled operators were required to successfully produce such closures.

The device of the present invention overcomes the difficulties of the prior art by providing an uncomplex, adhesive-free retainer arrangement between the closure and its liner. The particular retainer used is concealed behind the raised surface that forms the sealing area of the liner and, consequently, the finished closure has no visible retaining structure and can be used in all conventional closure lining machines. Also, the closure has the advantage that it can be used with all conventional closure testing apparatus because no upright center retaining member is present to interfere with the conventional vacuum gauge head normally used to test closures. Finally, the design of the retaining ring of the present invention lends a certain rigidity to the sealing area of the lining material and assists in securing a very effective seal.

SUMMARY OF THE INVENTION

The invention is directed towards a closure that uses a mechanical retaining means to hold the liner to the inside of the closure. The mechanical retaining means is a ring integrally molded to the inside surface of the closure. The ring is positioned in the region of the raised sealing surface for the lining material. The ring has an undercut surface, preferably on its outer edge, to form a locking structure with the lining material to hold the lining material to the closure. A gob of lining material is placed in the center of the closure and appropriate molding means form the gob into the properly shaped liner. The forming tool causes the gob to flow around the retaining ring and secure the mechanical lock between the liner and the retaining ring. Since the retaining ring is completely obscured by the raised sealing surface, there is no visible retainer in the finished product. Therefore, the liner provides a very aesthetic, clean looking appearance and is quite capable of being used with all the conventional machinery that had previously been used with the adhesively held liners.

BRIEF DESCRIPTION OF THE DRAWING

FIG. 1 is a sectional view of a closure embodying the liner of the present invention; and

FIG. 2 is a plan view of a closure and its associated liner according to the present invention.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now to the drawing, there is shown a closure **10** having a relatively flat base **11** and a peripheral skirt **12** extending outwardly from said base **11**. The inner portion of the skirt **12** may be threaded or otherwise provided with means to cooperate with the container such that the opening therein will be closed when the closure is applied.

The interior surface of base **11** is provided with an angular, exteriorly undercut retaining ring **13** extending outwardly in concentric relationship with said base and skirt **12**. Closure **10** may be formed of any of the known materials utilized in the closure art. If the closure is formed of plastic such as polystyrene, for example, it may be molded readily with conventional mold devices. The closure may be removed from its mold after it has been formed and while it is still in a heated, flexible condition without destroying the undercut on the retainer ring. Although polystyrene has been set forth by way of example, any of the conventional plastics or other materials may be used. As best seen in FIG. **1**, ring **13** has a radially inclined outer peripheral wall **14** which is inclined outwardly from said base **11** to form the undercut surface.

After the closure **10** has been formed, it may be supplied with liner material. Any of the known, formable liner materials may be utilized and may be deposited on the interior surface of base **11** in various forms. It has been found that heated polyethylene in semifluid form may be deposited on the surface of base **11**. The closure **10** then may be placed in a suitable holding device while a cooled plunger is pressed into engagement with the heated liner material to form it over the surface of base **11** in the manner shown in FIG. **1**. The portion of the molding plunger which contacts the liner material may be suitably configured to obtain the uniform thickness liner shape shown in the drawing. As seen in FIG. **1**, liner material is pressed into the undercut of ring **13** adjacent wall **14**. Since most plastics shrink upon cooling, the liner **15** is effectively shrunk fit upon retaining ring **13**. However, even without the shrinking characteristic, it will be seen that a mechanical interlock is provided between retainer ring **13** and liner **15** in the area of the undercut once the liner material has solidified. Liner **15** is obviously provided with a raised annular surface **16** at its periphery in the area of the retaining ring. This annular surface **16** will contact the upper surface of the neck of the container to which the closure is applied to form the sole sealing means for said container. Various other shapes of container contacting surfaces may be provided. Also, other conventional lining materials may be utilized. In addition to the retainer ring design shown, other designs may be provided, such as a multiple holding ring structure, a single ring with grooves on its outer wall, etc., to secure the bond between the closure and the liner.

The liner formed in the closure of FIG. **1** now provides a clean looking, aesthetic appearance. There is no adhesive to adversely affect the use of the closure. Further, there is no center post or retaining structure in the center region of the closure to interfere with the use of the closure on any of the conventional equipment in the art. It is to be understood that the present invention is not limited to the particular embodiment shown and described herein.

I claim:

1. A closure having a base, a skirt extending upwardly from said base and surrounding at least a portion thereof, retainer means on said base interiorly of said skirt and spaced therefrom, said retainer means having at least one radially inclined surface forming an undercut surface, and resilient liner material of uniform thickness overlying at least a portion of said base and undercut surface so that said liner material is

secured to said closure, said liner material having a raised annular surface and said retainer means being positioned under said raised annular surface so that said raised annular surface directly overlying said retainer means constitutes the sole means used to form a seal between the closure and the object to which the closure is applied.

2. A closure adapted for application to the neck of a container having a flat upwardly facing upper surface to be contacted by the closure to form a seal, said closure having a flat annular base, a peripheral skirt extending outwardly from the base and adapted to receive said container neck, a retainer ring molded integrally with and extending outwardly from said base and disposed within and spaced from said skirt, said ring having an undercut surface, and a molded liner of resilient material of uniform thickness generally conforming to said base, extending behind said undercut surface to interlock mechanically with said retainer ring and extending around and covering said ring on the outer side thereof to form a downwardly facing annular sealing surface directly overlying said ring and raised outwardly from said base to engage said upper surface of said neck in sealing relation when the closure is applied to the neck, said sealing surface being spaced farther from said base than any other portion of said liner whereby the center region of the closure within the sealing surface is free of projections outwardly beyond the sealing surface and the sealing surface is the only portion of the liner engaging the container neck and forming a seal therewith.

3. The closure as set forth in claim 2 wherein said base and said skirt are formed of polystyrene and said liner is formed of polyethylene.

4. The closure as set forth in claim 2 wherein said liner has a shrunk fit on said retaining ring.

5. The closure as set forth in claim 2 wherein said undercut surface is formed on the outer side of the retainer and is inclined outwardly from said base and toward said skirt.