Nov. 24, 1959 S. LOWEN 2,914,206

CONTAINER CAP

Filed March 6, 1957

FIG. 1.

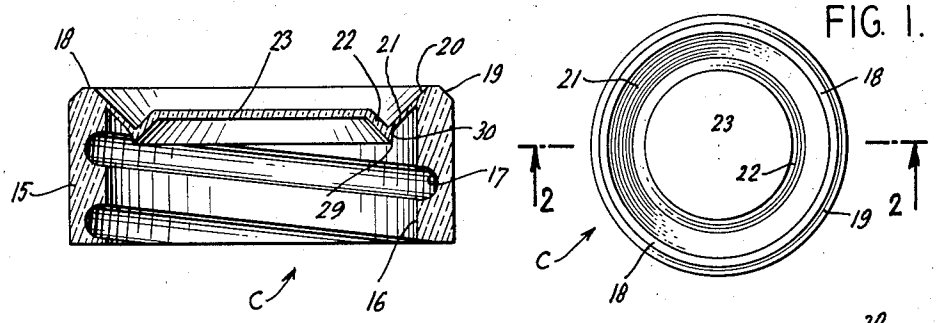


FIG. 2.

FIG. 3.

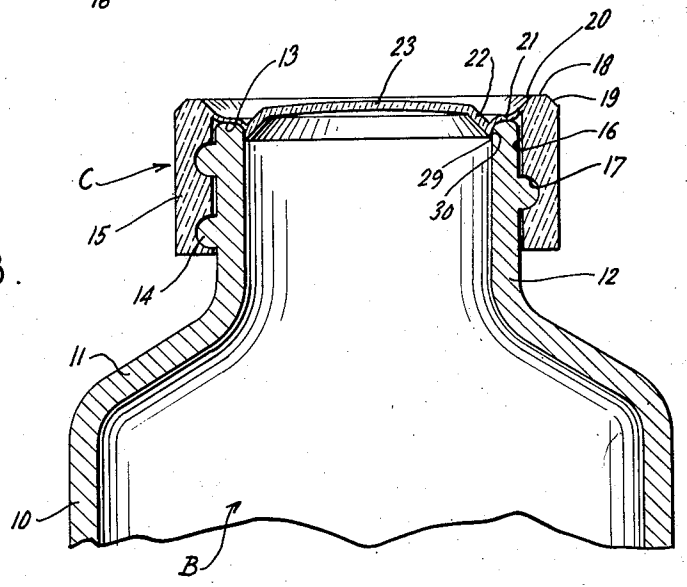
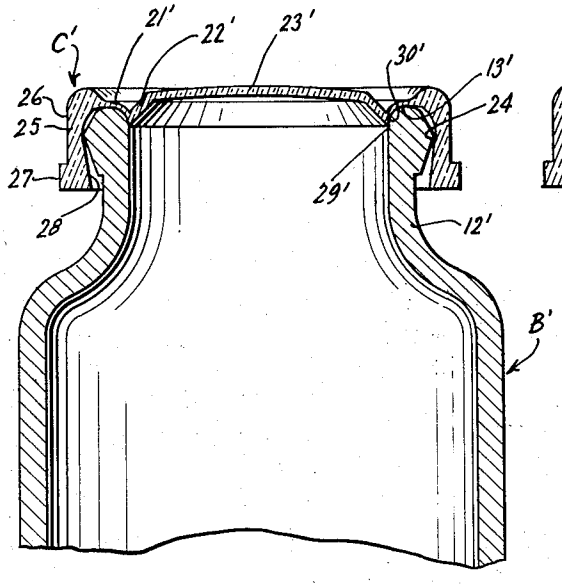


FIG. 5.



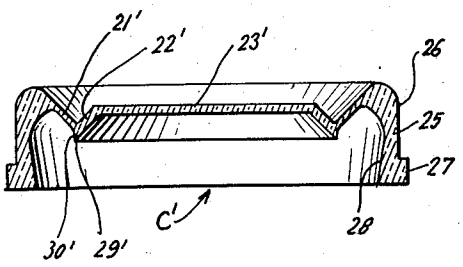


FIG. 4.

INVENTOR.
STANLEY LOWEN
BY Mock & Blum
ATTORNEYS.

United States Patent Office 2,914,206 Patented Nov. 24, 1959

2,914,206

CONTAINER CAP

Stanley Lowen, Yonkers, N.Y.

Application March 6, 1957, Serial No. 644,325

3 Claims. (Cl. 215—41)

The present invention relates to container closures such as are commonly employed as the closures for bottles, cans, etc., containing dry products and liquids, and is concerned primarily with caps that are made of plastic.

For many years it has been the practice to make a plastic cap of one of the so-called hard plastics, such as phenol formaldehyde, urea formaldehyde, styrene or the like, together with a resilient or soft liner where the cap engages the container about the opening thereof. It is the soft material which is supposed to provide the seal. This two-piece construction is relatively costly for materials, and of course requires assembly procedures.

Another disadvantage attending the use of the hard plastic caps above mentioned is intimately tied up with the necessity of employing the lining material. Various types of lining materials have been employed but in every case this material is deformed or compressed by the compression of the container lip thereon as the cap is screwed down tight. Obviously, the effectiveness of the seal is directly dependent upon the compressibility of the particular lining material together with the surface irregularities on the container lip. When these irregularities are pronounced, it is almost impossible for the liner to accurately follow the irregularities of the contour of the lip. Thus, the effectiveness of the seal is impaired. Another factor entering into this same end result is the tendency of the liner to shrink upon aging, which action of course breaks the seal. In addition, separate cap liners are subject to the well-known difficulties of looseness, splitting, sticking, becoming saturated, and others.

Since the advent of polyethylene, attempt has been made to use this material in the manufacture of plastic caps rather than the hard plastics heretofore employed. However, such caps have not been entirely satisfactory in that it has been necessary to force the caps downwardly onto the neck of a container with sufficient force to compress the material and effect the seal. This same force results in a distortion of the skirt of the cap which causes the latter to flare outwardly at the bottom. This is, needless to say, a highly unsatisfactory arrangement because the flaring action will cause the threads on the cap to jump the threads on the neck of the container.

With the foregoing conditions in mind, the present invention has in view, as its foremost objective, the provision of a cap for bottles or containers of the character above noted, which is made of polyethylene and which substantially eliminates the undesirable features of the old hard plastic caps and soft plastic caps.

More in detail, the invention has as an object the provision of a cap of the character aforesaid which is made of polyethylene or a material having comparable properties and which consists essentially of a cylindrical skirt to which is integrally joined an annular inwardly-extending diagonal membrane designed to overlie the lip about the opening of the container and which is of a thickness rendering it suitable for conforming to the lips as the cap is forced down tight about the neck of the container. Integrally joined to the lower inner edge of this membrane is a conical wall having joined thereto the central portion of the top head or end wall of the

cap. The joinder of the membrane to the conical wall provides a sharp downwardly directed edge with an outer vertical surface contiguous thereto.

When a bottle cap of the character aforesaid is first applied to the neck of the bottle, the inclined or diagonal membrane first engages the lip on the inner edge thereof. Continued downward or tightening movement of the cap causes the membrane to be distorted until it assumes a position substantially normal to the skirt in which it overlies the lip with a good surface engagement. At the same time the outer vertical surface at the joinder of the membrane to the conical wall engages the inner surface of the bottle neck adjacent to the lip. These surface engagements, of course, result in a good seal. It is notable that the distortion of the diagonal membrane is also accompanied by a distortion of the central or middle portion of the top wall and, due to the elastic nature of the latter, the top as a whole exhibits a tendency to expand. Thus, the upper end of the skirt is expanded which definitely counteracts any tendency of the lower end to flare as was the case with the old soft plastic caps. Moreover, the tendency to expand urges the vertical surface at the joinder of the membrane and conical wall against the internal surface of the bottle neck to enhance the seal at this zone.

In certain instances, the products in the bottles or containers with which the caps are employed will generate a gas. It is desirable that provision be made for the escape of this gas. This is accommodated by the cap of this invention because the gas pressure will raise the membrane sufficiently for this purpose.

The cap of the present invention may thus consist essentially of a relatively thick or heavy skirt having a diagonal membrane extending inwardly from the outer end thereof with a top wall being integrally joined to the inner edge of the diagonal membrane by a conical wall. At the joinder of the membrane to the conical wall, there is a sharp downwardly directed edge and an outer vertical surface contiguous thereto. The diagonal membrane is adapted to be distorted as the cap is applied to the neck of a bottle into a position substantially normal to the skirt in which it overlies the lip of the bottle with a surface engagement, and the vertical surface is urged against the inner surface of the bottle neck to provide an additional seal.

For a full and more complete understanding of the invention, reference may be had to the following description and accompanying drawing wherein:

Figure 1 is a top plan view of a bottle cap designed in accordance with the precepts of this invention.

Fig. 2 is a transverse vertical section taken about on the plane represented by the line 2—2 of Fig. 1.

Fig. 3 is a section through the neck and adjacent portion of a bottle with the cap of this invention applied thereto in sealing position.

Fig. 4 is a section through a modified form of cap, and

Fig. 5 is a section showing the cap of Fig. 4 applied to a bottle having an external annular bead in lieu of threads.

Before referring to the drawings, it is notable that the present invention is directed primarily to a cap that is made of polyethylene because of the resilient and elastic properties of this material. The invention contemplates the use of other materials having these same properties.

Referring now to the drawing and first, more particularly, to Fig. 3, the upper portion of a bottle or container is therein illustrated and referred to in its entirety by the reference character B. The bottle B will comprise a main body portion that is represented at **10**, to which is integrally joined, as by an inclined wall **11**, a circular neck **12** terminating in an end surface or lip

13 which surrounds or defines the mouth of the neck. Formed on the external wall of the neck 12 are threads 14.

This structure of a bottle or container is well known and conventional in the field of packaging.

The cap of this invention is intended to be applied to the neck 12 and is illustrated per se in Figures 1 and 2. It is referred to in its entirety by the reference character C.

The cap C comprises a cylindrical skirt 15 having an inner surface at 16 which is formed with a thread 17 complemental to the threads 14 on the bottle neck. The upper or outer end of the skirt 15 is defined by a narrow annular flat surface 18, an outer conical surface 19, and an inner conical surface 20. Formed as a continuation of this inner conical surface 20 is a so-called diagonal membrane 21. That is, the outer or exposed surface of the membrane 21 constitutes a continuation of the conical surface 20 of the skirt 15. This membrane 21 is relatively thin as compared to the thick skirt 15 with the thickness providing for the distortion thereof, as will be later described. The walls 22 and 23 may thus be considered as a downwardly concave, cup-shaped top having its lower peripheral edge connected to the lower edge of the annular membrane 21.

Integrally joined to the lower inner edge of the membrane 21 is a conical wall 22 that extends upwardly and inwardly, and integrally joined to the upper inner edge of this conical wall 22 is a circular top wall 23 which is substantially flat when the cap is not applied to a container, this condition being depicted in Fig. 2. It is notable that the conical wall 22 and flat top wall 23 may be appreciably thicker than the diagonal membrane 21 and not as thick as the skirt 15. At the joinder of membrane 21 and conical wall 22 there is a sharp downwardly-directed edge 29 and an outer vertical surface 30 contiguous thereto that is slightly larger in diameter than is the base of the neck 12.

As the cap C is applied to the neck 12 of the container B, the threads 17 on the cap are brought into engagement with the threads 14 of the bottle neck in a well-known manner. As the cap is rotated relative to the bottle neck, the diagonal membrane 21 engages the lip 13 and, as the tightening action is continued, the membrane is distorted or wrapped over the lip 13 until it assumes the position depicted in Fig. 3 in which the membrane is substantially normal to the skirt; that is, it has been appreciably distorted from the diagonal position of Fig. 2.

This distortion of the membrane 21 is accompanied by a distortion of the conical wall 22 and end wall 23, with the result that the latter assumes the upwardly-bowed position illustrated in Fig. 3. In this position, the walls 23, 22 and 21 exert a combined tendency to expand the outer end of the skirt 15, which definitely counteracts any tendency of the lower end of the skirt to flare outwardly. Thus, definite assurance is had that the threads 17 and 18 will always remain in effective engagement. At the same time, the vertical surface 30 is forced against the inner surface of the neck 12 adjacent to the lip 13 to create an additional and effective seal at this point. Should any gases be generated by the contents of the bottle B when the pressure of such gases is sufficiently great, the membrane 21 will raise enough to permit the gases to escape therebeneath and over the lip 13. The sharp edge 29 holds the cap firmly in position as it is inserted in the curved lip 13 and neck 12 and renders it unnecessary to screw the cap down tight.

The modification

Referring now more particularly to Figs. 4 and 5, the modified form of the invention which is therein illustrated will be described. In this form, the container B' has neck 12' that is formed with an outwardly protruding annular bead or rib 24 adjacent to the lip 13'.

The cap C' is formed with a skirt 25 having an outer cylindrical surface 26 which terminates at the lower end in an outwardly extending flange 27. The skirt 25 is formed with an inner surface 28 that is conical, with the narrowest or constricted end being located at the bottom. This cap C' includes the usual diagonal membrane 21', conical wall 22' and end wall 23'. It also includes the sharp, downwardly directed edge 29' and vertical surface 30'. It is evident that the cap C' may be applied to the bottle B' by simply forcing the skirt 25 over the bead 24. During this action, the skirt will be distorted or expanded, and the tendency to return to its original condition will hold the cap in place. The action of the diagonal membrane 21' is the same as that above described. It is distorted into the position into which it wraps over the lip 13' to come into surface engagement therewith, and the vertical surface 30' is urged against the inner surface of the neck 12' to provide a good seal.

While preferred specific embodiments of the invention are hereinbefore set forth, it is to be clearly understood that the invention is not to be limited to the exact constructions, dimensions and materials illustrated and described because various modifications of these details may be provided in putting the invention into practice within the purview of the appended claims.

What is claimed is:

1. A container cap made of a material having properties of resiliency and elasticity comparable to that of polyethylene and comprising a relatively thick cylindrical skirt, means on said skirt for effecting a detachable connection with the neck of a container, a relatively thin inwardly and downwardly extending annular diagonal membrane integrally joined to the upper end of said skirt, an inwardly and upwardly extending conical wall integrally joined to the inner edge of said membrane, and an end wall integrally joined to the inner edge of said conical wall, said conical and end walls being thicker than said membrane but thinner than said skirt.

2. In combination, a container having a cylindrical neck terminating in an annular lip substantially normal to the axis thereof, and a cap made of a material having properties of resiliency and elasticity comparable to polyethylene and comprising a cylindrical skirt, complemental elements of a detachable connection on said neck and skirt, a diagonal membrane integrally joined to said skirt and extending inwardly into a position in which it is wrapped over said lip with a surface engagement with said lip and the interior of said neck, an upwardly and inwardly extending conical wall integrally joined to the inner edge of said membrane and an end wall integrally joined to the inner edge of said conical wall.

3. A container cap made of a material having properties of resiliency and elasticity comparable to that of polyethylene and comprising a relatively thick cylindrical skirt, means on said skirt for effecting a detachable connection with the neck of a container, a relatively thin inwardly and downwardly extending annular diagonal membrane integrally joined to said skirt, an inwardly and upwardly extending conical wall integrally joined to the inner edge of said membrane, there being an outer vertical surface at the joinder of said membrane and conical wall, and an end wall integrally joined to the inner edge of said conical wall, said conical and end walls being thicker than said membrane but thinner than said skirt.

References Cited in the file of this patent

UNITED STATES PATENTS

2,586,775 Benner et al. ---------- Feb. 26, 1952

FOREIGN PATENTS

1,004,752 France ---------- Nov. 28, 1951
144,070 Sweden ---------- Feb. 9, 1954
1,126,491 France ---------- July 30, 1956