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CLOSURE MEMBER

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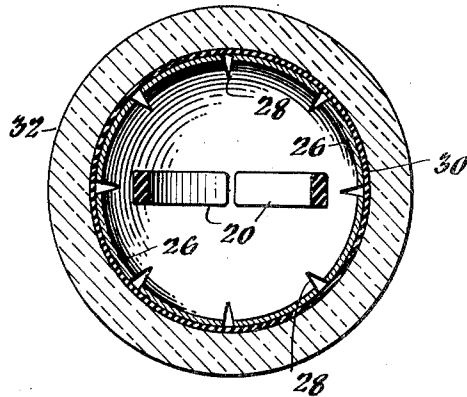
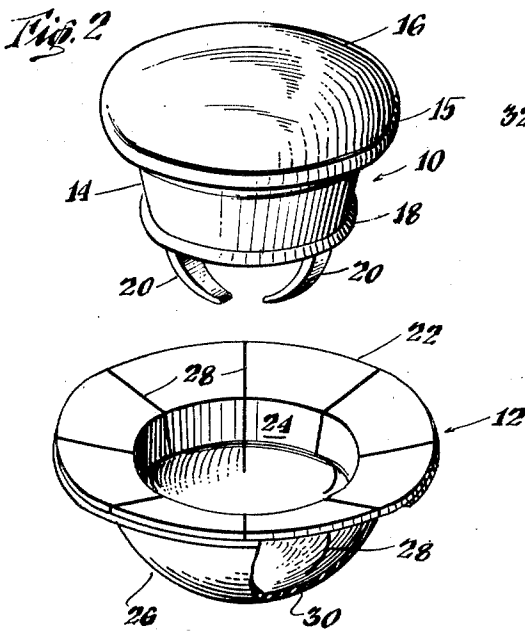
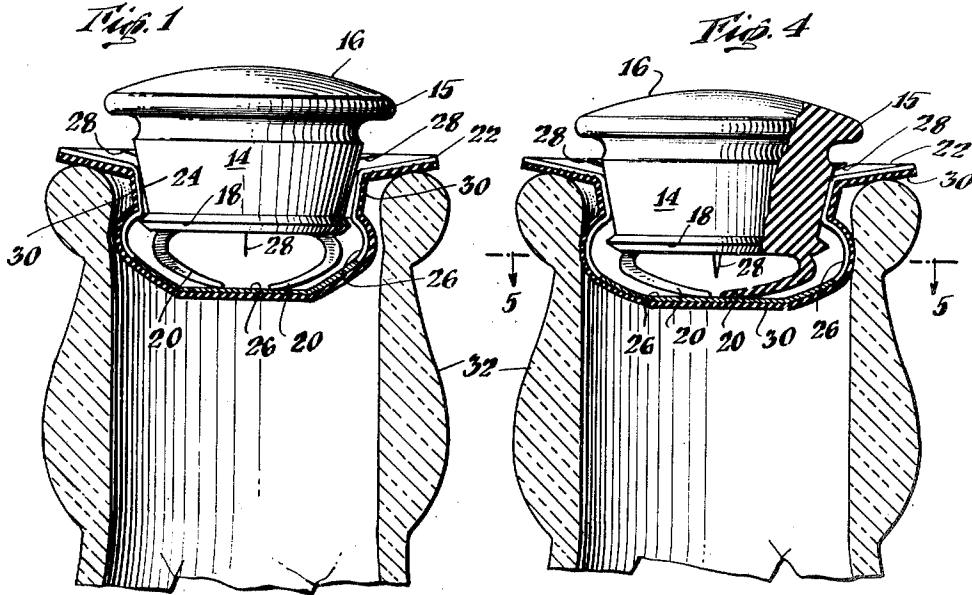


Fig. 3

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This invention relates to closure members for containers and more particularly relates to a reusable stopper for the hermetic sealing of bottles and other containers.

Stoppers of the type herein disclosed are especially useful in conjunction with bottles of the type conventionally used to contain carbonated beverages, such as beer, ginger ale or the like.

Many varying types of closure members are in common use. Included are stoppers of the reusable type such as the conventional cork stopper which, in addition to being expensive, deteriorates with usage and eventually results in contamination of the contents of the container. Other types of reusable stoppers available on the market are usually of complicated construction and relatively expensive which limits their use to that of a novelty nature rather than a widespread commercial utility.

Perhaps the most widely-used closure member for bottles containing carbonated beverages and the like is the conventional cork-lined, crimped, metallic bottle cap. Although this type or stopper is among the least expensive of the conventional closure members, deformation which always accompanies removal prevents reuse. Moreover a separate tool is a necessity for removal operations.

Among the advantages of the closure member herein described is a simplicity of construction, requiring inexpensive components and simple manufacturing operations, yet of sufficient durability to permit its continual reuse for hermetic sealing purposes by easy manual manipulation without the use of any special tools.

The invention may be briefly described as a reusable closure member adapted for internal disposition within the mouths of containers for carbonated and other beverages or other contents formed of a generally bowl-shaped deformable element having an enlarged lower portion disposed below a preferably conically shaped tapering intermediate portion defining a tapered central bore and terminating in an outwardly flared flange-like upper portion and coated with an external layer of resilient readily deformable material. Disposed within the tapered central bore is a plug adapted upon depression thereof to outwardly expand the bowl-shaped deformable element into hermetic sealing engagement with the interior surface of the mouth of the container.

Inasmuch as the closure member is disposed in hermetic sealing engagement with the inside of the mouth of the container, any increase in pressure therein will aid in the deformation of the bowl-shaped deformable element and thus aid in the maintenance of the hermetic seal.

An object of this invention is the provision of an improved closure member.

Another object of this invention is the provision of a simple and inexpensive reusable closure member.

A further object of this invention is the provision of a reusable closure member adapted for the production of a secure hermetic seal by engagement with the interior surface of the mouth of the container.

Still another object of the invention is the provision of a simple and improved reusable closure member that is readily manipulated by manual means without the use of special tools.

A still further object of the invention is the provision of a reusable closure member that is simple and inexpensive and of a construction that is readily adaptable to simple and mass production manufacturing techniques.

The above and other objects and advantages will ap-

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pear clearly from the following description, taken with the accompanying drawings in which:

Fig. 1 is a side elevational view, partly in section, of the closure member positioned in the mouth of a container;

Fig. 2 is an oblique view of one element of the closure member;

Fig. 3 is an oblique view of the other element of the closure member;

Fig. 4 is a side elevational view, partly in section, of the closure member disposed in hermetic sealing relationship in the mouth of the container; and

Fig. 5 is a sectional view taken on line 5—5 of Fig. 4. In the drawings, like reference characters denote like parts in the various views.

Referring to the drawings, the presently preferred embodiment of the closure member is formed of two major elements designated 10 and 12, and shown separately in Figs. 2 and 3, respectively.

The element 10 is a plug formed of material of suitable rigidity, such as any of the well-known plastics, and is provided with a preferably conically shaped downwardly-converging body portion 14 disposed beneath an outwardly flared lip or flanged portion 15 forming a manipulating knob 16. The lower extremity of the conically shaped body portion 14 terminates in an outwardly-projecting circumferential lip 18. Disposed beneath the body portion 14 and dependent therefrom are a plurality of curved spring members 20.

The element 12 is a generally bowl-shaped deformable unit, preferably formed of resilient metal, and provided with an enlarged bulge-shaped lower portion 26 disposed below a preferably conically shaped downwardly-converging intermediate portion 24 defining a central bore sized to receive the conically-shaped portion 14 of the element 10. The upper end of the intermediate portion 24 terminates in an enlarged outwardly flared flange-like lip 22. The element 12 is provided with a plurality of vertically disposed slits 28 to permit ready radial deformation of said element. The number and positioning of slits 28 is not critical and may be varied, eight being illustrated in the embodiment shown in the drawings. The exterior surface of the element 12 is covered with a continuous layer 30 of elastic readily deformable material.

The embodiment of the closure member illustrated in the drawings is readily assembled by placing the element 10 within the tapered bore of the element 12 and depressing said element 10, with accompanying deformation of the element 12 until the lip 18 is forced past the lower extremity of the intermediate portion 24 of the element 12 and into the enlarged bulge-shaped portion 26 thereof. After the plug element 10 is correctly positioned the resiliency of the part 12 will cause it to snap back to its normal closed position, i. e. with the slits 28 closed. The spring members 20 are sized so that they rest upon the bottom of the lower portion 26 of the element 12 when the closure member is assembled and bias the plug element 10 upwardly as shown in Fig. 1.

Fig. 1 shows the parts 10 and 12 assembled with the flanged lip 22 of the element 12 resting upon the upper surface of the mouth of the bottle 32. As illustrated, the stopper is positioned for hermetic sealing operations. Hermetic sealing is readily accomplished by a downward pressure upon the knob 16 of the part 10 sufficient to overcome the biasing effect of the spring members 20 and to move the element 10 downwardly with respect to the element 12.

The downward displacement of the element 10 within the central bore of the element 12 results in an outwardly directed radial deformation thereof causing the slits 28 to open. Continual downward displacement of the element 10 results in a continual outward deformation of the element 12 particularly of the lower bulge-shaped portion 26 and conically shaped intermediate portion 24 thereof until said outward deformation is halted by the elastic covered sides of the lower bulge-shaped portion 26 engaging the inner surface of the bottle mouth as shown in Fig. 4. At this point further downward movement of the element 10 relative to the element 12 is prevented and the bottle is hermetically sealed by the engagement of the elastic deformable layer 30 with the in-

ner surface of the bottle mouth. The frictional engagement between the adjacent surfaces of the conically-shaped body portion 14 of the element 10 and the conically-shaped intermediate portion 24 of the element 12 maintains the parts of the closure member in the position as shown in Fig. 4, i. e. with the elastic layer 30 disposed in hermetic sealing relationship with the inside surface of the neck of the bottle 32. The frictional engagement described above is of sufficient strength to maintain the closure member in hermetic sealing relationship and to prevent accidental and unwanted openings occurring through rough usage or other mishandling. Furthermore any pressure building within the bottle 32 aids in the maintenance of the hermetic seal rather than contributes to the destruction thereof.

The stopper is easily removed from the bottle by exerting a manual upward pressure on the underside of the lip 15 of the element 10, sufficient to overcome the above mentioned frictional engagement which results in an upward displacement of the element 10 relative to the element 12 which in turn, due to the resilient characteristics of said element 12, permits said element to return to its normal contracted position, as shown in Fig. 1, with the slits 28 closed.

In accordance with the provisions of the patent statutes, I have herein described the principal of operation of this invention, together with the elements which I now consider the best embodiments thereof, but I desire to have it understood that the structure disclosed is only illustrative and the invention can be carried out by other means. Also while it is designed to use the various features and elements in the combinations and relations described, some of these may be altered and modified without interfering with the more general results outlined.

Having thus described my invention, I claim:

1. A hermetically sealing closure member for conventional smooth internal wall containers having a predetermined internal neck diameter comprising an outwardly radially deformable resilient sealing element of substantially uniform thickness and of stiffly resilient construction adapted to be positioned within the neck portion of the container to be sealed and having at least one slit therein to permit ready deformation thereof, said sealing element having an annular outwardly flared upper portion sized to be supported upon the mouth of the container to be sealed, an annular intermediate portion dependent from said upper portion and having a diameter substantially less than the internal diameter of the container to be sealed and an enlarged bottom portion dependent from said intermediate portion sized to closely fit within the neck portion of the container to be sealed and covered with a layer of deformable elastic material, and a plug element having a substantially conically shaped body portion disposed within said sealing element and adapted for vertical displacement therein, said substantially conically shaped body portion of said plug element sized to be contained within said intermediate portion of said sealing element and having a progressively varying diameter along its length that varies from less than that of said intermediate portion to greater than that of said intermediate portion and having a slope such as to maintain frictional engagement in displaced position with the intermediate body portion of said sealing element, whereby a downward displacement of said plug element relative to said sealing element effects an outward radial deformation of said intermediate portion and a concomitant outward radial deformation of said covered enlarged bottom portion into sealing relation with the neck portion of said container through the engagement of the substantially conically shaped body portion of said plug element and the intermediate body

portion of said sealing element at a location remote from said enlarged bottom portion.

2. The closure member as set forth in claim 1 including a spring member dependent from the bottom of said plug element to bias the plug element upwardly with respect to said sealing element.

3. The closure member as set forth in claim 1 including retaining means associated with said plug element to restrain removal of said plug element from said sealing element.

4. A hermetically sealing closure member for containers having a neck portion of smooth unbroken internal configuration and of predetermined internal diameter comprising an outwardly deformable resilient metallic sealing element of substantially uniform thickness and of stiffly resilient construction adapted to be positioned within the neck portion of the container to be sealed and having at least one slit therein to permit ready deformation thereof, said sealing element having an annular outwardly flared upper portion of a diameter at least equal to the diameter of the mouth portion of the container to be sealed, an annular conically shaped downwardly converging intermediate body portion dependent from said upper portion and having a maximum diameter substantially less than the internal diameter of the neck portion of the container to be sealed, and an enlarged rounded bottom portion dependent from said intermediate portion having a peripheral sealing surface covered with a layer of deformable elastic material sized to closely fit within the neck portion of the container to be sealed and of an external diameter greater than the maximum diameter of said conically shaped intermediate portion, and a plug element slidably contained within the intermediate body portion of said sealing element and adapted for vertical displacement therein, said plug element having a conically shaped downwardly converging body portion of a progressively varying diameter that varies from less than that of said intermediate portion to greater than that of said intermediate portion and arranged to frictionally engage in displaced position the complementary conically shaped surface of said intermediate body portion of said sealing element, whereby a downward displacement of said plug element relative to said sealing element effects an outward radial deformation of said intermediate portion and a concomitant outward radial deformation of said enlarged rounded bottom portion displacing said covered sealing surface into sealing relationship with the neck portion of said container through engagement of said varying diameter complementary conical surfaces of said plug element and said sealing element at a location remote from said sealing surface.

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