Sept. 20, 1960 G. V. MUMFORD ET AL 2,953,272

CLOSURE CAPS FOR BOTTLES AND JARS

Filed Feb. 27, 1958

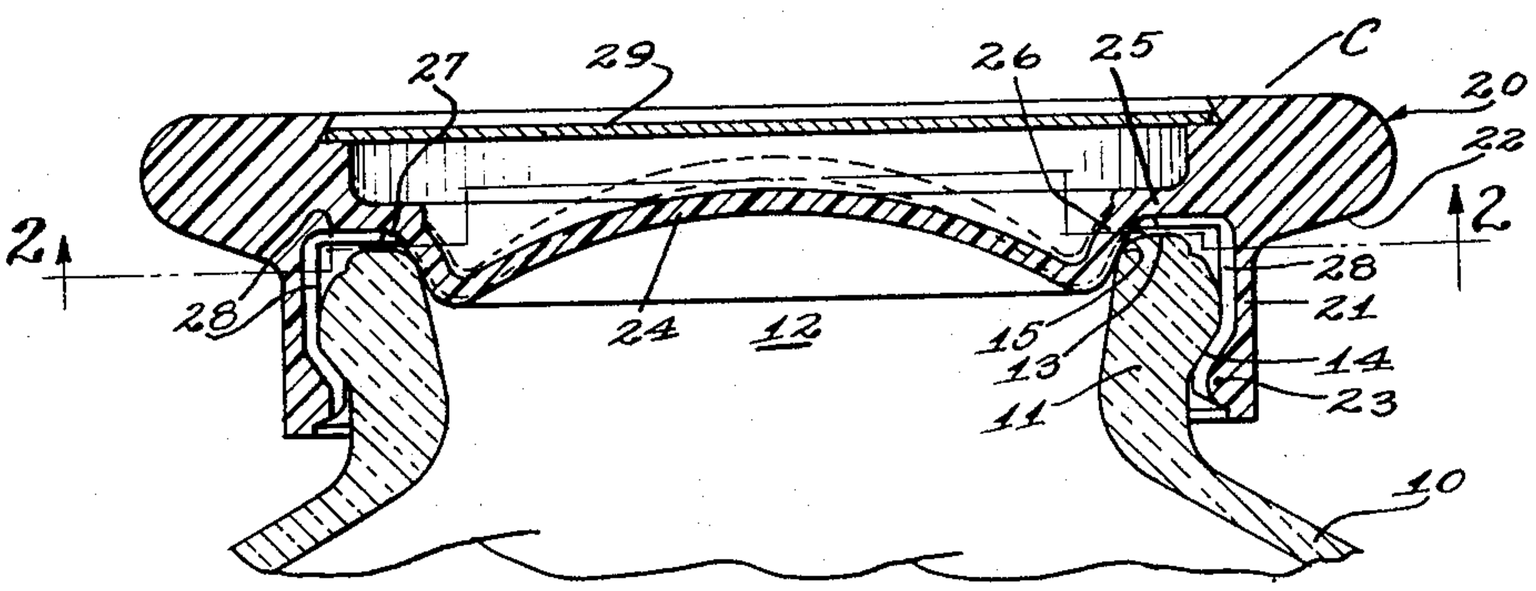

Fig. 1.

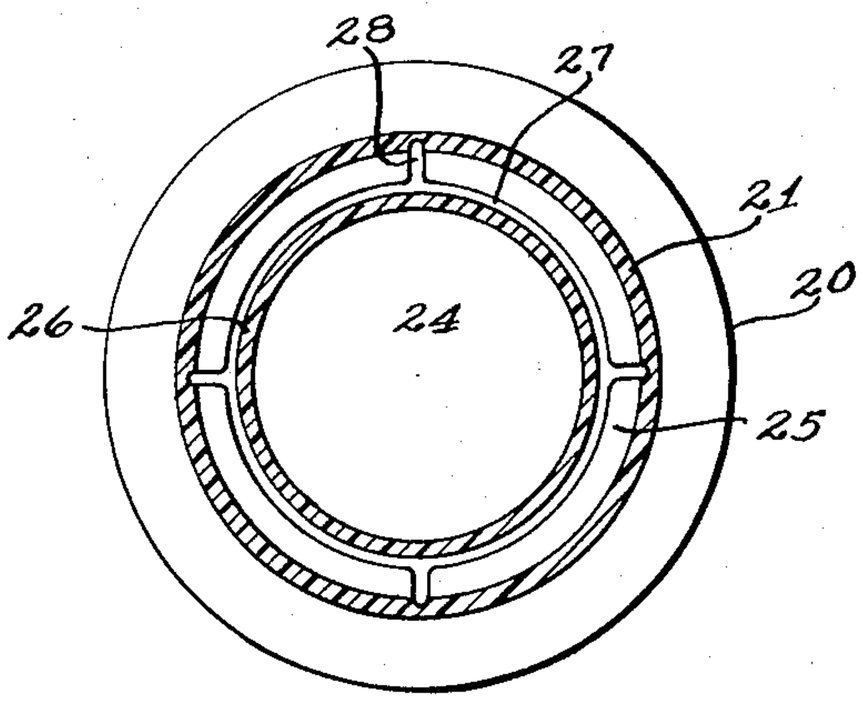

Fig. 2.

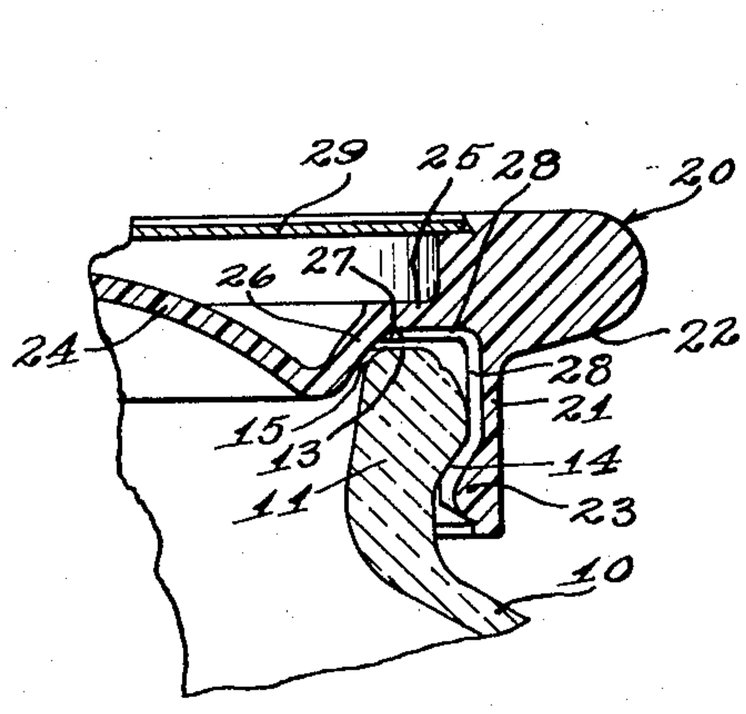

Fig. 4.

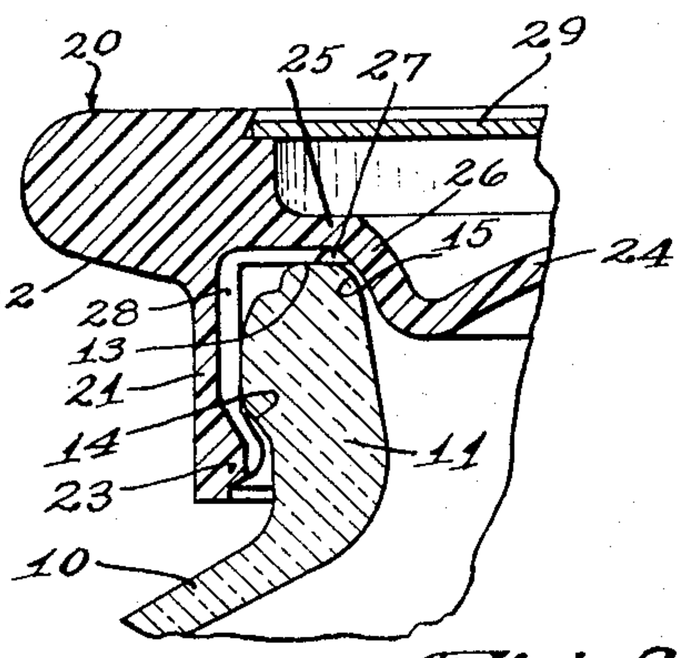

Fig. 3.

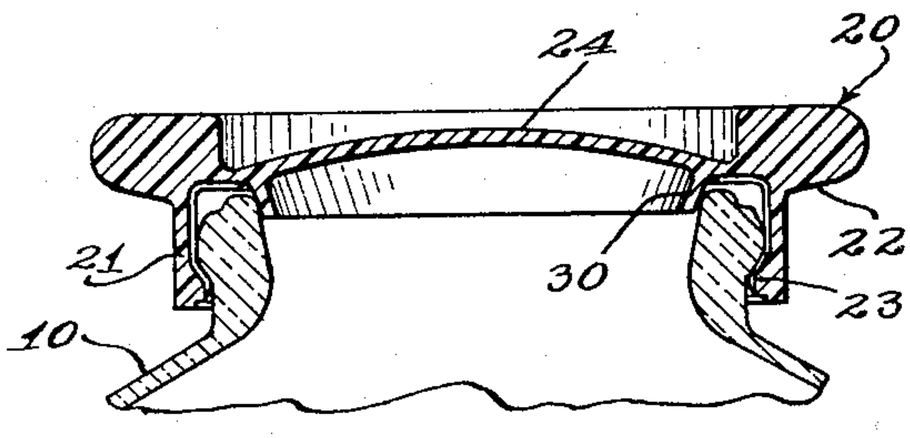

Fig. 5

INVENTORS
GEORGE V. MUMFORD
RALPH H. WHITNEY
BY
Rule & Hoge
ATTORNEYS

United States Patent Office

2,953,272

Patented Sept. 20, 1960

2,953,272

CLOSURE CAPS FOR BOTTLES AND JARS

George V. Mumford and Ralph H. Whitney, Toledo, Ohio, assignors to Owens-Illinois Glass Company, a corporation of Ohio

Filed Feb. 27, 1958, Ser. No. 717,928

2 Claims. (Cl. 215—41)

The present invention relates to improvements in closure caps for bottles and jars and more particularly to venting means for such caps which will permit maintenance of safe internal pressures without leakage of the contents.

An object of our invention is the provision of simple and effective means incorporated in a substantially all-thermoplastic closure cap for bottles and jars which will permit escape of excess gas to the atmosphere and immediately thereafter effect proper resealing of the container, irrespective of whether the latter stands alone or is at the bottom of a stack with the weight of the other containers applying top pressure to the closure cap.

Another object of our invention is the provision of a closure cap of the above character in which a relatively heavy semi-rigid ring and attaching flange or skirt element carry a flexible concavo-convex diaphragm, the latter formed with a sealing surface normally effectively contacting a sealing surface on a bottle or jar, but capable of separation from the latter for venting excess gas from the bottle.

A further object of our invention is the provision of a closure cap formed of thermoplastic material and incorporating a concavo-convex central diaphragm having an annular marginal element normally sealingly engaging an internal sealing surface on a bottle or jar but momentarily separable from the latter under excessive internal gas pressure.

It is also an object of our invention to provide a novel arrangement of vent grooves and channels which, although permitting ready escape of excess gas pressure as explained above, will not under normal conditions allow communication between the atmosphere and interior of the container.

Other objects will be in part apparent and in part pointed out hereinafter.

In the drawings:

Fig. 1 is a fragmentary sectional view showing a closure cap incorporating our invention affixed to a container.

Fig. 2 is a sectional view on a reduced scale taken substantially along the plane of line 2—2 of Fig. 1.

Fig. 3 is a fragmentary detail sectional view showing the venting position resulting from upward flexing of the diaphragm under internal pressure.

Fig. 4 is a fragmentary detail sectional view showing in full lines the diaphragm position indicated by dotted lines in Fig. 1.

Fig. 5 is a fragmentary sectional view of a slightly modified form of our invention.

In the illustrated embodiment of one form of our invention (Figs. 1–4) it is shown in conjunction with a glass jar or bottle **10** provided with a reduced neck **11** defining a mouth **12**. This neck is formed externally just below the rim **13** with an annular abutment **14** facing generally downward and capable of holding engagement with a portion of a closure cap C as will be apparent presently. An annular internal sealing surface **15** is formed substantially at the juncture of the rim **13** and

interior surface of the neck **11**, the latter surface being tapered downwardly and inwardly if preferred.

The closure cap C which is formed of plastic or other elastomeric material comprises a relatively heavy semi-rigid ring **20** and an annular depending attaching skirt **21** of lesser diameter than the maximum diameter of the ring. Thus a continuous ledge **22** is provided for removal and application purposes. This attaching skirt is formed internally near its lower margin with a projection **23** which takes over and holdingly engages the aforementioned abutment **14**.

A flexible concavo-convex diaphragm or disk **24** has its peripheral portions connected to the inner margin of the aforementioned ring **20**. In that form of our invention shown in Figs. 1–4, a narrow annular flange **25** and an inwardly downwardly directed wall **26** interconnect the diaphragm and ring. The inclined wall **26** is positioned to normally contact the sealing surface **15** throughout the length of the latter. It may flex upwardly to break such sealing contact when gas pressure internally of the container becomes excessive. Any such excess gas escapes to the atmosphere and thereupon the seal is reestablished.

Such escape of excess gas is made possible through the provision of an annular channel or groove **27** in the lower side of the closure cap substantially at the juncture of the inclined wall **26** and flange **25**. This places the groove almost immediately over the upper, outer margin of the sealing surface **15**.

A multiplicity of radial channels **28** extend along the lower side of said flange **25** and thence downward along the interior of the attaching skirt **21** opening through the lower margin of the latter. Because these vents are formed as channels in the relatively heavy portions of the closure cap it is apparent that the weight of stacked jars will not detrimentally affect the venting function of these channels. The thickness of the ring portion **20** is such that its upper surface lies in a horizontal plane well above that occupied by the diaphragm when the latter is flexed to its uppermost position. Thus there is no interference whatsoever to venting when necessary.

If desired, a price carrying disk **29** of any suitable material may be secured in place just above the diaphragm.

In Fig. 5 the closure cap generally is constructed as in the preferred form. However the diaphragm **24** carries a depending sealing flange or lip **30** which tapers downwardly and inwardly in the same fashion as the previously mentioned wall **26**. The flexibility of both said wall **26** and the lip **30** as well as their position relative to the diaphragm and ring are such that effective sealing contact with the glass is provided irrespective of whether the closure cap is seated upon the container as in Fig. 3 or positioned as in Fig. 1.

It is believed apparent in view of the above that normally the closure cap effectively seals the container and with the building up of sufficient internal pressure the diaphragm flexes upwardly and vents the excess gas to the atmosphere through the annular groove **27** and radial vent channels **28**. Normally expected top pressure cannot seal off the radial vent channels **28**.

Modifications may be resorted to within the spirit and scope of the appended claims.

We claim:

1. A venting-type closure cap for bottles and jars, said cap formed of a resilient thermoplastic material and comprising a relatively heavy semi-rigid ring, an attaching skirt depending from the ring at a point near its inner margin, a resilient generally concavo-convex diaphragm positioned coaxially within the ring, an annular radial flange formed internally as an integral part of the ring and an annular inclined wall interconnecting adjacent marginal portions of the radial flange and diaphragm for sealing contact

with the inner surface of a container mouth, said flange and attaching skirt formed internally with at least one vent-channel extending from the lower margin of the skirt upwardly and thence radially inward to the upper margin of the inclined wall.

2. In combination a container having an annular wall terminating in a circular mouth defining rim formed at its inner margin with a relatively narrow annular upwardly inclined sealing surface, said wall also provided with an external downwardly outwardly facing abutment for holding engagement with a closure cap, a venting-type closure cap formed at least in part of a resilient thermoplastic material and comprising a relatively heavy semi-rigid ring of greater diameter than said abutment, a resilient skirt depending from said ring, at a point radially inward from its periphery and telescoped over the abutment, an internal bead on the skirt holdingly engaging the abutment, a resilient generally concavo-convex diaphragm within and integral with said ring having its convex side facing axially outward and also having a portion immediately overlying the annular rim of the container, an annular inclined section connecting the last named portion and the diaphragm and normally in sealing contact with said inclined sealing surface of the container, said diaphragm radially outward of the inclined section and both the ring and attaching skirt being formed with vent passageways each at all times normally opening at one end through the lower margin of the skirt and at its other end just above said sealing surface on the container at the upper margin of the inclined section whereby incident to upward flexing of the diaphragm under internal pressure within the container the inclined section of the diaphragm is moved upwardly and inwardly away from the sealing surface whereby the vent passageways communicate with the interior of the container, the vent passageways including an annular downwardly facing channel immediately above the inner margin of the circular rim and generally radial grooves arranged about the closure cap and opening at one end into said channel and at the other end through the lower margin of the attaching skirt.

References Cited in the file of this patent

UNITED STATES PATENTS

1,694,851	Glass	Dec. 11, 1928
2,325,309	De Swart	July 27, 1943
2,693,892	Guinet	Nov. 9, 1954
2,772,013	Stover	Nov. 27, 1956
2,789,719	Wheaton	Apr. 23, 1957
2,834,496	Boston et al.	May 13, 1958