Nov. 2, 1954 A. VISCHER, JR 2,693,292

CONTAINER AND REPLACEABLE SEALING CLOSURE THEREFOR

Filed June 7, 1951 2 Sheets-Sheet 1

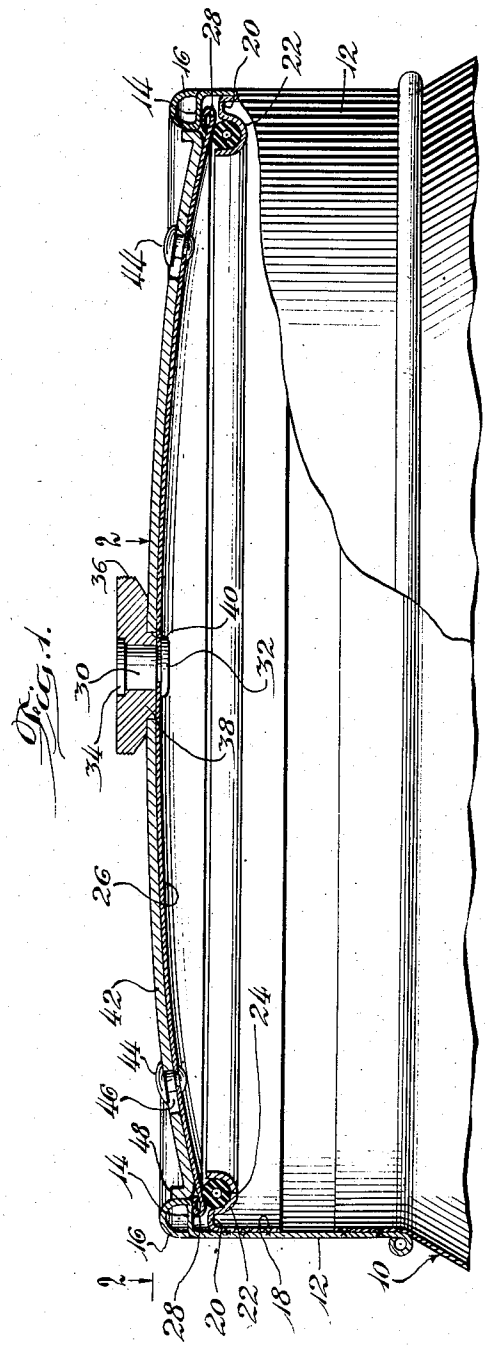


Fig. 1.

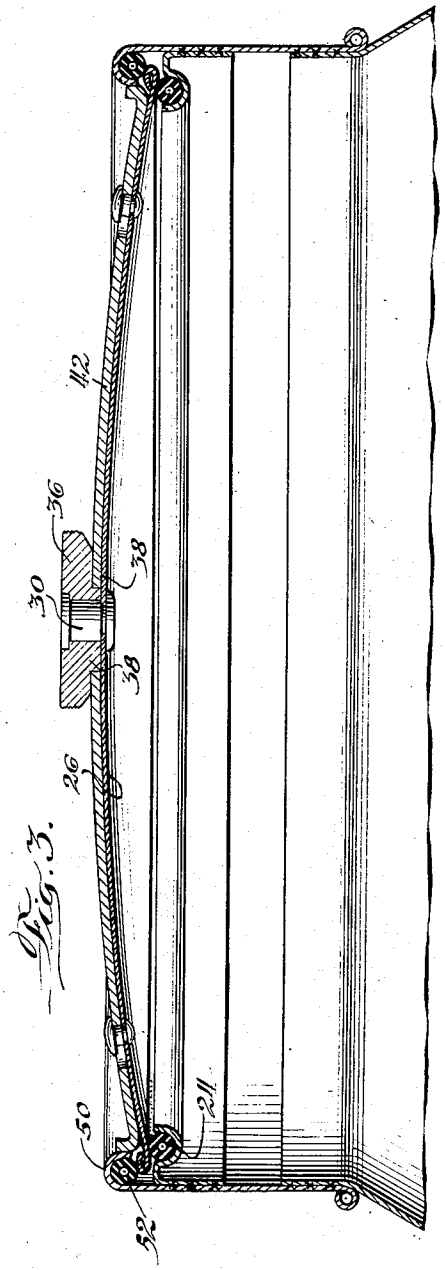


Fig. 3.

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Fig. 4.

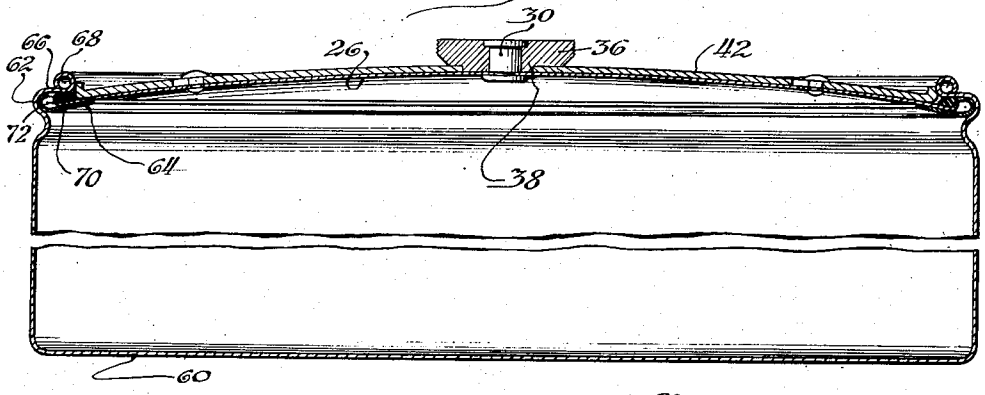


Fig. 4a.

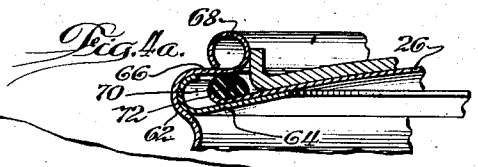
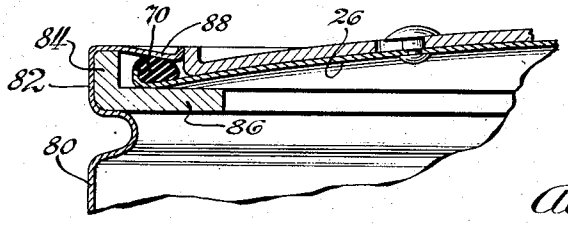


Fig. 2.

Fig. 5.



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2,693,292

CONTAINER AND REPLACEABLE SEALING CLOSURE THEREFOR

Alfred Vischer, Jr., Park Ridge, Ill.

Application June 7, 1951, Serial No. 230,283

4 Claims. (Cl. 220—24)

My invention relates generally to containers and closures, and more particularly to a closure which will be capable of maintaining a substantially airtight seal despite frequent removal and replacement.

In many uses of containers, it is desirable to have a closure which may be repeatedly removed and replaced, and yet will, when in use, maintain the container sealed against admission or escape of liquids and gases. For example, in containers for liquid and solid rations for life boats, life rafts, and the like, it is highly desirable that the food be kept in a substantially airtight container while it is being stored, and, after some of the contents have been removed, that the remaining contents be kept from spoilage by sea water, vermin, bacteria, and the like. For this reason the container closure should be capable of frequent removal and replacement without rendering it incapable of providing an airtight closure for the container.

It is, therefore, the primary object of my invention to provide an improved container and closure in which the container is sealed by the closure and may be repeatedly removed and replaced without detriment to its sealing property.

A further object is to provide an improved container closure which may be operated easily and which will form an effective seal.

A further object is to provide an improved container closure in which the escape of the contents of the container, or the ingress of atmospheric air, is effectively prevented even when the pressure within the container differs from that of the atmosphere.

Other objects will appear from the following description, reference being had to the accompanying drawings, in which:

Fig. 1 is a fragmentary sectional view of the upper portion of a container, showing the closure in container sealing position;

Fig. 2 is a fragmentary sectional view, taken on the line 2—2 of Fig. 1;

Fig. 3 is a fragmentary sectional view of a modified form of the invention, in which the closure seals the container against internal and external pressures;

Fig. 4 is a fragmentary sectional view of a second modified form of the invention;

Fig. 4a is an enlarged sectional view of a portion of the embodiment illustrated in Fig. 4; and

Fig. 5 is a fragmentary sectional view of a third modified form of container and closure.

Referring to Fig. 1, the container **10**, which may be of any desired shape, is indicated as having a cylindrical neck portion **12** which is welded to the body of the container. The container **10** may be of any size, being either of the same diameter as the neck **12**, or of larger diameter, and of any desired height. The neck portion **12** is provided at its upper edge with an inturned horizontal flange **14**, the upper extremity of the neck portion being rolled into a generally round hollow head **16** to reinforce the flange **14**, to render the neck **12** more rigid and to improve its appearance. Welded to the interior of the neck portion **12**, beneath the flange **14**, is a ring **18** having an internally projecting flange **20** terminating in a U-shaped annular groove portion **22**. The groove portion **22** provides a seat for an annular torroidal shaped gasket **24** which may, to insure greater compressibility, be hollow, that is, in the form of a thick walled tube. The gasket **24** may be molded as a complete ring, or a suitable length thereof may be placed

in the groove in such manner that the gasket is under slight longitudinal compression, so that the ends thereof will be resiliently maintained in abutment with each other and form a fluidtight seal.

The container closure comprises a cover **26**, of the construction shown in my prior patent No. 2,282,011, having a peripheral inturned somewhat elliptical bead **28** for reinforcement and for engagement with the inwardly facing surface of the flange **14**. The cover **26** is preferably made of a relatively hard stainless steel or similar sheet metal, and is formed so as to have internal stresses which cause it to assume a warped shape when no constraining forces are applied thereto. However, it is sufficiently flexible that it may be forced manually, without substantial effort, to assume the shape in which it is shown in Fig. 1, that is, substantially a sector of a spherical surface.

The cover is provided with a shouldered rivet **30** at its center. The inner end of the rivet extends through the cover **26**, and is peened over to provide a head **32**. The rivet also has a portion **34** of increased diameter to hold in place a rotatable actuator comprising a knurled knob **36**. An eccentric **38** is formed integrally with the knob **36** and is located within a hole **40** formed in a cross bar **42** which is guided for longitudinally sliding movement on a pair of shouldered and headed rivets **44** secured in the cover **26** near the ends of the cross bar, the rivets extending through suitable elongated slots **46** formed in the cross bar so as to provide guides for the longitudinal movement of the latter. It will be noted (Fig. 2) that the hole **40** is of such conformation that the knob **36** can rotate only through substantially 180° before its eccentric **38** will abut against the edges of the hole **40**. The necessity of providing other limiting stops is thus obviated.

The extremities of the cross bar **42** are provided with upturned flanges **48** forming contact portions or abutments for engagement with the bead **16**. The overall length of the cross bar **42** is substantially the same as the internal diameter of the bead **16** and somewhat less than the diameter of the cover **26**. The cross bar **42** is mounted along the diameter at which the cover normally warps, and thus does not interfere with the warping action of the cover. This warping action is more fully disclosed in my said Patent No. 2,282,011.

As previously indicated, the cover is of warped shape when it is free from restraining forces, so that a projection of its peripheral edge on a horizontal plane will be in the form substantially of an ellipse, the major axis of which is somewhat greater and the minor axis of which is slightly less than the internal diameter of the bead **16**. Due to this fact, the edge of the cover near one end of the major axis, the axis of flexure, may be inserted in the groove formed between the flanges **14** and **20**, the insertion being made further than indicated in Fig. 1 so that the peripheral edge of the cover **26** at the major axis abuts against the internal cylindrical wall of the neck portion **12**. When thus partially inserted, the cover may be forced to assume the shape in which it is shown in Fig. 1 by a downwardly and leftwardly directed force on the button **36**. During such application of downward and left ward pressure, incremental portions of the peripheral edge of the cover **26** slide beneath the flange **14** until all of the surface of the lower peripheral edge is in contact with the gasket **24**. When in this position, the cover **26** would, due to its internal stresses, tend to reassume its warped shape, and thus have a portion of it spring from the confinement provided between the flanges **14** and **20**. It is, therefore, necessary to shift the cover **26** laterally (to the right) in the direction of the cross bar **42** until the cover is centered with respect to the bead **16**. This is accomplished by rotating the knob **36**, thereby, through the eccentric **38**, moving the cross bar **42** longitudinally, and causing its upturned end flange **48** to press against the internal surface of the bead **16**, and thereafter sliding the cover **26** to its central position. It will be noted that in this position the eccentric **38** is prevented from further rotation by virtue of the shape of the hole **40**. In this position there is substantial friction between the eccentric **38** and the walls

of the hole **40** so that accidental rotation of the knob **36** is prevented.

The space between the gasket **24** and the downwardly facing surface of the flange **14** is such that some compression of the gasket is required to permit the insertion of the bead **28** within this space, and as a result a water and airtight seal is effected between the gasket **24** and the downwardly facing surface of the peripheral portion of the cover **26**.

When it is desired to remove the cover **26** from the container, it is necessary merely to rotate the button **36** counterclockwise (Fig. 2), thereby causing the cover **26** to be moved to the left due to the engagement of the eccentric **38** in the hole **40**, and causing the right-hand (Fig. 1) end portion of the cover **26** to be slid leftwardly so that its peripheral bead **28** is no longer beneath the flange **14**. When in this position, the cover will tend to reassume its warped shape, provided a downward force is not applied to the knob **36**, so that the cover may be easily removed from the container by sliding it upwardly toward the right (Fig. 1).

The container closure described above provides an effective seal even if a partial vacuum exists inside the container. The closure may be modified as shown in Fig. 3 to provide an effective seal whether the pressure in the container is greater or less than atmospheric pressure. In this modification the neck portion **12** is turned inwardly at its upper edge to form a U-shaped bead **50** for receiving a second torroidal shaped gasket **52** which faces inwardly. The gasket **52** may be retained inside the bead **50** by the resiliency of the gasket or may be bonded to the bead **50**.

Insertion of the cover **26** between the gaskets **24** and **52** compresses both of the gaskets so that the container is sealed whether it internal pressure is greater or less than atmospheric. If the pressure within the container **10** is greater than atmospheric, the cover **26** is forced against the inwardly facing gasket **52** but if the pressure inside the container is less than atmospheric the cover is forced against the outwardly facing gasket **24**.

Another modification of the container closure is illustrated in Figs. 4 and 4*a*. In this case a sheet metal container **60** has an S-shaped neck portion **62** for retaining a sheet metal ring **64** having a J-shaped cross-section. The upper edge of the sheet metal container **60** is turned inwardly to form a flange **66** and then outwardly to form a circular bead **68**. A gasket **70** is bonded to the upper surface of the edge of the cover **26** and the edge is turned upward to form a flange **72**. The cover is inserted between the sheet metal ring **64** and the inwardly directed flange **66** to seal the container. The insertion of the cover **26** into the groove between the ring **64** and the flange **66** compresses the gasket **70** and forces the lower surface of the edge of the cover **26** into firm, intimate contact with the upper surface of the ring **64**. The container **60** thus is tightly sealed even if the pressure inside the container is considerably greater than atmospheric pressure.

Fig. 5 illustrates another modified form of the container closure. A thin walled container **80** has a neck portion **82** which has an S-shaped cross-section for retaining an internal ring **84** having an L-shaped cross-section. An inwardly extending flange portion **86** of the ring **84** and the upper edge of the container **80**, which is turned inwardly and slightly downwardly to form a flange **88**, provide lower and upper walls of a dovetail groove for receiving the edge of the cover **26**. The gasket **70** is bonded to the edge of the cover **26** and in this respect the cover has the same construction as illustrated in Fig. 4. Insertion of the cover **26** through the narrow neck portion of the groove between the flanges **86** and **88** compresses the gasket **70**. As the edge of the cover **26** moves further into the groove the gasket expands slightly because the groove is somewhat wider at its base than at its neck. When the cover **26** is removed, the gasket **70** is again compressed for passage through the narrow neck of the groove. Thus the groove between the flanges **86** and **88** tends to retain the cover **26** in centered position. The use of a groove having a narrowed neck portion tends to prevent accidental movement of the cover which might inadvertently break the seal formed by the container closure.

Except for the above described variations in the edge portions of the cover, the cover construction of the modifications illustrated in Figs. 3–5 is the same as described in detail in connection with Figs. 1 and 2. In all of the illustrated container closures, the cover is inserted in the same way as described above.

While I have shown and described preferred embodiments, it will be apparent that numerous variations and modifications thereof may be made without departing from the underlying principles of the invention, I, therefore, desire by the following claims to include within the scope of the invention all such variations and modifications by which substantially the results of my invention may be obtained through the use of substantially the same or equivalent means.

I claim:

1. In a closable container, the combination of means defining a circular container opening, means on the container adjacent said opening defining an annular groove opening radially inward, a flexible circular cover having a peripheral edge received in said groove and having a diameter larger than said opening, said cover being internally stressed so as to have a residual warp about a diametrical axis thereof to facilitate its insertion into and removal from said groove, a cover sliding member having a length equal to the diameter of the container opening mounted on said cover for movement generally along said diametrical axis of warp and having container contacting abutments thereon at the ends thereof extending substantially above the top of the cover and engaging said means defining the container opening at loci above the cover, and an actuator connected to said cover sliding member and movably anchored to said cover for moving said sliding member container contacting abutments radially in relation to the cover to shift said cover sidewise by the reaction of the actuator and said sliding member on the container.

2. In a closable container, the combination of means defining a circular container opening, means on the container adjacent said opening defining an annular groove opening radially inward, a flexible circular cover having a peripheral edge received in said groove and having a diameter larger than the inner diameter of said groove, said cover being internally stressed so as to have a residual warp about a diametrical axis thereof to facilitate its insertion into and removal from said groove, a gasket mounted to form a tight seal between one side edge of said groove and the adjacent marginal edge of said cover when the latter is disposed within said groove, a cover sliding member having a length equal to the diameter of the container opening mounted on said cover for movement generally along said diametrical axis of warp and having container contacting abutments thereon at the ends thereof extending substantially above the top of the cover and engaging said means defining the container opening at loci above the cover, and an actuator connected to said cover sliding member and movably anchored to said cover for moving said sliding member cover contacting abutments radially in relation to said cover to shift the latter sidewise by the reaction of said actuator and said sliding member on the container.

3. In a closable container of the character described, the combination of means defining a circular container opening, means on the container adjacent said opening defining a narrow annular groove opening radially inward, a flexible circular cover having its peripheral edge received in said groove and having a diameter larger than said opening, said cover being internally stressed so as to have a residual warp about a diametrical axis thereof to facilitate its insertion into and removal from said groove, a cover sliding bar longitudinally movably mounted on said cover and extending along said diametrical axis of warp thereof, said sliding bar having a length equal to the diameter of the container opening and having its ends formed with container contacting abutments engaging said means defining the container opening at loci above the cover, and a bar actuator connected to said bar and rotatably anchored to said cover to shift said bar radially along the cover for sliding said cover sidewise by the reaction of the container on said bar and said actuator.

4. In a closable container of the character described, the combination of means defining a circular container opening, means on the container adjacent said opening defining a narrow annular groove opening radially inwardly, a flexible circular cover having its peripheral edge received in said groove and having a diameter larger than said opening, said cover being internally stressed so as to have a residual warp about one diametrical axis

thereof to facilitate its insertion into and removal from said groove, a cover sliding bar having an upstanding flange at each end and slidably mounted on said cover along said diametrical warp axis thereof and having a length substantially equal to the inner diameter of said groove defining means, and an eccentric actuator rotatably anchored to said cover and engageable with said bar for shifting the latter in opposite directions, to slide said cover sidewise by the reaction of the container transmitted to said cover through said bar and said actuator.

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