June 2, 1964 W. W. OSBORNE 3,135,411

VACUUM SEALING MEANS

Filed May 9, 1963

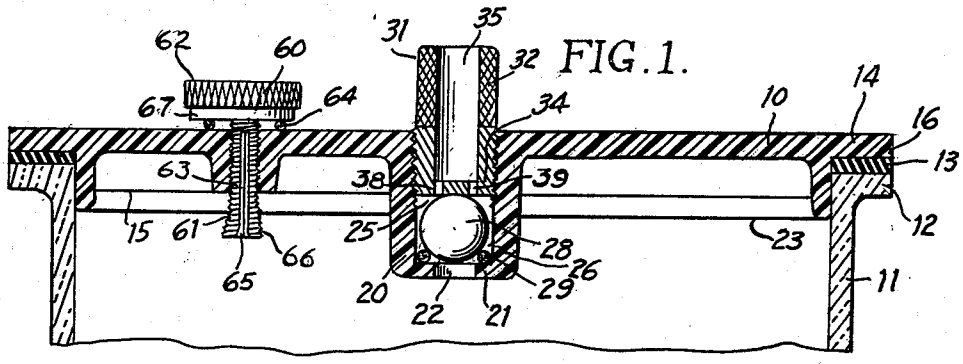


FIG. 1.

FIG. 2.

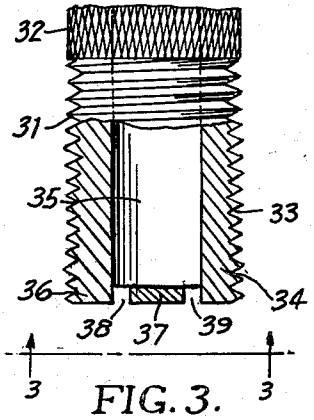


FIG. 3.

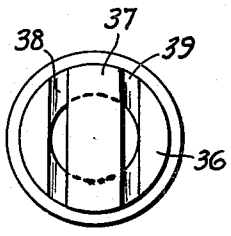


FIG. 4.

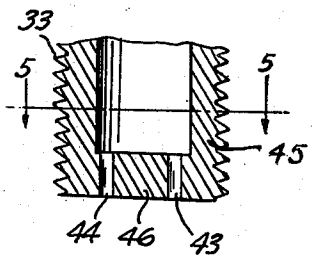


FIG. 5.

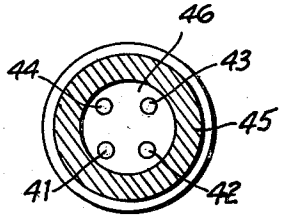
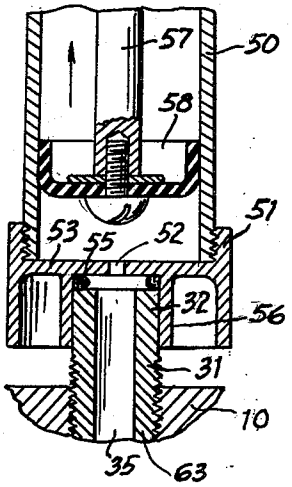


FIG. 6.



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VACUUM SEALING MEANS

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6 Claims. (Cl. 215—50)

This invention relates to an apparatus for preserving a vacuum in a container, and in particular, to a novel combination of a closure member for the container and valve means mounted thereon by which a vacuum is obtained and preserved.

An object of this invention is to provide for a novel valve mechanism associated with a closure member, and by which association a permanent vacuum is effected in a receptacle upon which the closure element is mounted.

Another object of this invention is to provide for a simple, expeditious, and efficient method by which a vacuum may be obtained with the use of my invention and a pump associated therewith.

A further object of this invention is to provide for a permanent vacuum in a receptacle in which it is required that moisture and air be removed for safe-keeping of food stuffs such as cookies, crackers, and the like, or for apothecary and other medicines which must be kept moisture-free until use thereof.

These and other objects and advantages of the invention will be apparent to those ordinarily skilled in the art to which this invention pertains, upon a reading of the following description and appended claims thereto, taken in connection with the accompanying drawing in which reference characters therein correspond to like numbers in the description and in which:

FIG. 1 is a view in section of subject matter incorporating my invention;

FIG. 2 is an enlarged view of a portion of the subject matter in FIG. 1;

FIG. 3 is a view taken on line 3—3 of FIG. 2;

FIG. 4 is a fragmentary sectional view of a modified form of an element shown in FIG. 1;

FIG. 5 is a view taken on line 5—5 of FIG. 4; and

FIG. 6 is a fragmentary view in section of means by which a vacuum is created with the use of my invention.

FIG. 1 shows a circular plastic or glass closure member 10 mounted on a neck 11 of a container such as a jar, bottle, or the like, having a substantially wide, preferably flat, boss 12 formed integrally with neck 11. A flat ring gasket 13 snugly engages a peripheral marginal area 14 on the underside of closure member 10 by means of an integrally formed circular vertical depending flange 15 mounted inwardly a sufficient difference in diameter from the peripheral edge 16 of member 10. Ring gasket 13 is adapted to register upon or engage flat flange 12 of the container when closure member 10 is positioned thereupon. Vertical flange 15 is spaced sufficiently inwardly from peripheral edge 16 so that closure member 10 may be combined with a variety of containers having variously sized internal neck diameters. It should be understood that the radial distances of peripheral marginal area 14 and gasket 13 mounted thereon are each sufficiently great that gasket 13 registers upon or engages a portion of flange 12 so that a physical engagement exists between the container and closure member 10.

Mounted centrally of and integrally with closure member 10 is a well 20 provided for supporting a valve mechanism by which a vacuum may be established in the container. Well 20 preferably depends beneath closure member 10, terminating in a base 21 having an aperture 22 therein. Base 21 preferably lies below all points of terminal edge 23 of circular flange 15. Well 20 comprises a cylinder having a threaded cylindrical bore 25 extending

from the surface of member 10 to a smooth-surfaced cylindrical chamber 26 terminating at base 21. A stainless steel valve ball 28, of slightly less diameter than chamber 26, is seated therein, upon an O-ring 29 snugly set against or engaging the perimeter of base 21 at its juncture with the cylindrical walls of chamber 26.

A threaded valve stem 31 (FIGS. 1 and 2) is disposed in well 20, and comprises a manually-seizable head 32 exposed above closure element 10, a threaded cylindrical body 33 engaging threaded bore 25, a terminal portion 34 on body 33, and a bore 35 extending centrally of the valve stem, communicating with the atmosphere adjacent head 32 and ending in terminal portion 34. Terminal portion 34 is adapted to engage a spherical surface of ball 28 as valve stem 31 is screwed deeper into or closed in well 20. Terminal portion 34 comprises a finite solid body portion 36 disposed below bore 35 of the valve stem, and in which a centered bridge 37 is formed by milling a pair of off-center slots 38 and 39 in such solid portion. Slots 38, 39 communicate with bore 35. Thus, as valve stem 31 is manually closed, centered bridge 37 registering upon ball 28 effects a permanent seal between O-ring 29 and ball 28. Such registry is assured by providing for a diameter of ball 28 slightly greater than the depth of chamber 26 or by providing for an O-ring 29 of such size to seat and elevate ball 28 above chamber 26 for a positive physical engagement between ball 28 and bridge 37.

Thus terminal portion 34 comprises means by which air is withdrawn from the container closed by member 10 as well as providing for means by which valve ball 28 maintains a seal on aperture 22 through which a developed vacuum in the receptacle is permanently established.

A modified form of a segmental body portion is shown in FIGS. 4 and 5. Rather than having milled slots formed therein, a plurality of apertures 41, 42, 43, 44 (FIG. 5) disposed off-center of a valve stem 45 is punched out in such a manner as to provide for a bridge 46 on valve stem 45, adapted to tangentially engage a spherical surface of a valve ball seated in a well of closure member 10 such as shown in FIG. 1.

FIG. 6 shows means and method by which a vacuum may be developed in a container to which my invention is applied. The loosening of valve stem 31 in well 20, as shown in FIG. 6 by exposure of some of the threads thereof above member 10, provides for ball 28 to be freely disengageable from O-ring 29. A hand pump cylinder 50 is thereafter mounted upon loosened head 32 by means of an adaptor 51 threaded to the front end of pump cylinder 50. Adaptor 51 is provided with an aperture 52 located in its base 53 and by which the interior of pump cylinder 50 is communicable with valve stem bore 35. Valve stem head 32 is disposed upon or engages an O-ring 55 seated in a neck 56 of adaptor 51 to prevent improper functioning of pump cylinder 50 in its association with well 10. As pump cylinder 50 is firmly held to valve stem head 32, a handle (not shown) attached to plunger rod 57 on the end of which plunger 58 is suitably secured, is manually actuated. As plunger 58 reciprocates upwardly in its housing 50, air is sucked and withdrawn from a container through well 20. Valve ball 26 above O-ring 29 becomes unseated thereby providing for the withdrawal of air from the container by means of aperture 22 in base 21 of well 20, around freely movable ball 28 in chamber 26, through milled slots 38, 39 or punched apertures 41–45 in segmental portion 36 to bore 35 and pump cylinder 50.

As plunger 58 is reciprocated downwardly, ball 28 seats upon O-ring 29, preventing ingress of air to the container. After several repeated reciprocations of plunger 58, a sufficient amount of air is removed from the con-

tainer, a vacuum is established in the container and valve ball 28 is pneumatically held against O-ring 29. To prevent seepage of air between valve ball 28 and O-ring 29, valve stem body 31 is closed into well 20, whereby centered bridge 37 or 46 engages the topmost spherical surface of ball 28 to retain the latter in a permanently sealed relationship with O-ring 29. A permanent vacuum is thereby provided for in the container thereafter.

A suitable release valve means 60 is provided in closure member 10 off center from well 20, whereby ingress of air to the closed receptacle releases the vacuum. In the preferred embodiment illustrated, a screw 61 having a finger-turning head 62 and a threaded shaft 63 extending through closure member 10, is normally maintained in tightened relationship thereto, by means of an O-ring 64 mounted on shaft 63 and cooperating with closure member 10 to prevent ingress of air into the closed container.

By unscrewing finger head 62, air is admitted to a closed receptacle by means of a milled slot 65 vertically extending along a length of the screw-threaded portion of shaft 63 between a flared out terminus 66 provided for retention of means 60 with member 10 and a point along its length below O-ring 64. A washer 67 may be mounted on shaft 63 to decrease distortion of O-ring 64 as head 62 is rotated.

It will thus be seen that by tightly engaging valve stem 31 against ball 28 by registry means 37 or 46, a permanent seal is effected at aperture 22 and vacuum maintained for an indefinite length of time. I have personally tried to rupture a vacuum established for more than a three month period in a container using my invention, by trying to manually remove closure member 10. This was impossible to do. Only upon opening valve means 60, was I able to remove closure member 10.

It is to be understood that various changes and modifications may be made in the embodiment of my invention herein described and illustrated, in size, shape, materials and arrangement, without departing from the spirit and scope of the invention as claimed.

Therefore, what I claim as new and patentable is:

1. The improvement in a closure member for a container to be put under vacuum, comprising

a well mounted in the closure member,

valve means disposed in said well, said well having an apertured base therein,

said valve means comprising

a valve stem disposed in said well,

a valve ball in a chamber disposed in said well below said valve stem,

said ball adapted to be seated on an O-ring about the perimeter of said base of said well,

said stem having a bore open to atmosphere at one end and a solid terminal portion at its other end,

at least one off-centered passageway in said terminal portion providing for communication between said bore and chamber, and

means included on said terminal portion to engage said ball when said valve stem is closed thereby preventing air seepage through said valve means into the container.

2. In a vacuum container, the improvement comprising a closure member for the container, an annular gasket mounted on said member adapted to register with the container, a well integrally formed on said member and having an apertured base therein providing for access to the interior of the container upon positioning said closure member on the container, an O-ring seated on said base, a spherical ball resting on said O-ring, a valve stem disposed in said well, said stem having a bore open to atmosphere at its one end and means provided on its other end to engage said ball, said means including at least one off-centered passageway communicating with said bore and portion of well in which said ball is disposed, said engaging means adapted to maintain said ball tightly against said O-ring thereby eliminating seepage of air into the container through said well.

3. The improvement in a closure member to maintain a permanent vacuum in a container comprising, in combination, a well mounted integrally on said member, said well having an apertured base therein, valve means disposed in said well, said valve means comprisig a valve stem having a bore open to the atmosphere at its one end, a ball disposed in said well below said stem above said base, an O-ring mounted on said base and engageable with said ball, a first means on the other end of said stem to engage said ball against said O-ring thereby sealing said well from the interior of the container, and a second means on such other end of said stem communicable with said bore and said well whereby air is capable of being removed from the container upon opening of the valve stem.

4. The improvement of claim 3 wherein said first means comprises a terminal portion on said valve stem engageable with a spherical surface of said ball when said valve stem is closed.

5. The improvement of claim 3 wherein said second means comprises a terminal portion on said valve stem having at least one off-centered passageway in said terminal portion communicating with said bore and well.

6. The improvement of claim 3 wherein said first means comprises a terminal portion on said valve stem engageable with a spherical surface of said ball when said valve stem is closed, and said second means comprises a terminal portion on said valve stem having at least one off-centered passageway in said terminal portion communicating with said bore and well.

No references cited.