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H. ULANET

2,312,738

HERMETIC SEAL BOTTLE STOPPER

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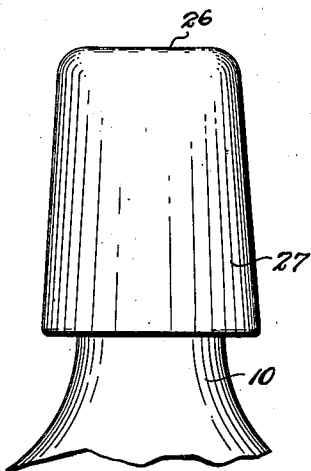


Fig. 1

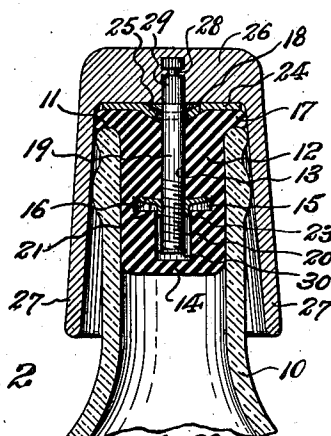


Fig. 2

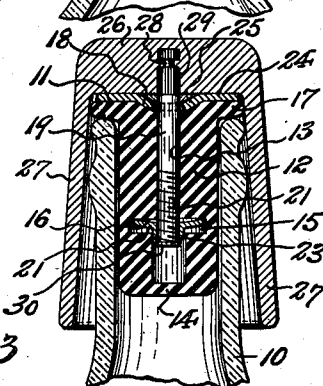


Fig. 3

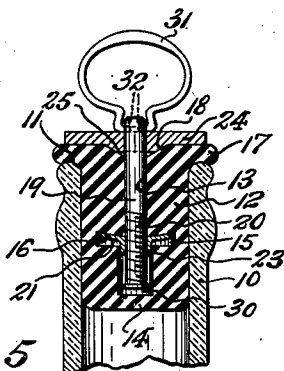


Fig. 5

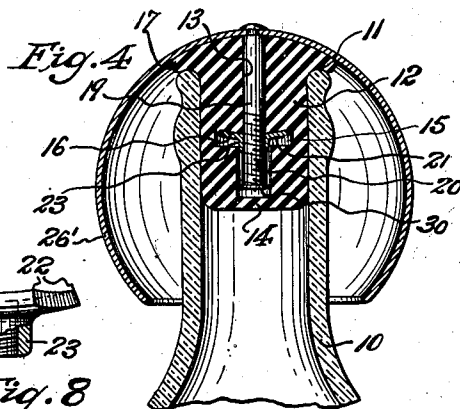


Fig. 4

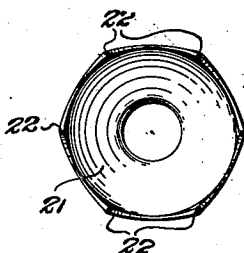


Fig. 6

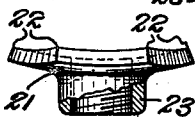


Fig. 8

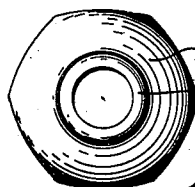


Fig. 7

INVENTOR.
Herman Ulanet,
BY George Richards,
ATTORNEY.

UNITED STATES PATENT OFFICE

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HERMETIC SEAL BOTTLE STOPPER

Herman Ulanet, Newark, N. J.

Application June 19, 1940, Serial No. 341,267

1 Claim. (Cl. 215—54)

This invention relates to improvements in stoppers for bottles and similar containers; and the invention has reference, more particularly, to a stopper operable to hermetically seal a bottle or container mouth; this application being a continuation in part of my co-pending application for U. S. Letters Patent, Serial No. 292,594, filed on or about August 30, 1939.

This invention has for an object to provide a simple and easily manipulatable expansible stopper which will initially loosely engage within the interior of a bottle or container neck portion, and which is provided with rotatively manipulatable means, cooperative with an internal compression plate of novel form, for actuating the stopper body so as to laterally or radially expand the same into tight, hermetically sealing engagement with the internal surfaces of the bottle or container neck portion.

The invention has for another object to provide an expandible bottle stopper body having at its upper end a compressible, externally projecting annular flange to overhang and engage the lip of the bottle or container mouth, said stopper body being further provided at its upper end with an axially aligned inverted conical depression, whereby, when axially directed pressure is brought to bear upon the upper end of the stopper body, stresses will be set up adapted to exert downward and laterally outward compressive thrust upon the material of said upper end portion and the flange so as to thrustingly crowd the same into tight sealing engagement with the lip of the bottle or container mouth in addition to the sealing expansion of the stopper body within the bottle neck interior.

Another object of the invention is to provide a rotatively manipulatable actuating means for the stopper body which is in the form of a hollow external cap adapted to telescopically engage exteriorly over and around the bottle or container neck portion, when the stopper device is operatively applied to the latter, and thus being adapted not only to provide a hand hold surface of generous area calculated to greatly facilitate operative manipulation thereof; but, being of greater length than the stopper body so as to fully enclose the same at all times, also adapted to provide both an external protective cover enclosing the mouth portion of the bottle or container to which the stopper device is applied, as well as a protective covering or guard for the stopper body per se, when the latter is removed from the bottle or container, whereby when the stopper device is laid aside, or should

it be dropped upon the floor or other place, said stopper body is fended from contact with dirt, germs or other foreign matter.

Other objects of this invention, not at this time more particularly enumerated, will be understood from the following detailed description of the same.

Illustrative embodiments of the invention are shown in the accompanying drawing, in which:

Fig. 1 is an elevational view of the neck portion of a bottle to which one form of the novel stopper device has been operatively applied; Fig. 2 is a longitudinal vertical section through the construction of Fig. 1, showing the stopper body expanded and compressed to hermetically sealing relation to the bottle neck walls and the lip of the bottle mouth; Fig. 3 is a similar sectional view showing the stopper body relaxed for detachment from the bottle; Fig. 4 is a sectional view similar to that of Fig. 2 but showing a modified form of the manipulating and stopper body shielding cap; and Fig. 5 is also a sectional view similar to that of Fig. 2, but showing a simplified capless form of stopper body manipulating means.

Fig. 6 shows a top plan view, Fig. 7 a bottom plan view and Fig. 8 a vertical sectional view, all on enlarged scale, of the novel internal compression plate means with which the stopper body and its actuating means is provided.

Similar characters of reference are employed in the above described views, to indicate corresponding parts.

In the drawing, the reference character 10 indicates the neck portion of a bottle, which terminates in an open mouth defined by the surrounding annular lip 11.

The novel stopper device, in a preferred form thereof, shown in Figs. 1 to 3 inclusive, comprises a cylindrical stopper body 12 having an axially extending bore 13 leading downwardly therethrough from its upper end, but terminating short of its lower end so as to be closed by the solid bottom portion or wall 14 of said body. Formed in the lower end portion of said body 12, in spaced relation to and above the closed lower end of said bore 13 is a laterally extending, diametrically enlarged annular chamber or recess 15, which is open to said bore, and the top wall of which provides a seating surface 16 adapted for operative engagement by the novel internal compression plate of the stopper actuating means to be subsequently described. At its upper end portion, said stopper body 12 is provided with a laterally and externally project-

ing annular flange 17 adapted to overhang and seat upon the lip 11 of the bottle neck mouth. Centrally formed in the upper end portion of the stopper body 12, in axial alignment with the bore 13 thereof, is an inverted conical depression 18. Said stopper body is made of an elastic material, such e. g. as soft rubber, which is capable of resilient deformation under applied compressive force.

The means for exerting compressive force upon the stopper body to expand and otherwise crowd the same into sealing contact with the sides of the bottle neck and with the lip 11 of the bottle mouth comprises, a stem or spindle 19 which extends downwardly through the bore 13 of the stopper body, and which is capable of free rotative movement therein. The lower inner end portion of said stem or spindle 19 is provided with external screw-threads 20 of suitable pitch. Housed in the chamber or recess 15 of the stopper body is an internal compression plate 21 of novel form, the same comprising a dished or concavo-convex disc of suitable material, preferably sheet metal, which is of suitable polygonal peripheral shape, for example of hexagonal shape. By reason of its dished form and polygonal peripheral shape a series of somewhat upwardly directed gripping points 22 are circumferentially spaced around the perimeter of said plate 21. Pressed downwardly and outwardly from the convex underside of the body of said plate 21 is a central hollow or tubular hub portion 23, the bore of which is internally screw threaded for operative engagement by the screw threads 20 of said stem or spindle 19. Mounted on the upper end of the stem or spindle 19 is a perforate metallic washer 24 having a central inverted conical bearing portion 25 to abut or seat upon the inclined sides of the conical depression 18, with which the top end of the stopper body 12 is provided.

In one form thereof, the rotatively manipulatable means for operatively turning the stem or spindle 19 comprises, a cap body 26 which may be of a suitable configuration, but which preferably includes an annular skirt flange 27 dependent therefrom and of such diametric size as to loosely telescopically engage over and externally around the neck portion of a bottle or other container in concentric surrounding relation thereto when the stopper device is operatively applied to the bottle or other container. Said cap body 26 may be made of a molded plastic material, such e. g. as hard rubber, a synthetic resin plastic, casein or the like. The upper end of the stem or spindle 19 is axially aligned with and suitably affixed rigidly to said cap body. When the cap body is made of molded material, the upper end portion thereof is molded into said cap body so as to be imbedded in and interlocked with the material thereof against both relative rotative and axial movement. One means for so relating the cap body and stem or spindle comprises provision in the imbedded end portion of the latter of an annular channel or groove 28 into which the material of the cap body will penetrate during molding of the latter, thereby to interlock the stem or spindle therewith against axial displacement; and additionally providing the surfaces of the imbedded end portion of the stem or spindle with indented knurling 29 into which the material of the cap body will penetrate during molding of the latter, thereby to interlock the stem or spindle therewith against rotative displacement. In assembling the parts of the stopper device into

operative relation, the washer 24 is engaged over the stem or spindle 19, and moved thereon into abutting relation to the under side of the cap body top wall, whereafter the compression plate 21 is screwed onto the stem or spindle, and properly positioned thereon, after which the free lower end of the stem or spindle 19 is mushroomed or upset to provide a stop bead 30, operative to prevent accidental separation of the compression plate 21 from the stem or spindle. When the parts are thus assembled, the stem or spindle 19 together with the compression plate 21 is forced downwardly through the bore 13 of the stopper body 12 (the latter, due to its resiliency readily yielding to such passage, especially when an assisting lubricant is employed) until the compression plate 21 snaps into place within the chamber or recess 15 provided in the stopper body for its reception, thereby opposing the concave face of the compression plate, together with its gripping points 22 to the seating surface 16 aforesaid.

The length of the skirt flange 27 of the cap body is in excess of the total length of the stopper body 12 as assembled therewith and therein, whereby said stopper body is fully enclosed by the cap body, and consequently when the stopper device is removed from the bottle or container and laid aside or set down as upon the surface of a counter, table or other place, or should it be accidentally dropped upon a floor surface, the skirt flange 27 fends away the stopper body 12 from any contaminating contact with dirt or soil carried by said surfaces. From the standpoint of maintenance of the stopper body in a proper sanitary condition, this feature of my invention is of real advantage and importance.

In use, the novel stopper device is applied to a bottle or like container by inserting the normal initially contracted stopper body 12 into the interior of the bottle neck until the flange 17 is stopped in frictional engagement with the lip 11 of the bottle mouth. To expand the stopper body laterally into tight hugging and hermetically sealing relation to the internal sides of the bottle neck wall, and at the same time to firmly and tightly compress the flange 17 against the lip 11 of the bottle mouth, the cap body 26 is turned, while down-pressed to maintain frictional engagement of the flange 17 with the bottle mouth lip 11, whereby the stopper body 12 is held against turning with the cap body, thereby rotating the stem or spindle 19 relative to the internal compression plate 21. Since the gripping points 22 of said compression plate 21 engage the seating surface 16 with tendency to dig into the overlying portion of the stopper body 12, said compression plate 21 is firmly held stationary, and thus prevented from partaking of the rotary movement imparted to the stem or spindle 19. The turning of stem or spindle 19 in proper direction, operates, through its screw-threaded connection with the compression plate 21, to cause the latter to travel upwardly on said stem or spindle, and consequently a longitudinal or axial compressional force is exerted upon the stopper body 12, whereby the latter is quickly expanded radially into tight hugging and hermetically sealing engagement with the bottle neck wall. At the same time the downward thrust exerted as a consequence of this action upon the stem or spindle 19 and cap body 26 causes the latter to bear upon the washer 24 with down thrusting pressure, whereby not only does said washer compressively squeeze down the stopper body flange

17 upon the bottle mouth lip 11, but likewise the oblique thrust of the conical bearing portion 25 of said washer against the inclined sides of the inverted conical depression 18 at the upper end of the stopper body 12 tends to laterally spread the flanged end portion thereof into tight hugging relation to and around the internal peripheral parts of the bottle mouth lip 11, with result that an exceedingly efficient fluid tight seal is assured.

The washer 24 provides a bearing surface in support of rotative movement of the cap body 26 of minimum frictional resistance, and consequently facilitates quick and easy manipulation of the stopper device.

The novel form of the internal compression plate 21, with its concave stopper body opposing face and gripping points 22, assures a firm and non-slipping operative engagement of the stopper body, while at the same time so grips the stopper body material as to offer strong and adequate resistance to any tendency to escape or force itself upwardly into the bore 13 of the stopper body, which tendency, resulting in accidental disarrangement of the parts, has been observed with respect to smooth flat topped nuts, travelers or compression exerting means of like form and character.

In Fig. 4 I have shown a modified form of stopper body actuating cap and shield comprising, a spherical metallic shell 26' to which the stem or spindle 19 is rigidly riveted so as to turn therewith. In this form of the device, the washer interposed between the cap body and stopper body may be omitted if desired, since the metallic material of the shell 26' will move relative to the stopper body with but little hampering frictional resistance.

It may frequently be desired to provide a simple capless type of stopper device of comparatively low cost. A stopper device of this type is

shown in Fig. 5, wherein a handle loop 31 is secured to the upper free end of the stem or spindle 19 in abutting relation to the washer 24. If desired, the handle loop 31 may be pivotally coupled to the stem or spindle 19 by journal members 32 arranged to enter respectively in opposite ends of a transverse bearing opening with which said stem or spindle 19 is provided.

Having described my invention, I claim:

- 10 A stopper device for the purposes described comprising, an expandible elastic stopper body adapted to initially loosely fit into the neck portion of a bottle or the like and having an annular flange at its upper end to engage over the bottle
- 15 mouth lip, said stopper body having a central inverted conical depression in its upper end inwardly of said flange, a washer overlying the flanged upper end of said stopper body, said washer having a central inverted conical bearing
- 20 portion to engage in said body depression, a manipulatable relatively rotatable cap body overlying said washer and having a shielding skirt exceeding in length the length of said stopper
- 25 body to fully enclose the latter in concentric spaced relation thereto, said stopper body having an axial bore extending from its upper end and terminating short of its lower end and an annular
- 30 recess of enlarged diameter around and open toward the lower end portion of said bore, a screw-threaded spindle fast to said cap body to enter said stopper body bore, a compression plate entered in said recess, said plate having an internally screw-threaded hub-portion engaged by
- 35 said screw-threaded spindle, said compression plate being of concavo-convex form and of polygonal peripheral shape thereby to provide a dished face and upwardly projecting gripping points to non-slippingly abut and grip the stopper body at the upper wall of said recess when said plate
- 40 is caused to travel upwardly on said spindle.

HERMAN ULANET.