

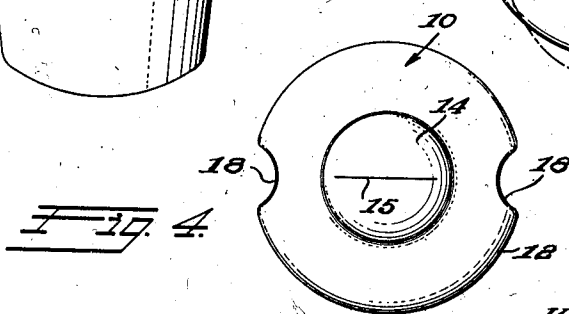
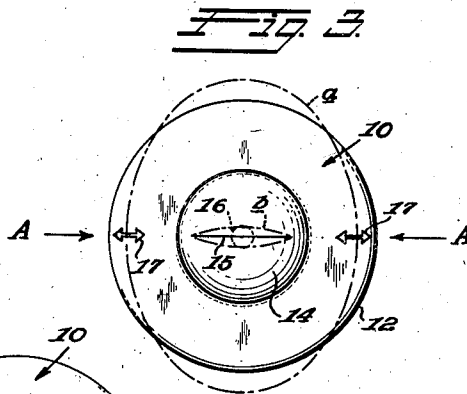
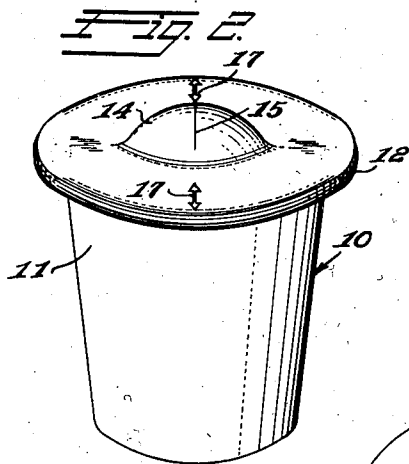
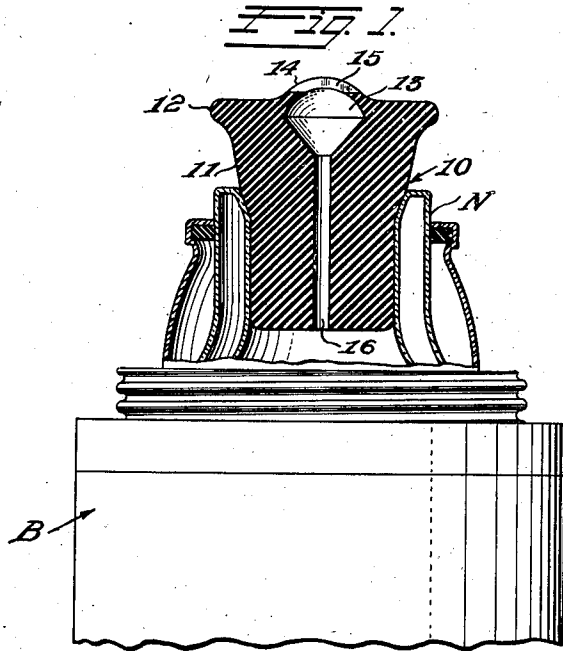
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MANUALLY OPERABLE VACUUM RELEASING BOTTLE STOPPER

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MANUALLY OPERABLE VACUUM RELEASING
BOTTLE STOPPER

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8 Claims. (Cl. 215—56)

This invention relates to a manually operable vacuum releasing bottle stopper. More particularly the invention is concerned with a stopper which is suitably adapted for use with Thermos bottles or other thin neck vessels wherein a pressure may be developed below atmospheric after the stopper has been inserted within the neck of the bottle, whereby it becomes difficult thereafter to remove the stopper. Under such conditions the danger of damaging the stopper or breaking the neck of the vessel by the use of tools or by merely exerting lateral pressure upon the stopper in an effort to loosen or remove the same will be readily appreciated.

Thus, the difficulty of removing stoppers under such conditions from thin neck vessels particularly, has been long recognized but to the best of my knowledge all efforts to overcome the same have failed to provide a stopper of usual size and shape and without complicated attachments for manipulation or operation thereof to equalize the pressure on opposite sides of the stopper.

The primary object of the present invention is, therefore, the provision of a stopper of substantially the usual shape and size which is particularly adapted to Thermos bottles or other vessels which in normal use are subject to pressure therein below atmospheric, and which upon merely gripping the stopper in the normal manner at diametrically opposite points thereon for the release thereof from the bottle and by simultaneously exerting slight pressure toward the axis of the stopper from the gripping points atmospheric pressure may be immediately established within the bottle.

A further object of the invention is the provision of a stopper preferably formed of a single piece of yieldable material such as rubber, or other moldable plastic material, and which is provided with a peripheral reinforcing flange at its upper end and an integral air admitting means within the flange, which means is operative upon manual compression of the flange at diametrical points thereon in the normal act of removing the stopper from the bottle.

A still further object of the invention is the provision of a stopper of the above noted character which is simple in construction, efficient in operation and which is capable of manufacture at relative low cost.

For a more complete understanding of the invention and objects of the invention, reference will be had to the accompanying drawing, wherein:

Figure 1 is a view showing the upper portion

of a Thermos bottle partially in elevation and partially in section and further showing the novel stopper in axial section in operative position in the bottle;

Fig. 2 is a perspective view of the stopper showing the flanged top thereof and intermediate vacuum releasing means;

Fig. 3 is a top plan view of the stopper showing in dot-and-dash lines the outline thereof in a vacuum releasing operation; and

Fig. 4 is a top plan view of the stopper in accordance with a modified embodiment thereof.

Referring now in detail to the drawing, 10 designates the novel stopper in its entirety and which stopper is adapted for use with a Thermos bottle or Dewar vessel B having a stopper receiving neck N.

The neck N as indicated and as is commonly known comprises a double glass wall, the inner wall of which is engaged by the stopper 10. In Thermos bottles and like vessels, a substantial vacuum is often produced by the cooling of heated fluids therein, thereby rendering the removal of the stopper difficult against atmospheric pressure thereon. Since the structure of the neck N will not permit of such lateral or wobbling movements to the stopper as are required to loosen it, it becomes necessary that some means be provided whereby the stopper may be withdrawn axially in order to preserve the usefulness of the bottle.

With this condition in mind the novel stopper 10 includes a body portion 11 which is yieldable and preferably molded from gum rubber. The body 11 is of elongated tapered form as shown particularly in Fig. 2, and at its top is provided with a peripheral flange 12. The body is further provided with an inner bulb portion providing a chamber 13 whose upper wall 14 is semi-spherical and projects above the otherwise plane top of the stopper and within the flange 12.

The wall 14 is provided with a slit 15 extending diametrically of the stopper through the bulb 13 and the interior of the bulb portion 13 is also shown in communication with a bore or passage 16 extending axially of the body 11 and opening through the inner end thereof.

As is shown in Figs. 2 and 3, indicating means in the form of double arrows 17 are provided in diametrical alignment and in alignment with the slit 15.

Having described the detailed construction of the improved stopper in accordance with a preferred physical embodiment thereof, the operation of same is as follows:

With the stopper in position in a bottle as

illustrated in Fig. 1, the lateral edge of flange 12 is gripped as between the thumbs and forefinger at diametrically opposed points in alignment with the arrows 17 and slit 15, whereupon pressure is exerted in the direction of the arrows as illustrated at A—A in Fig. 3, which action results in deformation of the reinforcing flange 12 adjacent portions of the top of body 11 from the circular outline to a more or less elliptical outline as indicated at *a*. Separation of the walls defining the slit 15 to the position indicated at *b* thus results in air being admitted into the interior of the bulb portion 13, bore 16 and the interior of the bottle B with an equalization of pressure on both ends of the stopper 10.

Having thus released the vacuum or partial vacuum in the bottle B, the stopper 10 is then withdrawn axially from the neck N while still grasped between the thumb and forefinger. Thus it will be seen that in releasing the vacuum and withdrawing the stopper substantially no more time or effort is required than in withdrawing the stopper only in normal fashion.

There should be no tendency toward moving the stopper bodily in a lateral direction with a consequent danger of breaking the bottle and since the slit 15 is provided in the semi-spherical wall, same will be normally maintained in a fluid sealing condition, with the further aid of the reinforcing flange 12.

By the provision of the arrows 17 the flange 12 may readily be grasped at the proper points and such arrows may be raised figures in the molding of the stopper for grip or may be colored for clear visibility.

As indicated in Fig. 4 the flange 12 may desirably be provided with finger receiving recesses 18 in lieu of the arrows 17. These recesses not only readily locate the fingers in proper position but further provide a grip on the flange.

It is to be particularly noted that by the provision of wall 14 extending over the otherwise plane surface of the upper end of the stopper as well as the flange 12, the wall readily flexes through a squeezing action on the flange to readily cause separation of the walls of the slit. Furthermore, the semi-spherical form of the wall surrounding the slit causes fluid tight sealing of this slit by pressure of the material itself even when a partial vacuum does not exist within the bottle.

From the above, it should be clear that the improved stopper is operable by application of lateral squeezing pressure, as above described, to admit atmospheric air pressure to the interior of a cooperating vessel to fill in the void or partial vacuum created within the vessel either as a result of cooling of the fluids or as a result of withdrawing action of the stopper itself, and it will further be clear that the stopper may be similarly operated to relieve excessive pressure within the container or vessel resulting from insertion of the stopper into the neck of the vessel or container or otherwise. In fact, in the preferred embodiment of the invention, this last noted action of releasing excessive internal pressure may be largely automatic due to the fact that the internal pressure has a tendency to expand the slit bulb-like portion of the stopper; whereas, external pressure on such bulb-like portion has a tendency to contract the same and close the slit.

While I have disclosed certain specific embodiments of my invention only, such are to be considered as illustrative, and not restrictive, the

scope of the invention being defined in the appended claims.

What I claim and desire to secure by U. S. Letters Patent is:

1. A vacuum releasing stopper for non-collapsible liquid containers comprising an elongated resilient body member having an inner bottle engaging end and an outer end, a chamber of relatively great diameter in the body member adjacent the outer end closed in part by a semi-spherical wall, a bore extending through the body member from the inner end thereof and communicating with said chamber, said bore being of relatively small diameter and being surrounded by relatively thick walls, a slit through said wall extending diametrically of the body member and opening into said chamber, the slit being normally closed through the inherent resiliency of the body member, and the walls thereof being separable under lateral pressure on said body member adjacent the outer end thereof toward the axis thereof at diametrically spaced points substantially aligned with said slit.

2. A vacuum releasing stopper for non-collapsible liquid containers comprising an elongated resilient body member having a side wall tapering toward the inner bottle engaging end thereof and a laterally extending circumferential flange at the outer end thereof, a relatively small diameter bore extending axially through said body member opening through the inner end thereof and communicating with the chamber of a bulb portion unitary with the opposite end of the body member, the chamber of said bulb portion being greatly enlarged with respect to said bore, said bulb portion including a relatively thin semi-spherical wall projecting outwardly from the body member beyond the plane of said flange, and a normally closed slit extending through said wall and into said chamber adapted to open upon opposed pressures on said flange at points aligned with said slit and in direction toward the axis of the body member.

3. The structure according to claim 2 wherein said body member is provided with means for visibly indicating the correct position of said points of pressure application for effecting opening of the slit.

4. The structure according to claim 2 wherein said flange is provided with finger receiving recesses at said points of pressure application.

5. A pressure-equalizing stopper for non collapsible liquid containers comprising an elongated resilient body member having a side wall tapered toward the inner bottle engaging end thereof, a small diameter bore extending axially of said body member opening through the inner end thereof and communicating with a chamber adjacent the outer end of the body member, said chamber being greatly enlarged with respect to said bore, said chamber being located outwardly of that portion of the body member that is normally received within the neck of a container, the outer wall of said chamber being in the nature of a semi-spherical bulb located closely adjacent the outer end of the body and having a normally closed slit extending therethrough and the said chamber and adapted to be opened upon application of lateral squeezing pressure on the upper end of the body member at points aligned with the slit.

6. The structure defined in claim 5 in which the said body member is provided with means for visually indicating the correct position of said points of pressure application for effecting opening of the slit.

7. The structure defined in claim 5 in which the said elongated resilient body member is provided approximately in the plane of the bulb portion with a peripheral flange.

8. The combination with a non-collapsible container having an admission and discharge opening, of a vacuum releasing stopper for said container comprising an elongated resilient body member designed to permit partial but incomplete insertion into the container opening, said resilient body portion being formed with an axial passage opening through the inner end of said body member, the outer end portion of said passage providing a bulb chamber having an upper wall of dome-shape, the dome-shaped upper wall of the

bulb chamber projecting above the plane of the top of the main body and at least fifty per-cent of the axial length of the bulb chamber being below the plane of the top of said main body, and a transverse slit in the dome-shaped wall of the bulb chamber, the wall thickness of the body member radially outwardly of the bulb portion being so relatively great as to maintain the slit closed under normal pressure variations within the container but permitting opening of the slit by relatively great squeezing pressure applied through said wall portions opposite the ends of said slit at the time of insertion or removal of the stopper.

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