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A. SKAR

2,385,847

VACUUM RELEASE STOPPER

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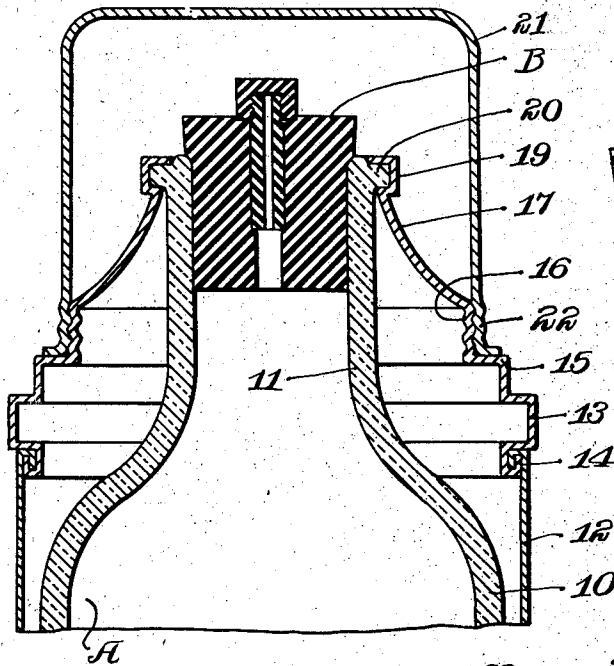


Fig. 1

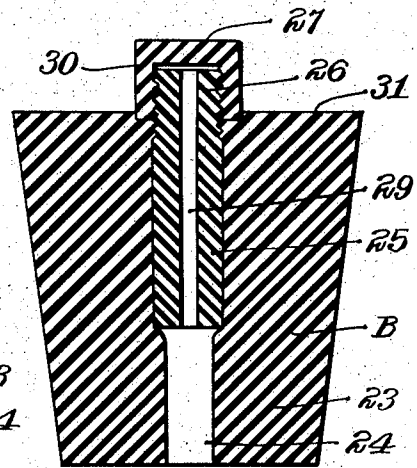


Fig. 2

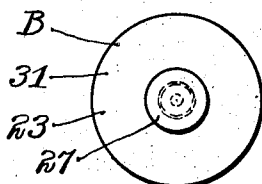


Fig. 3

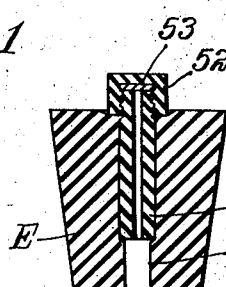


Fig. 4

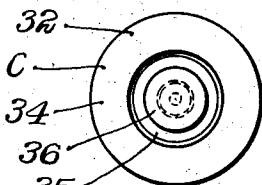


Fig. 5

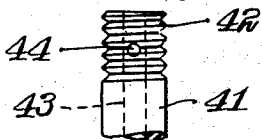


Fig. 6

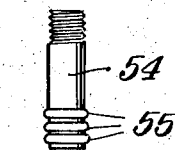


Fig. 7

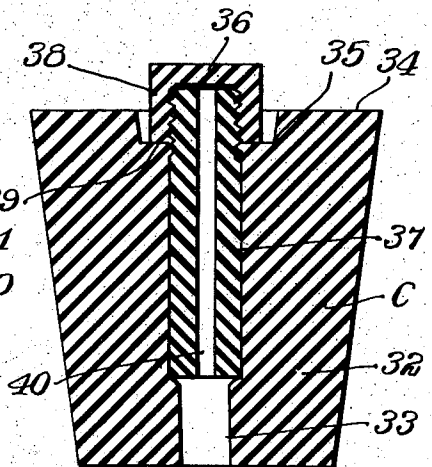


Fig. 8

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VACUUM RELEASE STOPPER

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3 Claims. (Cl. 215—56)

My invention relates to an improvement in vacuum release stoppers wherein it is desired to provide a stopper which will permit equalization of pressure on the inside and on the outside of the stopper.

When hot liquid is placed in a container, such as a vacuum bottle or Thermos bottle the liquid cools to some extent in spite of the insulation. As the liquid cools the vapor in the air above the liquid within the container condenses and a partial vacuum is created above the liquid within the container. When it is desired to remove the container stopper, unless some means is provided for the removal of the stopper, it is extremely difficult to remove. The partial vacuum within the bottle sometimes draws the stopper into the container until it can not be grasped easily with the fingers. Because of the force tending to pull the stopper inwardly an unusual force must be exerted to remove the stopper.

It is the purpose of the present invention to provide a stopper which has a longitudinal passage therethrough, and to provide a means of normally closing this passage when it is desired to remove the stopper. However, it is only necessary to open this passage through the stopper and thus to equalize the air on both sides of the stopper. The stopper may be then easily removed.

It is a feature of the present invention that the passage extending through the stopper may be formed of material which does not conduct heat readily. In the past metal pouring spouts and the like have been extended through stoppers to facilitate the pouring of liquid from the container. Such a construction would not be suitable in the present instance, as not only would this tubular member readily conduct heat from the container but it also would permit liquid to pass into the opening through the stopper to necessitate the cleaning of the same. In the present invention a passage through the stopper is formed in a tube of material relatively non-conductive of heat, and this passage is of such small dimension that liquid will not ordinarily pass therethrough. In other words, the opening through the tubular member may be termed a capillary passage, rather than a pouring spout.

A further feature of my invention relies in the fact that the tubular member does not extend entirely through the stopper. The stopper is ordinarily formed of resilient material, such as rubber or the like, although it should be understood that other suitable materials could be substituted therefor. An axial opening on the passage, which is preferably parallel to the axis of

the stopper extends through the stopper from one end to the other. The relatively rigid tubular element extends partially through this passage in the stopper, so as to restrict the size of the passage through the stopper. Because of the resilient material of the cork body, a small opening through the cork would often be closed when the cork or stopper was compressed. The relatively rigid tubular element also projects from the body of the stopper to permit the use of a closure cap to close the passage.

By having the tubular member of relatively rigid material the opening through the stopper may be held open when it is desired and may be effectively closed when it is desired. Such material is often more conductive of heat than the rubber of which the stopper body is formed. Accordingly by having the tubular element extend only partially through the stopper the lower end of the tubular element is spaced from the interior of the container and is less likely to transfer heat from the interior to the exterior of the container.

It is a feature of the present invention that by spacing the relatively rigid tubular element from the bottom of the stopper the lower extreme end of the stopper may flex more effectively than would otherwise be the case. Thus the stopper may be more readily inserted into a container than would be the case if the relatively rigid tube extended entirely through the same.

An object of the present invention relies in the manner in which the closing cap is sealed with respect to the stopper. As the cap is applied the lower surface thereof engages the outer surface of the stopper. As the stopper is of resilient material and is compressed adjacent the cap by engagement therewith, an effective seal is formed by the cap and the stopper. Thus a tighter seal may be provided than could ordinarily be effected by the cap and the tubular element.

It is a further feature of my invention to provide a tubular element which may be provided with circular ribs encircling the embedded end of the same to prevent the tube from being withdrawn from the opening through the stopper. These ribs act to prevent longitudinal movement of the tubular element relative to the stopper body.

A further feature of my invention relies in the relative diameter of the passage through the stopper body and the tubular element which is inserted into the same. The tubular element is of greater diameter than the passage through the

stopper into which the tubular element extends. Accordingly the stopper body is flexed by the insertion of the tubular element and this element is therefore held in place more effectively than would otherwise be the case.

These and other objects and novel features of my invention will be more fully and clearly set forth in the following specification and claims.

In the drawing forming a part of my specification:

Figure 1 is a cross sectional view through a vacuum bottle, or the like, containing a stopper showing my new construction.

Figure 2 is a cross sectional view in enlarged form of the stopper illustrated in Figure 1.

Figure 3 is a top plan view of the stopper shown in Figures 1 and 2.

Figure 4 is a vertical section through a modified form of stopper.

Figure 5 is a top plan view of the stopper illustrated in Figure 4.

Figure 6 is an elevation view of the top of a tubular element showing a modified form of construction.

Figure 7 is a similar view to Figure 6 showing another form of construction.

Figure 8 is a vertical view through a portion of a stopper showing a slightly different form of cap construction.

Figure 9 is an elevation view of a modified form of construction of my tubular element.

The vacuum or Thermos bottle A may be of any desired shape or form. In the particular construction illustrated the vacuum bottle A includes an inner container 10 of glass or other suitable material having a neck 11 of restricted size which forms the only opening in the container 10. The outer shell 12 of metal, or the like encircles the inner container 10 and is hermetically secured to a neck portion 13 with an air tight connection 14.

The neck portion 13 includes a stop bolt 15 adjacent which is provided a threaded section 16. A restricted neck 17 connects the threaded portion 16 to the small diameter portion 19 which encloses a bead 20 on the neck 11 of the inner container 10. The stopper B is positioned within the neck 11. A cup-like closure 21 is threaded at 22 to fit the thread 16 and provides an enclosure for the neck portion of the bottle and the stopper B.

The stopper B may be made of any suitable resilient material, such as rubber, cork, or any suitable substitute material. The cork body 23 is tapered from end to end and is provided with an axial passage or bore 24 extended from end to end of the body 23. A tubular element 25 extends into the bore or passage 24 from the large diameter end of the stopper body 23 and is of an external diameter somewhat greater than the diameter of the bore or passage 24. The upper extremity 26 of the tubular element 25 is threaded and a closure cap 27 is threadably secured to this threaded end 26. A passage 29 extends through the tubular element 25 from end to end and this passage is closed only by the cap 27.

The cap 27 is provided with a skirt portion 30 which may be threaded down into engagement with the upper surface 31 of the stopper body 23. Thus when the cap 27 is threaded into closed position, the lower edge of the skirt portion 30 engages and compresses the resilient body 23 to form an effective seal between the cap 27 and the resilient body 23. In this way a tighter seal

is provided by the cap and the tube element 25 than would otherwise be provided.

It will be noted that the tube 25 does not extend entirely through the passage 24. This permits the lower portion of the stopper to compress readily, as no reinforcing means is present at this end of the stopper to prevent ready compression.

In Figure 4 of the drawing I disclose a stopper C which is substantially like the construction previously described. In this stopper C, however, the body 32 of the stopper is tapered from top to bottom and is provided with an axial bore 33 therein. At the top of the stopper the upper surface 34 is provided with a circular recess 35 which is coaxial with the bore or passageway 33 and which is of sufficiently large diameter to accommodate the closure cap 36.

A tube 37, of suitable material, extends into the passage 33 and is threaded as illustrated. The cap 36 is provided with a skirt portion 38 which is internally threaded to fit the threads of the projecting portion of the tube 37, so that an effective seal may be provided. The cap 36 extends down into the recess 35 so that the cap does not project as far from the top of the stopper and so that a more effective seal may be provided. As in the previously described construction, the lower extremity of the skirt 37 engages the upper surface 39 of the stopper body at the base of the recess 35 so as to form an effective seal between the cap 36 and the stopper body. A small diameter passage 40 is provided in the tube 37 which is of sufficient size to permit air to enter the vacuum bottle, but it is of too small diameter to permit liquid to flow therethrough.

In Figure 6 of the drawing I disclose a modified form of construction of the tubular member to take the place of either the tubular member 25 or 37 previously described. The tubular member 41 is threaded at its upper end 42 and is provided with a passage 43 therethrough, so as to provide a means of equalizing pressure inside and outside of the vacuum bottle. An opening 44 is provided through the side of the tube 41 near the upper extremity thereof, which is normally covered by the cap 30 or 36 but which may permit the flow of air through the tube before the cap 30 or 36 is entirely removed.

In Figure 7 of the drawing I disclose a tubular member 45 having a threaded upper extremity 46 and a passage 47 extending therethrough. A notch 49 is provided in the upper end of the tube 46 so as to permit air to pass through the tube 45 before the cap 30 or 36 is entirely removed or unthreaded from the tube.

In Figure 8 of the drawing I disclose a stopper identical to the stopper B or C. The stopper E is provided with a bore 50 therethrough to accommodate a tube 51. A cap 52 is threaded to the upper extremity of the tube 51. A gasket 53 is provided within the cap 52. When the cap 52 is threaded down upon the tube 51 the gasket 53 is compressed and the cap 52 compresses the body of the stopper adjacent the lower end of the cap. Thus a double seal is provided in this construction.

In Figure 9 of the drawing I disclose a tube 54 which may take the place of the tubes 25, 37, or 51. Rings 55 of the material forming the tube encircle the lower extremity of the tube and hold this tube embedded in the body of the stopper. The stopper may be molded directly around the tube 54 or the tube may be inserted

into an axial opening and be difficult to remove because of the rings or flanges 55.

In preferred form the tubes illustrated are formed of glass or plastic relatively poor conductors of heat. The caps described are preferably formed of plastic, or the like, to be threaded into the tubes. By forming the tubes out of glass or plastic, little heat from within the container is transmitted through the stopper.

In accordance with the patent statutes I have described the principles of construction and operation of my stopper, and while I have endeavored to set forth the best embodiments thereof, I desire to have it understood that these are only illustrative of a means of carrying out my invention and that obvious changes may be made within the scope of the following claims without departing from the spirit of my invention.

I claim:

1. A vacuum release stopper for vacuum bottles comprising a tapered resilient body, said body having a normally open small diameter passage extending therethrough, a tubular element extending partially through said body and terminated in spaced relationship to the lower end of said body, one end of said tubular member projecting from the upper end of said body, said tubular element being of larger diameter than said passage, the resilient body being compressed about said tubular element, the passage through said tubular element forming a continuation of the portion of the passage through said stopper, below said tubular element, and a cap for said one end of said tubular member, said cap including a top closure portion having a depending skirt thereupon, said one end of said tubular member and the interior of said skirt being threaded so that said cap may be threadably engaged upon said tubular member, a relatively flat surface at the lower extremity of said skirt, said lower surface bearing against the resilient body and compressing the same to form a seal at the lower extremity of said cap, said resilient

body tightening the threaded engagement between said cap and said tubular element.

2. A vacuum release stopper for vacuum bottles comprising a tapered resilient body, said body having a normally open small diameter passage extending therethrough, a tubular element in said passage, said tubular element being of larger diameter than said passage, the resilient body being compressed about said tubular element, one end of said tubular element projecting above the large diameter end of said body, external threads on said one end of said tubular element, an internally threaded cap including a top and an internally threaded sleeve portion connected thereto, the lower end of said sleeve being substantially flat to provide a bearing surface, said cap being engageable with said resilient body to form a seal between the lower edge of said cap and said resilient body, said resilient body tightening said cap upon its threads.

3. A vacuum release stopper for vacuum bottles comprising a resilient tapered body, said body having a normally open small diameter passage extending therethrough, a tubular element resiliently engaged in said passage, said tubular element having one end thereof threaded and projecting above the large diameter end of said body, an aperture substantially concentric with said passage in said body at the large diameter end thereof, said aperture encircling said tubular element, a cap including a top closure and a depending internally threaded sleeve threadably engaged on the projecting end of said tubular element, said depending sleeve having a relatively flat bearing surface at the lower end thereof engageable against said resilient body at the bottom of said aperture to form a seal therebetween, said resilient body urging said cap upwardly to tighten the engagement between said cap and said one end of said tubular element.

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