Oct. 20, 1964 C. BRAMMING 3,153,490

CLOSURE FOR VACUUM BOTTLES

Filed Nov. 10, 1959

Fig. 3

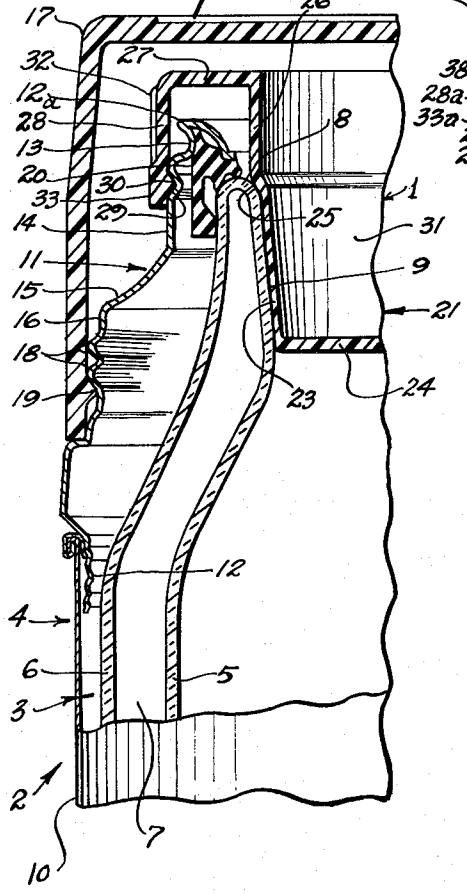


Fig. 5

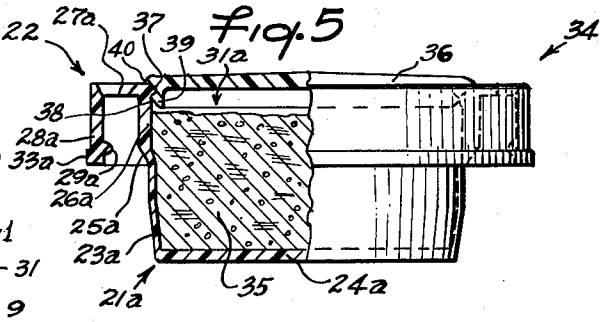


Fig. 1

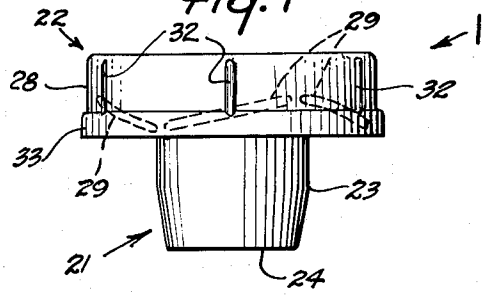


Fig. 4

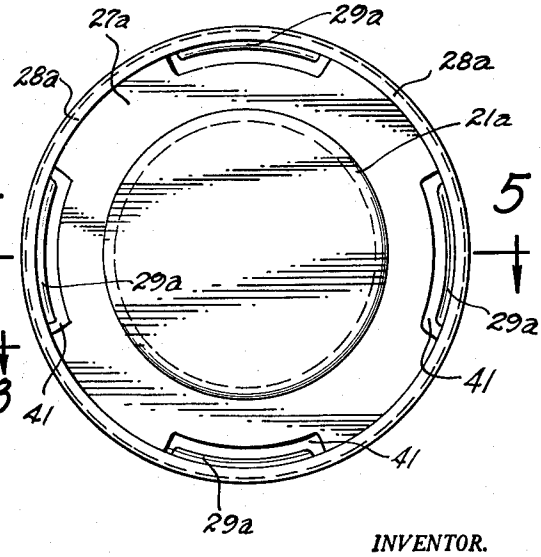
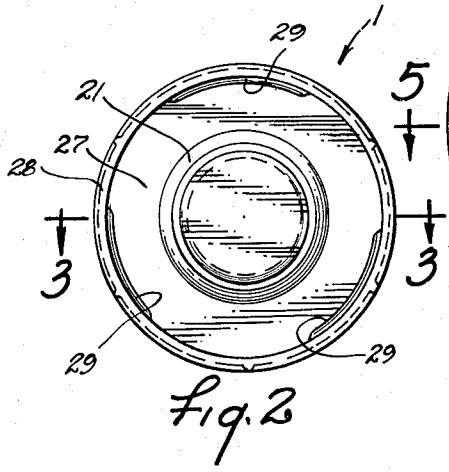


Fig. 2



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CLOSURE FOR VACUUM BOTTLES

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1 Claim. (Cl. 215—47)

This invention relates to a new and improved closure for vacuum bottles or the like.

One object of the present invention is to provide a new and improved closure which may be molded in one piece from inexpensive plastic materials, yet will seal the vacuum bottle in a positive and effective manner.

A further object is to provide a new and improved closure of the foregoing character which is hollow and may optionally be filled with insulating material, which may be retained in the closure by a lid or the like mounted thereon.

Another object is to provide a new and improved closure which seals against the neck of the vacuum bottle, and also has a shoulder which seats against the top of the filler, to provide double assurance of a positive seal.

A further object is to provide a new and improved closure of the foregoing character having threads for positively securing the closure to the vacuum bottle, while providing for easy removal of the closure.

Further objects and advantages of the present invention will appear from the following description taken with the accompanying drawings in which:

FIG. 1 is an elevational view of a closure to be described as an illustrative embodiment of the present invention.

FIG. 2 is a bottom plan view of the closure of FIG. 1.

FIG. 3 is a fragmentary sectional view showing the closure mounted on a vacuum bottle, the view being taken generally along a line 3—3 in FIG. 2.

FIG. 4 is a bottom view of a modified closure.

FIG. 5 is an elevational view of the closure of FIG. 4, partly in section along a line 5—5 in FIG. 4.

It will be seen that FIGS. 1–3 illustrate a closure 1 for use with a vacuum bottle 2. Of course, the closure will find many other uses with other types of receptacles.

The illustrated vacuum bottle 2 comprises a vacuum insulated filler 3 which is received within a protective jacket 4. The illustrated filler 3 has inner and outer walls 5 and 6, with an evacuated space 7 therebetween. The inner and outer walls 5 and 6 may be connected together by means of a top portion 8 extending between the upper ends of the walls. It will be seen that the inner wall 5 has an upper or neck portion 9 which tapers downwardly in diameter at a small angle and thus is generally frusto-conical in form.

As shown, the jacket 4 comprises a generally cylindrical casing 10 which surrounds the main body or lower portion of the filler 3. The casing 10 may be made of metal, plastic, or some other relatively rigid material, so that the filler 3 will be adequately protected. To provide for easy replacement of the filler 3, the upper end of the jacket 4 is in the form of a removable collar 11 having a lower portion 12 which is threaded and is adapted to screw into the upper end of the casing 10. The collar 11 may also be made of metal, plastic or

some other suitable material. At its upper end, the collar 11 is formed with an outwardly flaring, annular pouring lip 12*a* which prevents liquids from dripping or running down the side of the collar when poured out of the vacuum bottle. An annular undercutting groove 13 is formed in the collar 11 below the pouring lip 12*a*. Below the groove 13, the collar 11 is formed with a generally cylindrical portion 14 which is somewhat larger in diameter than the pouring lip 12*a*. A flaring portion 15 extends downwardly from the cylindrical portion 14 and connects with a larger generally cylindrical portion 16.

In the usual manner, a cup 17 may be inverted and mounted over the upper portion of the collar 11 to serve as a cover. Of course, the cup 17 may be removed from the vacuum bottle and used for drinking the liquid content of the vacuum bottle.

As shown, the cup 17 and the cylindrical portion 16 of the collar 11 may be formed with mating threads 18 and 19 so that the cup may be screwed onto the collar. In this regard, the illustrated vacuum bottle is constructed as disclosed and claimed in the co-pending application of Carl Bramming, Serial No. 804,497, filed April 6, 1959, and entitled Vacuum Bottle Jacket Construction.

It will be seen that an annular gasket 20 is interposed between the filler 3 and the collar 11, at the upper end thereof, to prevent any liquid from leaking into the space between the filler and the collar. The gasket 20 may be made of natural or synthetic rubber or a suitable plastic material.

The illustrated closure 1 is molded in one piece from a highly flexible and resilient plastic material, such as polypropylene, for example. It will be seen that the closure seals the upper end of the filler 3 so as to prevent leakage of any liquid therefrom.

The illustrated closure 1 comprises a stopper portion 21, for closing the neck of the filler 3, and a mounting portion 22, for securing the closure on the vacuum bottle. It will be seen from FIG. 1 that the stopper portion 21 is hollow and generally cup-shaped and is adapted to be inserted into the neck portion 9 of the filler 3. The stopper portion 21 has a thin anular side wall 23 which tapers downwardly at a small angle and is generally frusto-conical in form. A substantially horizontal bottom wall 24 closes the lower end of the stopper portion 21. As illustrated, the bottom wall 24 is relatively thick and rigid, while the side wall 23 is thin and highly flexible. Thus, for example, the side wall 23 may have a thickness of only about 25/1000 of an inch while the bottom wall 24 may be twice as thick.

It will be seen that the side wall 23 of the stopper portion 21 is slightly curved in its vertical outline and thus bulges outwardly so as to seal snugly within the downwardly tapering neck 9. When the stopper portion 21 is pushed downwardly into the neck 9, it is compressed inwardly in a radial direction so that there will be effective sealing pressure between the side wall portion 23 and the neck 9. The relatively rigid bottom wall 24 prevents the lower portion of the side wall 23 from collapsing inwardly or wrinkling.

Near its upper end, the stopper portion 21 is formed with a shoulder 25 which is adapted to seat against the upper end wall 8 of the filler 3, at the upper end of the

neck 9. As shown, the shoulder 25 is frusto-conical in form. It tapers downwardly at a substantially sharper angle than the side wall 23. It will be understood that the tapering shoulder 25 makes a positive seal with the upper end 8 of the filler 3.

In this case, the mounting portion 22 is in the form of a hollow annular ring which is generally in the form of an inverted circular trough. It will be understood that the mounting portion 22 is formed integrally with the stopper portion 21. Thus, the mounting portion 22 comprises an inner substantially cylindrical wall 26 which connects with the upper end of the stopper portion 21 and extends upwardly therefrom, above the shoulder 25. An upper substantially horizontal wall 27 extends outwardly in a radial direction from the upper end of the cylindrical wall 26. It will be seen that a generally cylindrical outer wall or flange 28 projects downwardly from the outer margin of the horizontal wall 27. As shown, the flange 28 extends downwardly slightly below the level of the shoulder 25.

In order that the mounting portion 22 may be relatively rigid, the wall thickness of the walls 26, 27 and 28 is made substantially thicker than the thickness of the side wall 23 on the stopper portion 21. As shown, the walls 26, 27 and 28 are approximately twice as thick as the wall 23.

In order that the closure 1 may be securely mounted on the vacuum bottle 2, the inside of the flange 28 is formed with screw threads 29 which are adapted to mate with complementary threads 30 on the cylindrical portion 14 of the filler 11. In this case, the threads 29 project inwardly from the flange 28, while the threads 30 are in the form of grooves or channels extending along the wall 14. It is preferred to employ multiple lead threads on the closure and the collar so that the closure may be mounted and removed very quickly and easily. In this case, the threads 29 on the closure 1 are in the form of three identical equally spaced triple lead thread segments, as shown to advantage in FIGS. 1 and 2. The threads 30 on the collar 11 are complementary in form to those on the closure flange 28.

It will be understood that the closure 1 is removed from the vacuum bottle 2 by unscrewing the mounting ring portion 22 from the collar 11, and withdrawing the stopper portion 21 from the neck 9. When the closure 1 is replaced, the stopper portion 21 is inserted into the neck of the vacuum bottle, and the threaded closure flange 28 is screwed onto the collar 11. The bulging, downwardly tapering side wall 23 of the stopper seals against the inside of the neck 9. As the threads 29 and 30 pull the stopper downwardly, the tapering shoulder 25 seats against the upper end of the filler 3. Thus, the stopper forms a positive double seal, and is securely retained on the vacuum bottle.

In the construction of FIGS. 1–3, the closure 1 is formed with a central hollow space 31 which is left empty and open at the top. For a relatively narrow mouthed type of vacuum bottle, the stopper portion 21 and the empty space 31 therein provide a reasonably sufficient degree of insulation, to prevent excessive flow of heat into or out of the vacuum insulated filler 3. The extreme thinness of the side wall 23 on the stopper 21 contributes to the heat insulation value of the stopper.

To facilitate removal and replacement of the closure 1, a plurality of vertical, outwardly projecting ribs 32 may be formed on the closure flange 28 so that the flange will form an efficient hand grip. The ribs 32 tend to prevent the hand from slipping along the outside of the flange when the closure 1 is turned. At its lower end, the flange 28 has a thickened annular portion 33 to impart greater strength and rigidity to the flange.

FIGS. 3 and 4 illustrate a modified closure 34, which, however, is generally quite similar to the closure 1 of FIGS. 1–3. To avoid repetitious description, those elements of the closure 34, which correspond to elements of the closure 1 are given the same reference characters, with the addition of the suffix "*a*." Except as described below, the closure 34 may be considered to be the same as the closure 1.

It will be seen that the closure 34 is larger in diameter than the closure 1, and that the stopper portion 21*a* is proportionately larger in diameter with respect to the diameter of the mounting portion 22*a*. Thus, the closure 34 is adapted for use on a vacuum bottle having a relatively wide mouth while the closure 1 is adapted for use on a narrow mouthed vacuum bottle.

To increase the heat insulating value of the closure 34, the hollow space 31*a* within the closure 34 is filled with a quantity of loose insulating material 35, such as ground cork or the like. To retain the insulating material, the opening at the upper end of the hollow space 31*a* is closed by a lid or cover 36, which is generally in the form of a disk, made of polypropylene or other suitable material. To retain the disk 36, the upper end of the inner cylindrical wall 26*a* is formed with an inwardly projecting annular bead 37 which is adapted to interlock with an outwardly projecting bead 38, formed on a flange 39 which projects downwardly from the lid 36, adjacent the outer edge thereof. When the flange 39 is pushed into the opening 31*a*, the bead 38 snaps past the bead 37 so that the cover 36 will be retained against accidental dislodgement. The cover 36 has an outwardly projecting peripheral flange 40 adapted to engage the horizontal wall 27*a* so as to limit the downward movement of the cover 36.

The outer flange 28*a* is formed with four internal thread segments 29*a* of quadruple lead. Immediately above the thread segments 29*a*, the horizontal wall 27*a* is formed with arcuate slots 41 which bring about an increase in the flexibility of the flange 28*a* adjacent the thread segments 29*a*. This enables the thread segments to accommodate slight irregularities or dimensional variations in the threads on the vacuum bottle.

It will be recognized that the closures of the present invention are effective, yet remarkably low in cost. The stopper of each closure makes a positive double seal with the neck and the upper end of the filler on the vacuum bottle. The mounting portion of the closure screws onto the vacuum bottle so that the closure will be securely retained thereon. Nevertheless, it is easy to mount and remove the closure. For narrow mouthed vacuum bottles, the closure may be molded in one piece from a flexible, resilient plastic material, such as polypropylene. Thus, the closure may be made at very low cost. For use with wider mouthed vacuum bottles, the closure is advantageously filled with loose insulating material, which is retained by a second component in the form of a cover. Of course, the closure for a narrow mouthed vacuum bottle may also be filled with insulating material and fitted with a cover, if greater heat insulating value is desired.

Various other modifications, alternative constructions and equivalents may be employed without departing from the true spirit and scope of the invention as exemplified in the foregoing description and defined in the following claim.

I claim:

A one-piece closure for a vacuum bottle or the like, said closure comprising a generally cup-shaped stopper portion made of polypropylene plastic material, said stopper portion having a generally frusto-conical side wall tapering downwardly at a small angle, a disk-shaped bottom wall extending across and closing the lower end of said side wall, said bottom wall being uniformly flat and materially thicker and more rigid than said side wall to reinforce the lower end of said side wall, said bottom wall forming a sharp angle with said side wall for firmly reinforcing said side wall at the lower end thereof, and a generally frusto-conical shoulder angling upwardly and outwardly from the upper end of said side wall, said shoulder tapering downwardly at a materially sharper angle than said side wall, said side wall bulging outwardly and being slightly curved in vertical outline between said shoulder and said bottom wall, and an annular mounting

portion formed integrally with said stopper portion and connected with the upper end thereof, said mounting portion comprising an inner essentially cylindrical wall extending upwardly from said shoulder, an essentially horizontal wall extending outwardly from the upper end of said inner cylindrical wall, and an outer essentially cylindrical flange extending downwardly from the outer margin of said essentially horizontal wall, said flange having slanting internal screw threads thereon for mounting said closure on a vacuum bottle, said side wall of said stopper portion having a thickness which is only a fraction of the thickness of said horizontal wall and said flange,

said mounting portion thereby being essentially rigid while said side wall is highly flexible.

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