

April 26, 1960

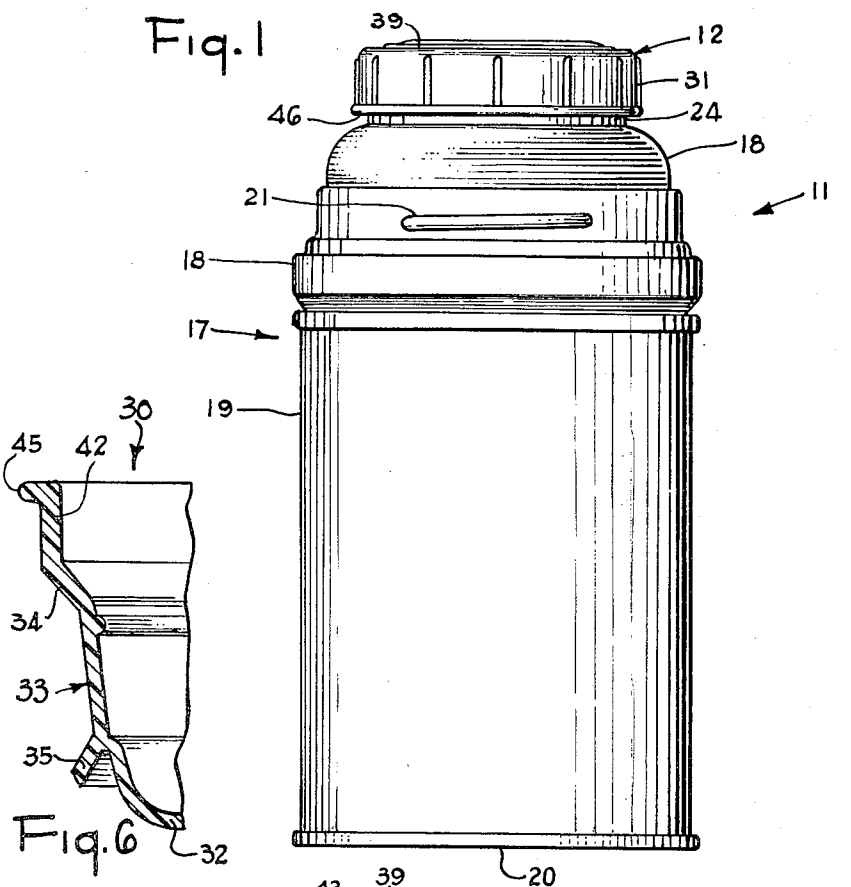
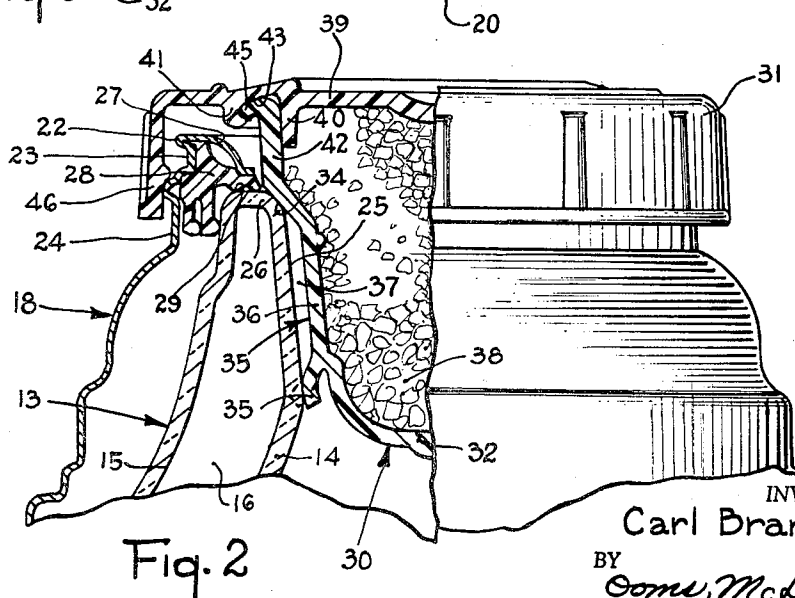
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2,934,231

CLOSURE FOR VACUUM BOTTLES

Filed Feb. 13, 1958

2 Sheets-Sheet 1



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2 Sheets-Sheet 2

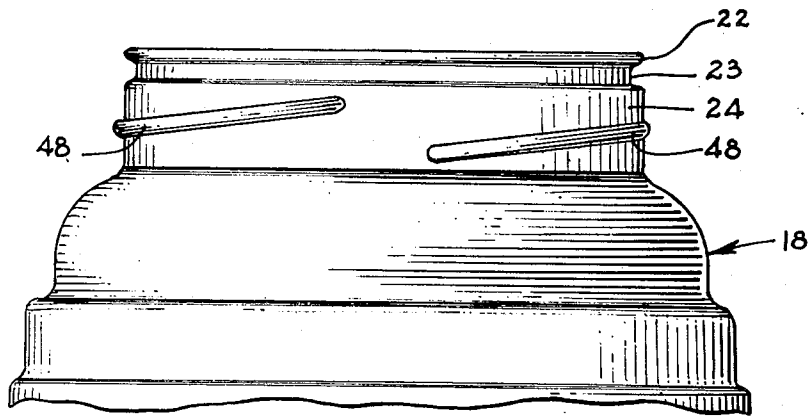


Fig. 3

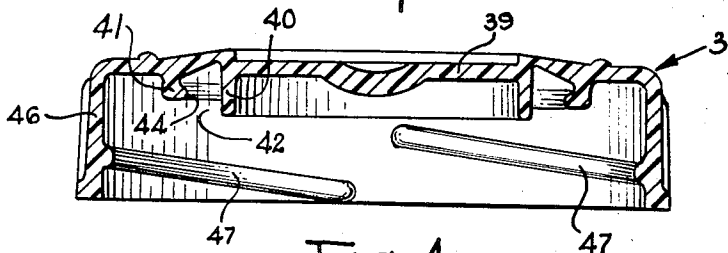


Fig. 4

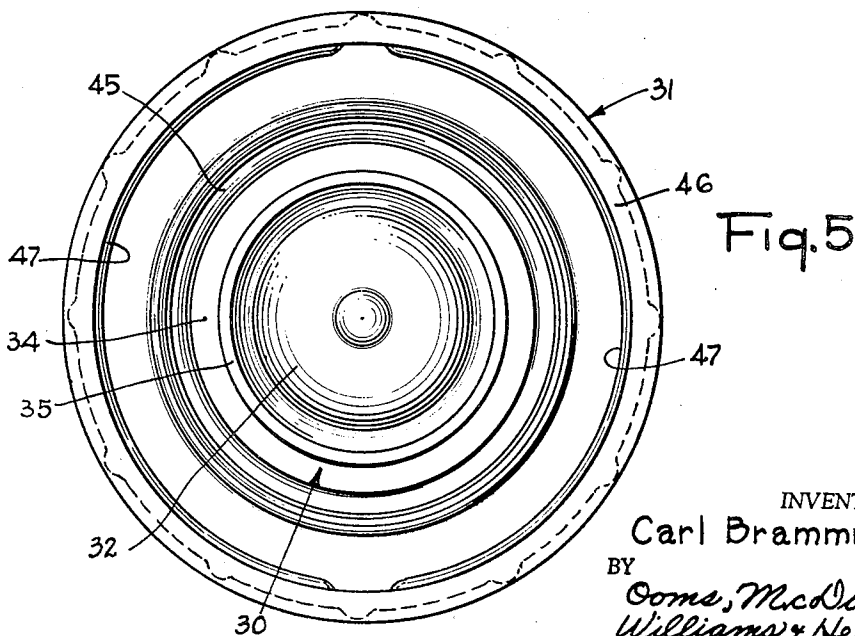


Fig. 5

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CLOSURE FOR VACUUM BOTTLES

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Application February 13, 1958, Serial No. 715,025

8 Claims. (Cl. 215—13)

This invention relates to vacuum bottles or the like, and pertains particularly to closures or stoppers for vacuum bottles.

This application is a continuation in part of the co-pending application of Carl Bramming, Serial No. 626,037, filed December 3, 1956, and entitled "Closures for Vacuum Bottles."

One object of the present invention is to provide a new and improved closure which will form a tight, doubly secure seal for the mouth of a vacuum bottle, despite minor variations in the size or conformation of the mouth.

A further object is to provide a new and improved closure which may easily be mounted on and removed from a vacuum bottle, and which will remain secured to the vacuum bottle against any possibility of accidental dislodgment.

It is another object to provide a new and improved closure which will maintain a perfect seal for the vacuum bottle despite the development of either pressure or partial vacuum in the vacuum bottle.

A further object is to provide a new and improved closure of the foregoing character which has a high heat insulating value, and thus will transmit very little heat either into or out of the vacuum bottle.

Another object is to provide a new and improved closure which is tasteless and odorless, so that the closure will not impart any flavor to the contents of the vacuum bottle.

It is another object to provide a new and improved closure of the foregoing character which is extremely durable and serviceable, yet is easy to manufacture and low in cost.

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 vacuum bottle equipped with a new and improved closure to be described as an illustrative embodiment of the present invention.

Fig. 2 is a fragmentary enlarged elevational view showing the closure and the upper portion of the vacuum bottle, the view being partly in longitudinal section.

Fig. 3 is a fragmentary enlarged elevational view showing the upper portion of the vacuum bottle with the closure removed.

Fig. 4 is an elevational sectional view of an internally threaded cap or mounting member constituting one element of the closure.

Fig. 5 is a bottom view of the closure.

Fig. 6 is a fragmentary elevational sectional view of the stopper member of the closure.

It will be seen that Fig. 1 illustrates a vacuum bottle 11 which, in most respects, may be of any suitable or desired construction. The vacuum bottle 11 is equipped with a closure 12 to be described as an illustrative embodiment of the invention. To some extent, the vacuum bottle 11 is especially adapted or modified to receive the closure 12, as will be explained in detail shortly.

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In accordance with the usual practice, the vacuum bottle 11 comprises a vacuum insulated receptacle or filler 13 having inner and outer walls 14 and 15 with an evacuated space 16 therebetween. The receptacle or filler 13 is mounted within and surrounded by a protective jacket 17. The filler 13 is usually made of thin glass and thus is quite fragile. The jacket 17 may be made of a more durable material, such as metal, plastics or the like.

The jacket 17 is usually constructed so that the filler 13 may be removed. In this way, the filler may be replaced if it is broken. While the jacket 17 may be arranged in various ways, the illustrated jacket is formed with an upper portion in the form of a collar 18 which may be screwed into or otherwise disengagingly secured to a lower, generally cylindrical member or can 19. A bottom wall 20 is crimped or otherwise securely attached to the can 19. Illustrated collar 18 is formed with threads 21 to receive the usual cup or cover (not shown).

In this case, the vacuum bottle is formed with an annular pouring lip 22 so that the contents of the bottle may be poured out very conveniently, without any substantial dripping or spilling down the side of the jacket 17. In this instance, the pouring lip 22 is formed integrally with the collar 18, at the upper end thereof. Illustrated collar 18 is formed of metal, but it might be made of plastics or other suitable materials. It will be apparent that the illustrated pouring lip 22 is in the form of a double folded outwardly projecting rim. Immediately below the lip 22, on the outside of the collar 18, is an annular undercutting groove 23. The pouring lip 22 just outwardly from the bottom of the groove 23 so that the lip will cleanly cut off the flow of liquid from the vacuum bottle when the bottle is returned to an upright position after a portion of the contents has been poured out. Below the groove 23 is a generally cylindrical portion 24 of the collar. This portion 24 cooperates with the closure 12, as will be explained in detail shortly.

The illustrated filler or vacuum insulated receptacle 13 has a mouth 25 which is formed by the upper portion of the inner wall 14. The mouth 25 tapers downwardly in its internal diameter, in accordance with the usual arrangement. At the junction of the inner and outer walls 14 and 15, the filler 13 has a rounded upper edge or rim 26.

To facilitate the smooth flow of liquids out of the vacuum bottle, the collar 18 is formed with a flange 27 which extends inwardly and slopes downwardly toward the upper rim 26 of the filler 13. Leakage of liquids between the filler 13 and the collar 18 is prevented by providing a gasket or sealing ring 28 therebetween. It will be seen that the gasket 28 is shaped to be confined closely in the space defined by the rim portion 26 of the filler, the flange 27, the groove 23, and the generally cylindrical upper portion 24 of the collar 18. One or more sealing ridges or edges 29 are formed on the gasket 28 to seat against the upper rim 26 of the filler 13. It should be understood, however, that the illustrated arrangement of the pouring lip and the gasket is not essential to the present invention, but may be varied considerably.

The illustrated closure 12 is advantageously formed in two parts, comprising a stopper member 30 and a cap or mounting member 31. The illustrated stopper 30 is hollow, thin walled and generally cup shaped in form. It will be seen that the stopper 30 has a bottom wall 32 which closes the lower end of an annular sidewall 33. The sidewall 33 is open at its top end, but is closed by the cap 31.

The illustrated stopper 30 is arranged to form a double seal with the mouth 25 of the filler 13. Near its

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upper end, the sidewall 33 is formed with a downwardly facing, downwardly tapering shoulder or seating portion 34 which is adapted to form the first or primary seal by seating against the upper rim 26 of the filler 13, as clearly shown in Fig. 2. To insure a perfect seal, stopper member 30 may be made of a soft resilient material, preferably polyethylene or some other tasteless, odorless, rubberlike plastic material. Synthetic or natural rubber or the like also may be employed, but polyethylene or the like is preferred because it is completely tasteless and odorless, and thus will not impart any flavor to the contents of the vacuum bottle.

Near its lower end, the stopper 30 is formed with a skirtlike flange 35 which projects outwardly and downwardly from the sidewall 33, so as to engage the mouth 25 and thus form a second seal around an annular area spaced downwardly from the rim 26. The flange 35 is flexible and resilient, and thus is flexed inwardly as the stopper 30 is pushed into the tapering mouth 25. When the stopper 30 is removed, the flange 35 springs outwardly, as indicated by the dotted line position shown in Fig. 2.

Between the tapered shoulder 34 and the flange 35, the sidewall 33 has an intermediate portion 36 which is reduced in diameter so as to be spaced inwardly from the mouth 25 when the stopper 30 is in place. Thus, the reduced intermediate portion 36 defines an air space 37 between the stopper 30 and the mouth 25. This air space has a high heat-insulating value. The thin walled construction of the stopper 30 also contributes to the high heat-insulating value of the stopper. It is preferred to fill the stopper 30 loosely with ground cork or other loose or soft insulating material 38, to improve the heat-insulating value of the stopper. However, the cup-shaped cavity within the stopper 30 may be left empty, in which case the air contained therein will provide good insulation.

It will be seen that the illustrated cap or mounting portion 31 of the closure 12 is formed with an upper, generally horizontal wall 39, to which the upper end of the stopper 30 is connected. The wall 39 closes the upper end of the stopper 30.

In this case, the stopper 30 is secured to the cap 31 by means of inner and outer depending flanges 40 and 41 on the underside of the upper wall 39. As illustrated, the inner flange 40 extends downwardly to a greater extent than the outer flange 41. As shown in Fig. 2, the stopper 30 has a generally cylindrical upper wall portion 42 adapted to fit snugly around the inner flange 41. The outer flange 41 has an inwardly projecting lip or bead 44, which is adapted to interlock with an outwardly projecting flange 45 at the upper end of the stopper 30. Because of the soft resilient nature of the stopper 30, the flange 45 may be snapped behind the lip 44. A comparison of Figs. 6 and 2 will show that the flange 45 is flexed downwardly, from its free-state, generally horizontal position, when the flange 45 is forced past the bead 44, in the assembly of the closure. Between the flanges 40 and 41, the upper wall 39 of the cap has an angular, downwardly sloping undersurface 43, which confines the flange 45 in its downwardly flexed, assembled position. The interlocking arrangement of the bead 44 and the flange 45, together with the confining action of the inner flange 40 and the sloping wall 43, forms an exceedingly secure connection between the cap 31 and the stopper 30. This connection will remain secure and rigid under all stresses incurred in ordinary service.

The cap 31 is employed to secure the closure 12 to the jacket 17, so that the vacuum bottle will remain perfectly sealed against any accidental dislodgment of the closure. Thus, the illustrated cap 31 is formed with a skirtlike, generally cylindrical flange 46 which projects downwardly from the periphery of the upper wall 39. Interlocking thread elements or the like are formed on the flange 46 and the jacket 17. In this case, as clearly

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shown in Figs. 3 and 4, the inside of the flange 46 is formed with segmental, multiple threads 47. Cooperative external multiple thread segments 48 are formed on the cylindrical portion 24 of the collar 18.

Thus, the closure 12 may be securely mounted on the collar 18 by screwing the internal threads 47 on to the external threads 48. The closure 12 is screwed down until the tapered shoulder 34 seats firmly against the rim 26 of the filler 13. A leak-proof seal is thus formed between the stopper 30 and the filler 13. As the stopper 30 is pushed into the mouth 25 of the filler, the flange 35 is flexed inwardly so that it will form a second seal with the mouth.

The arrangement of the closure is such that a perfect seal is provided despite minor variations in the size and conformation of the mouth 25 of the filler 13. The threads 47 and 48 provide a considerable range of adjustment so that the tapered shoulder 34 may always be brought into firm engagement with the rim 26 of the filler. Moreover, the flexible resilient flange 35 will compensate for a considerable range of variations in the mouth 25.

The threads 47 and 48 hold the closure 12 very securely on the vacuum bottle, against any accidental dislodgment, and against the action of any pressure that may develop in the filler 13. If, on the other hand, a partial vacuum develops in the filler, the pressure of the atmosphere will push the stopper 30 downwardly with increased force, so that the seal will be maintained perfectly.

The closure 12 has an extremely high heat-insulating value because of various factors. The air space 37 between the sealing shoulder 34 and the sealing flange 35 provides a considerable insulating value. This is also true of the air space within the stopper 30. If the stopper 30 is filled with insulating material, such as ground cork, the insulating value will be increased to an even greater extent. The thin wall of the stopper 30 also contributes to the insulating value, because the thinness of the wall minimizes conduction of heat along the wall. In addition, the plastic material normally employed in the stopper 30 has a low heat conductivity.

The stopper 30 and the cap 31, constituting the two parts of the closure, may be easily molded of plastic materials at extremely low cost. The cap 31 may be made of a relatively rigid, inexpensive plastic material, such as polystyrene. It is easy to add the ground cork to the stopper, if desired, and to snap the upper end of the stopper into the retaining elements on the cap 31. Thus, the enclosure may be easily made at low cost. Moreover, it is extremely durable and serviceable, and is easy to mount on and remove from the vacuum bottle.

Various 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 claims:

I claim:

1. In a vacuum bottle, the combination comprising a vacuum insulated receptacle, a protective jacket mounted around said receptacle and having an upper portion surmounting a pouring lip, an annular gasket interposed between said upper portion and the upper end of said receptacle, said receptacle having an inner wall with an upper portion forming a downwardly tapering mouth for said receptacle, said receptacle having an annular upper edge extending around the upper end of said mouth, a closure disengageably receivable in said mouth of said receptacle, said closure comprising a hollow generally cup-shaped stopper member disengageably receivable in said mouth, said stopper member being made of soft resilient material, said stopper member having a side wall with a frusto-conical downwardly facing external seating portion near the upper end thereof and tapering

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downwardly to a substantial extent to seat against the upper edge of said receptacle in sealing engagement therewith, said stopper member having a generally frusto-conical skirt-like flange projecting outwardly and downwardly therefrom near the lower end thereof for sealing engagement with said mouth of said receptacle along an annular area spaced downwardly to a substantial extent from the upper edge of said receptacle, said side wall of said receptacle having an intermediate portion of substantial length between said seating portion and said skirt-like flange, said intermediate portion being of reduced diameter with respect to said seating portion and said skirt-like flange and thereby being receivable in said mouth with an air space between said mouth and said intermediate portion to afford heat insulation, said closure having a substantially rigid cap member disengageably receivable over said upper end of said jacket, said cap member having a generally horizontal upper wall with a downwardly extending skirt-like flange around its periphery, means securing the upper end of said stopper member to the underside of said generally horizontal wall on said cap member, said upper portion of said jacket having external thread means thereon, and internal thread means on the inside of said flange of said cap for cooperative engagement with said thread means on said upper portion of said jacket to screw said stopper member downwardly and thereby bring said seating portion into sealing engagement with the upper edge of said receptacle.

2. In a vacuum bottle, the combination comprising a vacuum insulated receptacle having a mouth therein with an upper edge extending around said mouth, a jacket mounted around said receptacle, a closure comprising a soft resilient generally cup-shaped stopper member disengageably receivable in said mouth, said stopper member having a downwardly facing downwardly tapering frusto-conical shoulder near the upper end thereof for disengageably seating against the upper edge of said receptacle, said stopper member having a flexible resilient skirt-like flange near the lower end thereof for sealing engagement with said mouth at a point spaced substantially downwardly from said shoulder, said stopper member having an intermediate portion of substantial length between said shoulder and said skirt-like flange and of a reduced diameter with respect thereto to define an air space between said intermediate portion and said mouth so as to afford heat insulation, a substantially rigid cap portion on said closure for covering the upper ends of said jacket and said receptacle, said cap portion being connected to the upper end of said stopper member, and screw thread elements on said cap portion and the upper end of said jacket for retaining said stopper member in sealing position in said mouth.

3. In a closure for a vacuum bottle, the combination comprising a hollow thin walled generally cup-shaped stopper member made of soft resilient material, said stopper member having a downwardly facing downwardly tapering frusto-conical shoulder formed thereon near the upper end thereof to provide a first closure seal, said stopper member having a generally frusto-conical skirt-like flange flaring outwardly and downwardly thereon near the lower end thereof to form a second closure seal, said stopper member having an intermediate portion of substantial length between said shoulder and said flange and of a reduced diameter to form an insulating air space between said first and second seals, a substantially rigid cap portion on said closure and connected to the upper end of said stopper member, said cap portion having an upper wall with a downwardly extending flange thereon spaced outwardly from said stopper member, and internal screw thread elements on the inside of said downwardly extending flange of said cap portion.

4. In a vacuum bottle, the combination comprising a vacuum insulated receptacle having a mouth therein

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with an upper edge extending around said mouth, a jacket mounted around said receptacle, a closure comprising a soft resilient generally cup-shaped stopper disengageably receivable in said mouth, said stopper having a downwardly facing annular frusto-conical shoulder thereon for disengageably sealing against the upper edge of said receptacle to form an upper seal, said stopper having a flexible resilient annular generally frusto-conical flange flaring outwardly and downwardly thereon below said shoulder for sealing engagement with said mouth to form a lower seal, said stopper having a reduced intermediate portion of substantial length between said shoulder and said flange to define an insulating air space between said intermediate portion and said mouth, a mounting member on the upper end of said stopper, and interengageable mounting elements on said mounting member and said jacket for disengageably securing said stopper thereto in sealing position.

5. In a closure for a vacuum bottle, the combination comprising a hollow thin walled generally cup-shaped stopper made of soft resilient material, said stopper having a downwardly facing, downwardly tapering frusto-conical annular shoulder thereon to provide an upper closure seal, said stopper having a generally frusto-conical skirtlike annular flange flaring outwardly and downwardly thereon below said shoulder to form a lower closure seal, said stopper having a reduced intermediate portion of substantial length between said shoulder and said flange to form an insulating air space therebetween, a substantially rigid mounting cap having a top wall covering the upper end of said stopper and extending outwardly therefrom, interlocking flange elements on said top wall and the upper end of said stopper for positively securing said stopper to said cap, said cap having a downwardly extending flange thereon spaced outwardly from said stopper, and internal screw thread elements on the inside of said downwardly extending flange of said cap for disengageably securing said cap to the vacuum bottle.

6. In a closure for a vacuum bottle or the like, the combination comprising a hollow generally cup-shaped stopper made of soft resilient material, a cap having a hand grip portion with a substantially horizontal wall for closing the top of said stopper, said wall having a first depending annular flange thereon for snug reception within the upper end of said stopper, said stopper having an outwardly projecting continuous annular lip on the end thereof, said upper wall having a second depending continuous annular flange with an inwardly directed annular lip thereon for interlocking with said lip on said stopper to secure said cap to said stopper, said wall having an annular portion with an underside sloping upwardly and inwardly between said first and second flanges to retain said lip on said stopper in a downwardly flexed position in interlocking relation with said lip on said outer flange.

7. In a closure for a vacuum bottle or the like, the combination comprising a hollow generally cup-shaped stopper made of soft resilient material, an upper wall member for closing the top of said stopper, said upper wall member having first and second closely spaced depending annular flanges thereon, said first annular flange being disposed within said second annular flange and being of a diameter corresponding closely to the inside diameter of the upper end of said stopper for snug reception therein, said stopper having an outwardly projecting substantially horizontal annular lip on the upper end thereof, said second depending annular flange having an inwardly directed annular lip thereon for interlocking with said lip on said stopper to secure said upper wall member to said stopper, said upper wall member being made of a substantially more rigid material than said stopper, said outwardly projecting lip on said stopper being substantially greater in outside diameter than the inside diameter of said inwardly directed annular lip on said second flange but being adapted to be forced up-

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wardly past said inwardly directed lip, said lip on said stopper being adapted to be flexed downwardly as it passes said lip on said second flange, the inside diameter of said second flange above said lip thereon being slightly less than the outside diameter of said lip on said stopper for maintaining said last-mentioned lip in a partially downwardly flexed condition and thereby affording strong resistance to separation of said stopper from said upper wall member, said upper wall member having an annular portion sloping upwardly between said second and first flanges at the upper end of the space therebetween to afford room for movement of said stopper into said space through a sufficient distance to move said outwardly projecting lip on said stopper past said inwardly directed lip on said upper wall member, while assisting in maintaining said outwardly projecting lip in its partially downwardly flexed condition.

8. In a closure for a vacuum bottle or the like, the combination comprising a hollow generally cup-shaped stopper made of soft resilient material, an upper wall member for closing the top of said stopper, said upper wall member having a peripheral hand grip portion projecting outwardly beyond said stopper, said upper wall member having first and second closely spaced depending annular flanges thereon, said first annular flange being disposed within said second annular flange and being of a diameter corresponding closely to the inside diameter of the upper end of said stopper for snug reception therein, said stopper having an outwardly projecting substantially horizontal annular lip on the upper end thereof, said second depending annular flange having an inwardly directed annular lip thereon for interlocking with said lip on said stopper to secure said upper wall member to

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said stopper, said upper wall member being made of a substantially more rigid material than said stopper, said outwardly projecting lip on said stopper being substantially greater in outside diameter than the inside diameter of said inwardly directed annular lip on said flange but being adapted to be forced upwardly past said inwardly directed lip, said lip on said stopper being adapted to be flexed downwardly as it passes said lip on said second flange, the inside diameter of said second flange above said lip thereon being slightly less than the outside diameter of said lip on said stopper for maintaining said last-mentioned lip in a partially downwardly flexed condition and thereby affording strong resistance to separation of said stopper from said upper wall member, said upper wall member having an annular portion sloping upwardly between said second and first flanges at the upper end of the space therebetween to afford room for movement of said stopper into said space through a sufficient distance to move said outwardly projecting lip on said stopper past said inwardly directed lip on said upper wall member, while assisting in maintaining said outwardly projecting lip in its partially downwardly flexed condition.

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