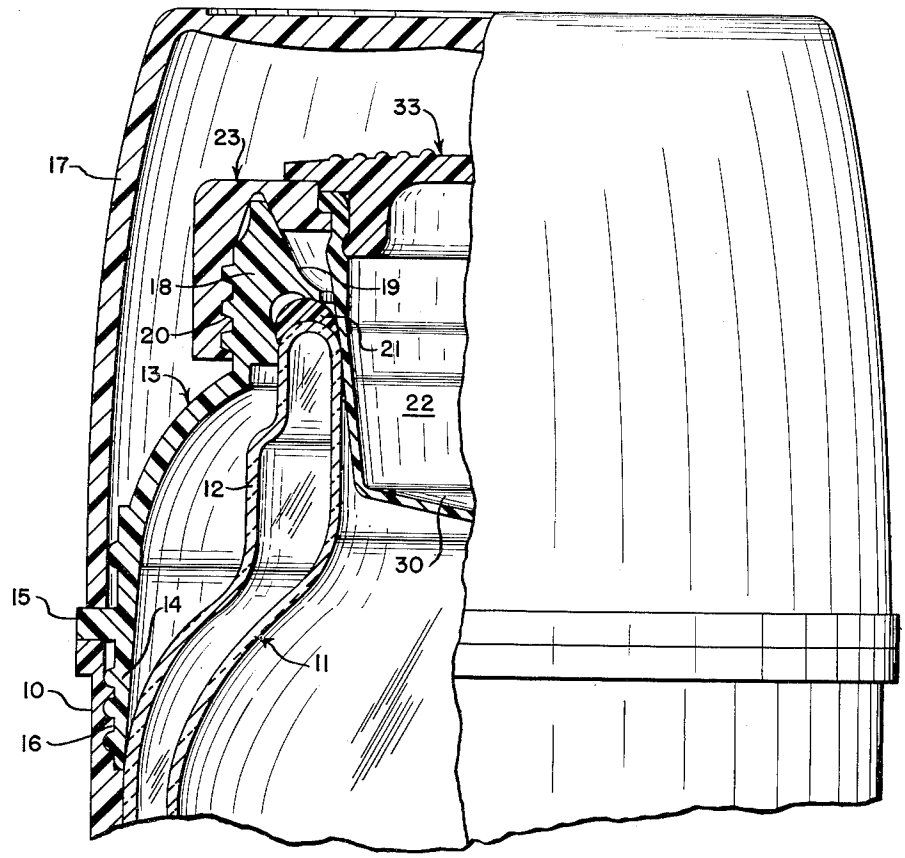
Oct. 23, 1962 L. J. DARMSTADT ETAL 3,059,798

STOPPER FOR VACUUM BOTTLE ASSEMBLY OR THE LIKE

Filed Feb. 25, 1960

FIG. 1



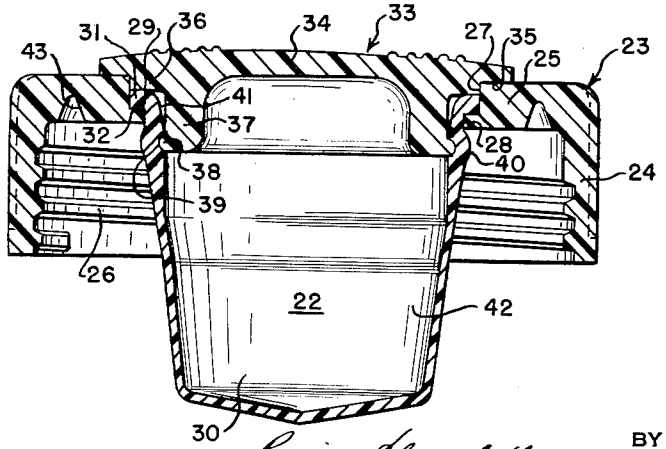


FIG. 2

INVENTORS
LOUIS J. DARMSTADT
GEORGE W. FULLER
BY Pennie, Edmonds, Morton, Barrows & Taylor
ATTORNEYS

United States Patent Office 3,059,798 Patented Oct. 23, 1962

3,059,798
STOPPER FOR VACUUM BOTTLE ASSEMBLY OR THE LIKE

Louis J. Darmstadt, Norwich, and George W. Fuller, Hampton, Conn., assignors, by mesne assignments, to King-Seeley Thermos Co., Ann Arbor, Mich., a corporation of Michigan

Filed Feb. 25, 1960, Ser. No. 11,002
4 Claims. (Cl. 215—13)

The present invention relates to stoppers for vacuum bottle assemblies or the like, and more particularly to a novel and improved assembly of parts forming an improved and simplified stopper particularly adapted for use in connection with vacuum bottle assemblies.

Although the present invention is not so limited, it is directed specifically to the provision of an improved stopper for a vacuum bottle assembly or the like, where the stopper is engaged with the bottle assembly by threads. To this end, the stopper advantageously incorporates a collar member, formed of styrene or other hard material, and on which are provided suitable threads for engagement with a threaded breastpiece of the bottle assembly. That part of the stopper which is inserted in and forms a seal with the neck of the bottle advantageously is formed of a semi-resilient material, such as polyethylene, so that the desired sealing may be obtained while avoiding excessive contact pressures between the stopper and the neck of the bottle, which may be an evacuated, double-walled glass container of a relatively fragile nature. The described combination of materials is desirable, in that easy operation and long wear of the threaded parts is provided through the use of hard or substantially rigid materials, while the desired sealing contact is provided to advantage by using softer or semi-resilient plastic materials.

One aspect of the invention resides in the provision of a stopper incorporating a threaded collar and a central plug or nosepiece, each being formed of the desired material, and in a novel and improved arrangement for assembling such parts to provide a sturdy and effective stopper structure having insulating qualities and adapted to be maintained easily in a clean and sanitary condition. To this end, the improved stopper comprises, broadly, a collar member provided with a central opening, in which is received a hollow, cup-shaped nosepiece. The nosepiece and collar are locked in assembled relation by a cap, which is inserted into the open upper end of the nosepiece to seal off and form an air chamber in the nosepiece. The cap also distends outwardly the walls of the nosepiece, adjacent the central opening in the collar, to maintain the collar and nosepiece in sealed and mechanically locked relation.

In one of the more specific, advantageous forms of the invention, the collar and nosepiece are formed of styrene and polyethylene plastic, respectively, and cooperating shoulders are provided on the collar and nosepiece to position the parts properly one with respect to the other. A cap member, also advantageously formed of styrene plastic, has a cylindrical projecting portion received in the open end of the nosepiece and extending through the central opening in the collar. Outer portions of the cap seat upon and seal with the top surface of the collar, in the area surrounding the central opening, so that the top of the stopper assembly may be kept clean and sanitary without difficulty. An annular bead is provided adjacent the lower end of the projecting portion of the cap, and this bead, in the assembled stopper, is received interlockingly in an annular groove in the nosepiece. The location of the cooperating annular bead and groove is slightly below the central opening in the collar, and the relative dimensions of the parts are such that the bead distends the wall

of the nosepiece outwardly, just below the central opening, thereby locking the three parts in assembled relation.

For a better understanding of the above and other advantageous features of the invention, reference should be made to the following detailed description and to the accompanying drawing, in which:

FIG. 1 is an enlarged, fragmentary, elevational view, partly in section, of a typical vacuum bottle assembly incorporating the stopper of the invention; and

FIG. 2 is a longitudinal, cross-sectional view of the stopper alone.

Referring now to the drawing, the reference numeral **10** designates a cylindrical casing of a vacuum bottle assembly, in which is received an evacuated, double-walled container **11**, typically made of glass, which may be used as a container for hot or cold beverages or foods. Conventionally, the container **11** will have a neck portion **12** of reduced diameter which projects above the casing **10** and, in the illustrated assembly, the neck portion **12** is surrounded by a combined breastpiece and pouring lip **13**, which may be molded of a plastic material, such as styrene. The lower portion of the breastpiece **13** is threaded at **14** and provided with a radially outwardly extending flange **15**, and the breastpiece is assembled to the casing **10** by engagement of the threads **14** with suitable threads **16** in the upper portion of the casing, the flange **15** being arranged to seat upon the upper end of the casing. A suitable cover **17** usually is received over the entire upper end of the bottle assembly, being threadedly engaged with the breastpiece **13** for easy removal.

In the illustrated vacuum bottle assembly, the breastpiece **13** has an integral upper portion **18** forming a pouring lip **19** and having an externally threaded neck **20**. The lower edge of the pouring lip presses downward against a sealing ring **21** which, in turn, seats on the top of the container neck **12**.

In accordance with the invention, a novel stopper assembly **22** is provided for the described bottle assembly, the stopper having means for threadedly engaging the neck **20** of the breastpiece and means for sealing and insulating the neck opening in the container **11**. As shown more particularly in FIG. 2, the new stopper comprises a collar **23** of generally annular form which advantageously is molded of a substantially rigid plastic material, such as styrene and is shaped to provide a downwardly extending, cylindrical outer wall **24** and an integral, horizontal top wall **25**. The cylindrical wall **24** is provided with internal threads **26** adapted to mate with the threaded neck **20** of the breastpiece whereby the collar **23** may be screwed tightly onto the breastpiece **13**. The top wall **25** of the collar is provided with a central opening **27** of relatively large diameter and, advantageously, a radially inwardly extending flange **28** is provided adjacent the bottom of the central opening, forming an upwardly facing shoulder **29** and defining the narrowest diameter portion of the central opening. In a typical stopper assembly, the collar **23** may be about 2½ inches in diameter and ¾ of an inch high, and the central opening may be about 1⅜ inches in diameter throughout its larger, upper portion and about 1¼ inches in diameter in the region of the flange **28**.

Received in the central opening **27** of the collar is a nosepiece **30**, which advantageously is formed of a semi-resilient plastic material, such as polyethylene and is of hollow, cup-shaped configuration. At its upper, open end, the nosepiece **30** is provided with a radially outwardly extending flange **31**, whose outside diameter may equal or slightly exceed the diameter of the enlarged portion of the opening **27** and whose bottom surface forms a shoulder **32** adapted for cooperating engagement with the shoulder **29** formed by the collar flange **28**. The outside diameter of the nosepiece **30**, in the region of the flange **28**, advantageously is equal to or slightly greater than the inside

diameter of the lower or flanged portion of the central opening 27. Accordingly, the nosepiece 30 may be press-fit into the central opening 27 and retained in the opening by a certain amount of friction, in a desired position relative to the collar 24 as determined by the cooperating shoulders 29, 32 on the collar and nosepiece, respectively. By way of example, the nosepiece 30, as initially molded, may be designed to have an interference-fit of about 0.025 inch in the central opening 27.

In accordance with the invention, the stopper assembly is completed and the respective parts thereof are mechanically locked in assembled relation by means of a cap 33, which advantageously is molded of a substantially rigid material, such as styrene. The cap 33 is provided with a circular top portion 34 somewhat larger in diameter than the central opening 27, providing a marginal annular surface 35 adapted to engage and form a seal with the upper surface of the collar 24 in an annular area surrounding the central opening 27 therein. The cap 33 also is provided with a cylindrical projection or boss 36 substantially equal in diameter to that of the upper portion of the central collar opening 27 and adapted to be received in the opening above the flange 31 of the nosepiece.

As an important feature of the invention, the cap 34 is provided with a downwardly projecting cylindrical portion 37, which is slightly smaller than the small diameter portion of the central collar opening 27 and of sufficient axial length to project downward through the opening when the cap is in assembled relation to the collar 24. Adjacent its lower end, the cylindrical portion 37 is provided with an annular bead 38 which projects radially outward and is adapted to be received in and interlock with an annular groove 39 provided internally in the nosepiece 30. As shown in FIG. 2, the dimensional relationships of the respective parts are such that the interlocking bead and groove 38, 39, in the assembled stopper, lie below the flange 28 of the collar.

The outside radius of the bead 38 is smaller than the radius of the central opening 27, in the region of the flange 28, by an amount less than the wall thickness of the nosepiece 30 in the adjacent region. Accordingly when the cap 33 is pressed in place, after prior assembly of the nosepiece and collar, the semi-resilient plastic material of the nosepiece is compressed as the bead 38 passes through the flange region. After the bead has passed the flange region, it snaps into place in the annular groove 39. And, as one of the specific features of the invention, the diameter of the groove 39, when the nosepiece is assembled in the collar, is less than the diameter of the bead 38. Accordingly, when the cap 33 is pressed into assembled position, the walls of the nosepiece 30 adjacent and directly below the flange 28 are distended in an outward direction, forming a slight bulge 40 around the nosepiece and effecting a mechanical interlock of the nosepiece and collar.

As seen best in FIG. 2, the inner wall surface of the nosepiece 30, above the annuluar groove 39, diverges outwardly, as indicated at 41, so that the diameter of the main recess or well of the nosepiece is greater at its extreme upper edge than at the upper edge of the recess 39. This facilitates entry of the cylindrical projection 37 of the cap and provides for the proper interfering relationship between the bead 38 and the nosepiece wall as the bead approaches the lower region of the flange 28 during assembly. By way of example, the upper wall portion 41 of the nosepiece may diverge at an angle of about 10° from the vertical from the upper edge of the annular recess 39, where the wall thickness of the nosepiece may be on the order of 0.067 inch.

The desired interfering relation of parts to effect a satisfactory seal and mechanical interlock is achieved where the diameter of the opening 27 in the region of the flange 28 is about 0.045 inch greater than the maximum outside diameter of the bead 38 and where the wall thickness of the nosepiece, directly above the groove 39 is 0.067 inch, the said top edge being located about 0.033 inch below

the bottom surface of the flange 28. The bead and groove advantageously may have a radius of about 0.032 inch, so that the center line of the interlocked bead and groove lies about 0.065 inch below the bottom surface of the flange.

In the assembled stopper, dead air space 42 is provided, as desired, in the nosepiece 30, providing substantial insulation against the transfer of heat through the stopper neck of the container. The several parts of the stopper itself are sealed at the various exposed, contacting surfaces, as at points of contact between the nosepiece 22 and collar 23 and the annular area of contact between the collar 23 and cap 33. This prevents the entry of liquids into small crevices, which otherwise would render cleaning difficult and lead ultimately to unsanitary conditions.

As shown in FIG. 1, the new stopper is applied to a vacuum bottle assembly by inserting the lower portion of the nosepiece into the neck 12 of the vacuum container and screwing the collar 24 tight onto the threaded neck 20 of the breastpiece 13. As indicated, the lower portion of the nosepiece may be tapered to facilitate its entry into the container but has intermediate portions of slightly larger diameter than the inside diameter of the container neck, so that a low pressure seal is effected when the stopper is applied fully. The nosepiece 30 and cap 33, being in tight gripping relation to the collar 24, rotate with the collar during its threaded application to and removal from the neck of the bottle assembly.

In the illustrated bottle and stopper assembly, an auxiliary seal advantageously is provided between the collar 23 and pouring lip 19. Such an auxiliary seal is realized by providing an annular recess 43 in the collar having a surface disposed at an angle to mate with the diverging surface of the pouring lip. Thus, when the collar 23 is threadedly applied to the bottle assembly, the upper edge of the pouring lip is received in the recess 43 and makes tight contact therewith. It will be understood, however, that the principal seal for the container 11 is provided by the lower pressure contact between the nosepiece 30 and the container neck 12.

The new stopper is designed to incorporate effectively a number of desirable and advantageous functional features, while being capable of economical manufacture and assembly. The new design readily accommodates the use of rigid material, such as styrene plastic, for the threaded collar 23, while permitting the use of semi-resilient plastic materials, such as polyethylene, for the nosepiece 30, to provide a low pressure seal with the more fragile walls of a vacuum container. The principal parts of the stopper—the collar 23 and nosepiece 30—are completed and held firmly in assembled and sealed relationship by means of a cap 33, which may be snapped into place, deforming or distending the wall of the nosepiece 30 to provide sealing and gripping pressure and causing sufficient distortion of the nosepiece to provide a mechanical interlocking thereof with the collar 23.

It should be understood, however, that the specific form of the invention herein illustrated and described is intended to be respresentative only, as certain changes may be made therein without departing from the clear teachings of the disclosure. Accordingly, reference should be made to the following appended claims in determining the full scope of the invention.

We claim:

1. A stopper for a vacuum bottle assembly or the like, which comprises an annular collar of semi-rigid material for engaging the neck of the bottle assembly, said collar having a central opening of predetermined size, a hollow, cup-shaped nosepiece of distortable material received in said central opening and having a portion projecting downward therefrom, said collar and nosepiece having cooperating shoulders for positioning said nosepiece relative to said collar, and a cap of semi-rigid material received in and closing the top of said nosepiece, said cap having a shoulder extending over the top of and contact-

ing said collar about the central opening therein and having a generally cylindrical wall projecting downward through said opening and into said nosepiece, and said nosepiece and cap having cooperating bead and groove means positioned below the central opening in said collar and locking said cap and nosepiece in assembled relation, said bead and groove means being of such relative size as to cause radially outward distension of said nosepiece, below said central opening, when said cap and nosepiece are assembled, whereby said nosepiece and said cap are locked in assembled relation with said collar.

2. A stopper for a vacuum bottle assembly or the like, which comprises a collar formed of substantially rigid material and having a cylindrical outer wall for engaging the neck of said bottle assembly and a top wall extending radially inward from said outer wall, said top wall having a central opening therein and a radially inwardly extending shoulder located adjacent the bottom of said central opening and defining the smallest diameter portion of said central opening, a hollow, cup-shaped nosepiece formed of semi-resilient material received in said central opening, said nosepiece having a portion extending substantially below the top wall of said collar and having a radially outwardly extending flange at its upper end, the lower surface of which engages the upper surface of said shoulder to position said nosepiece relative to said collar, the wall of said nosepiece in the region opposite said shoulder being in snug-fitting relation with the collar in the smallest diameter portion of said central opening, the axial thickness of said flange being substantially less than the thickness of the top wall of said collar, whereby said flange is received in said central opening below the upper surface of said top wall, said nosepiece having an annular groove therein located below the bottom surface of said top wall, and a cap member having a top portion and a central, generally cylindrical portion projecting downward from said top portion, said top portion having a cylindrical shoulder portion received in said central opening above the flange of said nosepiece and having a radially outwardly extending portion in sealing contact with an annular area of the top surface of said collar surrounding said central opening, the downwardly projecting portion of said cap member being received within said nosepiece and having an annular bead adjacent its

lower end, said bead being interlockingly engaged with the groove in said nosepiece, the relative diameters of said bead and groove being such that the wall of said nosepiece is distended outward by said bead to lock said nosepiece, collar and cap member securely together in sealed relation.

3. A stopper for a vacuum bottle assembly or the like, which comprises an annular collar of semirigid material for engaging the neck of said bottle assembly, said collar having a central opening of predetermined size, a hollow cup-shaped nosepiece of readily distortable material received in said central opening and having a portion projecting downward therefrom, a cap of semi-rigid material received in and closing the top of said nosepiece, cooperating shoulders on said collar and nosepiece for positioning the nosepiece relative to the collar, and cooperating bead and groove means on said cap and nosepiece located on the side of said collar opposite said cooperating shoulders for locking said collar and nosepiece in predetermined relative positions; said cap and nosepiece being of such relative proportions that wall portions of said nosepiece are distended outward below said shoulders by said cap to effect locking and sealing engagement between said nosepiece and collar.

4. The stopper of claim 3, in which said cooperating bead and groove means comprises an annular groove in said nosepiece located below the central opening in said collar and an annular bead on said cap, the outside radius of said bead being smaller than the radius of said central opening by an amount less than the wall thickness of said nosepiece in the region adjacent said central opening, whereby the wall of said nosepiece is compressed during assembly of the cap to the assembled nosepiece and collar.

References Cited in the file of this patent

UNITED STATES PATENTS

2,830,722	Darmstadt	Apr. 15, 1958
2,934,231	Bramming	Apr. 26, 1960

FOREIGN PATENTS

1,197,084	France	June 1, 1959