

[54] RESEALABLE HERMETIC VIAL
[76] Inventor: Lyle D. Winkler, 515 Kimball,
Wauconda, Ill. 60084

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[58] Field of Search 215/32, 34, 31, 2, DIG. 3;
401/132; 128/272

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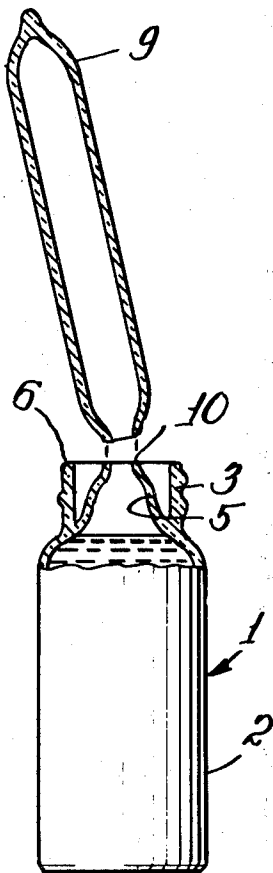
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Primary Examiner—William I. Price
Assistant Examiner—Ro E. Hart
Attorney, Agent, or Firm—Darbo, Robertson &
Vandenburg

[57] ABSTRACT
The sealed fill tube of a glass hermetic vial is broken
off at a score mark to open. The vial is resealable by a
cap which fastens to securing means at the top of the
vial to close the opening and may also seal at the top
of the securing means.

11 Claims, 11 Drawing Figures



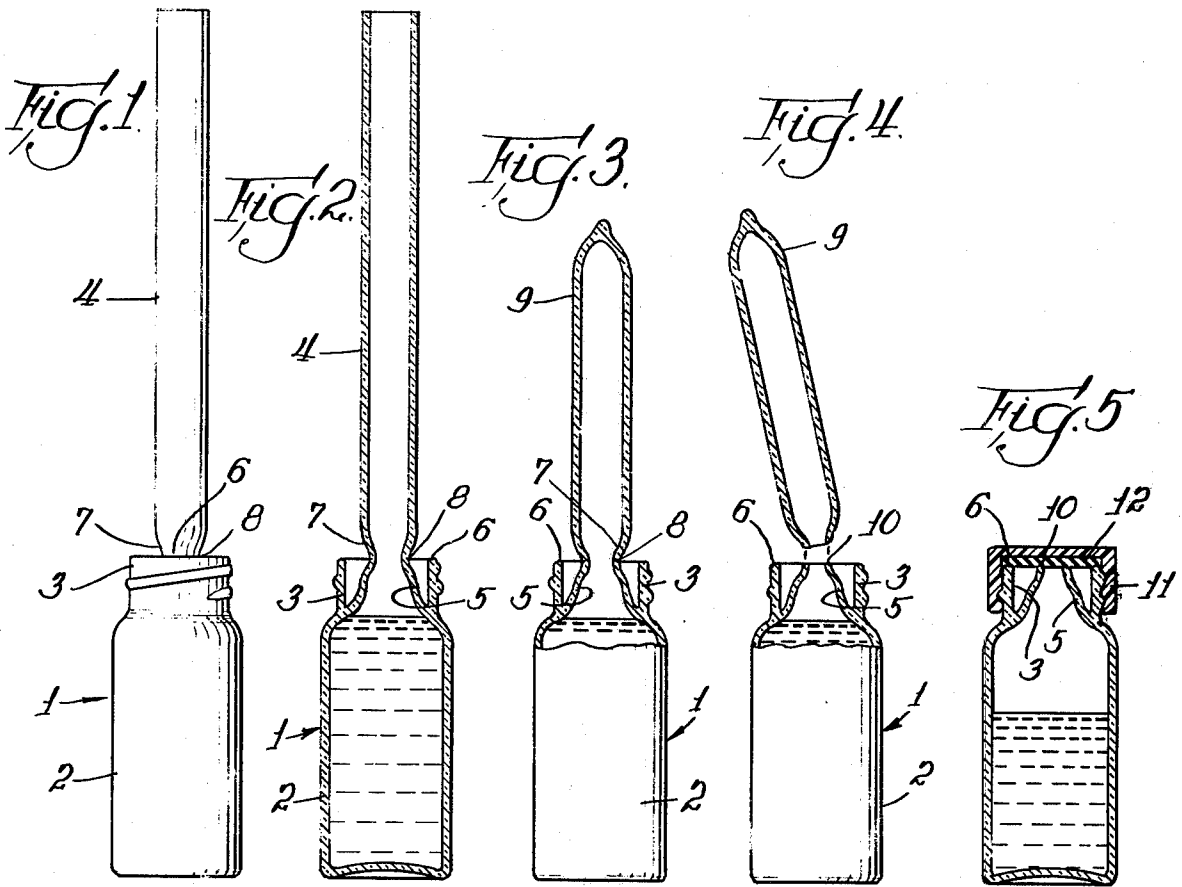


Fig. 6.

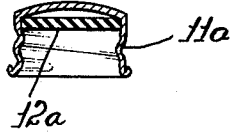


Fig. 7.

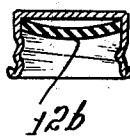


Fig. 8.

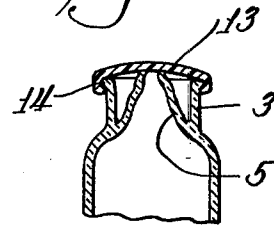


Fig. 9.

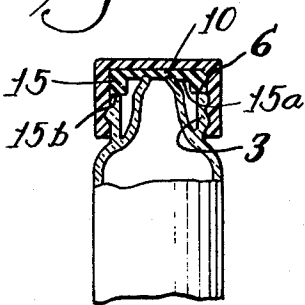


Fig. 10.

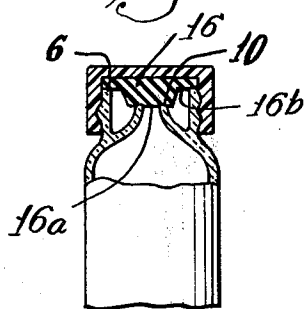
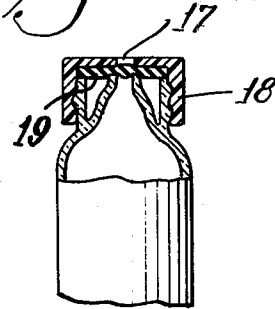


Fig. 11.



RESEALABLE HERMETIC VIAL

BACKGROUND AND SUMMARY OF THE INVENTION

Certain types of liquids, especially in the medical and chemical fields, are necessarily or advantageously packaged for shipment and storage pending use in hermetic vials, ampules, bottles or other type of glass container; that is, glass containers which are hermetically sealed, as by applying heat to the glass at the opening to weld it shut, after filling. While some of these ampules are sized to contain, for example, a single dose of medicine and are completely emptied and discarded once opened, others are desirably resealable for proper and safe storage of the balance of the liquid after the desired quantity, but less than all, of the liquid has been taken from the vial.

It is an object of the invention to provide a glass container which can be hermetically sealed, conveniently opened and conveniently and dependably resealed. A further object is to provide such a hermetic container which is resealable at the access opening formed when the hermetically sealed container is first broken open. A further object is to provide such a container which, on resealing, has a safety seal in addition to the primary seal.

The advantageous features of the invention and alternative structural variants for their implementation will be more completely understood as the description of the invention proceeds in conjunction with the drawings.

DESCRIPTION OF THE DRAWINGS

FIG. 1 is an elevational view of a hermetic vial ready for filling.

FIG. 2 is a cross-sectional view of the vial of FIG. 1.

FIG. 3 is a cross-sectional view of the vial after filling and heat sealing.

FIG. 4 is a cross-sectional view showing the vial of FIG. 3 broken open.

FIG. 5 is a cross-sectional view of the vial of FIG. 4 mechanically resealed.

FIGS. 6 and 7 are cross-sectional views showing alternative forms of resealing caps.

FIGS. 8-11 are cross-sectional views showing further alternative constructions and arrangements for resealing the vial.

DESCRIPTION OF SPECIFIC EMBODIMENTS

This invention contemplates containers of any suitable shape and size. By way of example, a glass vial is illustrated and the structural and performance features of the invention are described with reference to this exemplary embodiment.

The vial may best be described as a broadmouthed jar 1 having a conventional cylindrical body 2 and a threaded neck 3 which jar is fitted with a fill tube 4. The fill tube extends through the neck 3 coaxially therewith a distance which is convenient for the subsequent filling and use of the vial. The outside diameter of fill tube 4 is substantially less than the inside diameter of neck 3 of the vial. The flared base 5 of the fill tube is welded to body 2 at the base of neck 3. Thus, the interior of the container is defined by the interior of body 2 and the interior of the fill tube.

At approximately the level of the top 6 of neck 3, the fill tube is constricted, as at 7, and a score mark 8 is im-

pressed into the outer surface of the fill tube throughout its circumference. The purposes of the constriction and score mark are to facilitate the opening of the hermetically sealed vial and determining the exact level of the break for the purposes hereinafter more fully described.

The hermetic vial, thus constructed, is ready to be filled. This is accomplished by introducing the liquid to be sealed in the vial through the fill tube, usually by means of a nozzle in a filling machine. After the body of the vial has been filled, the open top of the fill tube is hermetically sealed, as indicated at 9, FIG. 3, by the local application of heat. The vial of liquid is then ready for packing into a suitable shipping and storage container.

When it is desired to use liquid from the vial, the portion of fill tube 4 which extends above score mark 8 is broken off. The level of the break is determined by the score mark. In the example of FIGS. 1-5, the mouth 10 of the opening made when the fill tube is broken off at the score mark 8 is at approximately the level of the top 6 of neck 3. When the vial has been opened in this manner, liquid may be poured from it or may be withdrawn by means, for example, of a pipette or syringe. After the required amount of liquid has been taken from the vial, it may be resealed, in accordance with the invention, by screwing cap 11 tightly onto neck 3 so that sealing gasket 12 is pressed firmly against surface 10 and, preferably, also surface 6. Gasket 12 is preferably made from a suitably resilient material to provide the pressure contact calculated to seal off the opening at 10. White rubber may, for example, be employed and if a surface more inert to the contents of the vial is desired, the rubber gasket may be coated with, for example, Teflon resin.

Although the mechanical seal provided by the cap and gasket can not be regarded as the full equivalent of the original hermetic glass seal, it is sufficiently tight to preserve the liquid remaining in the vial for a reasonable period of time. The primary seal at the surface 10 is backed up and augmented by the secondary seal at the surface 6.

Many alternative and equivalent structures and arrangements may be employed for resealing the opened hermetic vial. Some are shown in FIGS. 6-11. The cap 11A shown in FIG. 6 is domed to allow limited flexing of gasket 12A to ensure a double seal where the level of surface 10 of the access opening is somewhat above that of surface 6. Gasket 12A should be semi-rigid and still sufficiently resilient to form the necessary sealing pressure contacts. Cap 11 is shown in FIG. 7 with a concave gasket 12B to properly reseat a vial in which the level of surface 10 is somewhat below that of surface 6.

FIG. 8 illustrates the use of a snap-type cap 13 which is held snugly in position by bead 14 at the periphery of the top of neck 3. The cap is composed of a plastic material which is sufficiently stiff to hold itself securely in position upon the vial and soft enough to seal the vial.

Gasket 15 of the arrangement illustrated in FIG. 9 has two different levels of sealing surfaces, level 15A being intended to effect the primary seal at the surface 10 which, in this instance, is somewhat above the level of surface 6 of neck 3, level 15B of the gasket around the periphery thereof engaging surface 6 to effect the safety seal. In a similar manner, gasket 16 shown in

FIG. 10 has sealing surfaces 16A and 16B to engage, respectively, surfaces 10 and 6 to effect the double seal where the level of surface 10 is substantially below that of surface 6.

A central hole 17 in the cap 18 (FIG. 11) permits, with the use of a suitable gasket 19 of, for example, silicone gum rubber, the withdrawal of liquid from the resealed vial by means of a hypodermic needle which is driven through the gasket to reach the liquid. The gasket is self-closing upon withdrawal of the needle.

ACHIEVEMENT

The invention provides a resealable hermetic vial which combines the desirable hermetically sealed container which ensures the longest possible shelf life for the liquid contained therein with a container that is calculated to keep residual liquid almost as efficiently as the original hermetically sealed container. The construction, which may start from a standard form of glass jar, is commercially practical to manufacture, is easy to break open, dependably provides resealing means and permits easy access to liquid remaining in the vial after it has been broken open.

I claim:

1. A resealable hermetic vial comprising a container body having a neck at the top thereof and means on said neck for securing a resealing closure cap thereto, a glass filler tube hermetically secured to the body-neck structure near the top thereof and extending upwardly therefrom, said tube having a score mark thereon at a level near the top of said neck to establish the level at which said tube is broken off when the filled and hermetically sealed vial is opened, and a closure cap having securing means adapted to cooperate with said securing means on said neck to sealingly close the broken-open filler tube at said score mark.

2. Structure in accordance with claim 1 wherein the filler tube is constricted at the level of the score mark.

3. Structure in accordance with claim 1 wherein the closure cap includes means for sealing the vial at the neck of the container as well as at the filler tube.

4. Structure in accordance with claim 3 wherein the means for sealing the vial comprises a gasket of self-healing gum material and the cap has an aperture at its center whereby liquid contained in the resealed vial may be withdrawn by means of a hypodermic needle without removal of said cap.

5. Structure in accordance with claim 1 wherein the score mark is at approximately the level of the top of

the neck of the container and the closure cap contains a resilient gasket for sealing engagement with the broken-open filler tube.

6. Structure in accordance with claim 5 wherein the gasket is adapted to engage and seal the top of the neck of the container as well as the filler tube.

7. Structure in accordance with claim 6 wherein the closure cap is domed and the gasket is semi-rigid whereby limited upward movement of the central portion of said gasket with respect to said cap is permitted to allow for a slight extension of the filler tube above the level of the top of the neck of the container.

8. Structure in accordance with claim 6 wherein the gasket is concave and semi-rigid whereby the central portion thereof engages the filler tube whereof the level of the score mark is slightly below the level of the top of the neck of the container.

9. Structure in accordance with claim 1 wherein the score mark is above the level of the top of the neck of the container and the closure cap contains a resilient gasket having a greater thickness at its periphery than at its central area whereby the opened vial is resealed at both the filler tube and the neck of the container when the closure cap is secured in place upon said neck.

10. Structure in accordance with claim 1 wherein the score mark is below the level of the top of the neck of the container and the closure cap contains a resilient gasket having a greater thickness at the central area than at the periphery thereof whereby the opened vial is resealed at both the filler tube and the neck of the container when the closure cap is secured in place upon said neck.

11. A resealable hermetic vial comprising a glass container body having a wide-mouthed threaded neck at the top thereof, a glass filler tube hermetically secured to said container at the top thereof and extending upwardly through and above said neck, the outside diameter of said tube being less than the inside diameter of said neck, said tube having a constriction and a score mark at approximately the level of the top of said neck to establish the level at which said tube is broken off when the filled and hermetically sealed vial is opened, and a threaded resealing closure cap containing a resilient gasket therein adapted to engage and seal both the broken-open filler tube and said neck of said container at the top thereof when said cap is secured tightly upon said neck.

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