April 20, 1965 G. DE MALGLAIVE 3,179,313

DOUBLE CLOSURE FOR SEALING VOLATILE LIQUID CONTAINER

Filed Oct. 24, 1961

FIG. 1

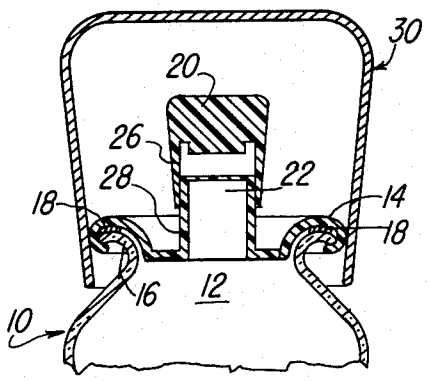


FIG. 2

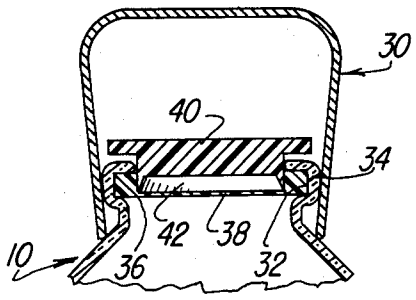


FIG. 3

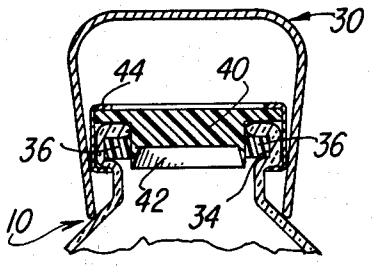


FIG. 4

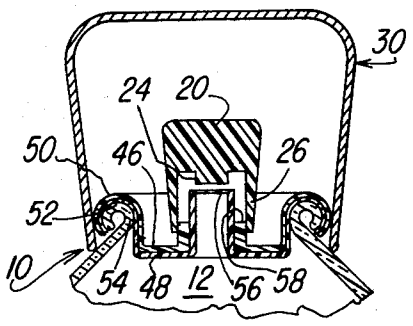


FIG. 5

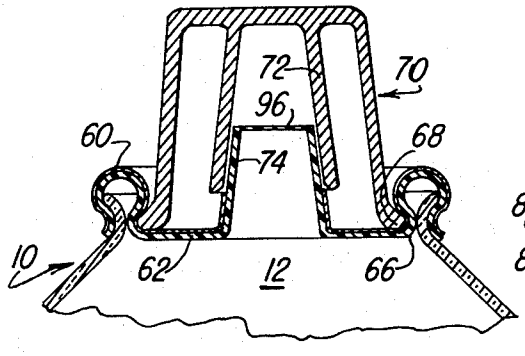
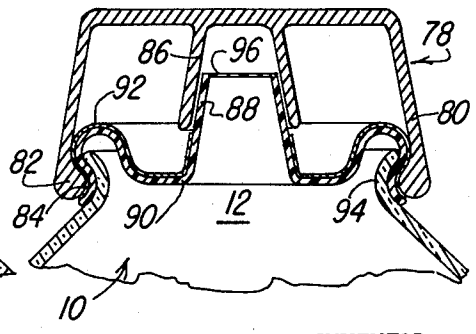


FIG. 6



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DOUBLE CLOSURE FOR SEALING VOLATILE LIQUID CONTAINER

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7 Claims. (Cl. 222—541)

This invention relates to a container assembly, and it relates more particularly to a container and to closure elements therefor which provide a safe and effective means for storing materials, particularly volatile liquids such as ethyl ether, ethyl chloride, bromide or chloroform.

Various containers are currently used for storing volatile compounds and other materials. Such containers include glass bottles, usually provided with tapered glass stoppers. In addition, metal containers, provided with screw caps, corks or similar closures, are widely used. The use of glass containers is objectionable since they are generally heavy and naturally extremely fragile. In addition, closure mechanisms for such containers as well as metal containers are of a nature such that their sealing capacity is virtually destroyed after the initial use of their contents. It is thus virtually impossible to effectively store in such containers liquids which are in the least volatile or which are otherwise harmed by contact with the atmosphere.

Present packaging methods have not produced packages which are impervious whereby volatile liquids and similar materials can be stored indefinitely. Existing designs for packages do not provide shock resistance, and the closure elements therefor generally lose sealing capacity once the packages are opened.

It is an object of this invention to provide an improved container assembly characterized by closure elements which enable safe and effective storing of materials including volatile liquids.

It is a further object of this invention to provide a container assembly which is provided with a fluid and vapor tight seal even after initial use of some of the contents, which can be easily opened without damage to its sealing potential, and which is not susceptible to damage by reason of violent shocks.

These and other objects of this invention will appear hereinafter, and for purposes of illustration, but not of limitation, specific embodiments of this invention are shown in the accompanying drawings in which:

FIGURE 1 is a schematic sectional elevation of a container assembly characterized by the features of this invention;

FIGURE 2 is a schematic sectional elevation of an assembly provided with an alternative closure mechanism, the closure being shown in position prior to initial use of the contents;

FIGURE 3 is a schematic sectional elevation of an assembly similar to that of FIGURE 2 wherein the closure is shown in closed position after initial use of the contents;

FIGURE 4 is a schematic sectional elevation of an alternative container assembly;

FIGURE 5 is a schematic sectional elevation of an additional alternative illustrating a combined stopper and cap unit for an assembly; and

FIGURE 6 is a schematic sectional elevation of a further embodiment of the invention illustrating an alternative combined stopper and cap assembly.

The container assembly of this invention comprises a hollow body portion preferably formed of a shock resistant material such as aluminum sheet. The container body portion is provided with an improved closure for the orifice of the body whereby materials contained therein will be continuously protected from the atmosphere. The improved closure preferably comprises a thin member extending over the container orifice and secured at its edges to the container in a fluid and vapor impervious fashion. This thin member, which may be composed of plastic, is adapted to seal the container prior to initial use. After the thin member has been opened in order to remove all or a portion of the material contained therein, a stopper element is provided for resealing the container.

The stopper element of this invention is also preferably formed of a resilient plastic material and is adapted to tightly interfit with the remaining portion of the above mentioned thin closure member. In order to insure an impervious seal for the container, a packing which may also be composed of a resilient plastic material is disposed between the container and the thin closure member. The packing in certain embodiments of this invention will also serve to cooperate with the stopper element to provide an adequate seal after initial use of the container contents.

As indicated, resilient plastic materials are preferred for certain of the portions of the closure assembly. A suitable plastic is a superpolyamide known as "Rilsan." This material and related plastics will resist deterioration by various volatile liquids and is also characterized by adequate wear resistance. Various other resilient materials including polypropylene, nylon, delryn, styrene, Teflon, polyethylene and vinyl plastic are also contemplated. It will be understood, however, that the materials mentioned are not to be considered all-inclusive and that othar materials with similar properties will be suitable for the purposes of this invention.

Referring to the drawings for a more specific explanation of the inventive concepts, there is shown a container body 10 provided with various novel closure assemblies. The orifice 12 of the container 10 shown in FIGURE 1 is fitted with a closure member 14 which extends completely across the orifice. The closure member is turned over at its ends and engages the beaded rim 16 of the container 10 in a well known manner. An annular ring 18 of a plastic packing material is interfitted between the closure and container rim to insure an imprevious seal at this point. A stopper element 20 is provided for closing an opening 22 which may be made in the member 14.

The opening 22 is provided in the closure 14 by punching out or piercing the material in this central portion of the member 14. With this in mind, the molded plastic member 14 can be formed whereby only a thin membrane of plastic material is disposed in this central portion. The stopper 20 is provided with a protruding portion 24 adapted to tightly fit within the opening 22. To provide a further sealing relationship, a downwardly extending flange 26 is provided on the stopper 20 and is adapted to tightly engage the outer walls of the opening 22.

To complete the closure assembly, a cap 30 can be provided for the container. This cap is considered conventional and may be adapted to snap over the top of the container, or it may be threaded for engagement therewith.

FIGURE 2 illustrates a similar closure assembly provided for closing off the container portion 10. In this assembly a recess 32 is provided in the neck 34 of the container 10, and a resilient packing ring 36 is tightly fitted within this recess. Integrated with the packing ring is a thin membrane portion 38 provided for sealing the container prior to initial use. A stopper 40 is provided for sealing of the container after piercing of the membrane 38. In order to provide for an opening in the

membrane a punch 42 consisting of a metal collar having sharp bottom edges is integrated with the stopper 40.

FIGURE 3 illustrates an assembly similar to that shown in FIGURE 2 after the stopper 40 is pressed downwardly for operation of the punch 42. In this illustration the membrane 38 has been pierced to provide an opening therein. After removal of some of the container contents the tight engagement of the stopper 40 with the packing 36 will provide an impervious seal for the container.

FIGURE 3 also illustrates a ring 44 positioned around the closure assembly. This ring with its inturned edges is provided for initial sealing of the container and will be removed upon initial use thereof.

A further embodiment of the invention similar to that shown in FIGURE 1 is illustrated in FIGURE 4. In this embodiment, first molded plastic member 46 is provided for partially covering the orifice 12, this member having a central opening therein. A second molded plastic member 48 is disposed beneath the member 46 and extends across the orifice 12. These members are secured to the container 10 by means of their respective overturned edges 50 and 52. The edge 52 of member 48 interfits with the beaded edge 54 of the container and the edge 50 of member 46 lies over the edge 52.

In order to initially use the contents of the container shown in FIGURE 4, an aperture 56 is made centrally of the upstanding portion 58 of the member 48. This aperture, serving as the dispensing aperture for the container, can then be later closed by means of the stopper 20. As in FIGURE 1, the stopper 20 is provided with a downwardly protruding portion 24 which fits into the opening 56. The stopper is also provided with flange 26 which engages the outside wall of the upstanding portion 58 in a fluid and vapor tight fashion.

The closures shown in FIGURES 5 and 6 include integral cap and closing means. In addition, the closures provide only a single removable member while at the same time forming two impervious joints with the container body.

More specifically, the orifice 12 in the container body 10 is provided with closing means made up of closure member 60 and packing member 62. The member 62 is fitted over the beaded edge 64 of the body 10, while the member 60 is fitted over the edge of the member 62. The embodiment shown in FIGURE 5 also includes an internal annular recess 66 which is adapted to receive the out-turned end 68 of the cap 70. The cap 70 is also provided with a downwardly extending annular flange portion 72 which fits over the outside surface of a truncated neck portion 74 formed in the member 62.

In a preferred construction of the type shown in FIGURE 5 the element 60 is formed of thin, flexible metal, while the elements 62 and 70 are preferably formed of molded plastic of a resistant nature. The metal member 60 will provide greater rigidity in the construction, while the plastic members 62 and 70 will provide the necessary resilience for accomplishing impervious seals while still resisting deterioration by the container contents.

The construction shown in FIGURE 6 is similar to that illustrated in FIGURE 5. However, in this case the cap 78 is provided with an outer wall 80 having an inwardly directed edge portion 82. The cap can thus be forced over the top edge of the container and snugly seated in the recess 84. A second impervious joint is provided in this construction by means of the interengagement of the inner flange 86 of the cap and the upstanding wall 88.

The upstanding wall 88 is formed in a packing member 90 which is positioned beneath a closure member 92. The packing member is molded whereby it will be snugly received within the recess 94 formed in the container body 10 while the closure 92 will fit snugly about the packing member 90.

As in the previous cases, initial use of the container is accomplished by piercing the thin extension 96 formed centrally of the orifice 12. After breaking this seal, the integral cap and stopper 78 will provide a fluid and vapor impervious seal for the container.

It will be apparent that many variations in the above described embodiments are possible. For example, the interfitting, truncated members shown in FIGURES 5 and 6 could be inverted whereby the flanged portion in the cap would be adapted to fit inside the upstanding, outwardly flaring neck in the closure member. It will also be apparent that various of the members in the construction can be made integral with each other. Thus, the members 60 and 62 of FIGURE 5 and the corresponding members 90 and 92 of FIGURE 6 could be formed of a single piece of molded plastic. Furthermore, resilient members of the type needed for this construction could be formed of metal, the metal members being provided with slits parallel to their axes to provide the desired resilience.

There have been described container assemblies and packages which are capable of resisting deterioration by the materials contained therein, and which will not be destroyed when subjected to violent shocks. The packages described are provided with relatively simple closure means whereby vapor and fluid impervious seals exist before and after initial use. Although the packages of this invention are particularly suitable for the storage of volatile liquids, it will be apparent that many other materials can be stored therein.

It will be understood that various modifications may be made in the above described container assemblies which provide the characteristics of this invention without departing from the spirit thereof, particularly as defined in the following claims.

I claim:

1. A container assembly for the storage and dispensing of materials, particularly volatile liquids, comprising a body portion for holding said materials, an orifice in said body portion for loading and dispensing said materials, a closure element comprising resilient packing means disposed in fluid-tight relation around the edges of said orifice, a fluid and vapor impervious membrane positioned centrally of said orifice and engaging said packing means in a fluid and vapor impervious manner, said membrane being adapted to be opened, a resilient stopper element adapted to engage said opening in a pressure-tight manner to provide a fluid and vapor tight seal for said container assembly after the membrane closure is opened, and a cap member engaging said orifice and adapted further to seal said body portion, and in which said closure includes an upstanding wall terminating in said opening and wherein said stopper includes a protruding annular flange adapted to be pressed about said wall.

2. An assembly according to claim 1 wherein said cap member is formed integrally with said stopper and comprises a second outer annular flange portion adapted to resiliently engage said body portion.

3. A container assembly for the storage and dispensing of materials, particularly volatile liquids, comprising a body portion for holding said materials, an orifice in said body portion for loading and dispensing said materials, a closure element comprising resilient packing means disposed in fluid-tight relation around the edges of said orifice, a fluid and vapor impervious membrane positioned centrally of said orifice and engaging said packing means in a fluid and vapor impervious manner, said membrane being adapted to be opened, a resilient stopper element adapted to engage said opening in a pressure-tight manner to provide a fluid and vapor tight seal for said container assembly after the membrane closure is opened, and in which said body portion defines an inwardly facing annular recess adjacent said orifice, said packing means being fitted within said recess and wherein said membrane is formed integrally with said packing means.

4. A container assembly in accordance with claim 2 wherein said body portion defines an outwardly facing

annular recess adjacent said orifice, said packing means being fitted within said recess and said closure means overlying said packing means, said membrane being formed integrally with said packing means, said closure means and said packing means forming an inwardly facing recess within said orifice and said second flange portion being resiliently engaged within said inwardly facing recess.

5. A container assembly in accordance with claim 2 wherein said body portion defines an outwardly facing annular recess adjacent said orifice, said packing means being fitted within said recess and said closure means overlying said packing means, said membrane being formed integrally with said packing means, and said second flange portion being disposed in said recess and overlying said closure means.

6. A container assembly for the storage and dispensing of materials, particularly volatile liquids, comprising a body portion for holding said materials, an orifice in said body portion for loading and dispensing said materials, a closure element comprising resilient packing means disposed in fluid-tight relation about the edges of said orifice, a fluid and vapor impervious membrane positioned centrally of said orifice and engaging said packing means in a fluid and vapor impervious manner to seal the orifice, said membrane having a central upwardly extending portion adapted to be opened, a cap member in the form of a cylindrically shaped member having free edges which

are dimensioned to engage said orifice in sealing relationship and an inner annularly flanged stopper portion depending from said cap member and dimensioned to engage the outer walls of said upwardly extending portion in sealing relationship when the cap member is in position of use on said body portion.

7. A container as claimed in claim 6 in which the packing and the membrane are integrally formed as a single element.

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