March 14, 1967 J. R. TAYLOR 3,308,980

SAFETY PACKAGE FOR DANGEROUS LIQUIDS

Filed Nov. 19, 1965

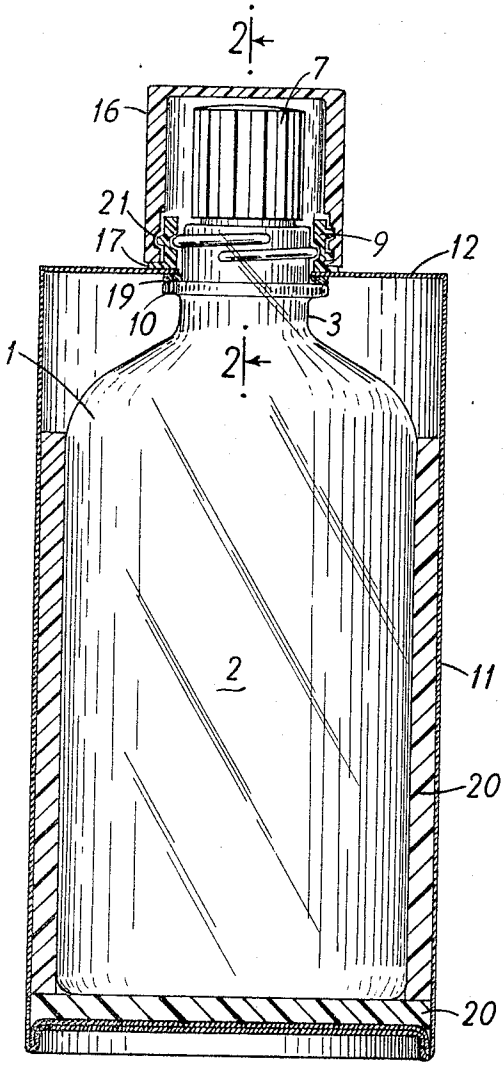

FIG. 1.

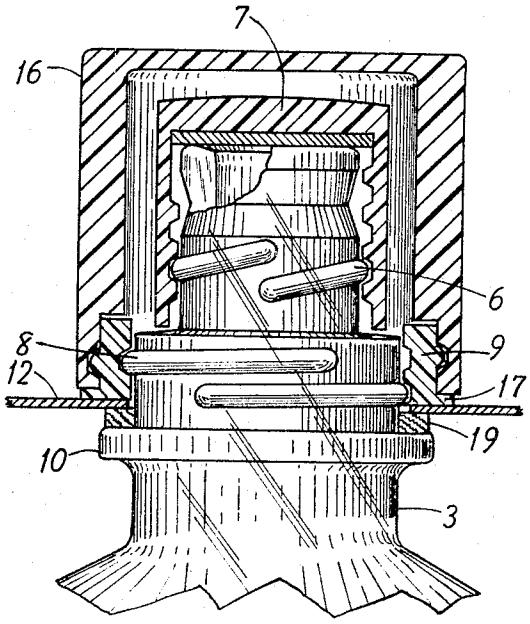

FIG. 2.

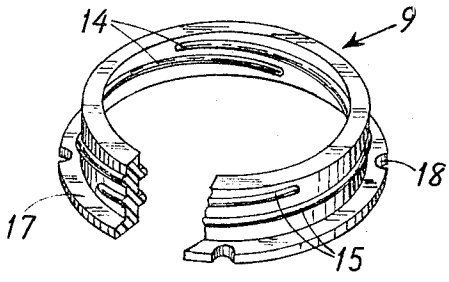

FIG. 3.

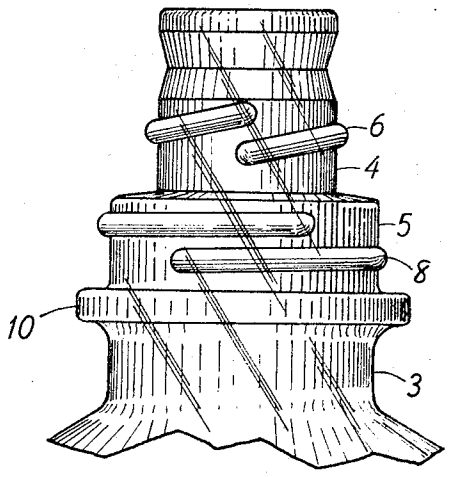

FIG. 4.

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SAFETY PACKAGE FOR DANGEROUS LIQUIDS

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This invention relates to safety containers for flammable, corrosive, or other similarly dangerous liquids and to sealing members therefor.

It is often desirable to store and dispense such dangerous liquids from a glass container, or other container constructed of such a breakable or frangible material, in order to avert contamination and otherwise protect the quality of the fluid to be contained. An example is found in cases wherein the liquid, for example ethyl ether, is used in the processing of electronic devices. Such liquids, if stored in metal containers will pick up metallic impurities, even small traces of which may cause unworkability of the electronic devices.

The frangibility of the containers thus employed creates hazardous situations occurring in the event of breakage, when the flammable contents are exposed to an ignition source. Considerable damage to person and property has resulted from such a sequence of events. Similarly, damage to persons or property frequently occurs when glass containers, containing highly corrosive or other dangerous materials, are broken.

Accordingly, it is a primary object of this invention to provide a safety package or container assembly designed to hold flammable, corrosive or other similarly dangerous liquids.

More particularly, it is a major object of the invention to provide a safety package for dangerous liquids as above described, comprising an inner frangible container of suitable material to protect the quality of the product and an outer non-frangible shell or container, which serves to protect the inner frangible container from damage and also to retain liquid in the package in the event that the inner container is broken, thus affording an opportunity to dispose of said liquid subsequently, in a safe manner.

It is a further object of the invention to provide a safety package for dangerous liquids as above described, in which the inner frangible container and the outer non-frangible shell or container are connected with a particularly strong seal, thus making such packages particularly suited for heavy units.

These and other objects and advantages of the invention will become apparent from the following description of the construction and arrangement of the elements of the combination, as well as of the combination, when considered with the accompanying drawings in which:

FIG. 1 is a front elevational view, partly in section of one embodiment of the combination safety package in accordance with the invention.

FIG. 2 is an enlarged fragmentary view taken on line 2—2 of FIG. 1 of the top portion of the combination shown in FIG. 1, showing the overcap, closure cap and sealing ring in section and the bottle top in elevation.

FIG. 3 is a perspective of a preferred embodiment of the sealing ring or fitment, a portion thereof being cut away.

FIG. 4 is a front elevational view of the preferred embodiment of the neck portion of the inner frangible container.

In accordance with the present invention, there is provided an assembly of an inner frangible or breakable bottle for liquids and an outer protective unbreakable container arranged so that the assembly may be used as a

unit to pour liquid from the bottle and being adapted to prevent spillage of the liquid in the event of misadventure during storage, or even use, resulting in breakage of the bottle.

The inner frangible container may be a glass bottle, for example, which is provided with a special and essential structure at the neck. More specifically, the neck portion of an otherwise conventional bottle is recessed intermediate its uppermost and lowermost extremities and possesses a circumferential shoulder extending from a lower portion of the non-recessed portion of the neck.

In accordance with the invention, the bottle nests within a liquid-tight protective container, made desirably of sheet metal, having an aperture in its top so that a portion of the bottle neck extends above the container with the container resting on the circumferential shoulder of the bottle neck. A thermoplastic fitment, or ring, is disposed around the non-recessed portion of the bottle neck in contact with the upper surface of the apertured top and is so dimensioned as to provide a tight connection between the can top, the outside of the bottle neck and the fitment. Preferably, this connection is liquid tight. Suitable means, such as cast threads, may be provided on the bottle neck, both on the recessed portion and on the non-recessed portion, in order to provide a means of engagement with a bottle cap and the fitment, respectively. When assembled the bottle is suspended within the outer container, with downward vertical movement of the bottle within the container being prevented by the holding action of the fitment against the non-recessed portion of the bottle neck and the upper surface of the apertured top, and with upward vertical movement of the bottle within the outer container being prevented by the retaining action of the circumferential shoulder of the bottle neck against the undersurface of the apertured top. In this manner, the stresses caused by the weight of the bottle are essentially distributed to the apertured top and therefore the measure of the strength of the assembly lies essentially in the strength of the apertured top and not in the strength of any individual component, or in a point of attachment with any given component. This feature makes the assembly particularly suited for use with large bottles having considerable weight when filled. Optionally and preferably, the assembly includes a protective overcap which covers the bottle, including the cap thereon, and this may be conveniently attached to the outer lateral surface of the fitment.

Referring to FIGS. 1, 2 and 4 of the drawings, **1** represents a frangible or breakable inner container, such as a cylindrical glass bottle, comprising a main body portion **2**, terminating in a cylindrical neck **3**, which neck is recessed intermediate its uppermost and lowermost extremities to provide a recessed portion **4** and a non-recessed portion **5**. The recessed neck structure is most clearly shown in FIG. 4. Recessed portion **4** may be provided with threads **6** in order to facilitate engagement with bottle closure **7**. Non-recessed portion **5** may also be provided with threads **8** in order to facilitate engagement with fitment **9**, to be described in more detail hereafter. Although thread engagements of the indicated parts are preferred, it will be understood that substitute means of engagements may be provided, such as for example, frictional fits between the indicated parts. Bottle neck **3** is also provided with a lower peripheral or circumferential shoulder **10** extending from a lower portion of non-recessed portion **5** of the bottle neck. The frangible container is mounted within an outer protective non-frangible shell **11**, which surrounds the main body portion and lower neck portion of inner container **1**. The outer shell or container **11** is provided with an inwardly extending, upper annular flange or apertured top **12** providing a circular opening

in the top of the outer shell, which permits the upper portion of neck 3 of the inner container to extend therethrough, as is best shown in FIG. 1. An annular sealing ring or fitment 9 is provided in order to engage or grip the bottle at its non-recessed portion 5 of the neck and secure it to apertured top 12 of the outer shell. As can best be seen in FIG. 2, the clamping action of fitment 9 against apertured top 12, which apertured top 12 rests directly or indirectly on circumferential shoulder 10, which shoulder is of larger diameter than the apertured top, affords a tight sealed unit, thereby suspending container 1 from apertured top 12, while preventing vertical movement in either direction. Fitment 9 may be made of any suitable material, such as metal or plastic, and in a preferred embodiment consists of relatively non-resilient thermoplastic material, such as polyethylene, polyvinyl chloride, polyetetrafluoroethylene, polychlorotrifluoroethylene, polypropylene or rubber. In a preferred embodiment, the fitment is provided with: inner threads 14 to engage with threads 8 which are preferably provided on non-recessed portion 5 of the bottle neck; outer threads 15 to facilitate engagement with a protective overcap 16; and an outwardly extending flange 17 which serves the dual purpose of distributing downward vertical stress more evenly over apertured top 12 and of affording a plurality of notches, such as 18, as shown in FIG. 3, for facilitating gripping of the fitment for installation and removal. In a preferred embodiment, there is provided a gasket 19 between the undersurface of apertured top 12 and the upper surface of circumferential shoulder 10 in order to ensure a liquid-tight seal at this point. Gasket 19 may be of any suitable material as is conventionally employed for this purpose and is normally a resilient form of thermoplastic material, such as the ones mentioned above. Appropriate cushioning material 20 may be disposed between inner frangible container 1 and the outer protective non-frangible shell 11. In a preferred embodiment, a pad of resilient cushioning material, such as polyurethane foam, is compressed into the assembly between the bottom of inner container 1 and the bottom of outer shell 12 and serves not only to insulate the inner container from shock but to cause inner container 1 to exert upward pressure against gasket 19 and the undersurface of apertured top 12, thereby assisting in stabilizing the inner container against vertical movement and aiding in maintaining a liquid-tight seal at this point.

In a typical safety package according to the invention, a cylindrical glass bottle, designed as above described, is employed as the inner container. The glass bottle differs from conventional bottles in the recessing of the bottle neck, as above described, to form two sections of bottle neck of distinctly different diameter. Another distinction of the novel bottle neck structure over conventional bottles lies in the elongation of the bottle neck between the top of the bottle and he circumferential shoulder, which latter component may be found on most bottles. The bottle or container may be constructed of a number of other frangible materials, such as porcelain and various ceramic materials depending upon considerations of such factors as economics and contaminability. The outer protective shell is conveniently constructed of sheet metal, e.g., steel, aluminum, alloys, etc., although any one of a variety of non-frangible materials which would afford the sought-for protection could be employed, thermoset resins or rigid or semi-rigid thermoplastic resins being exemplary.

The safety package of the invention may be employed without providing insulating material between the inner frangible container and the outer protective shell. Use of some insulating material, however, is preferred since it reduces shock and vibration to the inner frangible container and minimizes the possibility of breakage of the same. In addition to the preferred form for such insulating material described above, a variety of other materials which would provide such protection could be used, such as corrugated fibre-board, felt, cotton, excelsior and others which will readily occur to those skilled in the art. Such material may be disposed between the inner frangible container and the outer protective shell substantially along the length of the inner frangible container and between the bottom of the inner container and the bottom of the protective shell.

The removable protective overcap 16, which may be placed over bottle cap or closure 7, may be constructed of any non-frangible material such as used in the construction of the outer protective shell. The overcap may be provided with inner threads 21 to engage with outer threads 15, which are preferably provided on the sealing ring, or it may be designed to attach in some other way, such as by fitting frictionally with the outer vertical face of the sealing ring in the event the latter is not provided with threads.

It has been found that for a gallon sized bottle, very satisfactory results are obtained by providing components with the following dimensions: The diameter of recessed portion 4 of the neck is about 1 5/16". The diameter of non-recessed portion 5 of the neck is about 1 8/16". The diameter of peripheral shoulder 10 is about 2". The vertical distance between the top of circumferential shoulder 10 and the top of the bottle is about 1 9/16". The vertical height or thickness of the peripheral shoulder is 9/16". The vertical height of the non-recessed portion of the neck above the shoulder is about 7/16". The vertical distance from the top of the non-recessed portion of the neck to the top of the bottle is about 1". The diameter of the circular opening in apertured top 12 is about 1 11/16". The inner diameter of sealing ring 9 is also about 1 11/16", with the outer diameter at the top being about 2", with the outer diameter at the bottom (including flange 17) being about 2 4/16". The vertical height of sealing ring 9 is about 7/16" with the vertical height of flange 17 of the sealing ring being about 1/16".

In commercial use, assembly of the unit is accomplished in the following manner: The outer protective, non-frangible shell, or can, may be purchased partially assembled, i.e., body formed, top seamed to body and hole punched in top. The shell is positioned over and around the inner container so that the upper portion of the inner container above the circumferential shoulder extends through the opening in the apertured top of the shell with the apertured top resting on the circumferential shoulder or on a gasket positioned therebetween. The annular sealing ring, or fitment, is then screwed or positioned tightly around the non-recessed portion of the bottle neck so as to form a tight seal between the apertured top of the shell, the sealing ring and the non-recessed portion of the bottle neck, thus leaving the bottle suspended within the outer shell. The desired cushioning material is then positioned on the surface of the inner container and the bottom of the protective shell may then be attached, e.g., by crimping, seaming or by some other conventional method. The bottle may then be filled and capped, the protective overcap applied and the safety unit is then ready for shipment, storage or use.

It will be obvious to those skilled in the art that changes in construction and arrangement of the parts of my invention may be made without departing from the spirit and purpose of the invention and it is accordingly my intention to include by the claims, all modifications of structure or mechanical equivalents thereof, reasonably included with the scope of the claims.

I claim:

1. A container assembly comprising:

(a) a breakable bottle for liquid provided with

(b) a neck adapted to receive a bottle closure, which neck is recessed intermediate its uppermost and lowermost extremities and possesses a circumferential shoulder extending from a lower portion of the non-recessed portion of the neck,

(c) a non-breakable outer container adapted to hold liquid enclosing said bottle, which outer container has

(d) an apertured top through which the bottle neck extends, which apertured top is larger than the non-recessed portion of the neck, but smaller than the circumferential shoulder of the neck so that when the bottle neck is extended through the apertured top of the outer container from within the outer container, the apertured top rests on the top surface of the circumferential shoulder,

(e) a fastening unit disposed above the apertured top around the non-recessed portion of the bottle neck, which fastening unit forms a tight seal with said apertured top and with the non-recessed portion of the bottle neck.

2. A container assembly comprising in combination:

(a) an inner container comprising a main body portion terminating in a cylindrical neck, which cylindrical neck is recessed intermediate its uppermost and lowermost extremities and possesses a peripheral shoulder extending from a lower portion of the non-recessed portion of the neck,

(b) an outer protective shell surrounding the main body portion and lower neck portion of the inner container, which shell is provided with an inwardly extending annular flange at its upper extremity so dimensioned so that the neck portion of the inner container extends therethrough and so further dimensioned that it does not permit the peripheral shoulder on the container neck to extend therethrough, and

(c) an annular sealing ring surrounding the non-recessed portion of the container neck above the inwardly extending annular flange of the outer protective shell so dimensioned and positioned as to form a tight seal with the non-recessed portion of the container neck and with the inwardly extending flange of the outer protective shell.

3. A container assembly according to claim 2 in which the non-recessed portion of the container neck is provided with threads adapted to engage with threads which are provided on the inner surface of the annular sealing ring.

4. A container assembly according to claim 2 in which there is provided resilient material between the peripheral shoulder of the container neck and the inwardly extending annular flange of the outer protective shell so as to form a light-tight seal therebetween.

5. A container assembly according to claim 2 in which the inner container is constructed of glass and in which the outer protective shell is constructed of metal.

6. A container assembly according to claim 2 in which there is provided means to protect the cylindrical neck portion of the inner container extending through the outer protective shell.

7. A container assembly according to claim 2 in which there is provided a detachable, non-frangible overcap to protect the cylindrical neck portion of the inner container extending through the outer protective shell.

8. A container assembly according to claim 2 in which the non-recessed portion of the inner container neck is provided with threads adapted to engage with threads provided on the inner surface of the annular sealing ring and in which there is further provided a resilient seal between the peripheral shoulder of the container neck and the inwardly extending annular flange of the outer protective shell so as to form a liquid-tight seal therebetween.

9. A container assembly according to claim 8 in which the inner container is constructed of glass, the outer container is constructed of metal and in which there is provided cushioning material between the inner container and the outer protective shell.

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