

- [54] **DISPLAY BOTTLE HAVING FRANGIBLE INNER COMPARTMENT**  
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 [51] Int. Cl. .... B65d 79/00  
 [58] Field of Search ..... 206/47 A; 222/94; 128/272, 218 M; 215/6

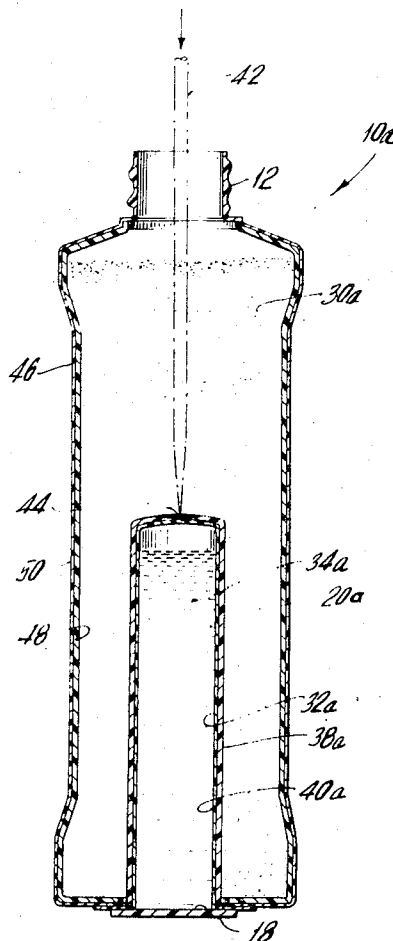
- [56] **References Cited**  
**UNITED STATES PATENTS**  
 2,980,540 4/1961 Turpin ..... 206/47 A  
 3,590,989 7/1971 Wittwer ..... 220/20

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- [57] **ABSTRACT**  
 A unitary container for shipping and storing a liquid

and a non-liquid (e.g., a powder), or two incompatible materials one of which has solvent properties. The materials are normally separated in the container and can be mixed when desired. The container includes a first chamber for storing the liquid and a second chamber for storing the non-liquid material. One of the chambers is surrounded by the other chamber, and in one embodiment of the invention is separated therefrom by a wall formed of a two-layer laminate. One layer of the laminate which is in contact with the liquid material is impervious to the liquid but penetrable. The inner layer of that laminate is rigid but soluble in the liquid, such that when the insoluble layer is pierced, the soluble layer comes into contact with the liquid and can thereupon be mixed with the liquid. In another embodiment of the invention, the container wall is formed of a two-layer laminate in which the inner layer is soluble and normally in contact with the non-liquid material. When the outer wall comes into contact with the liquid, its inner layer is thereby dissolved, and the normally rigid container wall thereupon becomes flexible and compressible.

6 Claims, 3 Drawing Figures



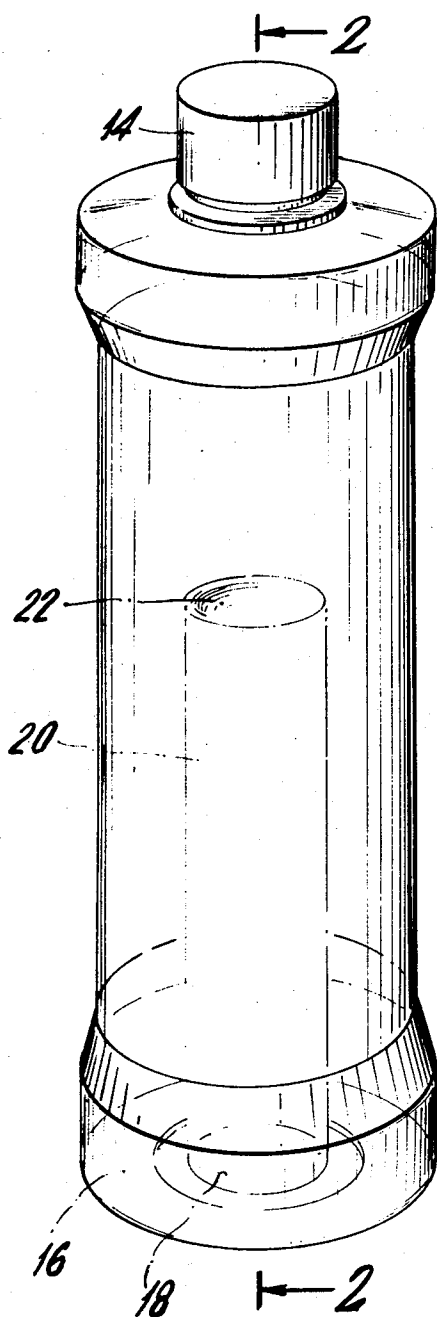


FIG. 1

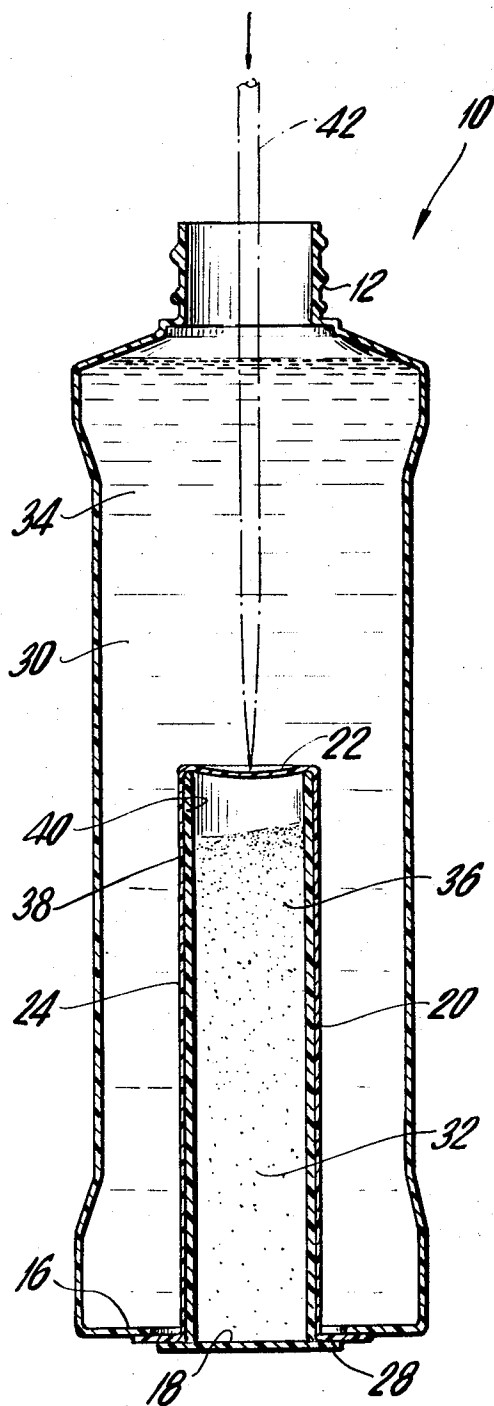


FIG. 2

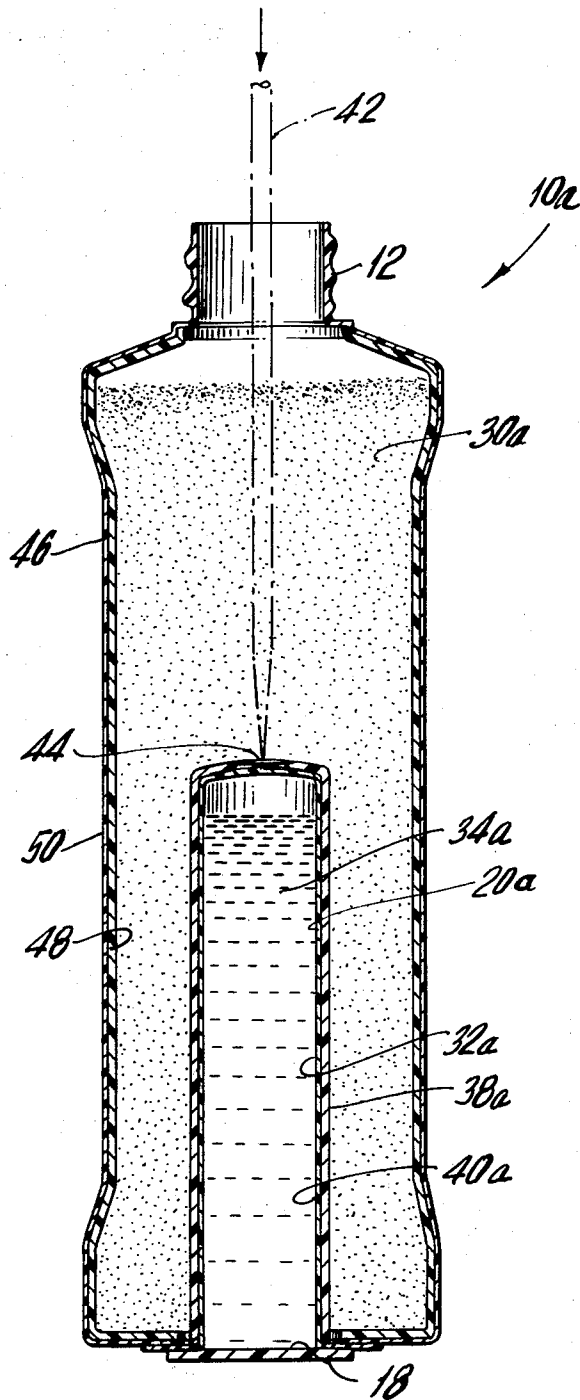


FIG. 3

# DISPLAY BOTTLE HAVING FRANGIBLE INNER COMPARTMENT

## BACKGROUND

The present invention relates generally to containers, and more specifically to an improved shipping and display container for use in the storing of liquid and non-liquid substances, or non-compatible liquids or products.

There are many instances in which it may be desirable or even necessary to ship and store a liquid and a non-liquid or non-compatible substance in a single container in which the substances are separated from one another. For example, it may be desired to ship and store liquid and non-liquid materials which are to be mixed just prior to use in a separated, unitary container.

The need for the separate storing of the liquid and non-liquid substances in the container may arise from the fact that if the liquid and non-liquid substances were already mixed during storage for a long period of time prior to use, the mixture, which may be unstable, may produce an unwanted chemical reaction. This reaction may have the effect of producing an unpleasant appearance, taste, and/or odor to the substance, or may even produce the danger of an explosion under certain circumstances.

As a solution to this problem of separate storage, it has been proposed to store the liquid and non-liquid substances in chambers or regions that are separated by a number which can be broken whenever the two substances are to be mixed just prior to the intended use of the mixture. To be readily breakable that wall must be, however, relatively thin, breakable, and thus relatively weak. As a result, the thin separation member may break, particularly during the shipment of the container when the container may be subjected to considerable shaking and vibration, to thereby cause an undesired, premature mixing of the substances.

It is thus an object of the invention to provide a container that is particularly well suited for reliably storing and separating liquid and non-liquid substances, and which enables the mixing of these substances, when desired for end use, in relatively simple and convenient manner.

## SUMMARY OF INVENTION

The container of the present invention includes an outer chamber for the storage of a liquid substance and an inner chamber for the storage of a non-liquid substance, such as a powder, in a manner which permits the ready mixture of the liquid and non-liquid substances to produce a desired solution or suspension from the liquid and non-liquid substances. The chambers are separated by a wall formed of a two-layer laminate. The layer of the wall laminate that is in communication with the liquid substance is formed of a readily breakable but insoluble material, whereas the other layer of the laminate is composed of a more rigid plastic material which dissolves or decomposes when it is contacted by the liquid substance.

To achieve mixture of the liquid and non-liquid substances stored in the container, the insoluble layer of the laminate is broken or pierced to bring the soluble layer of the laminate into contact with the liquid substance to thereby cause the soluble layer to decompose, such that the liquid substance enters the inner chamber

in which the non-liquid material is stored, and the two materials can be mixed.

In another embodiment of the invention as herein disclosed, the outer wall of the container is made of a similar two-layer laminate, the inner layer of which is made of a soluble material. In this embodiment, the liquid is stored in the inner chamber, and the non-liquid material is stored in the outer chamber. When the insoluble outer layer of the inner wall is punctured and the inner soluble layer is dissolved by contact with the liquid, the liquid and non-liquid mix in the outer chamber until the inner soluble layer of the container outer wall is contacted by the liquid substance and is dissolved thereby. After the container inner layer is dissolved in this manner the remaining layer of the container wall is thin and flexible and may be readily compressed by hand to enhance the mixing of the liquid and non-liquid, and/or to permit the mixed liquid and non-liquid to be squeezed out from the container.

To the accomplishment of the above and to such further objects as may hereinafter appear, the present invention relates to a display bottle, substantially as defined in the appended claims and as described in the following specification taken together with the accompanying drawing in which:

FIG. 1 is a perspective view of a container according to one embodiment of the invention;

FIG. 2 is a vertical cross-section taken along line 2—2 of FIG. 1, indicating the manner in which the outer insoluble layer of the laminate can be broken, thereby bringing the soluble layer of the laminate into contact with the liquid; and

FIG. 3 is a vertical cross-section similar to that of FIG. 2 of an alternative embodiment of the invention.

Referring to the drawing, the container of the invention generally designated 10 is herein shown in the form of a cylindrical bottle having an outer wall or surface made of a suitable plastic. As is conventional, container 10 includes a reduced diameter threaded neck 12 which receives a correspondingly threaded closure or cap 14.

Container 10 includes a base or bottom wall 16 in the form of an annulus having a central circular opening 18. A cylindrical chamber-separating wall 20 projects upwardly and is secured to base 16 at the periphery of opening 18. Separation wall 20 includes a top wall 22 and a vertical side wall 24 which terminates at an annular skirt 26 which is secured as shown to the underside of base 16. A closure plate or membrane 28 is secured to skirt 26 to thereby close the lower, open end of the container.

As shown best in FIG. 2, the outer wall of container 10 and the side walls 22 and 24 of separating wall 20 define an outer annular chamber 30, and the interior of wall 20 and bottom closure plate 28 define an inner chamber 32 which is surrounded by the outer chamber and separated therefrom by wall 20.

The container that has thus far been described is similar to the shipping container disclosed in my U.S. Pat. No. 3,590,989. The container of the present invention is, however, particularly directed to the storing of a liquid material in one of chambers 30 and 32, and a non-liquid (e.g., powder) material in the other of the chambers in a manner which permits the reliable separation of the materials while still permitting the ready mixing of these materials when desired.

To this end the cylindrical separating wall 20 is formed of a two-layer laminate, one layer of which is relatively thin and thus breakable and insoluble to the liquid solvent stored in chamber 30, and the other layer of which is relatively thick and rigid but soluble and decomposable in that solvent.

In the embodiment of the invention shown, a liquid material 34 is stored in outer chamber 30 and a powder material 36 is stored within inner chamber 32. Cylindrical separating wall 20 and its top and side walls 22 and 24 may be, as herein shown, each formed of a two-layer laminate consisting of an outer breakable and insoluble layer 38 and an inner and relatively thick and soluble layer 40.

In the normal use of container 10, such as in the shipping, displaying or storing of the liquid and non-liquid materials 34 and 36, outer, insoluble layer 38 is in contact only with the liquid material, and inner, soluble layer 40 is in contact only with the powder contained within inner chamber 32. Since layer 40 is kept out of contact with liquid material 34, layer 40, and thus walls 22 and 24 of the chamber separating wall, retain their integrity to thereby separate and reliably prevent the mixture of the liquid and non-liquid materials stored in the container.

When it is desired to mix the liquid material 34 in chamber 30 and the powdery material 36 in chamber 32, the cap is removed, and as shown in FIG. 2, a sharp object 42, such as a stick or needle, is inserted through the container opening and brought into contact with and fractures the outer, insoluble layer 38 of upper wall 22 of chamber-separating wall 20.

When that layer is thus broken, the inner soluble layer 40 lying beneath the insoluble layer is brought into contact with liquid material 34, and as a result, layer 40 rapidly begins to decompose and dissolve. The decomposition of soluble layer 40 continues until an opening is formed therein which allows the liquid material in chamber 30 to enter into chamber 32 where the liquid thereupon mixes with the powdery material contained in chamber 32. The mixing process once begun in this manner can be facilitated and accelerated by shaking the container.

The outer wall container 10 may be made of a plastic material, such as polyethylene, polyvinyl chloride, or polystyrene, and may, if it is desired to view the contents of the container, be made of a transparent plastic. The outer breakable layer of the two-layer laminate of wall 20 may be made of polystyrene, polyethylene, polyvinyl chloride, or similar plastic, and as herein specifically shown for purposes of example, the inner soluble layer of the laminate may be made of a water-soluble hydroxypropyl cellulose thermoplastic manufactured by Hercules Inc. and identified by Hercules by the trademark Klucel.

One alternate embodiment of the invention is shown in FIG. 3 in which the container during shipment and storage has a rigid outer wall and the liquid and non-liquid materials are reliably separated from one another. In use, however, the liquid and non-liquid materials are mixed when desired and the outer wall of the container becomes flexible permitting the user to compress and squeeze the container by hand.

As shown in FIG. 3, container 10a includes an outer annular chamber 32, and the inner and outer material-storing chambers 30a and 32a are separated by a cylindrical separator wall 20a. Wall 20a, as in the embodi-

ment of FIGS. 1 and 2, is in the form of a two-layer laminate. However, since in the embodiment of FIG. 3 a liquid 34a is stored in chamber 32a, the inner layer 40a of the laminate is relatively thin and is made of an insoluble material, whereas outer layer 38a of the laminate is made of a relatively thick soluble material. Layer 38a may be weakened or scored as shown at 44 to facilitate its breaking when desired to mix the liquid and non-liquid substances stored in the chambers.

In further contrast to the previously described embodiment, the container of FIG. 3 includes an outer cylindrical wall 46, which like inner wall 20a is formed of a two-layer laminate. That is, wall 46 includes an inner soluble layer 48 and an outer, relatively thin insoluble layer 50. The materials of layer 48 and 50 may be the same as the corresponding layers of wall 20a of this embodiment as well as wall 20 of the embodiment of FIGS. 1 and 2.

In the use of the container of FIG. 3, outer layer 38a of wall 20a is broken through at region 44 by means of a sharp object 42 to cause the liquid substance in the inner chamber to begin to dissolve soluble layer 38a and to mix with the non-liquid substance in outer chamber 30a.

As the mixing of the liquid and non-liquid continues, the liquid comes into contact with inner soluble layer 48 of outer container wall 46 which thereupon begins to be dissolved by the liquid. Upon complete dissolution of inner soluble layer 48, the outer container wall is reduced to its thin outer layer 50. In this condition, the outer container wall can be readily squeezed by hand to enhance the mixing operation of the liquid and non-liquid within the container, and to permit the container to be squeezed such that the resulting mixture is forced out of the container through the opening.

The provision of the two-layer laminate as a separator between a liquid and a non-liquid substance in a single container as described hereinabove provides several significant advantages beyond the mere separation of the liquid and non-liquid substances. Firstly, the provision of the rigid soluble layer in the separator wall, as in the embodiment of FIGS. 1 and 2, provides a support for the relatively thin, weak, and breakable insoluble layer of the laminate, thereby ensuring the integrity of the separator wall even when the container is subjected to rough handling and shock during shipment. Moreover, the dissolving of the soluble layer during a mixing operation serves to aid the mixing of the liquid and non-liquid substance by providing an agitating action resulting from the whip-like movement of the thin, broken upper insoluble layer as the underlying soluble layer is being dissolved by the liquid.

In the embodiment of FIG. 3, the outer wall of the container is rigid during shipment and storage, but is rendered flexible during use such that the materials being mixed in the container can be squeezed to enhance the mixing and thereafter expelled from the container by the compression by hand of the container outer wall.

As shown in the embodiment of FIGS. 1 and 2, the entire periphery of wall 20 is formed of the two-layer, soluble and insoluble laminate. However, if desired, only the upper wall 22 may be formed of this laminate, and the vertical side walls of the separator wall may be formed of relatively thick, insoluble plastic material which need not be broken through in order to perform mixing of the substances contained in the container. In

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addition, to facilitate the breaking of the outer, thin insoluble layer of the wall, that layer may be scored or weakened at the area of anticipated engagement with the piercing object. In the embodiment of FIG. 3, the separator wall, shown as a two-layer wall, may be made of a single layer of insoluble and breakable material.

Thus, while the invention has been herein specifically described with respect to preferred embodiments thereof, it will be appreciated that variations may be made therein, all without departing from the spirit and scope of the invention.

I claim:

1. A container for storing a first substance not having solvent properties and a second substance having solvent properties, said container comprising an outer wall, an inner wall, an outer chamber for storing one of said first and second substances defined between said inner and outer walls, an inner chamber for storing the other of said first and second substances separated from said outer chamber by said inner wall, one of said outer wall and said inner wall comprising a laminate having a first insoluble and relatively breakable layer, and a second relatively unbreakable soluble layer having one surface in communication with said first insoluble layer and separated from the one of said chambers in which the solvent substance is stored by said first insoluble layer, and an exposed surface normally commu-

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nicating with the one of said chambers in which the non-solvent substance is stored.

2. The container of claim 1, in which said first insoluble layer is relatively thin as compared to said second soluble layer.

3. The container of claim 2, further comprising a bottom annular wall having a central opening therein, said inner wall being secured to said bottom wall at the portion thereof surrounding said opening, and a closure plate secured to said bottom wall and completely covering said opening.

4. The container of claim 1, in which said inner wall comprises said laminate, said second solvent substance being stored in said inner chamber, whereby the breaking of said first insoluble layer causes said second soluble layer to be brought into contact with said second solvent substance.

5. The container of claim 1, in which said outer wall is formed of said laminate, said first substance being stored in said outer chamber, said second solvent substance being stored in said inner chamber, said inner wall being breakable, the inner layer of said outer wall comprising said soluble layer.

6. The container of claim 5, in which said first insoluble layer of said outer wall is comparatively thin and flexible as compared to said soluble layer.

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