Dec. 8, 1953 P. HAUDUROY 2,661,742

MULTIPLE CONTAINER

Filed Aug. 14, 1950

FIG 1

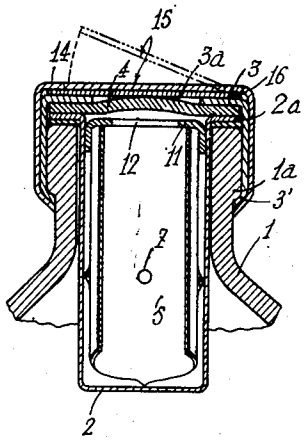


FIG 2

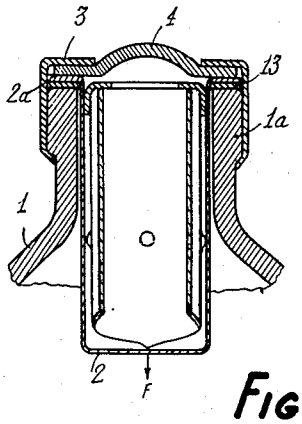


FIG 4

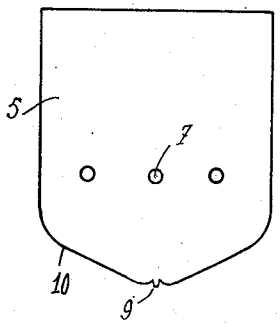


FIG 3

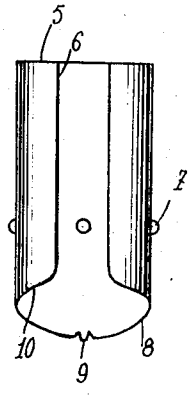


FIG 6

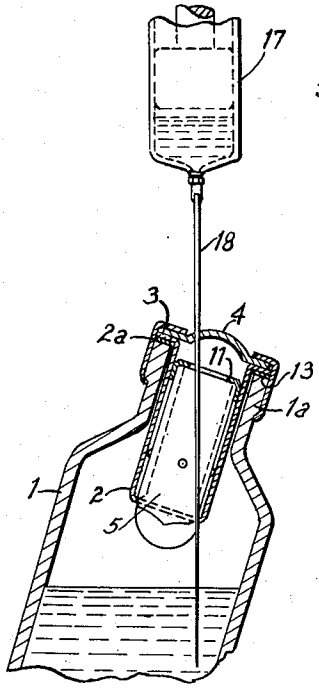
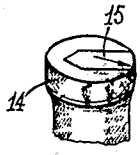


FIG 5



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MULTIPLE CONTAINER

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7 Claims. (Cl. 128—272)

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It is frequently necessary, especially in medical practice, to mix together, at the time of use and not before, two substances that are to be retained in a sterile condition and which, if previously mixed, would have some essential properties of either or both the substances, destroyed or impaired.

Such is the case for example with certain antibiotics such as arsenical and other salts and penicillin derivatives, which are to be dissolved in an appropriate solvent at the time of use, or further bacterial ferments which are to be mixed with a sterilized fermentable liquid or serum.

It is the object of this device to provide a device, whereby two liquid or solid (e. g. pulverulent, crystallized, etc.) substances may be retained separate from each other within a sealed container for an indefinite period of time, and then mixed together when necessary without having to open said container, and thus without allowing either of the products to come into contact with the atmosphere.

With the above and further objects in view, my invention essentially consists in a composite container for the purpose specified, which comprises a primary container adapted to contain a first ingredient of a mixture and having a top opening, a secondary container containing another ingredient of the mixture and secured in the primary container near the said top opening thereof, said secondary container having at least part of its bottom made of a frangible material, a deformable sealing means sealing the common top of both containers, and a perforating member in said secondary container having its bottom edge adjacent the frangible bottom part of said secondary container and movable under pressure exerted from outside through said deformable sealing means to perforate said frangible bottom part and allow said other ingredient to fall into the primary container there to mix with said first ingredient.

The primary container may take the form of a flask, and the secondary container that of a generally cylindrical cup with a flat frangible bottom and an open flanged top resting on the top surface of the flask opening.

The deformable sealing means may consist of a disc of rubber or equivalent material and an annular cap sealingly engaging the periphery of said rubber disc to seal the composite container as by a crimped attachment round the neck of the flask. Preferably, I may further provide a comparatively rigid, but removable, outer protecting cover over said deformable sealing means, removal of said outer cover uncovering the central portion of said rubber disc for actuation of the perforator but still preserving the sealed condition of the composite container.

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The perforator member may comprise a slotted metal tube having a pointed tapering bottom end adapted to rest against the bottom of the secondary container until pushed down to puncture the same.

An exemplary embodiment of my invention will now be described by way of illustration and not of limitation, as applied to a flask for an antibiotic, in which the two substances to be mixed together comprise, the one a solvent or a serum placed in the bottom of the flask, and the other an antibiotic, e. g. consisting of a powder placed in a frangible cup near the mouth of said flask.

In the accompanying drawings,

Fig. 1 is an enlarged view in axial section of the top of a flask arranged in accordance with the invention.

Fig. 2 is a similar view after removal of the protecting cover or cap,

Figs. 3 and 4 are a perspective and a developed showing, respectively, of the perforator member, and

Fig. 5 is a perspective view of the flask top in its final condition just before use.

Figure 6 is a sectional view illustrating one way in which the device may be used.

As shown, the exemplary embodiment of my invention comprises a primary container or flask 1 having a reinforced neck or mouth 1*a*. Inserted into the mouth 1*a* of the flask is a generally cylindrical cup-like secondary container 2 made of aluminum or similar frangible or easily puncturable material and having a flange 2*a* seated against the top surface of the flask neck 1*a*, with the preferable interposal of a rubber or other flexible ring 13 therebetween. Overlying the flange 2*a* of the cup-container is a deformable disc or diaphragm 4 made of natural or synthetic rubber or the like, and a cap 3 is clamped about the peripheral margin of the diaphragm 4 to secure the underlying elements firmly to the bottleneck, by a crimped portion 3' as shown, or by any other suitable means. The cap 3 is provided with a central opening 3*a* through which the central area of the diaphragm 4 is apparent, as more clearly shown in Fig. 2. The deformable diaphragm 4 together with the cap 3 forms a tight seal for the container. Under the diaphragm 4 and projecting down into the bottom of the cup 2 is the perforator member 5, now to be described.

The perforator member 5 (see Figs. 3 and 4) is of tubular shape, being produced from a flat plate

in the general form of a shield (Fig. 4) rolled into an open tube with its adjacent longitudinal side edges 6 spaced from each other by an amount equivalent to about one fifth or so of the circumference of the tube. Projecting from the outer side of the tube are a number of spaced bosses or projections 7. The lower edge 8 of the tube is formed with a sharp point 9 tapering upwards gradually and merging with the vertical edges 6 through a progressive arc 10. This tubular perforator member 5 is inserted into the cup-like container 2 under a slight resilient pressure and over it is fitted a cap 11 formed with a central aperture 12 wide enough to allow insertion of a suitable pointed tool, such as a pencil. It will be understood that, with the outer cover 14 removed (Fig. 2), it is possible in this way to exert pressure through the diaphragm 4 and the cap 11 upon the perforator 5 in the direction of the arrow F. The tapered shape of the lower end of the perforator is such that it gradually punctures the bottom of the cup-like secondary container 2 so that the entire contents thereof is gradually emptied into the primary container or flask 1.

As illustrated in Figs. 1 and 5, the protecting outer cover 14 crimped about the neck of the flask is preferably provided with a breakable strip 15 which is torn off to remove the cap 14. Preferably also, a reinforcing disc 16 (Fig. 1) is interposed between the top of the protecting cap or cover 14 and the cap 3 for further protection of the diaphragm 4 and the underlying perforator member 5.

In preparing the assembly for use, the flask 1 is first filled with the desired quantity of the first of the two ingredients of the desired mixture, for instance a liquid solvent or a serum. The perforator member 5 with its apertured cap 11 is inserted into the cup 2 with the seal ring 13 fitted under the flange of said cup. The resulting unit including cup 2, seal ring 13, perforator 5 and cap 11 is next inserted into the neck of the flask 1 and the corresponding amount of the other of the two ingredients, e. g. pulverulent penicillin, is introduced into the cup 2 through the aperture in cap 11.

The outer cover 14, protective disc 16, cap 3 and deformable diaphragm 4 are assembled separately to form a unit, and this unit is fitted over the neck of the composite container filled as described in the preceding paragraph, and the skirts of the cap 3 and outer cover 14 are crimped around the upper reinforcement 1a of the neck of the flask, by any known means such as with a roller- or rubber ring-type bottle capping machine.

The resulting composite container assembly may be preserved in this state for an indefinite period.

When it is desired to make use of its contents, the cover 14 is removed by tearing off the strip 15 (Fig. 5) whereupon the protecting disc 16 falls off. The container at this stage (Fig. 2) still remains sealed by the cap 3 and the rubber diaphragm 4 which protrudes visibly through the aperture 3a in the cap 3. With a pencil or other suitable means, a firm pressure is exerted upon the perforator cap 11 through the diaphragm 4 the resiliency of which allows the perforator member 5 to be forced down with its lower edge 8 cutting through the bottom of cup container 2. Because of the open space defined between the adjacent longitudinal edges 6 of the perforator tube, the bottom of the cup 2 is not cut out entirely and will not therefore drop into the flask 1. Moreover, the projections 7 frictionally engage the side walls of the cup 2 due to the resiliency of the perforator and prevent the perforator 5 from dropping out of the cup. The powder substance contained in the cup 2 drops into the bottom of the flask 1 and mixes with the liquid contained therein. The flask may be shaken to facilitate this mixing.

To use the resulting mixture, the mixture may be drawn out of the bottom of the flask without having to remove the cap 3 and diaphragm 4, by means of suitable aspirating means such as a hypodermic syringe 17 and a needle 18 or trocar inserted through the centre of the rubber diaphragm 4, or in other suitable ways.

What I claim is:

1. A multiple container comprising a primary container means containing a first ingredient of a mixture and having a top opening, a secondary container means containing another ingredient of said mixture, said secondary container means having a top opening and being secured in said primary container adjacent said top opening thereof, said secondary container having at least part of its bottom made of a frangible material, deformable seal means sealing said containers, and a perforating means in said secondary container having its bottom edge adjacent said frangible bottom part thereof, movable as a result of pressure exerted from outside through said deformable seal means to perforate said frangible part and allow said other ingredient to fall into said primary container and mix with said first ingredient.

2. A multiple container comprising a primary container with a top opening, a secondary container with a top opening secured in, and adjacent the top opening of, said primary container, and having generally cylindrical walls and a frangible bottom, a generally tubular perforator member slidable with a friction fit in said cylindrical secondary container and having a pointed bottom edge movable into perforating engagement with said frangible bottom, and deformable seal means sealing said containers and deformable to allow a downward movement to be imparted to said perforator from outside without un-sealing said container tops.

3. A composite container assembly as in claim 2, wherein said perforator member is a slotted metal tube with spaced adjacent longitudinal side edges formed with a sharp point centrally of its bottom end tapering off gradually toward said side edges.

4. A composite container assembly as in claim 3, wherein said perforator tube is resiliently inserted into said cylindrical secondary member to be frictionally applied thereagainst.

5. A composite container assembly as in claim 4 wherein said resilient perforator tube is formed with spaced projections on its outer wall frictionally applied against said cylindrical secondary container walls.

6. A flask containing a first ingredient of a mixture and having a top opening, a frangible cylindrical cup containing another ingredient of said mixture secured within, and adjacent the opening of, said flask, a slotted tubular perforator movable in, and frictionally applied against the cylindrical walls of, said cup, having a sharp bottom end adapted on downward movement of the perforator to cut through part of the circumference of the bottom of said cup, a deformable diaphragm across said flask opening overlying said cup and perforator, a centrally apertured cap peripherally engaging said diaphragm

and sealable about said flask opening, and a breakable outer cover overlying said cap, removal of said outer cover uncovering the central portion of said diaphragm without unsealing said composite container, and allowing pressure to be exerted through said diaphragm on said perforator to break said cup bottom and allow said other ingredient to fall into the bottom of said flask and mix with said first ingredient without allowing atmospheric air to penetrate into either the flask or the cup.

7. In the combination of claim 6, a centrally apertured cap overlying the top of said perforator tube in said cup to facilitate the transmission of said pressure from the diaphragm to the perforator.

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