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MULTIPLE CHAMBER PACKAGE

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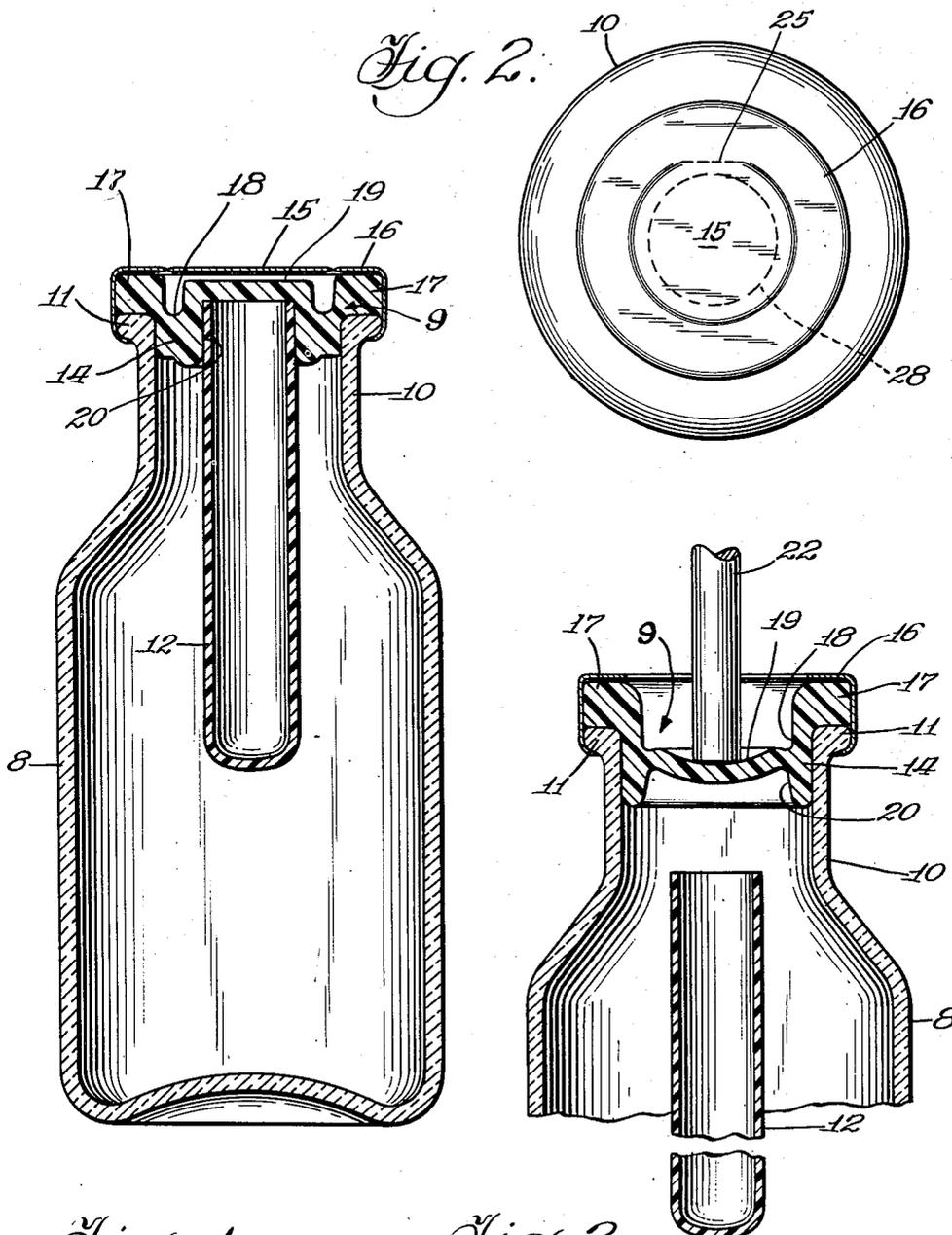


Fig. 1.

Fig. 3.

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## MULTIPLE CHAMBER PACKAGE

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6 Claims. (Cl. 128—272)

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This invention relates to pharmaceutical packages, and more particularly to packages having two chambers detachably sealed apart, whereby incompatible substances are separated in a dispensing container for storage periods, and may be combined with facility immediately prior to use.

The two-compartment packages of the prior art tend to be bulky and unwieldy, and further require especially designed bottles and seals. The prior art packages, generally, have protuberances extending outwardly from the cap, making storage and handling very difficult.

Included among the objects and advantages of the present invention is a flush top package adapted to be sealed against contamination, and a two-compartment package in which the separated incompatible substances will not be accidentally admixed during ordinary handling and shipping.

Referring to the drawings:

Figure 1 is a vertical section of a device according to the invention;

Figure 2 is a top plan view of the device of Figure 1; and

Figure 3 is a partial view in section showing the release of the inner container.

The package of Figure 1 comprises an outer container 8 of glass or other suitable material and an inner container 12, preferably of a non-breakable plastic, such as polyethylene plastic disposed inside the outer container. The two containers are sealed by a common closure 9, whereby the ingredients in the containers are separated.

The container 8 comprises a neck portion 10 of smaller diameter than the main body of the container, and an outwardly flaring lip 11 around the outlet. The inner container 12 is shown as test tube shape but may be of any suitable shape, so long as there is an outlet neck portion adapted to be sealed into the closure 9.

The closure 9 comprises an outwardly flaring skirt 17, adapted to seat on lip 11 forming a tight seal therewith, integrally attached to a central circular septum 19 and a torus 14. The septum is separated from the skirt by an annular groove 18. The torus seats in the opening of the outer container and seals and frictionally holds the inner container, as shown in Figure 1. The septum is evertible in the sense that it may be turned inside out under axial thrust, as indicated in Figure 3.

The closure 9 is tightly held onto the container 8 by means of the cup-shaped cap 16 which is spun under the lip 11, which keeps the closure in aseptic condition. The cap 16 has a central cir-

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cular portion 15 frangibly connected to the outer portion of the cap. The circular portion 15 is removable as by prying up and breaking the seal portion 25, thereby exposing the evertible portion 19.

The package is assembled as follows:

1. The small tube 12 is filled with one of the incompatible ingredients.

2. The small tube 12 is presented to the undistorted closure and the closure is pushed over the end of the small container. It may be desirable to apply a little lubricant to the end of the container 12 so that it will not stick to the material of the closure.

3. The large container is filled with the other incompatible ingredient.

4. The assembled small container, and closure are placed in the position of Figure 1.

5. The cap 16 is set in place, and its rim is spun under the lip 11, thereby sealing the container. The package is then sterilized, and is ready for shipment to point of use.

In preparing the filled package for use, the circular flap 15 is pried up and torn off, exposing the evertible portion 19. The operator pushes axially inwardly with a rod 22, as indicated in Figure 3, and the portion 19 is distorted to the position indicated in Figure 3, so that the portion embracing the end of the small container 12 is opened up and turned at least partially inside out and the small container 12 drops into the large container 8. The package may then be shaken to secure good mixing of the combined ingredients. In case the mixture is liquid, it may be withdrawn from the container by a hypodermic syringe, or in any other conventional way.

Because rubber is volumetrically inelastic as water or steel, a smooth and easy release action is obtained by shaping the contour of the torus or annulus 14 so that it can be distorted outwardly and rolled downwardly against the guiding wall of the neck 10, as clearly indicated in Figure 3. During such distortion the material in the approximately torus-like annulus partakes of a movement that is principally rotation around a curved axis which is itself a complete circle, combined more and more with attenuation along the guiding wall. During this distortion the septum 19 and the outer flange 17 remain relatively unchanged in shape. The progressive contact with the inner wall of the large container materially assists in getting the movement of the parts so that the action is dependable and takes place smoothly under the application of a moderate and relatively constant axial thrust.

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The two-compartment package may be used for liquids which are incompatible, or are mutually destructive. The package may also be used for compact handling of an unstable solid and a solvent therefor. The size of the two containers may be varied to suit the requirements of the individual preparations.

Others may readily adapt the invention for use under various conditions of service, by employing one or more of the novel features disclosed or equivalents thereof. As at present advised with respect to the apparent scope of my invention, I desire to claim the following subject matter.

I claim:

1. A multiple-compartment package comprising, in combination: an outer container having an opening thereinto and an inner container having an opening thereinto; a single resilient closure common to both containers; said closure comprising an outer peripheral skirt adapted to seat on the outlet of said outer container, an inner circular portion separated from said skirt by an annular groove, and a stopper for said outer container below said groove, having an axially aligned circular recess therein adapted to hold and seal said inner container; said closure adapted to release said inner container into said outer container by axial inward displacement of said circular portion, whereby said stopper is distorted along the wall of said outer container opening and said circular recess is distorted laterally, releasing said inner container; and an outer cover aseptically sealing said closure, said cover being a cup-shaped cap sealed over said closure and secured to said outer container, said cover having a central circular flap frangibly connected to the outer portion of said cover, whereby removal of said flap exposes the circular portion of said closure.

2. A multiple-compartment package comprising, in combination: a cylindrical outer container having an opening, and a cylindrical inner container having an opening, disposed in said outer container; a single resilient closure common to both of said containers sealing the contents thereof individually apart, said closure comprising a flat top portion covering the opening of said outer container and extending to the outer edge of the wall of said opening, a stopper portion adapted to fill said opening in said outer container extending below said flat top, a recess in said stopper adapted to receive telescopically said inner container, sealing the opening therein and holding said inner container in spaced relation to said outer container, and an annular groove in said flat top of smaller diameter than said opening in said outer container, whereby inward axial movement of the circular plane described by said groove distorts said stopper along the wall of said opening and laterally distorts said stopper recess releasing said inner container into said outer container to permit admixing the respective contents thereof.

3. A multiple compartment package comprising, in combination: a large container having a circular opening; a small container having a circular outer contour small enough to lie coaxially in said large container opening, leaving an intervening annular space; and a closure of material yieldable with respect to shape but not with respect to volume, including an annular portion encircling one end of said small container and lying inside the lip of the large container opening; a septum covering the open end of the small container and integrally united around its

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periphery with said annular portion; a sealing flange overlying the lip of the large container opening and integrally united with an edge of said annular portion; the inner diameter of said flange being greater than the outer diameter of said septum to leave an annular groove between them; said septum terminating in a plane offset slightly below the plane of the upper surface of said flange; and a metallic closure cap overlying and pressing down on said flange and engaging an outer irregularity of contour in said large container to hold it in place.

4. A closure for a multiple compartment package comprising, in combination: an annular portion; a central septum integrally united around its periphery with said annular portion; a sealing flange integrally united with an outer edge of said annular portion; the inner diameter of said flange being greater than the outer diameter of said septum to leave an annular groove between them; said septum terminating in a plane offset slightly below the plane of the upper surface of said flange, said annular portion extending below said sealing flange and adapted to seat internally in one compartment and externally on the other compartment to seal both said compartments.

5. A multiple compartment package comprising, in combination: a large container having a circular opening; a small container having a circular outer contour small enough to lie coaxial with said large container opening and leaving an intervening annular space; and a closure of yieldable material common to both of said containers, including an annular portion encircling one end of said small container and seated inside the large container opening; a septum covering the open end of the small container and integrally united around its periphery with said annular portion; a sealing flange overlying the lip of the large container opening and integrally united with an edge of said annular portion; the inner diameter of said flange being greater than the outer diameter of said septum to leave an annular groove between them; said septum terminating in a plane offset slightly below the plane of the upper surface of said flange.

6. A closure for a multiple compartment package consisting of a pair of telescoping containers, comprising, in combination: an annular portion adapted to encircle the mouth of the smaller of said containers and stopper the mouth of the larger of said containers; a central septum integrally united with the upper, inner edge of said annular portion; a sealing flange for the lip of said larger container extending radially from the upper outer edge of said annular portion; the inner diameter of said flange being greater than the outer diameter of said septum to leave an annular groove between them; said septum terminating in a plane offset slightly below the plane of the upper surface of said flange.

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