Sept. 25, 1956 F. F. SIMON ET AL 2,764,156

AMPULES

Filed Dec. 22, 1954

Fig. 1

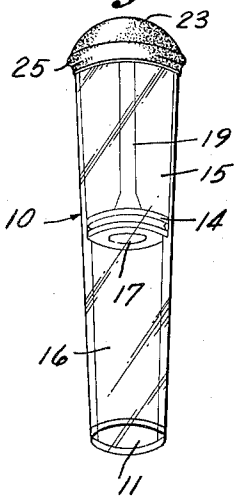



Fig. 2

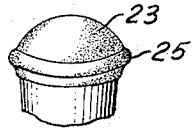



Fig. 3

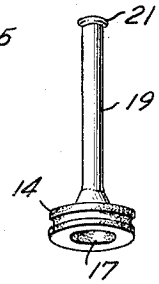



Fig. 4

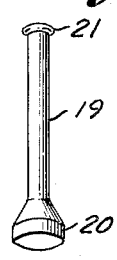



Fig. 6

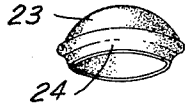



Fig. 9

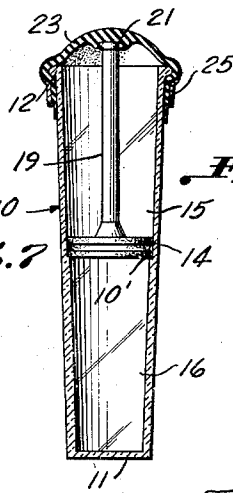



Fig. 7

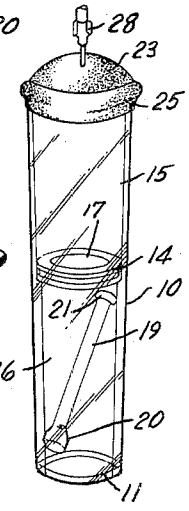
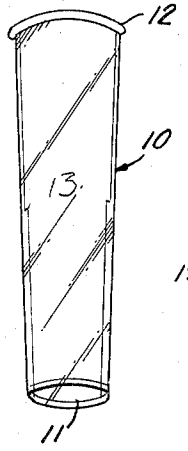
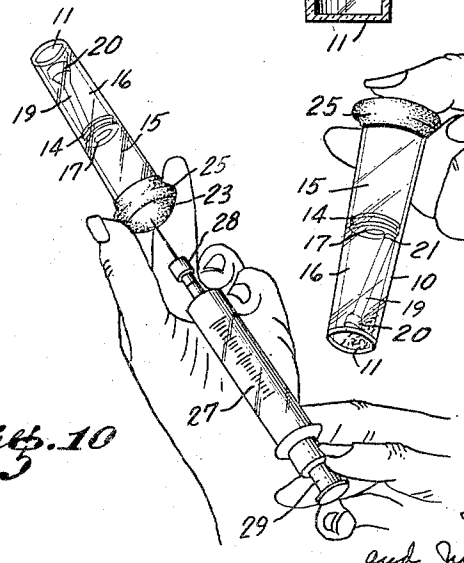



Fig. 5



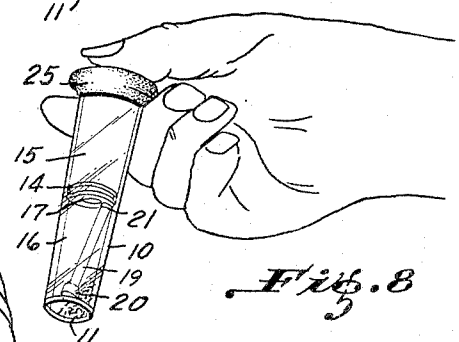




Fig. 8

Fig. 10

INVENTORS

Felix Fernandez Simon

and Juan Fernandez Oliver

BY Moses, Nolte, Crewe & Berry

ATTORNEYS

United States Patent Office 2,764,156 Patented Sept. 25, 1956



2,764,156

# AMPULES

Felix Fernandez Simon and Juan Fernandez Oliva, Havana, Cuba

Application December 22, 1954, Serial No. 476,951

13 Claims. (Cl. 128—272)

This invention relates to containers, and more particularly to containers or ampules of the type commonly employed to fill hypodermic syringes.

In such ampules or containers currently in use, the ampule or container is filled after the powdered material has been dissolved in the desired solution, whereupon the solution may then later be extracted by the hypodermic syringe by puncturing the container cover. Such containers, wherein the powdered material is already dissolved in the desired solution are objectionable in that deterioration and decomposition of the material occurs on standing.

In our copending application, Serial No. 395,542, filed December 1, 1953, of which the present application is a continuation-in-part, there is described a container which is adapted to fill hypodermic syringes. The container described therein is of general cylindrical shape and has a uniform inside diameter except for a relatively small restricted area provided intermediate the ends of the container. This restricted area is adapted to receive and seat a rubber piston which in turn is adapted to receive a plug and elongated rod attached to said plug. There is accordingly formed within the cylindrical container an upper and lower compartment wherein can be placed a liquid and a powdered material which are not admixed with each other.

In the manufacture of these containers, certain production problems were presented by virtue of the particular construction. The present invention is an improvement on the containers described in my copending application. It solves the problem of the practical use of said container with no loss of time and material in the inspection procedure or calibration necessary in selecting the vials before filling.

It is an object of the present invention to provide a container or ampule adapted to be easily and readily used to fill hypodermic syringes wherein the powdered material is sealed off from the solution until such time as it is desired to employ the contents of the container, just prior to filling the hypodermic syringe, whereupon the contents are permitted to mix in a novel manner.

It is another object of the present invention to provide a container or ampule of the type commonly employed to fill hypodermic syringes wherein the powdered material is sealed off from the solution until such time as it is desired to employ the contents of the container, just prior to filling the hypodermic syringe, whereupon the contents are permitted to mix in a novel manner.

It is another object of the present invention to provide a container or ampule of the type commonly employed to fill hypodermic syringes wherein the powdered material is sealed off from the solution, the powdered material being permitted to dissolve in the liquid by simply pressing a flexible cover which also serves later to receive therethrough the needle of the hypodermic syringe.

Another object of the present invention is to eliminate certain production problems which are present in the



manufacture of the ampules described in our copending application Serial No. 395,542.

Other objects of the present invention are to provide a container or ampule bearing the above objects in mind which is of simple construction, inexpensive to manufacture, has a minimum number of parts, is easy to use and efficient in operation.

For other objects and a better understanding of the invention, reference may be had to the following detailed description taken in connection with the accompanying drawings in which:

Figure 1 is a perspective view of a container or ampule embodying features of the present invention showing the assembly of the parts ready for use;

Fig. 2 is a perspective view of the details of the assembly of the covering means and sealing means used to seal said cover to the container;

Fig. 3 is a perspective view of the rubber piston used in the present invention and also shows the assembly of the piston and elongated rod which are features of the present invention.

Fig. 4 is a perspective view showing the details of the elongated rod embodied in the present invention;

Fig. 5 is a perspective view of the elongated hollow shaped, generally cylindrical container, embodied in the present invention before assembly;

Fig. 6 is a perspective view of a closure means embodied in the present invention showing the details thereof;

Fig. 7 is a median longitudinal section taken through Fig. 1;

Fig. 8 is a perspective view illustrating the manner in which elongated rod of the present invention is pressed down in the use of the container of the instant invention;

Fig. 9 is a perspective view showing the insertion of a hypodermic syringe needle through covering means after the elongated web has been pressed in as illustrated in Fig. 8; and

Fig. 10 is a perspective view illustrating the manner in which the operator holds the container embodied in the present invention while filling the syringe.

Referring now more in detail to the drawings, wherein reference numerals identify corresponding parts throughout the several views, **10** represents an elongated hollow generally cylindrical member of glass or other suitable material, which is slightly tapered downward having a bottom end wall **11** and a rimmed open top end **12**, substantially as illustrated.

The cylinder **10** is constructed so that the inside diameter of the upper half of the cylinder is larger than the inside diameter of the lower half of said cylinder. This construction provides a ledge **13** which surrounds the hollow portion of the cylinder, and which acts as a seat for rubber piston **14**. Rubber piston **14** is of such diameter as to allow its insertion through top end **12** but too large to permit its passage into the lower half of said cylinder. There is thus provided an upper compartment **15** and a lower compartment **16**. The piston **14** is provided with a central opening **17** for a purpose which will hereinafter become clear.

Container **10** is first partially filled with a powdered material, for example penicillin, after which the piston **14** is then inserted downwardly until it abuts ledge **13**. The slight taper in the side walls of container **10** insures a tight fit between said side walls and rubber piston **14**.

An elongated rod **19** of glass or other suitable material has integrally formed at its lower end an enlarged cylindrical plug **20** adapted to be forced into the central opening of rubber piston **14**, and providing a closure therefor. The upper end of rod **19** extends above

the open end 12 and is formed with a knob 21 as illustrated for a purpose which will hereinafter become apparent.

After plug 20 of rod 19 is forced into piston 14, whereby to close the central opening 17 of the latter and to seal off the lower compartment 16 from the upper compartment 15, liquid, for example, saline solution, is poured into the container up to mouth 12.

A convex cover 23 of rubber or other elastic flexible material having a flanged portion 24 (see Fig. 6) is stretched and snapped over the open mouth 12, and then secured in place by a plastic seal 25 (see Fig. 7). It will be noted that knob 21 of rod 19 is disposed within and adjacent to cover 23. It will be also noted that the liquid in upper chamber 15 will be sealed off from powdered material in lower chamber 15 preventing their mixing, and subsequent decomposition during prolonged standing or storage.

The container or ampule is now ready for shipment and ultimate distribution to hospitals or physicians, and may be stored indefinitely without decomposition or deterioration.

When it is desired to use the contents of the container, it is only necessary to press the convex cover 23 downwardly, as shown in Figure 8, thus forcing the rod 19 downwardly, and pushing the plug 20 through piston 14. The liquid in the upper compartment 15 will then pass downwardly through opening 17 into lower compartment 16, where it dissolves the powdered material therein to form a solution. The hypodermic syringe 27 (Fig. 10) may then be filled with freshly prepared solution by inserting the hypodermic needle 28 through cover 23, and withdrawing the plunger 29 in the usual manner.

While the cylinder 10 and rod 19 have been described as being formed of glass, it will be readily apparent to those skilled in the art that these parts may be formed of aluminum, plastic, or any other suitable material. It will also be apparent to those skilled in the art that while the container or ampule has been described in connection with a hypodermic syringe, it will be readily appreciated that the construction may be employed wherever it is desired to store two separate and different substances without mixing until they are ready to be used.

While various changes may be made in the detail construction, it shall be understood that such changes shall be within the spirit and scope of the present invention, as defined by the appended claims.

We claim:

1. A container comprising, a hollow body portion closed at one end and open at the other, said body portion comprising at least two sections adjacent each other, wherein an internal cross-sectional dimension of a section closer to said open end is larger than an internal cross sectional dimension of an adjacent section, thereby forming a ledge within said hollow body portion, a closure within said body portion in abutment with said ledge, said closure having a central opening, a plug fitted within said central opening whereby to close the same and to permit powdered material to be disposed intermediate said closure and said closed end of said body portion and liquid material intermediate said closure and the open end of body portion without admixture, an elongated rod connected to said plug and extending upwardly through the open end of said body portion, and a flexible cover sealing the open end of said body portion.

2. A container comprising, a hollow body portion closed at one end and open at the other of said body portion, comprising at least two sections adjacent each other wherein an internal cross sectional dimension of a section closer to said open end is larger than an internal cross sectional dimension of said adjacent section thereby forming a ledge within said hollow body portion, a partition within and dividing said body portion into separate compartments, said partition having a central opening, a plug press fitted into said central opening whereby to seal off said compartments and to permit one of them to contain a powdered material and the other a liquid without admixture, an elongated rod extending upwardly from said plug above the open end of said body portion and a flexible cover sealing off the open end of said body portion, the upper end of said rod terminating within and near said flexible cover.

3. A container in accordance with claim 2, wherein the exterior side walls of the container taper throughout their length and said partition is in abutment with the said side walls.

4. A container comprising, an elongated hollow, generally cylindrical body closed at one end, the open end being provided with a rim, said body comprising at least two sections adjacent each other, wherein an internal cross-sectional dimension of a section closer to said open end is larger than an internal cross-sectional dimension of an adjacent section thereby providing a ledge for seating an elastic piston and preventing displacement of said piston through said body, an elastic piston inserted into said body through said open end in abutment with said ledge, said piston having a central opening, a plug press fitted into said central opening and sealing off said body into separate compartments adapted to contain different substances without admixture, an elongated rod extending upwardly through the open end of said body above said rim, and a substantially convex flexible cover having a flanged portion adapted to engage said body adjacent said rim, the upper end of said rod having an enlarged portion disposed within and adjacent said flexible cover.

5. A container in accordance with claim 4, wherein the exterior side walls of said container taper throughout their length and said piston is in abutment with said side walls.

6. An ampule for hypodermic syringes comprising, a hollow elongated generally cylindrical body closed at one end, the other end of said body being open and integrally formed with a rim, said body comprising an upper and lower section, the inside diameter of the upper section being larger than the inside diameter of the lower section so as to provide a substantially circular ledge, a rubber piston having a central opening, inserted through the open end of said body beyond said rim, a plug press fitted into said central opening and sealing off said body into separate compartments adapted to receive different substances without admixture, an elongated rod extending upwardly from said plug through the open end of said body above said rim, a substantially convex cover having a flanged portion adapted to be stretched over said rim, the upper end of said elongated rod terminating in an enlarged portion within and adjacent said cover.

7. A container according to claim 6, including a plastic seal securing said flanged portion of said cover to said body.

8. A container in accordance with claim 6, wherein the exterior side walls of said container taper throughout their length and said piston is in abutment with said side walls.

9. A container comprising a hollow body portion closed at one end and open at the other, a partition within and dividing said body portion into separate compartments, said partition having a central opening, a plug press fitted into said central opening whereby to seal off said compartments and to permit one of them to contain a powdered material and the other a liquid without admixture, an elongated rod extending upwardly from said plug above the open end of said body portion and a flexible cover sealing the open end of said body portion, the upper end of said rod terminating within and near said flexible cover.

10. A container comprising an elongated hollow cylin-

der closed at one end, and open at the other, said cylinder intermediate its ends having a restricted portion, an elastic piston inserted downwardly through the open end of said cylinder in abutment with said restricted portion, said piston having a central opening, a plug press fitted into said central opening and permitting the disposal of different substances within each half of said cylinder without admixture, an elongated rod extending upwardly from said plug beyond the open end of said cylinder, and a flexible cover closing the open end of said cylinder, the upper end of said rod terminating within and adjacent said flexible cover.

11. A container comprising an elongated hollow cylinder closed at one end, the other end of said cylinder being open and provided with a rim, said cylinder intermediate the ends thereof having a restricted portion, an elastic piston inserted into said cylinder through said open end into abutment with said restricted portion intermediate the latter and said rim, said piston having a central opening, a plug press fitted into said central opening and sealing off said cylinder into separate compartments adapted to contain two different substances without admixture, an elongated rod extending upwardly from said plug through the open end of said cylinder above said rim, and a substantially convex, flexible cover having a flanged portion adapted to engage said cylinder adjacent said rim, the upper end of said elongated rod having an enlarged knob disposed within and adjacent said flexible cover.



12. An ampule for hypodermic syringes comprising a hollow elongated glass cylinder closed at one end, the other end of said cylinder being open and integrally formed with a rim, said cylinder intermediate its ends being provided with a restricted portion, a rubber piston inserted through the open end of said cylinder into abutment with said restricted portion, said piston having a central opening therein, a plug press fitted into said central opening whereby to seal off said cylinder into separate compartments adapted to contain a powder and a liquid without admixture, an elongated rod extending upwardly from said plug through the open end of said cylinder beyond said rim, and a substantially convex rubber cover having a flanged portion adapted to be stretched over said rim, the upper end of said elongated rod terminating in an enlarged knob within and adjacent said cover.

13. A container according to claim 12, including a plastic seal securing said flanged portion of said cover to said cylinder.

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