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C. H. BARR
CONTAINER

2,372,352

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Fig. 1

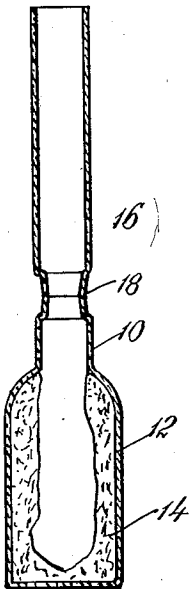


Fig. 2.



Fig. 3.

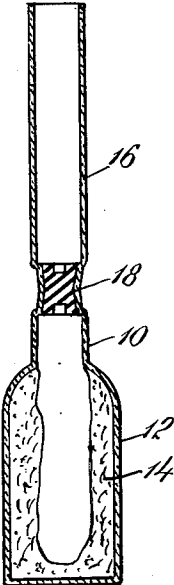
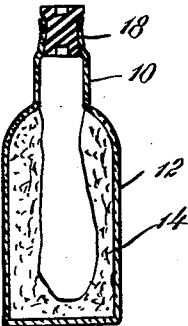


Fig. 4.



Fig. 5.



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2,372,352

CONTAINER

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5 Claims. (Cl. 128—272)

This invention relates to improvements in sealed ampoules, and more particularly to improvements in the type of ampoule described in Patent 2,176,004, granted October 10, 1939.

Patent 2,176,004 describes containers for desiccated substances which are provided with a body portion containing the desiccated substance and with a flame-sealed neck, within which is positioned a perforable stopper in tight engagement with the neck. When used, the neck of the container is broken off and a needle is passed through the perforable stopper to introduce liquid which dissolves the desiccated substance and to remove the resulting solution for use, e. g., for injection. In the container specifically described in said patent, the stopper is tapered, and is fitted tightly into a correspondingly tapered portion of the neck of the container. In practice, certain disadvantages have been encountered in the use of this specific type of container. If the neck is broken off above the stopper, a jagged edge is exposed which may cut the hand of the person handling the vial. If the neck is broken off just below the top of the stopper, the stopper is sometimes removed along with the portion of the neck which is broken off, with the result that air may enter the container and contaminate the contents. Additionally, if in inserting liquid into the container through the perforable stopper, pressure above atmospheric is built up within the container, the stopper may be blown out of the neck.

The present invention provides an improved container which has the advantages, for the storage and distribution of substances, particularly desiccated substances, including desiccated biologicals, of the containers described in said patent, but is free from the disadvantages to which reference has been made.

The new containers of the invention are provided with a neck, having, usually near the body portion of the container, a circumferential depression or groove approximating in shape two conical frustums with the smaller bases touching and with the diameters of the larger bases usually somewhat smaller than the inner diameter of the neck proper. In this portion of the neck is firmly seated a correspondingly shaped perforable stopper, usually rubber, and formed in the shape of two conical frustums with the smaller bases joined; i. e., an "hourglass" shape. The stopper should, of course, be somewhat larger than the corresponding portion of the neck into which it fits, so that, when in place, it will be under compression and form a tight seal. Above the stopper the neck of the container is flame-sealed, so that the entire container has an all-glass seal.

When used, the neck of the container is broken off at about the midpoint of the upper half of the stopper, leaving a free portion of the stopper

extending above the glass edge. This portion of the stopper expands and tends to cover the exposed edge of the broken glass. The breaking of the neck at the proper point is readily accomplished by a scratch-mark made with a file or the like in the known way.

The expanded or flared-out lower portion of the stopper prevents the stopper from being removed along with the portion of the neck which is broken off, and also serves to prevent the stopper from being blown out if the inner portion of the container is placed under pressure and from being pulled out upon withdrawing a needle or the like, passed through the stopper to introduce liquid to dissolve the desiccated material or to produce a vacuum under which the container is sealed, or for other purposes.

The invention will be further described in connection with the appended drawing which illustrates one form of the invention.

In the drawing:

Fig. 1 represents a container containing a desiccated material, for example, a desiccated biologically active material;

Fig. 2 illustrates a suitable stopper;

Fig. 3 illustrates the container of Fig. 1 with the stopper in place;

Fig. 4 illustrates the container with the glass neck flame-sealed; and

Fig. 5 illustrates the container with the glass neck broken off and ready for use.

In the drawing, there is shown a container 10 having a body portion 12 in which is a substance, such as the desiccated material 14. This desiccated material may be produced by drying an aqueous material such as serum or the like from a frozen state by processes such as are described in my Patent 2,198,752, or application Serial No. 90,003, filed November 7, 1938, or in other suitable ways. The container is provided with a neck 16 which has a circumferentially depressed portion 18 having approximately the shape of two conical frustums with the small bases in contact, as illustrated. It is not, of course, necessary that the shape of this circumferential depression be geometrically that of portions of cones, as other suitably shaped depressions which permit the interlock of the stopper with respect to motion in either direction and provide the necessary tight engagement of the stopper with the neck, may be used. The essential feature of the arrangement is the hourglass shape, with the smallest lumen in the middle portion of the depression and flaring portions both upwardly and downwardly therefrom.

The stopper is introduced into the proper position by forcing it into place with a suitable plunger. The stopper will ordinarily be made so that the diameter of its base is slightly less than or the same as the inner diameter of the neck,

so that it can be readily introduced into the neck. The depression or groove into which it fits will be somewhat smaller, so that, when in place, the stopper will be under compression along its entire length. Usually, the stopper will be positioned while the container is maintained under a vacuum, for example, by the procedure described in my said patent or application, although in many cases it is not necessary that the container be evacuated. It may be sealed in an atmosphere of inert gas such as nitrogen, or even full of air, if the material within it is not damaged by air. Even where the final container is to be an evacuated one, it is not always necessary to insert the stopper while maintaining a vacuum within the container, as the stopper may be seated while the container is under atmospheric or other pressure, and subsequently evacuated through a hollow needle forced through the stopper. Upon withdrawal of the needle, if the stopper is of good quality material, the seal will be sufficient to maintain the vacuum. After the stopper is inserted as illustrated in Fig. 3 and the desired conditions, i. e., vacuum, inert atmosphere, etc. produced within the container, the upper portion of the neck is flame-sealed as illustrated in Fig. 4. In some cases, particularly where the body of the container is small, and the material within it particularly sensitive, it may be desirable to seal off the neck while maintaining a reduced pressure within it, as described, for example, in my said Patent 2,198,752.

When the desiccated material is to be restored to a liquid state, the neck is scratched somewhere along the upper half of the stopper, usually about half-way between the small diameter and the top, and the glass neck broken off. The upper portion of the stopper, under compression when seated in the neck, expands somewhat and helps to cover the jagged edge of the broken neck. Whether it adequately covers the jagged edge or not, the fact that it extends beyond the broken edge affords substantial protection to the operator handling the container. The flaring lower portion of the stopper prevents the stopper from being removed along with the broken-off neck. The stopper is then pierced by a hollow needle, such as the needle of a hypodermic syringe and liquid introduced to dissolve the desiccated material, the technique of restoring being substantially that described in Patent 2,176,004. If the container is not sealed under vacuum, it is usually necessary, when introducing a liquid, to permit some of the gas within the container to escape through the needle. This is readily accomplished by introducing a little liquid, permitting some of the gas to escape, introducing more liquid, etc.

I claim:

1. In a package of the type comprising a container having therein biologically-active substance or the like which is adapted to be placed in usable condition by the addition of water, which container has a neck sealed by a perforable stopper through which water may be introduced and an extension beyond the neck, the neck being adapted to be broken opposite the stopper to enable the extension to be removed to provide access to the perforable stopper; the improvement which comprises a neck having an inwardly-extending portion which assists in retaining the stopper in place in the neck when the extension is removed.

2. In a package of the type comprising a container having therein biologically-active substance or the like which is adapted to be placed in usable condition by being dissolved in water, which container has a neck sealed by a perforable stopper through which water may be introduced and a sealed extension beyond the neck, the neck being adapted to be broken opposite the stopper to enable the extension to be removed to provide access to the perforable stopper; the improvement which comprises a neck with which the stopper contacts having an intermediate portion of less inner diameter than parts of the neck at opposite sides thereof, whereby when the extension is removed the portion of the neck of less inner diameter will hold the stopper in the neck.

3. In a package of the type comprising a container having therein biologically-active substance or the like which is adapted to be placed in usable condition by being dissolved in water, which container has a neck sealed by a perforable stopper through which water may be introduced and a sealed extension beyond the neck, the neck being adapted to be broken opposite the stopper to enable the extension to be removed to provide access to the perforable stopper; the improvement which comprises a neck with which the stopper contacts of the general shape of two frusta joined at their smaller bases, whereby when the neck is broken adjacent the juncture of the frusta to enable the extension to be removed to provide access to the perforable stopper, the inner frustum will hold the stopper in the neck.

4. In a package of the type comprising a container having therein desiccated biologically-active substance or the like which is adapted to be restored and placed in a liquid state by being dissolved in water, which container has a neck sealed by an elastic perforable stopper through which water may be introduced to restore the biologically-active substance or the like and a sealed extension beyond the neck, the neck being adapted to be broken opposite the stopper to enable the extension to be removed to provide access to the perforable stopper; the improvement which comprises a neck having an inwardly-extending portion which assists in retaining the stopper in place in the neck when the extension is removed.

5. In a package of the type comprising a container having therein biologically-active substance or the like which is adapted to be placed in usable condition by the addition of water, which container has a neck sealed by a perforable stopper through which water may be introduced and an extension beyond the neck, the neck being adapted to be broken opposite the stopper to enable the extension to be removed to provide access to the perforable stopper; the improvement which comprises a neck having an inwardly extending portion which assists in retaining the stopper in place in the neck when the extension is removed, and a stopper including an outer portion having an inherent elastic bias tightly fitting in said neck under compression, whereby when the neck is broken opposite the stopper and the extension removed the inherent elastic bias of the outer portion of the stopper will cause that portion of the stopper to expand and at least in part overlies the broken edge of the neck.

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