

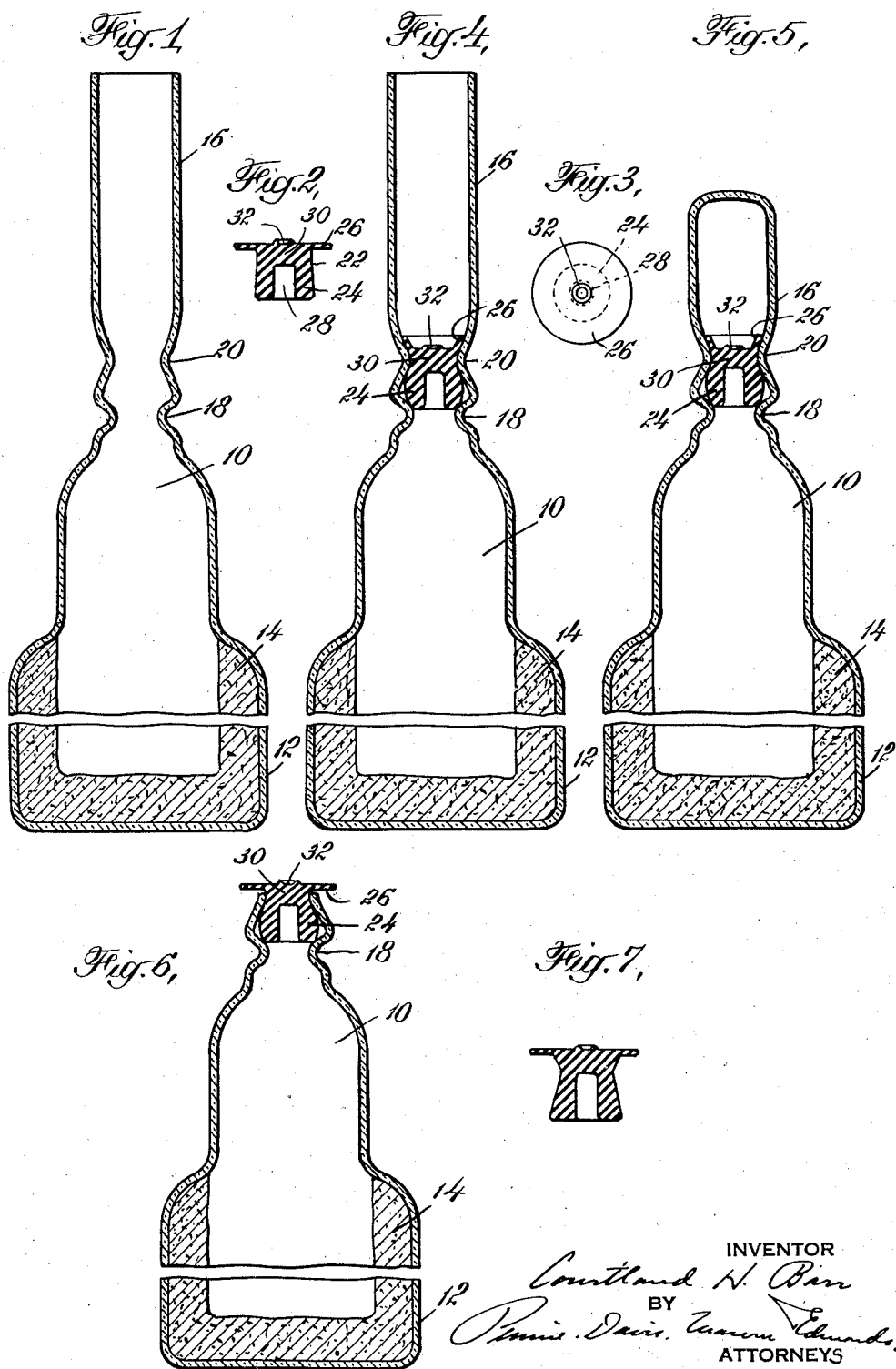
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CONTAINER

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2,372,181

CONTAINER

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This invention relates to improvements in containers and stoppers for the preservation, storage or distribution of various materials, and particularly desiccated substances including desiccated biologically active substances.

In my application Serial No. 420,311, filed November 24, 1941, there is described a container for such substances provided with a body portion, a flame-sealed neck, and within the neck a firmly seated rubber stopper having the shape of two truncated cones joined at the small bases, i. e., an "hourglass" shape, firmly seated in a similarly shaped groove in the neck. In the Reichel Patent 2,176,004, there is described a similarly flame-sealed container having positioned in the neck a perforable stopper interlocked with the neck to limit its inward movement.

When the material within the container is to be used, the glass neck is broken off just above the stopper or somewhat below the upper surface of the stopper. If the container contains a material which is to be dissolved in some liquid before it is used, the liquid is introduced into the container by passing a needle through the perforable stopper and introducing liquid through the needle. In practice, the containers described in the Reichel patent, and to some extent those described in my said application, have been subject to the disadvantage that the exposed jagged edge of the broken neck presents a hazard in handling. While the containers of my said application are superior to those of the Reichel patent in this respect, they nevertheless do present a hazard. Additionally, with such containers, and particularly those described in the Reichel patent, the stopper is sometimes removed with the portion of the neck broken off.

The present invention provides improved stoppers and final containers including such stoppers of the general type described in said application and patent, the improvement residing in the provision, on the upper portion of the stopper, of an integral flange perpendicular to the longitudinal axis of the stopper and the provision, in the neck of the container, of appropriate means to limit the movement of the stopper.

When the improved stopper is firmly seated in the neck of the container, the extending flange is bent upwardly, forming a dish or cup shaped upper portion which is usually firmly seated against the inside of an extension of the neck of the container as will be hereafter described.

When the neck of a container provided with this type of stopper is broken off just below the flange or disc, the inherent reitency of the

flanged portion immediately causes the flange to assume its normal flattened position, forming an extending disc which completely covers the raw edge of the broken glass and avoids any possibility of cutting the fingers thereon. Additionally, by forming the lower portion of the stopper, that is, below the flange with an outwardly flaring shape, that is, substantially the shape of a truncated cone, either by proper compression of a cylindrically shaped stopper or by the shape of the stopper itself, the possibility of removing the stopper with the broken off portion of the neck is substantially reduced, because the thin flange is deformed and pulled out of the broken off portion of the neck much more easily than the relatively solid lower portion is deformed and pulled out of the neck.

The invention will be further described in connection with the appended drawing which illustrates a container with a flame-sealed extension of the neck and with a stopper of the improved type sealed within the neck and the extension thereof, the shape of the neck being appropriate for the particular shape of stopper used. The container illustrated is of the type used for the preservation of plasma by desiccation from the frozen state, and may be a container having a capacity of 500 cc. containing 250 to 300 cc. of plasma.

In the drawing:

Fig. 1 illustrates a container containing desiccated plasma;

Figs. 2 and 3 illustrate a suitable stopper having a cylindrical body portion;

Fig. 4 illustrates the container of Fig. 1 with the stopper in place;

Fig. 5 illustrates the container with the glass neck flame-sealed;

Fig. 6 illustrates the container with the glass neck broken off; and

Fig. 7 illustrates a somewhat differently shaped stopper which embodies the invention.

In the drawing, there is shown a container 10 having a body portion 12 in which is desiccated plasma 14. This desiccated plasma may be produced by drying the liquid plasma from a frozen state by processes such as are described in my Patent 2,198,752 or my application Serial No. 239,417, filed November 7, 1938, or in other suitable ways. The container is provided with a neck having an extension 16. The neck has an annular depression or circumferential groove 18 which limits the inward movement of the stopper. Above this is a second circumferential depression

20, usually a little shallower than the groove or depression 18, but broader, as illustrated.

The stopper 22 is provided with a cylindrical body portion 24 and integral therewith at the top an outwardly extending flange or disc 26. The stopper is also provided with an opening 28 extending upwardly from the bottom and part-way through the stopper so that a relatively thin portion 30, easy to puncture with a hypodermic needle, is provided at the top. At the top and directly above the thin section 30 is provided a mark, e. g., a protrusion or depression 32 which serves to indicate the place at which the stopper should be pierced by a needle to make sure that it will penetrate to the interior of the container through the thin portion 30 of the stopper.

When this stopper is seated in the neck of the container, as illustrated in Fig. 4, the lower portion firmly abuts the groove 18, while the upper part of the body portion is firmly seated at the base of the groove or depression 20. The flange or disc 26, which is bent or deformed upwardly when the stopper is inserted in the neck, is usually seated against the outwardly flaring portion of the groove or depression 20. The stopper, compressed when in place, forms a tight seal, particularly at the bases of the grooves for depressions 18 and 20. After the stopper is forced into place, the extension above the stopper is flame-sealed as illustrated in Fig. 5.

When the plasma within the container is to be used, the neck is broken off just below the juncture of the flange or disc and the body portion of the stopper, usually by scratching the neck at that point and snapping it off. When the extension is broken off, the flange or disc flattens out, covering the broken edge of the container neck and affording protection to the operator handling the container, as shown in Fig. 6. The flaring lower portion of the stopper, caused by the compression of the stopper, prevents the stopper being removed along with the broken off extension. A needle may then be pushed through the stopper to introduce liquid to dissolve the plasma, the technique of restoring, in the case of plasma, being substantially that described in Patent 2,176,004.

Usually, where desiccated biologically active substances, such as plasma, are sealed in the containers, the containers will be sealed under vacuum, for example, by the procedure described in my Patent 2,198,752 or application Serial No. 90,003, although it is not necessary that the container be evacuated when sealed. Many biologically active substance may be successfully preserved when sealed in an atmosphere of dry gas, such as dry nitrogen, or dry air. Even where the final container is to be evacuated, 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. If the stopper is of good quality material, the seal will be sufficient to maintain the vacuum after the needle is withdrawn.

If the container is not sealed under a vacuum, and if the addition of liquid is required to dissolve a dry substance, it is usually necessary, when introducing the liquid, to permit some of the gas to escape through the needle. This is readily accomplished by introducing a little liquid, permitting some of the air to escape, introducing more liquid, etc.

In the particular improved stopper illustrated

in Fig. 7, the body portion is in the form of two frusta, attached at the small bases, with a relatively long lower cone and short upper cone, and with the flange or disc attached at the larger base of the upper cone.

A stopper of this form may be used with a container having the neck configuration of that illustrated in the drawing.

It is not necessary that the stopper have either of the particular shapes illustrated, nor is it necessary that the container be provided with the particular types of depressions or grooves illustrated, although these constructions have important advantages. In its broadest aspects, the invention includes stoppers provided, at the upper portion thereof, with a horizontal flange or disc adapted to assume a dish or cup shaped position when in the neck of the container and to flatten out when the upper portion of the neck is broken off, whether the stopper be an ordinary tapering stopper provided with the flange or disc at the larger end or a stopper having an "hourglass" shape as described in my application Serial No. 420,311, or a cylindrical or other suitable shape. The neck of the container will, of course, be appropriately shaped to provide the necessary tight seal with the particular form of stopper used. Nevertheless, the particular types of stopper illustrated in the drawing have important advantages in use because of the effective protection they afford to the operator and because removal of such stoppers when the extension is broken off is effectively prevented, while at the same time inward movement of such stoppers may be effectively prevented by a groove or depression provided in the neck of the container.

I claim:

1. In a package of the type comprising a container having a neck sealed by a stopper 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 stopper; the improvement which comprises a stopper provided with a flexible flange normally extending outwardly therefrom in a direction not substantially above a plane perpendicular to the axis of the stopper at the place of juncture of the flange and stopper, the flange being within the extension and the extension being constructed and arranged to maintain the flange deformed upwardly from its normal position, said flange having an inherent reitency tending to return it to its normal position, whereby when the neck is broken opposite the stopper and the extension removed, the inherent reitency of the flange will cause it to return to its normal position and to overlie the broken edge of the neck.

2. In a package of the type comprising a container having a neck sealed by a stopper 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 stopper; the improvement which comprises a stopper provided with a flexible flange normally extending outwardly therefrom in a direction substantially perpendicular to the axis of the stopper, the flange being within the extension and the extension being constructed and arranged to maintain the flange deformed upwardly from its normal position, said flange having an inherent reitency tending to return it to its normal position, whereby when the neck is broken opposite the stopper and the extension removed, the inherent reitency of the flange

will cause it to return to its normal position and to overlie the broken edge of the neck.

3. In a package of the type comprising a container having a neck sealed by a stopper 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 stopper; the improvement which comprises a stopper provided with a flexible flange normally extending outwardly therefrom, at the outer end thereof, in a direction substantially perpendicular to the axis of the stopper, the flange being within the extension and the extension being constructed and arranged to maintain the flange deformed upwardly from its normal position, said flange having an inherent renitency tending to return it to its normal position, whereby when the neck is broken opposite the stopper and the extension removed, the inherent renitency of the flange will cause it to return to its normal position and to overlie the broken edge of the neck.

4. In a package of the type comprising a container having a neck sealed by a stopper 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 stopper; the improvement which comprises a stopper having a portion substantially the shape of a frustum inserted in the neck of the container with its larger base inward, the stopper having a flexible flange normally extending outwardly therefrom in a direction not substantially above a plane perpendicular to the axis of the stopper at the place of juncture of the flange and stopper, the flange being within the extension and the extension being constructed and arranged to maintain the flange deformed upwardly from its normal position, said flange having an inherent renitency tending to return it to its normal position, whereby when the neck is broken opposite the stopper and the extension removed the inherent renitency of the flange will cause it to return to its normal position and overlie the broken edge of the neck.

5. In a package of the type comprising a container having a neck sealed by a stopper 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 stopper, the improvement which comprises a stopper interlocked with the neck to impede at least inward movement thereof, the stopper having a flexible flange normally extending outwardly therefrom in a direction not substantially above a plane perpendicular to the axis of the stopper at the place of juncture of the flange and stopper, the flange being within the

stopper and the extension being constructed and arranged to maintain the flange deformed upwardly from its normal position, said flange having an inherent renitency tending to return it to its normal position, whereby when the neck is broken opposite the stopper and the extension removed, the inherent renitency of the flange will cause it to return to its normal position and to overlie the broken edge of the neck.

6. In a package of the type comprising a container having a neck sealed by a stopper 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 stopper; the improvement which comprises a stopper having the general form of two frusta joined at their smaller bases inserted in the neck of the container, said stopper being provided with a flange normally extending outwardly therefrom, at the free base of the outer frustum, in a direction not substantially above a plane perpendicular to the axis of the stopper at the place of juncture of the flange and stopper, the flange being within the extension and the extension being constructed and arranged to maintain the flange deformed upwardly from its normal position, said flange having an inherent renitency tending to return it to its normal position, whereby when the neck is broken opposite the stopper and the extension removed, the inherent renitency of the flange will cause it to return to its normal position and to overlie the broken edge of the neck.

7. 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 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 stopper; the improvement which comprises a stopper having a flexible flange normally extending outwardly therefrom in a direction not substantially above a plane perpendicular to the axis of the stopper at the place of juncture of the flange and stopper, the flange being within the extension and the extension being constructed and arranged to maintain the flange deformed upwardly from its normal position, said flange having an inherent renitency tending to return it to its normal position, whereby when the neck is broken opposite the stopper and the extension removed, the inherent renitency of the flange will cause it to overlie the broken edge of the neck.

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