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N. GREENE

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COMBINATION CLOSURE AND LIQUID DISPENSER FOR BOTTLES, ETC

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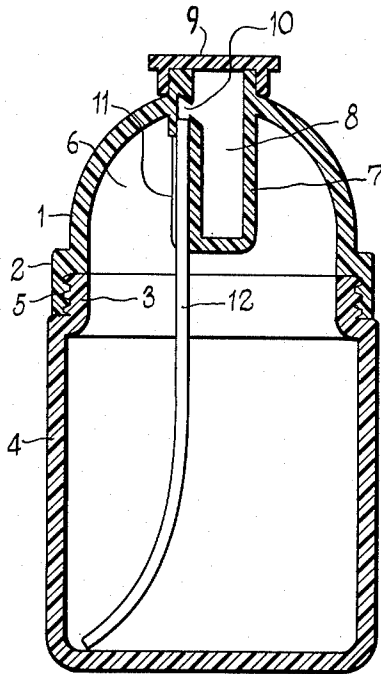


Fig. 1.

Fig. 2.

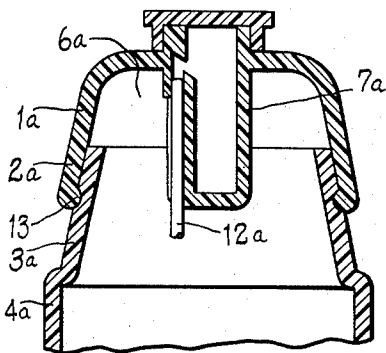


Fig. 3.

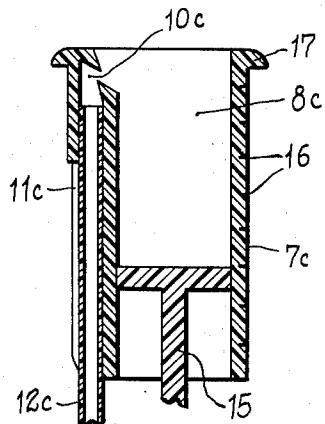
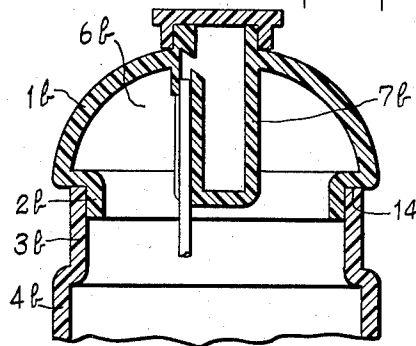


Fig. 4.

INVENTOR.
NORMAN GREENE
BY
Davis Horie & Fairfull
HIS ATTORNEYS

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COMBINATION CLOSURE AND LIQUID DISPENSER FOR BOTTLES, ETC.

Norman Greene, New York, N. Y.

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7 Claims. (Cl. 222—205)

My invention relates to closures for bottles and other liquid containers. It relates more particularly to an improved closure which serves the dual functions of substantially sealing the mouth of the container and dispensing the liquid from the container in desired quantities by way of a reservoir forming part of the closure.

The principal object of the invention is to provide a simple closure whereby a liquid in a container, such as a drug which must be topically applied, can be made easily accessible for dispensing in quantities as needed, without subjecting the main body of the liquid to possible contamination, evaporation, accidental spilling or loss.

A closure made in accordance with the invention comprises a flexible or rubber-like body which is hollow and has at the bottom a neck adapted to make a tight fit around the mouth of the container. The hollow body thus forms a recess communicating with the interior of the container, the recess being contractible by simply squeezing the sides of the body. The latter also forms, separately from the contractible recess, a chamber or reservoir for dispensing a desired quantity of the liquid. Above the bottom of the reservoir is an inlet opening connected to a depending tube of sufficient length to extend into the body of the liquid in the container and to a point at or near the bottom of the container. When the sides of the closure are squeezed to contract the recess, as described, the resulting increase of the air pressure in the container forces some of the liquid upward through the tube and into the reservoir of the closure, from which it may be poured when and as desired. Upon release of the sides of the closure from the squeezing action, air is drawn into the container by way of the tube from the reservoir, so that the closure recess expands to its original shape and size.

For a better understanding of the invention, reference may be had to the accompanying drawing, in which

Fig. 1 is a vertical sectional view of one form of the new closure, showing it applied to a container;

Figs. 2 and 3 are similar views of modified forms of the closure, showing different ways of securing the closure to the container, and

Fig. 4 is a vertical sectional view of a modification of the reservoir, showing it as a separate unit which may be attached to the closure.

The closure comprises a hollow body 1 made of a flexible, rubber-like material. At its lower portion, the body 1 has a neck 2 adapted to make a tight fit around the neck 3 of a container 4 for the liquid to be dispensed. It will be understood that the neck 2 of the closure body may be secured to the container neck 3 in any desired manner so as to effect a tight seal around the container neck. The latter, of course, forms the mouth of the container. As shown in Fig. 1, the closure neck 2 is internally threaded at 5, so that the closure body can be screwed tightly on to an externally threaded portion of the container neck 3.

The hollow closure body 1 defines a recess 6 which communicates with the interior of the container through

the interengaging necks 2 and 3, when the closure is applied to the container. By reason of the rubber-like quality of the closure 1, the recess 6 may be contracted by simply squeezing the flexible sides of the closure body. When the squeezing pressure on the closure body 1 is released, the body tends to return to its original shape, thereby expanding the recess 6 to its original size.

The closure body 1 is provided with walls 7 forming a reservoir 8 for the liquid to be dispensed. As shown in Fig. 1, the reservoir 8 extends centrally into the recess 6 from the top of the closure body 1. The walls of the reservoir may be made of the same material as the closure body 1, or they may be made of a rigid material. They may be molded as integral parts of the closure body or they may be made as a separate unit adapted to be forced into an opening in the top of the closure body and removable from it. The reservoir 8 is open at the top and may be provided with a removable cap 9 for closing the top of the reservoir. The cap 9 may be held in place frictionally or by means of conventional threads (not shown).

The reservoir 8 has an inlet opening 10 located above the bottom of the reservoir. The inlet opening or orifice 10 is inclined downward toward the bottom of the reservoir. A channel 11 formed in the walls 7 connects the opening 10 with a depending tube 12 which is of sufficient length to extend to the region of the bottom of the container 4 when the closure is applied to the container.

The operation of the closure is as follows: When the sides of the flexible body 1 are squeezed to contract the recess 6, there is an increase in the pressure of the entrapped air above the level of the liquid in the container 4. Consequently, some of the liquid is displaced upward through the tube 12, which may be flexible, and into the reservoir 8 by way of the inlet opening 10. Because of the downward slope of this inlet opening, splashing of the liquid through the top of the reservoir is prevented even without the cap 9. The reservoir 8 is thus filled with the liquid to the desired level below the opening 10. When the squeezing pressure on the closure body 1 is released, the tendency of the body to return to its original shape causes air to be drawn downward from the opening 10 through the tube 12, thereby replacing the liquid delivered into the reservoir 8. The liquid in the reservoir may be dispensed in any desired manner, as by tilting the container.

In the modifications of the closure illustrated in Figs. 2 and 3, the parts are indicated by the same reference numerals as those used in Fig. 1, except that the subscripts *a* and *b*, respectively, are added. Referring to Fig. 2, the flexible closure body 1*a* has a neck 2*a* which closely receives a tapered neck 3*a* of the container 4*a*, whereby the closure is held in position on the container by friction. If desired, the closure neck 2*a* may be formed with an internal bead 13 adapted to engage an external annular recess in the neck of the container, so as to hold the closure more firmly in position. Referring to Fig. 3, the closure body 1*b* has a neck 2*b* which fits closely within the container neck 3*b*, the fit being sufficiently tight to hold the closure frictionally in position on the container. A shoulder 14 of the closure body engages the rim of the container neck when the closure has been applied to the container.

In some cases, it may be desired to provide a reservoir having a variable capacity, such a reservoir being illustrated in Fig. 4. As there shown, the bottom of the reservoir is formed by a plunger 15 which may be raised or lowered to decrease or increase, respectively, the reservoir capacity. If desired, one of the side walls of the reservoir may be provided with graduations 16 to indicate the capacity of the reservoir for any setting of the plunger 15. The use of the reservoir illustrated in Fig. 4

is of particular advantage when accurately measured quantities of liquid are desired in the reservoir. It will be observed that the reservoir 8c, as illustrated in Fig. 4, is made separately from the closure body and may be inserted through a central opening in the top of this body, the reservoir unit having at the top an external flange 17 adapted to rest upon the top of the flexible closure body.

The simplicity of its construction and its wide adaptability render my invention available for a large number of uses. Examples of such uses include the dispensing of topically applied drugs, such as iodine and mercurochrome, it being understood that a cotton swab may be dipped into the solution in the reservoir 8, thereby minimizing the possibility of contaminating the main body of liquid in the container. The closure will hold evaporation and spillage losses in the main body of liquid in the container to a minimum. Moreover, when the inlet opening 10 of the reservoir is small, the liquid from the container will not be ejected into the reservoir except when pressure is applied to the closure. By making the orifice or opening 10 sufficiently small, the reservoir 8 may be rinsed without contaminating the liquid in the container. The size of the opening 10 and the diameter of the tube 12 may be varied as required for liquids of different viscosities or for more rapid dispensing of the liquid. The shape and size of the reservoir 8 may be designed or modified as needed.

The closure of my invention may also be used for the dispensing of ink, in which case the reservoir 8 will serve as a receptacle for the pen. Additionally, the closure may be used for dispensing eye-wash lotions, in which case the reservoir 8 may serve as a cup to be applied directly to the eye.

The subject matter of this application is an improvement over the subject matter disclosed in my application Serial No. 154,321, filed April 6, 1950, now Patent No. 2,559,446, dated June 3, 1952.

I claim:

1. In a closure for a container having a mouth, the combination of an expansible and contractible hollow body made of a flexible, rubber-like material, the body having a top and depending side walls defining a recess

which is contractible by squeezing the side walls inwardly, the body having a reservoir depending from the top into said recess and provided with an inlet opening located above the bottom of the reservoir, said side walls terminating at their lower portion in a neck near the bottom of the reservoir, said neck having a mouth-engaging portion adapted to make a sealing fit around said mouth and affording communication between the recess and the interior of the container, the body having walls separating said recess from atmosphere and separating the reservoir from said recess except for said inlet opening above the bottom of the reservoir, and a tube depending from the closure and communicating with said opening to convey liquid to the reservoir from the container upon squeezing said side walls.

2. The combination according to claim 1, comprising also said container, the container having a neck forming said mouth and received tightly in the neck of said body.

3. The combination according to claim 1, comprising also said container, the container having a neck forming said mouth and receiving the neck of said body with a tight fit.

4. The combination according to claim 1, in which the reservoir extends centrally into said recess from the top of the hollow body.

5. The combination according to claim 1, in which the reservoir is open at the top, and comprising also a removable cap covering the top opening of the reservoir.

6. The combination according to claim 1, comprising also a plunger movable in the reservoir to vary its capacity.

7. The combination according to claim 1, comprising also graduations on a side wall of the reservoir.

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