Jan. 29, 1952 J. H. DU BOIS 2,583,821

METERING SPRAY APPLICATOR

Filed Nov. 12, 1948

FIG. 1

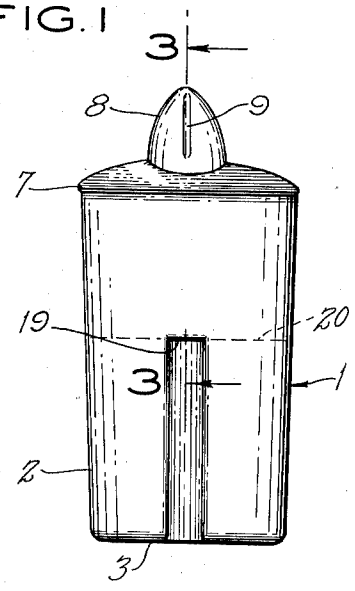


FIG. 2

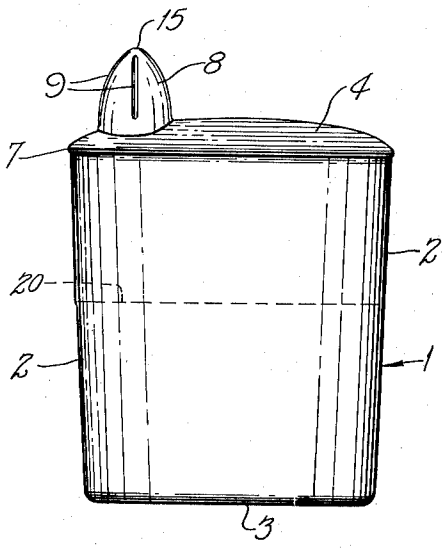


FIG. 3

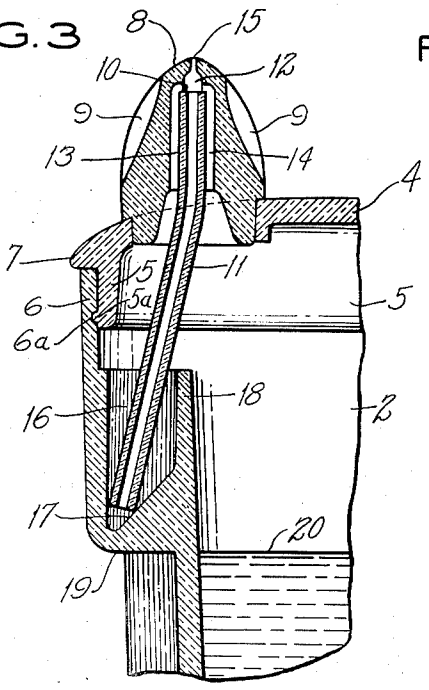
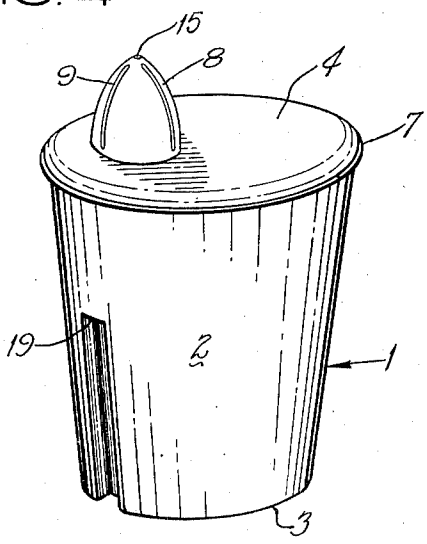


FIG. 4



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METERING SPRAY APPLICATOR

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Application November 12, 1948, Serial No. 59,717

4 Claims. (Cl. 299—90)

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This invention relates to dispensing containers and more particularly, to containers for discharging a measured amount of a liquid as an atomized spray.

The invention is extremely useful in dispensing a liquid medicinal preparation as a spray into the nasal passages. Containers embodying the invention are also suitable for the packaging and dispensing of other liquid products such as antiseptic medication, facial astringents; cologne; hand, face and after-shaving lotions; hair lacquers; deodorants; insecticides; and shoe polish.

An object of the invention is to provide an improved dispensing container of the described character which may be readily manufactured and utilized in a simple manner.

Other objects and the advantages of the invention are described in, or will be apparent from, the following specification and the accompanying drawings to which reference is made and in which:

Fig. 1 is a front elevation of a dispensing container or atomizer embodying the present invention;

Fig. 2 is a side elevation of the atomizer shown in Fig. 1;

Fig. 3 is an enlarged cross-sectional view taken on line 3—3 of Fig. 1 of a portion of the atomizer showing liquid measuring, atomizing and discharge structure embodied in the container; and

Fig. 4 is a perspective view of the atomizer shown in Figs. 1–3, inclusive.

Referring to Figs. 1, 2 and 4, the container, designated generally by the numeral 1, comprises a continuous side wall 2 and integral bottom 3 together with either a permanently attached or removable cover 4. The illustrated container 1 including the cover 4 are molded, although either or both may be otherwise fabricated, of a resilient plastic material, preferably transparent or at least translucent, as, for example, polyethylene. If desired the cover 4 may be formed of rigid material.

In accordance with the invention, the container 1 serves both as a packaging receptacle for a nasal spray or other liquid preparation, and also serves as a squeezable bulb with which to produce the necessary fluid pressure for dispensing the liquid from the container as an atomized spray. Preferably, the cover 4 and bottom 3 of the container are relatively thick and therefore substantially shape-retaining. The illustrated cover or top 4 is convex to increase its own shape retaining and restoring character and also that of the assembled container atomizer. The side

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wall 2 may be of a lesser thickness and is readily collapsed merely by a manual gripping and squeezing pressure and without greatly deforming the cover 4 or bottom wall 3. In addition to their shape retaining property, the cover 4 and bottom 3 provide a self shape restoring property which serves to hasten and assure the return of the partially collapsed container to the shape illustrated in the drawings when squeezing pressure is relieved.

The cover 4 and bottom 3 preferably are of oval outline and the cross-section of the container side wall 2 of similar oval contour to suggest and to facilitate "squeezing" by the user. The side wall 2 may be vertical or, as illustrated in the drawings, provided with a slight inward and downward draft to facilitate removal of the container after its formation in a mold.

As shown in Fig. 3, the cover 4 is provided with a downwardly extending rim 5 which fits snugly within upper lip portion or mouth 6 of the container. The fit of the rim 5 in the mouth 6 may be a friction type or preferably, as shown in Fig. 3, improved and made more secure by a mating rib 5a and groove 6a connection. Preferably the cover 4 is heat sealed or otherwise cemented to the container to assure a liquid-tight seal. However, if access to the interior of the container is to be had by removal of the cover 4, the latter preferably is provided with a protruding peripheral edge 7 which extends slightly beyond the side wall 2 of the closed container to facilitate removal and replacement.

In accordance with the invention, a discharge nozzle 8 is removably secured by a fluid-tight press fit in a suitable opening in the cover 4 at the front and out of concentricity with the container. In the embodiment illustrated, the discharge nozzle 8 is in the form of a dome-shaped nose piece adapted to fit into nasal passageways. The external surface of the nozzle 8 is provided with grooves 9 which permit the escape of air from the nostril so that the dispensing unit may be used to discharge a nasal spray without possible injury to the nasal passage by air pressure.

Extending axially through the discharge nozzle is an irregularly shaped passageway, generally designated 10, in the lower portion of which the upper end of a length of flexible tubing 11 is secured by a press fit. A mixing chamber portion 12 in the upper end of the passageway 10, communicates with the interior of the container through the tubing 11 and through grooves portion 13 and 14 in the sides of the passageway 10.

The grooves 13 and 14 are separated from the bore of the tubing 11 by the tubing wall so that the grooves 13 and 14 and the tubing bore each provides a separate duct communicating with the mixing chamber 12 and the interior of the container. The passageway 10 also includes a restricted portion 15 which is the discharge outlet from the mixing chamber 12. From an inspection of Fig. 3, it will be seen that the cover 4 and its discharge nozzle 8 including the passageway 10 and its mixing chamber portion 12, its grooves 13 and 14, and its discharge orifice portion 15 may be readily molded by a simple molding operation.

When the cover 4 is secured on the container, the lower end of the tube 11 extends into a measuring well or cup 16 formed in the front portion adjacent the top of the wall 2 of the container. The measuring cup 16 may be of any desired size from a fraction to several cubic centimeters. Preferably it is provided with a downwardly and outwardly sloping bottom wall 17 which serves to direct the lower end of the tube 11 towards the lowermost point in the well and to assure draining of the well to the lower end of the tube 11. As shown in Fig. 3, the well 16 is defined partly by the wall 2 of the container and partly by an additional wall 18. A portion of the container underlying the well 16 may be undercut as at 19 to facilitate molding the well 16 in the container proper while utilizing the least amount of excess molding material.

In operation, the container 1 is filled with a liquid nasal spray or similar product to a level 20 which permits the maximum contemplated squeezing and collapse of the container in an upright position without the liquid level rising sufficiently to overflow into the well 16. A liquid level mark may be provided in or on the container wall 2 to designate this maximum height. In the illustrated embodiment, the undercut surface 19 underlying the well 16 constitutes such a mark and makes any additional mark unnecessary.

Where the container, as in the case of the one illustrated, is formed of polyethylene which is translucent, the level to which the container is filled may be readily determined by inspection.

With the container filled with liquid to the level 20, the cover 4 is attached firmly and the lower end of the tube 11 directed by the sloping wall 17 to the bottom of the well 16 whereupon the container is ready for use as an atomizer.

When it is desired to discharge a measured amount of the liquid as a spray, the upright container 1 is tilted until the front portion including the well 16 is completely submerged and filled. Thereafter the container is righted and a measured amount of liquid captured in the brimful well 16. In the case of small diameter wells (three-eights of an inch or less) surface tension normally is sufficient to keep the well filled even though the container thereafter is tilted from the upright position. In fact, in the case of aqueous liquids, the container may be inverted and, in the absence of jarring or shaking, the well will remain filled.

When a lesser charge of liquid is required, a portion may be poured from the well, jarring of the container ordinarily being sufficient to overcome the surface tension or capillary action of small diameter wells. The level of the liquid in the well 16 may be readily observed through the translucent wall 2 and the amount of liquid in the well estimated or determined by reference to

suitable graduations (not shown), on the container wall 2.

Having charged the well 16 with a full or predetermined lesser charge of liquid, the discharge nozzle 8 is inserted in a nostril and squeezing pressure manually exerted on the container wall 2 to dispense the charge as an atomized spray into the nasal passage. It will be understood that squeezing the container increases the internal air pressure forcing the liquid in the well 16 up through the tube 11 into the mixing chamber 12. There the measured charge of liquid is entrained by air escaping from the squeezed container through the ducts 13 and 14 and is discharged as an atomized spray through the discharge orifice 15 into the nasal passage or similar area to be treated. When the liquid charge has been dispensed from the well 16, the squeezing pressure is relieved. Thereupon, the container returns to its self-restoring and self-maintaining shape and, in so returning, draws air through the orifice 15 and ducts 13 and 14 into the container preparatory to a recharging of the well 16 and a repetition of the atomizing operation.

If it is desired, the liquid content may be discharged from the container in regulable amounts as a liquid stream merely by inverting the bottle so that liquid fills the chamber 12, and, thereafter, apply pressure to the container wall 2. Depending upon the amount of pressure exerted, the liquid is discharged from the nozzle either in drops or as a controlled stream.

The size of the nozzle aperture 15 is a principal factor in determining the fineness of the spray or size of the drops discharged, more restrictive apertures providing finer or more highly atomized spray and smaller drops.

It will be seen that the invention provides a container which, itself, serves as a dispenser of its contents either in a predetermined measured charge or dose as an atomized spray or as a stream in regulable quantity. Furthermore, the embodiment illustrated is always in readiness for its several functions without a need for separate applicators.

Dispensing containers embodying the invention, in addition to their simplicity of construction, requires no parts of metal or other corrodable materials, and, in fact, may be manufactured from virtually unbreakable plastic materials by simple molding and extrusion operations.

Either the cover 4 or nozzle 8, or both, may be removable so that the user may refill or add liquid as desired. The seller may put a powder or drug in the container at assembly. This will have good shelf life and the user may make the solution when ready to use the device by adding liquid to the proper level and dissolving the powder.

Dispenser-containers embodying the invention are attractive to manufacturers and merchandizers of pharmaceuticals, perfumes, and other products which preferably should be atomized and applied in measured quantities or doses.

While only a single embodiment of the invention has been illustrated and described, the scope of the invention as defined by the appended claims, includes modifications thereof as well as other embodiments which will be apparent to those skilled in the art and which come within the scope of the claims.

I claim:

1. A dispensing container including a flexible receptacle having a flexible side wall and a wide-mouth lip, a top cover secured to the lip of said

receptacle, a discharge nozzle projecting upwardly from the cover, said nozzle having an axially extending passageway with a discharge orifice portion at its upper end and a mixing chamber portion below said orifice, a tube having one end secured in the lower portion of the passageway with the bore of the tube in communication with the mixing chamber, a grooved portion in said passageway forming with the outer wall of the tube a duct connecting the mixing chamber with the interior of the flexible receptacle, a measuring well within the receptacle, said well being open at the top and having a bottom wall located upwardly from the bottom of the receptacle, said well having a mouth entirely uncovered with respect to said flexible side wall and wide-mouth lip of the receptacle, the lower end of the tube being directed to and supported at the bottom of the well.

2. A dispensing container including a flexible receptacle having a flexible side wall and a wide-mouth lip, a top cover secured to the lip of said receptacle, a discharge nozzle projecting upwardly from the cover, said nozzle having an axially extending passageway with a discharge orifice portion at its upper end and a mixing chamber portion below said orifice, a tube having one end secured in the lower portion of the passageway with the bore of the tube in communication with the mixing chamber, a grooved portion in said passageway forming with the outer wall of the tube a duct connecting the mixing chamber with the interior of the flexible receptacle, a measuring well within the receptacle, said well being open at the top and having a bottom wall which slopes outwardly and downwardly to a low point laterally offset out of alignment with the portion of the passageway securing said tube, said bottom wall of the well being located upwardly from the bottom of the receptacle, said well having a mouth entirely uncovered with respect to said flexible side wall and wide-mouth lip of the receptacle, the lower end of the tube being directed to and supported by the bottom wall of the well adjacent the low point of the well and out of alignment with the top end of said tube when the cover portion is secured to the receptacle.

3. A dispensing container including a flexible receptacle having a flexible side wall and a wide-mouth lip, a top cover secured to the lip of said receptacle, a discharge nozzle projecting upwardly from the cover, said nozzle having an axially extending passageway with a discharge orifice portion at its upper end and a mixing chamber portion below said orifice, a tube having one end secured in the lower portion of the passageway with the bore of the tube in communication with the mixing chamber, a grooved portion of said passageway forming with the outer wall of the tube a duct connecting the mixing chamber with the interior of the flexible receptacle, a measuring well within the receptacle, said well being open at the top and having a bottom wall located upwardly from the bottom of the receptacle, and having an undercut bottom surface which forms the top of an open-bottom recess having a side wall extending inwardly of the flexible side wall of said receptacle, the side wall of said recess extending generally in the same direction as said side wall of the receptacle, said well having a mouth entirely uncovered with respect to said flexible side wall and wide-mouth lip of the receptacle, the lower end of the tube being directed to and supported at the bottom of the well.

4. A dispensing container including a flexible receptacle having a flexible side wall and a wide-mouth lip, a top cover secured to the lip of said receptacle, a discharge nozzle projecting upwardly from the cover, said nozzle having an axially extending passageway with a discharge orifice portion at its upper end and a mixing chamber portion below said orifice, a tube having one end secured in the lower portion of the passageway with the bore of the tube in communication with the mixing chamber, a grooved portion in said passageway forming with the outer wall of the tube a duct connecting the mixing chamber with the interior of the flexible receptacle, a measuring well within and integral with the flexible side of the receptacle, said well being open at the top and having a bottom wall which slopes outwardly and downwardly to a low point laterally offset out of alignment with the portion of the passageway securing said tube, said bottom wall of the well being located upwardly from the bottom of the receptacle and having an undercut bottom surface which forms the top of an open-bottom recess having a side wall extending inwardly of the flexible side wall of said receptacle, the side wall of said recess extending generally in the same direction as said side wall of the receptacle, said well having a mouth entirely uncovered with respect to said flexible side wall and wide-mouth lip of the receptacle, the lower end of the tube being directed to and supported by the bottom wall of the well adjacent the low point of the well and out of alignment with the top end of said tube when the cover portion is secured to the receptacle.

JOHN H. DU BOIS.

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