June 26, 1956 W. W. WELSH 2,752,069

LIQUID DISPENSER

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Fig. 1.

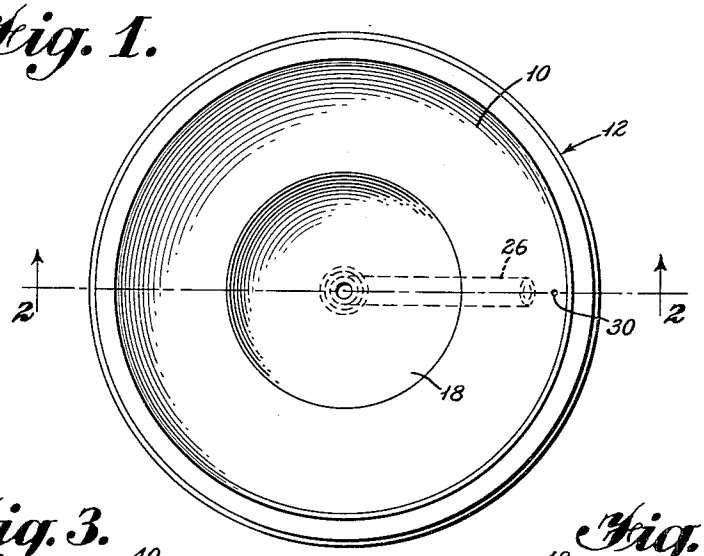


Fig. 3.

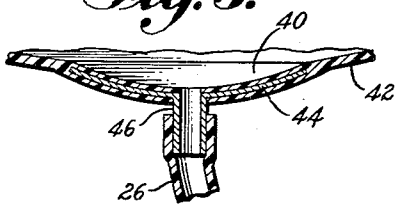


Fig. 4.

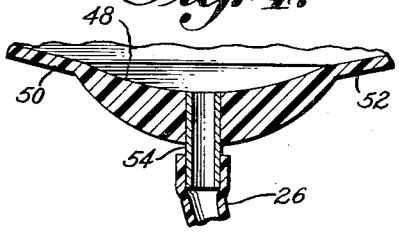


Fig. 2.

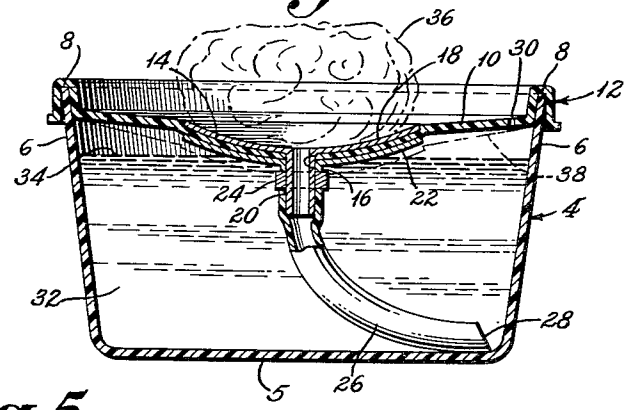
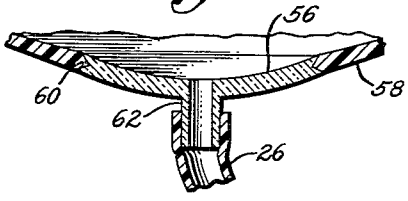


Fig. 5.



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LIQUID DISPENSER

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10 Claims. (Cl. 222—207)

This invention relates to apparatus for dispensing liquids, and particularly to apparatus for dispensing indeterminate but small quantities of liquid for immediate use. The device is particularly adapted to the dispensing of liquids under circumstances where the user is restricted to or desires to use only one hand to effect soaking of a dab of absorbent material with the liquid.

The apparatus of the present invention comprises generally a closed container which may be provided with a removable or permanent top and which container has at least a portion thereof flexible so that downward pressure on the top will tend to reduce the internal volume of the container. At least a portion of the top of the container is of dished configuration and is provided with an opening in the bottom thereof communicating with a conduit inside the container and so arranged that downward pressure on the top will force liquid contained in the container upwardly through the conduit and onto the dished portion referred to. Thus, it is only necessary for the operator to place a ball or wad of absorbent material, such as a wad of absorbent cotton, in the dished portion referred to and to press downwardly thereon. Such downward pressure causes material to be forced upwardly into the dished portion, where it is readily absorbed by the absorbent material which then may be removed for use by the same hand that applies the pressure. Upon removal of the soaked absorbent material, any liquid remaining in the dished portion of the container top drains readily back into the container where it is protected against contamination and where undue evaporation is prevented.

The present invention is particularly useful in hospitals, doctors' offices, or the like, where frequent and repeated use of a small quantity of alcohol or other surface medicament is necessary. The invention makes it unnecessary for the doctor or nurse to go frequently through the inconvenience of removing a bottle top and manipulating the bottle to the necessary extent to soak a small absorbent pad, then replacing the bottle top to protect the contents, which was the method usually employed heretofore. The invention may obviously be employed in many other places also, for instance, it may be used to dispense liquid cosmetics and/or tonsorial preparations in beauty parlors, barber shops, or the home. As another example, the invention may be employed to dispense cleaning fluids for use in hand "spotting" clothing in laundries or dry cleaning establishments, to dispense baby oil in nurseries, or to dispense water to an absorbent pad for moistening stamps, gummed paper, or the like.

It is, therefore, an object of this invention to provide a dispenser for liquids which will accomplish dispensing of the required amount of liquid in response to simple downward pressure thereon.

Another object of this invention is to provide a dispenser as set forth above wherein excess liquid drains back into the container for future use without substantial evaporation or contamination.

A further object of this invention is to provide a dispenser accomplishing the objects hereinbefore set forth and wherein said dispenser is provided with a vent whereby to reduce the quantity of liquid that would normally be dispensed to the small quantity desired.

A further object of this invention is to provide a dispenser for liquids accomplishing any or all of the above noted objects and which is further of simple but durable construction, yet inexpensive to manufacture.

Further and additional objects and advantages will become apparent to those skilled in the art as the description proceeds in connection with the accompanying drawings, wherein:

Fig. 1 is a top plan view of a preferred embodiment of the invention;

Fig. 2 is a vertical sectional view of the invention taken substantially along the line 2—2 of Fig. 1; and

Figs. 3, 4 and 5 are fragmentary sectional views of different embodiments of the invention.

The dispenser of the present invention consists of a container 4 which may be of any suitable material, such as a flexible molded thermoplastic resin, but preferably a material inert to the particular liquid to be dispensed. The container 4 may be of any desired configuration but is preferably provided with a bottom 5 and upstanding side walls 6 terminating in upper terminal edges 8. The container 4 must be impervious to the particular liquid to be dispensed and is preferably also impervious to air.

A removable cover 10 may be provided with an annular rim portion designated generally at 12, of inverted U-shape, and constituting an integral portion of the top wall 10. The annular rim portion 12 is of such dimensions that it snugly frictionally receives the terminal edges 8 of the side walls 6 in airtight relation to thus define a completely closed airtight container. Other suitable forms of cover may be provided to engage the container body in other manners, if desired.

It is within the scope of this invention to provide a completely and permanently sealed container in which the top wall is integrally or otherwise permanently joined to the side walls.

The cover 10, constituting the top wall of the container, is preferably of a flexibly resilient material, such as one of the many presently available resins, and is sufficiently resilient so that it will return to its original configuration after being deflected downwardly in the manner to be described. In this respect to the material of the top wall may be described as somewhat rubbery or rubberlike. The side wall 6 and the remainder of the container may be of rigid material, if desired, or may be made of the same resin or the like material constituting the cover 10. As shown, the central portion of the top wall 10 is dished downwardly to provide a concave area 14 in the container top. The top wall itself is provided with an opening 16 at about the lowest point of the dished portion 14. A disk 18 of rigid material, preferably a noncorrosive or stainless metal, is dished to conform to the upper surface of the dished portion 14 and is provided with a downwardly extending short rigid tube 20 fixed thereto as by welding, brazing, soldering, or the like. If desired, the tube 20 may be formed integrally with the disk 18. The interior of the short rigid tube 20 provides a passageway through the disk 18 as shown. The disk 18 and tube 20 are assembled to the top 10 with the tube 20 extending through the opening 16 and the disk 18 is preferably pressed into or clamped to the top wall 10 to such an extent that the upper surface of the disk is substantially flush with the adjacent upper surface of the top wall 10. A second annular disk 22 of rigid material, which may also be of a stainless metal, surrounds the short tube 20 and abuts the

under surface of the dished portion 14 of the container top. A tight fitting ring 24 is pressed onto the short tube 20 and against the second disk 22 to hold the disks 18 and 22 in firm pressure engagement with the upper and lower faces, respectively, of the top wall 10.

A length of flexible tubing 26 telescopically engages the lower portion of the short rigid tube 20 and extends downwardly and preferably laterally to the bottom of the container 4. Preferably the tubing 26 extends outwardly adjacent the side wall of the container and may be bevelled, as at 28, to prevent obstruction of the open lower end by a side wall of the container.

The top wall 10 is also provided with a relatively small vent opening 30 therethrough. The vent opening is preferably laterally displaced from the dished portion 14 and is of a diameter substantially less than the inside diameter of the short tube 20.

The container hereinbefore described may be charged with a desired liquid 32 to a suitable level indicated by the numeral 34. Hence, when it is desired to use some of the liquid 32, the user may place a wad or ball of absorbent material, such as a ball of absorbent cotton, indicated at 36 by dotted line, on the central dished portion of the apparatus, and by exerting a slight downward pressure on the absorbent material itself the upper wall 10 may be deflected downwardly to a position generally indicated by dotted line 38. Upon such downward deflection of the upper wall 10 the normal inner volume of the container is decreased and the liquid and any air therein are thus placed under pressure. The pressure forces some air out through vent hole 30 and also forces liquid upwardly through the tubing 26 onto the upper dished disk 18, where it is immediately absorbed by the material 36 which may then be removed for use. The vent opening 30 is provided to relieve some of the pressure in the container when the top 10 is pressed downwardly to thus prevent the discharge of too great a quantity of liquid onto the disk 18. In usual practice a relatively small quantity of liquid is sufficient for a single use and it has been found that too great a quantity will usually be discharged unless such a vent opening as that shown at 30 is provided. If the container had no vent opening 30, too great a quantity of liquid would be delivered onto the dished disk 18, the excess liquid would then remain thereon after the material 36 is removed and pressure relieved from the top wall 10. The top wall 10 would then assume its normal position, shown in solid line, and in so doing would create a partial vacuum within the container which would draw the excess liquid through tubing 26 and also enough air to replace the used liquid. The vent hole 30 permits air to enter the container to replace the dispensed and used liquid and permit the top wall 10 to reassume its normal position without the necessity of drawing air through the flexible tubing 26. Thus the level of the liquid inside the tubing 26 and short tube 20 is at all times the same as the liquid level in the container and subsequent charges may be dispensed from the container as readily as desired, without having to wait for the top wall 10 to slowly return to its normal position, which would be the case if the vent opening 30 were not provided. Clearly, the vent opening 30 may be positioned in the side walls 6 of the container at a position above the normal liquid level 34, if desired.

The vent opening 30 also functions to relieve vapor pressure which would accumulate in the container upon evaporation of the liquid during periods of non-use.

As previously stated, the upper surface of the dished disk 18 is flush with the upper surface of the top wall 10, thus no exposed grooves or shoulders exist around the periphery of disk 18 to prevent complete drainage of excess liquid back into the container after each use.

While it is not absolutely necessary that the dished portion of the top wall be rigid, yet it is desirable to have it so.

In the modification of Fig. 3, the central dished portion 40 of the flexible top wall or cover 42 is made substantially rigid by embedding therein, during the molding process, a member 44 in the form of a substantially rigid disk, which may be of metal, molded thermosetting resin, or the like. Preferably, the stiffening member 44 has a short rigid tubular member 46 formed integrally therewith to telescopically receive the flexible tube 26.

In the modification of Fig. 4 the central dished portion 48 constitutes an integral portion of the flexible top wall 50 but is molded in sufficient thickness to be substantially rigid even though the material thereof, when of thin section as shown at 52, is quite flexible. A short rigid tubular member 54 may be pressed into or molded in place centrally of the dished portion 48, as shown, to telescopically receive the flexible tube 26.

In the embodiment shown in Fig. 5 the central dished portion 56 of the dispenser is formed entirely of a substantially rigid material which may be a molded thermosetting resin, such as Bakelite, or which may be of any other suitable rigid material. The flexible top wall 58 is provided with a central opening of a shape complementary to the peripheral outline of the dished portion 56 and the periphery of that opening may engage in an undercut or groove 60 in the peripheral edge of the dished portion 56. The dished portion 56 is thus interlocked with the top wall 58 and is inset relative thereto so that the upper surfaces of the members are substantially flush. The dished portion 56 may be inserted in the central opening of the top wall and bonded thereto after the top wall is formed or the top wall may be molded directly about the inset dished portion and bonded thereto. The short rigid tubular portion 62 may be integrally formed with the dished portion 56 to telescopically receive the flexible tube 26. Clearly, such a rigid inset as shown in Fig. 5 may be secured to the top wall 58 by other interlocking engagements than that shown, many of which will be obvious to those skilled in the art.

While the description herein is directed to a limited number of embodiments of dispenser having a flexible and resilient top wall, it is to be understood that the required resilience may be provided by making any or all portions of the container of material having suitable resilient characteristics and that other embodiments are contemplated within the scope of the appended claims.

I claim:

1. In a dispenser for liquids, a container for the liquid, a resiliently flexible top wall on said container mounted thereon in airtight relation thereto, said top wall being provided with a shallow and smoothly concave dished portion, an opening through said dished portion adjacent the bottom thereof, a flexible tubular conduit in said container fixed to said top wall to normally extend from said opening to the bottom of said container, and a relatively small vent opening through said top wall laterally displaced from said first-named opening.

2. A dispenser as defined in claim 1 wherein said downwardly dished portion is substantially rigid and located centrally of said flexible top wall as a smooth continuation thereof.

3. In a dispenser for liquid, walls defining a closed container for said liquid, said walls including a top wall and side walls, at least a portion of said container being resiliently flexible so that external pressure on the top thereof decreases the normal internal volume of said container, said top wall being provided with a shallow and smoothly concave dished portion with an opening through the bottom thereof, a flexible tubular conduit arranged in said container to extend from said opening to the bottom of said container to deliver liquid from said container outwardly through said opening, and a vent opening through one of said walls at the upper portion of said container, said vent opening being substantially smaller than said first-named opening.

4. A dispenser as defined in claim 3 wherein said top

wall is of resilient material and is provided with a first downwardly dished substantially rigid disk having a central opening therethrough and overlying said dished portion of said top wall to define the upper surface thereof, a short rigid tube fixed to said disk in communication with said central opening and extending through said opening in said top wall, said tubular conduit being connected to said short rigid tube.

5. A dispenser as defined in claim 4, wherein the upper surface of said disk is substantially flush with the upper surface of said top wall.

6. A dispenser as defined in claim 3, wherein said top wall is removable from said container and is provided with means to snugly and frictionally engage said side walls in airtight relation thereto.

7. A dispenser as defined in claim 3, wherein said top wall is of resiliently flexible material and wherein said downwardly dished portion comprises a substantially rigid member embedded in said resiliently flexible material.

8. A dispenser as defined in claim 3, wherein said top wall is of resiliently flexible material and wherein said downwardly dished portion comprises an integral portion of said top wall substantially flush therewith at its edge and sufficiently thick to be substantially rigid.

9. A dispenser as defined in claim 3, wherein said top wall is of resiliently flexible material and wherein said downwardly dished portion comprises a substantially rigid

solid member, said top wall having a central opening complementary to the peripheral outline of said member, said member being inset in said central opening and permanently joined to said top wall at the periphery of said central opening and substantially flush therewith.

10. A dispenser as defined in claim 3, wherein said top wall is of resilient material and is provided with a first downwardly dished substantially rigid disk having a central opening therethrough and overlying said dished portion of said top wall to define the upper surface thereof, a short rigid tube fixed to said disk in communication with said central opening and extending through said opening in said top wall, a second rigid annular disk underlying said dished portion of said top wall around said short rigid tube, clamping means engaging said short rigid tube and the underside of said second disk to clamp said first and second disks tightly against the upper and lower surfaces, respectively, of said top wall, said tubular conduit being a length of flexible tubing telescopically engaging said short rigid tube.

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