

March 17, 1959

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2,877,810

DISPENSING LIQUID CONTAINERS

Filed April 16, 1956

3 Sheets-Sheet 1

FIG. 1.

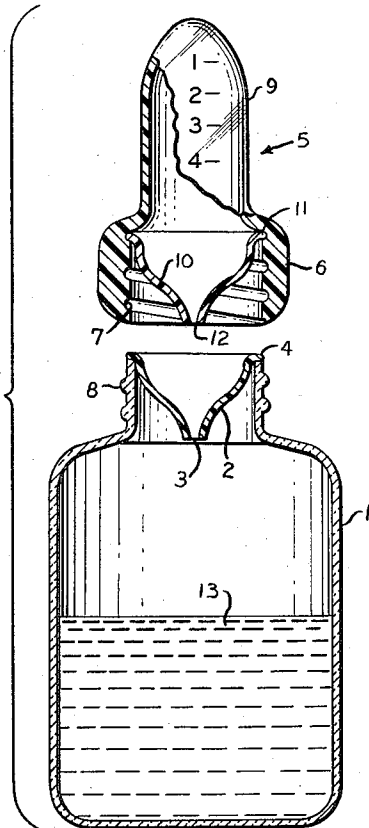


FIG. 2.

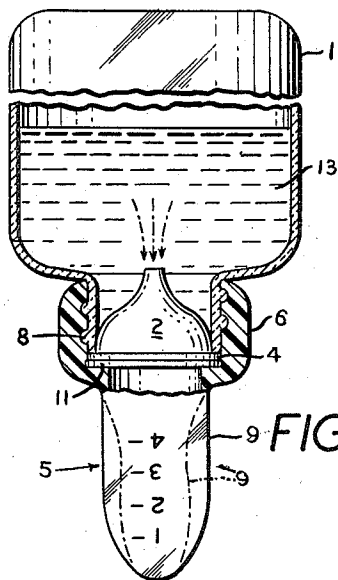
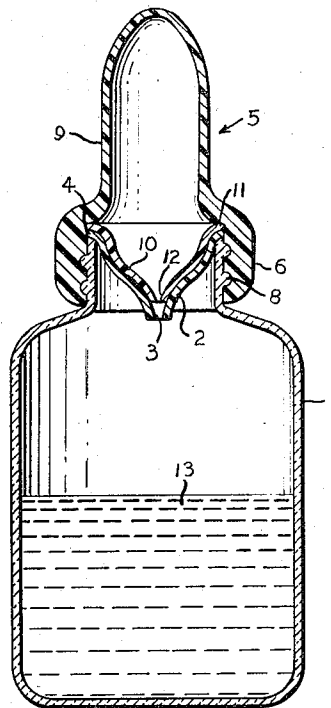


FIG. 3.

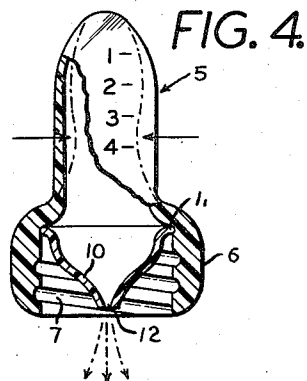


FIG. 4.

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FIG. 5.

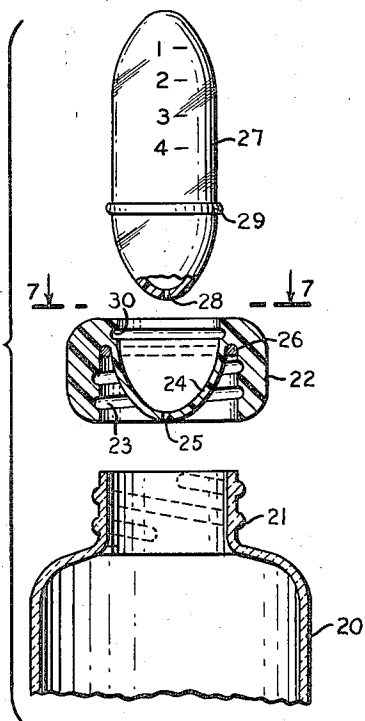


FIG. 6.

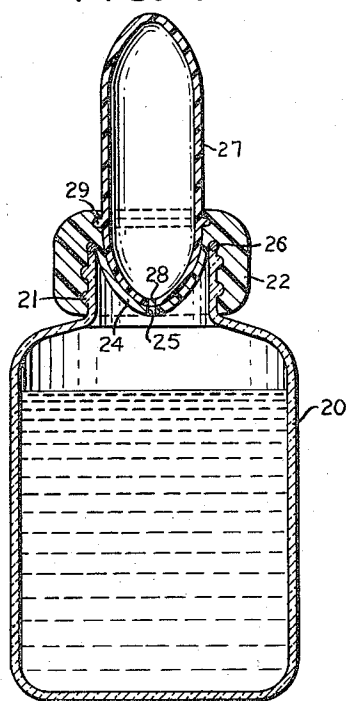


FIG. 8.

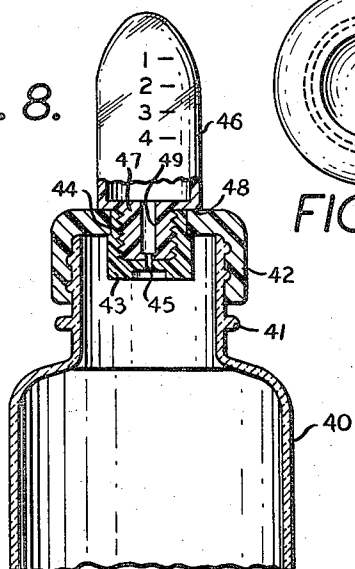


FIG. 7.

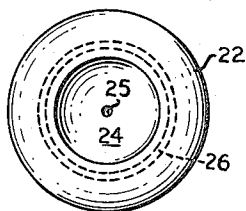
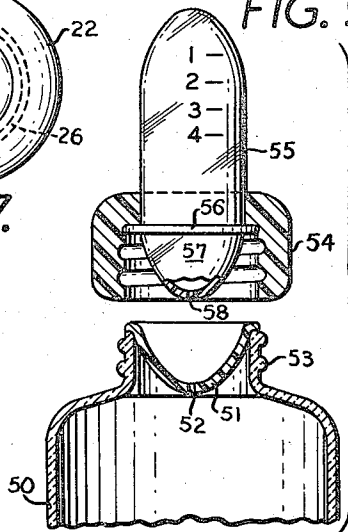


FIG. 9.



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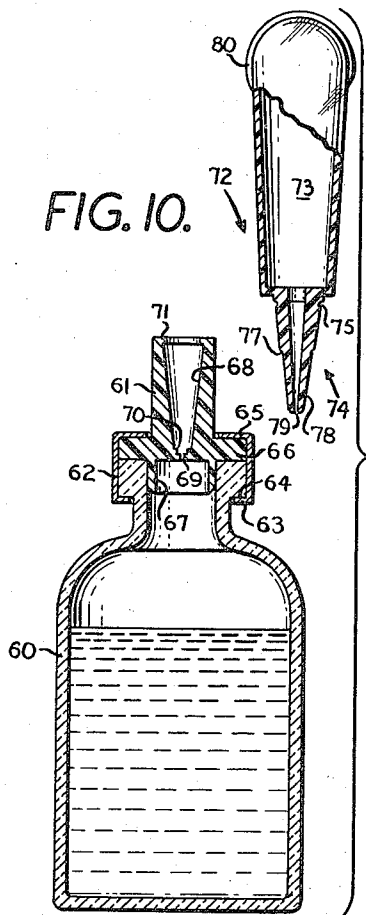


FIG. 13.

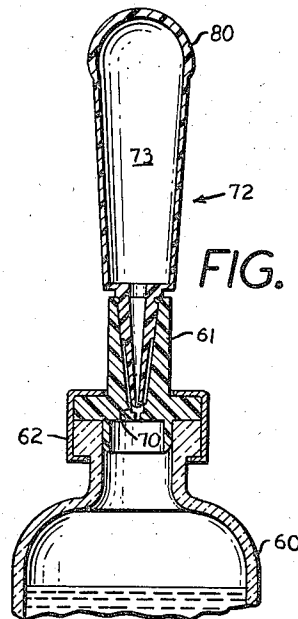
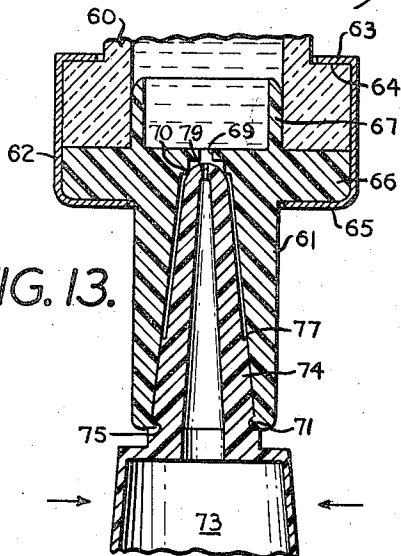


FIG. 11.

FIG. 12.

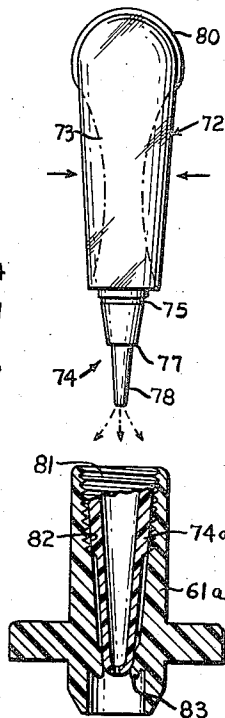


FIG. 15.

FIG. 14.

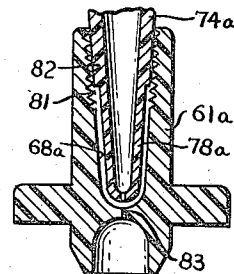
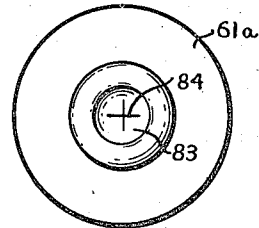


FIG. 16.



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DISPENSING LIQUID CONTAINERS

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Application April 16, 1956, Serial No. 578,423

11 Claims. (Cl. 141—24)

This invention relates to improvements in dispensing liquid containers.

More particularly, the invention is concerned with the bottling and dispensing of medicinal and other preparations of a type administered or measured out by means of a dropper or a teaspoon.

Objects of the invention include the prevention of loss of contents due to spilling, prevention of the drinking of overdoses, particularly by small children, and the provision of quick, accurate means for measurement of dosage.

These objects are achieved in a reliable and simple manner in the container of the invention by a suitable combination of dropper and bottle closure, in which the dropper abuts against or engages in an opening in the bottle top, instead of dipping into the bottle as usual, and the opening in the bottle top may be reduced in size so as to minimize leakage and prevent sucking out of any major part of the contents.

Dispensing containers embodying the invention in preferred forms will now first be described with reference to the accompanying drawing, and the features forming the invention will then be pointed out in the appended claims.

In the drawing:

Fig. 1 is a central vertical section of a bottle and cap embodying the invention in a preferred form;

Fig. 2 is a similar view, showing the parts of Fig. 1 in assembled relation;

Fig. 3 is a view similar to Fig. 2, but showing the bottle inverted for removing liquid therefrom;

Fig. 4 is a similar view showing the cap removed for dispensing the liquid;

Figs. 5 and 6 are views similar to Figs. 1 and 2, respectively, but showing a modification;

Fig. 7 is a plan view of the bottle cap element of Fig. 5;

Fig. 8 is a view similar to Fig. 2, showing another modification;

Fig. 9 is a view similar to Fig. 1, showing another modification;

Figs. 10 and 11 are views respectively similar to Figs. 1 and 2, showing still another modification;

Fig. 12 is a side elevation showing the dropper element of Fig. 10 removed from the bottle and dispensing the liquid;

Fig. 13 is an enlarged section of part of the assembly of Fig. 11, in inverted position;

Fig. 14 is an axial section showing a modification in parts of Fig. 11;

Fig. 15 is a view similar to Fig. 14, showing the parts in a different position; and

Fig. 16 is a bottom elevation of the parts shown in Fig. 14.

Referring first to Figs. 1 to 4 of the drawing, the container comprises a bottle 1, typically of glass and preferably of rigid material for reasons which will appear, having a neck closure 2 in the form of a funnel or cup and

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having a central discharge opening 3. The size of this opening is determined by the character of the liquid and intended use, but for a typical application may be about $\frac{1}{32}$ " in diameter, an opening of capillary dimensions being preferred to prevent spillage if the bottle is knocked over or inverted. Adjacent its upper edge 4 the fitting 2 is secured and sealed to the bottle neck in any convenient manner, as by a pressure fit with or without adhesive.

The dropper cap 5 has a lower screw cap portion 6 internally threaded at 7 to fit the external thread 8 of the bottle cap. An upper dropper-bulb portion 9 may be formed integral with the lower part 6, as shown, and may have graduations for measuring dosage, as indicated. The dropper closure is completed by a funnel or cup-shaped cap fitting 10 secured and sealed to the cap by its upper rim 11. The fastening and sealing at this point may be merely a pressure fit, or suitable adhesive may be employed. The fitting 10 conforms generally to the shape of fitting 2 and has an opening 12 adapted to register with the opening 3 when the cap is screwed on, as shown in Fig. 2. The parts are dimensioned and shaped so that the material surrounding and immediately adjacent opening 12 makes a pressure seal to the material similarly surrounding opening 3.

With the cap 5 in position as shown in Fig. 2, the dropper is filled by inverting the bottle so as to submerge opening 3 in the liquid contents 13. Squeezing and releasing the bulb 9 one or more times, as indicated in phantom and full lines, will partially or wholly discharge the air from bulb 9 into the bottle 1 and partially or wholly fill the bulb with liquid from the bottle. The dropper may readily be filled to desired level as indicated by the graduations.

The dropper cap is preferably transparent or translucent and may be made of polyethylene or any other convenient material. Fittings 2 and 10 may be of similar material, or one may be made of metal or other rigid material.

As will be apparent, even if the dropper is removed so that opening 3 is open to the atmosphere, evaporation will be extremely slight due to the lack of opportunity for air circulation into and out of the bottle. If the bottle should be tilted, little or no leakage will occur through an opening 3 of capillary size, while an opening of such dimensions is entirely adequate for permitting removal of a measured dose by means of the dropper. Accidentally drinking a large part of the contents by a small child or other person is very much impeded if not prevented, as the liquid can be sucked out only intermittently, in small quantities and with considerable effort. It will also be apparent that the filling of the bulb in the position of Fig. 3 where full visibility may be had, makes the withdrawal of an accurately measured dose extremely simple.

In the form of container shown in Figs. 5 to 7, the screw cap, bottle and bulb are formed as separable elements. The bottle 20 is screw threaded at 21 and takes the cap 22 which is internally threaded at 23. The cap incorporates a cup-shaped closure member 24, which may be molded integral with the cap 22, as shown, and in which is the capillary discharge orifice 25. A rubber ring or other gasket 26 compressed between cap and bottle (Fig. 6) may be provided for sealing the cap and bottle together or an adhesive may be used permanently to seal the cap to the bottle. The dropper takes the form of a bulb 27 having an opening 28 and may be formed as a single integral envelope or bulb, as shown. The lower end of the bulb 27 conforms generally to the cup-shaped closure element 24 and includes a circumferential rib or bead 29 fitting a groove 30 in the cap 22. The bulb 27 being made of polyethylene or like resilient material may

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be pressed into the concavity of the element 24, the bead 29 yielding inwardly and snapping out into groove 30. With the bead 29 in the groove 30, the end of the bulb 27 surrounding the opening 28 will be held against the element 24 immediately adjacent the orifice 25 with sufficient pressure to form a seal. The filling and use of bulb 27 is the same as in the case of the dropper-cap of Figs. 1-4, but bulb 27 may conveniently be used for purposes, such as administering nose drops, for which the dropper-cap would be relatively clumsy.

In the form shown in Fig. 8, the dropper bulb is again separable from the cap, but, in this case, the parts are all screwed together for more secure attachment and more powerful sealing pressure between bulb and bottle neck fitting. The bottle 40 has a screw threaded neck 41 and takes an internally threaded cap 42, provided with a center part 43 having an internally threaded socket or cylindrical recess 44 at the bottom of which is a discharge orifice 45 (preferably of capillary size, as before). The dropper bulb 46 has a base 47 formed as a threaded plug fitting the socket 44 and surrounded by a shoulder 48. Passage 49 through the plug 47 communicates with passage 45, above mentioned. Bulb 46 and its plug 47 may be formed integrally of polyethylene or like material, or the bulb 46 and plug 47 may be of different materials and joined together in any suitable way. In this case, the screw threaded part may be of material such as plastic or metal. The bulb 46 is filled and used in the same manner as described above, apart from being attached and removed by a turning movement. The screw threads of the bottle and cap may be of the same hand as those of the plug and socket, or of opposite hands.

In the modification of Fig. 9, a bottle 50 and neck fitting 51 secured and sealed together as in the embodiment of Figs. 1 to 4, are used with a bulb 55 generally like that of Figs. 5-7. However, the parts are arranged to hold the bulb to the bottle in such a way as to provide a secondary seal as additional protection against leakage and to obtain an appropriate orifice coupling pressure. In this modification, the bottle 50 is provided with a screw thread 53, as before, and the neck fitting 51 has a preferably capillary orifice 52. The internally threaded screw cap 54 receives the bulb 55 in a central aperture, the bulb being inserted, however, from below and the bead 56 serving as a shoulder to stop upward movement of the bulb 55 and hold it in the cap 54. The lower part 57 of the bulb conforms generally to the fitting 51 and has an orifice or opening 58 communicating with orifice 52 when the parts are screwed together. Bead 56 may function also as a gasket between cap 54 and the lip of bottle 50 and furnishes a secondary seal which is of utility in shipment and when traveling. The geometry and dimensions of the parts are such that when the cap 54 is screwed home and the bead 56 is in contact with the lip of fitting 51 which engages the top of the bottle, the capillary orifices 52 and 58 are in registry and in sufficiently close engagement as to permit suction in the tube 55 to withdraw fluid from the bottle.

In Figs. 10 to 13, there is shown a modification, in which provision for more complete use of contents is made and in which the dropper takes the form of a dispensing tube of generally familiar type and usable for a variety of purposes. The bottle 60 is of the widely used serum bottle type and the neck closure fitting 61 is fastened and sealed to the bottle by a spun metal ring or collar 62 having a lower flange 63 under the shoulder 64 on the bottle neck and an upper flange 65 on the peripheral flange 66 of fitting 61. Flange 66 may be thereby compressed against the bottle so as to form a seal of any desired tightness. A collar or cylindrical flange 67 extends member 61 into the neck of the bottle and may have a tight sealing fit therein, either supplementing or replacing the seal by the compression of flange 66. Member 61 is extended vertically, having a

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generally conical recess or socket 68 terminating in a capillary discharge orifice 69. Above orifice 69 is an enlarged bore having an edge 70 for engaging the tip 78 as shown and the upper edge of recess 68 is constructed to form a shoulder 71. The dropper element 72 comprises a bulb 73 and tip 74 generally conforming to the conical recess 68. A groove 75 is provided to take the shoulder 71. The tip from this point through about a third of its length and to a stop or shoulder 77 fits the recess 68 snugly, but the remainder 78 of the tip is reduced to leave a clearance, as indicated in Fig. 13. In consequence, the end of the tip 74 surrounding the opening 79 thereof engages edge 70 firmly, forming a good and reliable seal at this point, and with a pressure determined by the distance from groove 75 to the end of the tip 74 as compared with the distance from shoulder 71 to edge 70. The bulb may be molded in one piece and closed off at the end by heat sealing as at 80, polyethylene being again a very convenient material. Neck fitting 61 may conveniently be molded of rubber, synthetic rubber, silicone rubber or polyethylene.

The bulb is filled in the inverted position or position of Fig. 13 in the same manner as indicated with reference to the modifications of Figs. 1-9, inclusive. It will be observed, in this case, however, that the entire contents of the bottle may be removed, due to the absence of any element projecting down centrally of the bottle and leaving a space around it in which liquid may collect in inverted position.

Figs. 14 to 16 show a still further modification. The dispensing bottle may be, apart from the parts shown, identical with that shown in Figs. 10 to 13. However, there is substituted for the neck closure fitting 61, a neck closure fitting 61a which is attached to the bottle (not shown) in a similar manner to the neck fitting 61, and for the dropper 72 an otherwise similar dropper having a modified tip 74a. In this modification, the neck fitting 61a has a generally conical recess or socket 68a, which receives a similarly shaped lower portion 78a on the tip 74a with clearance, as indicated. The upper part of the socket at 81 is cylindrical and preferably formed with raised rings, parallel ridges, or screw threads 81a, as indicated, receiving a correspondingly cylindrical but screw threaded portion 82 of the dropper tip 74a. For storage and transportation, the dropper may be pushed into the position shown in Fig. 14, where its tip just reaches the bottom 83 of the recess or socket 68a. The parts are held in this position against inadvertent movement by the interengagement of the rings, ridges or screw threads 81a as the case may be with the threaded portion 82 of the dropper.

This recess 68a, in substitution for the discharge orifice 69 of Figs. 10 to 13, is pierced at the bottom as at 84, in the configuration of a cross, as shown, asterisk, pin point or the like, and the material pierced being resilient forms in the position of Fig. 14 an effective seal against leakage or discharge of the contents of the bottle otherwise than in the intended manner. When it is desired to dispense liquid from the bottle, the tip 74a of the dropper is pushed into the recess, as indicated in Fig. 15, so that its extreme lower end, pushing against the center of the pierced portion 84, separates the bottom 83, as indicated in Fig. 15, establishing communication between the space within the dropper and the space within the bottle. The method of extracting the desired dose or quantity is the same as described in connection with Figs. 10 to 13.

Piercing the bottom of the recess 68a so that there is an automatic closure when the dropper is removed, and making provision for positioning the dropper in its normal non-use position just clear of the bottom, results in an arrangement which on the one hand discourages a "set" of the material in open position and on the other hand maintains a seal, with the dropper removed, suf-

ficiently tight to prevent passage of liquid even under conditions of normal sucking.

What is claimed is:

1. A liquid dispensing container comprising a bottle and neck closure therefor, the neck closure having an opening for sucking out liquid and positioned above the liquid level when the bottle is in upright position, a bulb having an opening for receiving liquid, and further means for removably holding the bulb pressed against the neck fitting with the openings in communication.

2. A liquid dispensing container according to claim 1, in which the last said means comprises a screw cap for the bottle and means fixing the bulb therein.

3. A liquid dispensing container according to claim 1, in which the last said means comprises a screw cap and means detachably securing a bulb therein.

4. A liquid dispensing container according to claim 3, in which the said detachably securing means comprises a threaded connection between bulb and cap.

5. A liquid dispensing container according to claim 3, in which the said detachably securing means comprises a cooperating rib and groove snap fitting between cap and bulb.

6. A liquid dispensing container comprising a bottle and neck closure therefor, the neck closure having a capillary opening for sucking out liquid and positioned above the liquid level when the bottle is in upright position, a bulb having an opening for receiving liquid, and further means for removably holding the bulb pressed against the neck fitting with the openings in communication.

7. A liquid dispensing container comprising a bottle and neck closure therefor, the neck closure having a capillary opening for sucking out liquid and positioned above the liquid level when the bottle is in upright position, a bulb having an opening for receiving liquid, further means for removably holding the bulb pressed against the neck fitting with the openings in communication, and an upstanding rim about the said capillary opening for sealing to the said bulb around the openings.

8. A liquid dispensing container comprising a bottle and neck closure therefor, the neck closure having an opening for sucking out liquid and positioned above the liquid level when the bottle is in upright position, a bulb having an opening for receiving liquid, further means for removably holding the bulb pressed against the neck fitting with the openings in communication, the said bulb

being transparent, whereby the bulb may be filled from the bottle with the bottle inverted and the liquid level in the bulb may be observed through its wall.

9. A liquid dispensing container comprising a bottle and neck closure therefor, the neck closure having a pierced resilient portion forming a seal and adapted to open when pressure is exerted against the pierced resilient portion, said resilient portion being positioned above the liquid level when the bottle is in upright position, a bulb having a tip with an opening for receiving liquid and adapted to spread the pierced resilient portion when pressed thereagainst to establish communication with the interior of the bottle, further means for removably holding the said tip in a position where it does not press against the pierced resilient portion and for holding it in a position pressing against the pierced resilient portion and opening the same.

10. A liquid dispensing container comprising a bottle and neck closure therefor, the neck closure having a pierced resilient portion forming a seal and adapted to open when pressure is exerted against the pierced resilient portion, said resilient portion being positioned above the liquid level when the bottle is in upright position, a bulb having a tip with an opening for receiving liquid and adapted to spread the pierced resilient portion when pressed thereagainst to establish communication with the interior of the bottle, a socket above the pierced resilient portion engageable with the said tip for holding it in a position where it does not press against the pierced resilient portion and for holding it in a position pressing against the pierced resilient portion and opening the same.

11. A liquid dispensing container according to claim 10, in which the said socket and tip have correspondingly threaded sections engageable for holding the tip selectively in the two said portions.

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