

[54] EYE DROP DISPENSER WITH LIQUID
METERING DEVICE

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[22] Filed: **Feb. 3, 1971**

[21] Appl. No.: **112,147**

[52] U.S. Cl. **222/420, 222/211, 222/215**

[51] Int. Cl. **B65d 47/18**

[58] Field of Search **222/420, 211, 215;
128/233**

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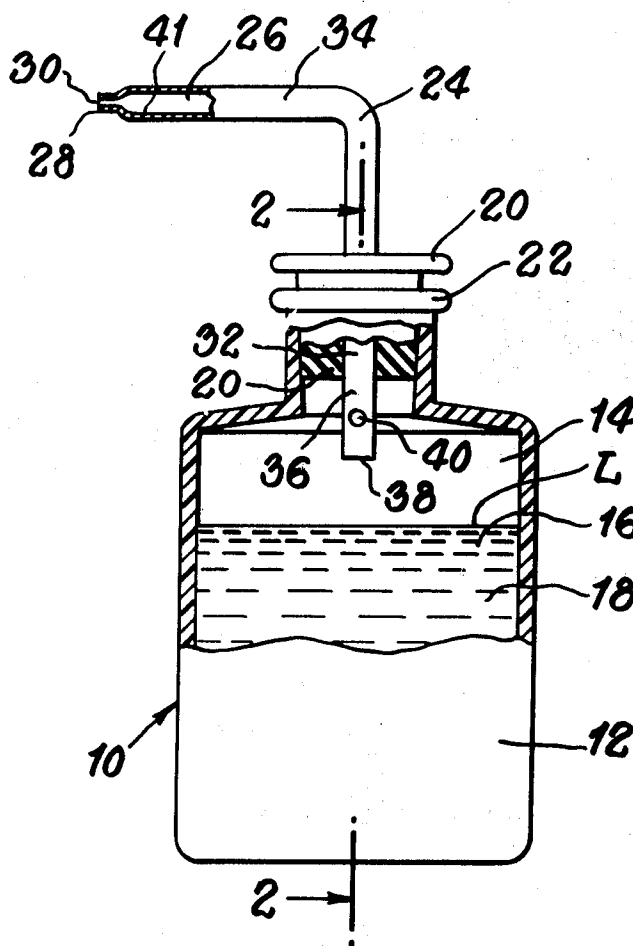
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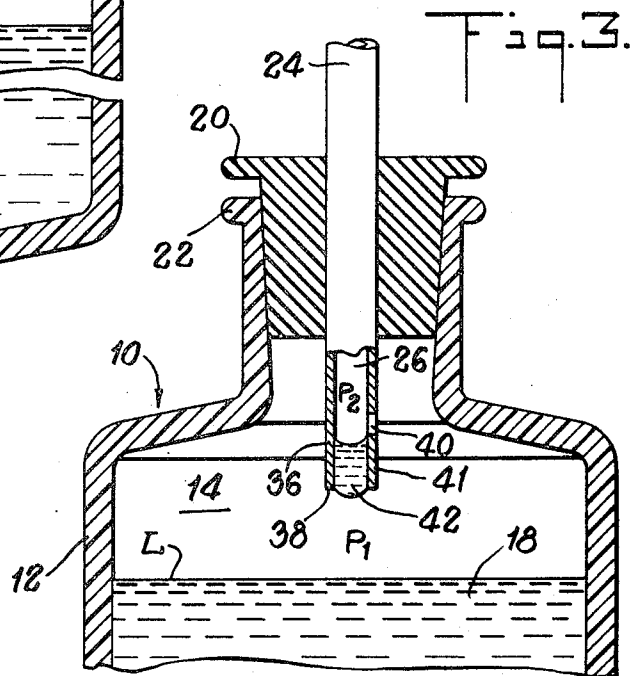
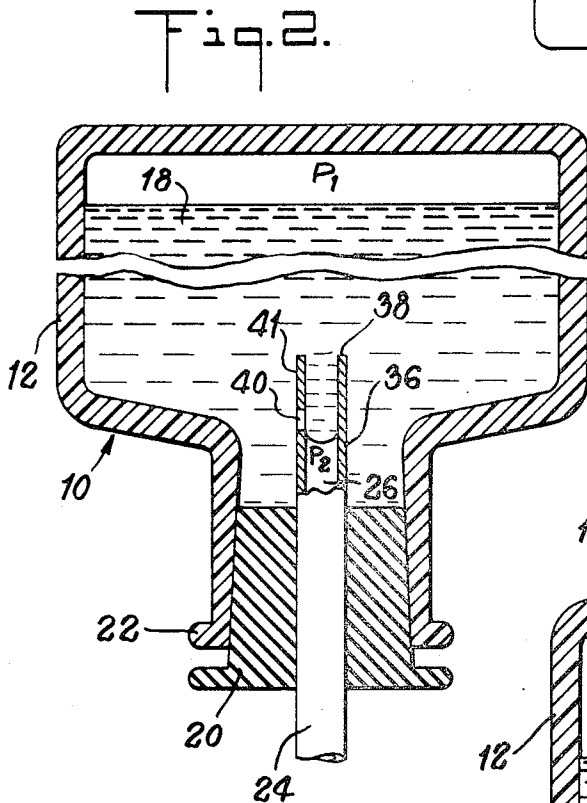
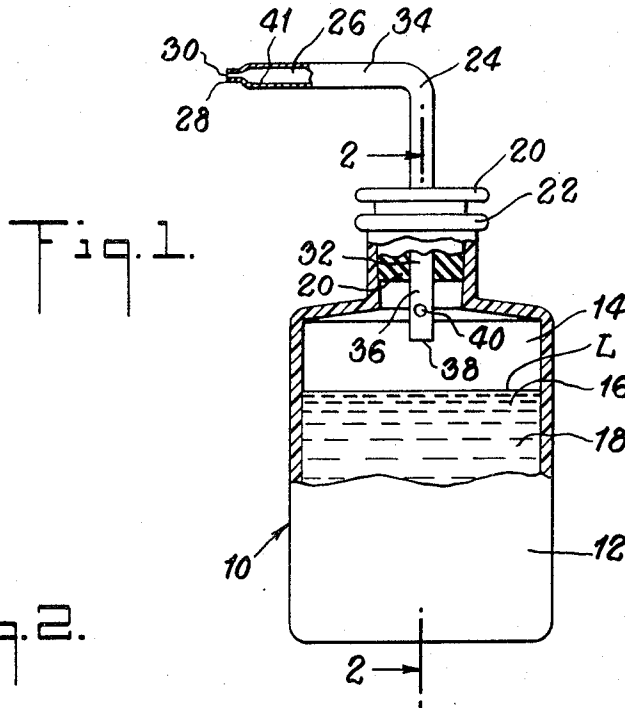
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[57] **ABSTRACT**

A liquid dispensing device for use in connection with a dispenser of the squeeze-bottle type for dispensing a measured quantity of eye drops and administering the drops directly to the eye through an angled tube enabling the squeeze-bottle to be held in an upright position during application of the drops while the head is held in an essentially normal upright position. A limited amount of liquid is dispensed by virtue of a metering device which includes a delivery tube with an internal passage having a diameter small enough to retain a limited quantity of liquid adjacent the terminal end of the internal passage when the squeeze-bottle is in the upright position, and a vent in the tube adjacent the terminal end for permitting the limited quantity of liquid to enter the internal passage when the squeeze-bottle is inverted.

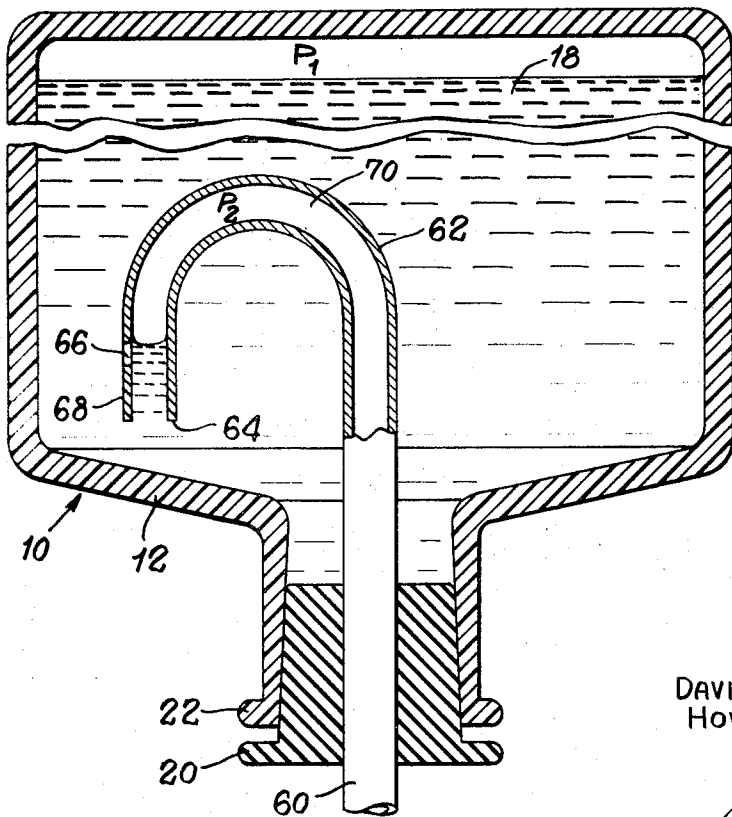
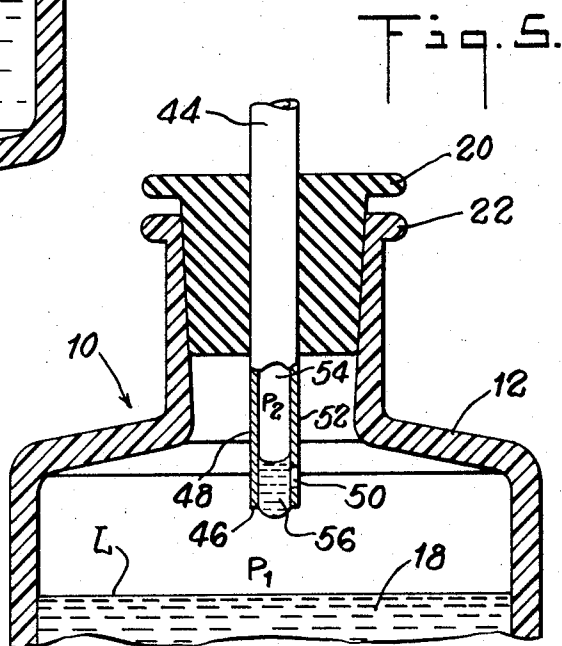
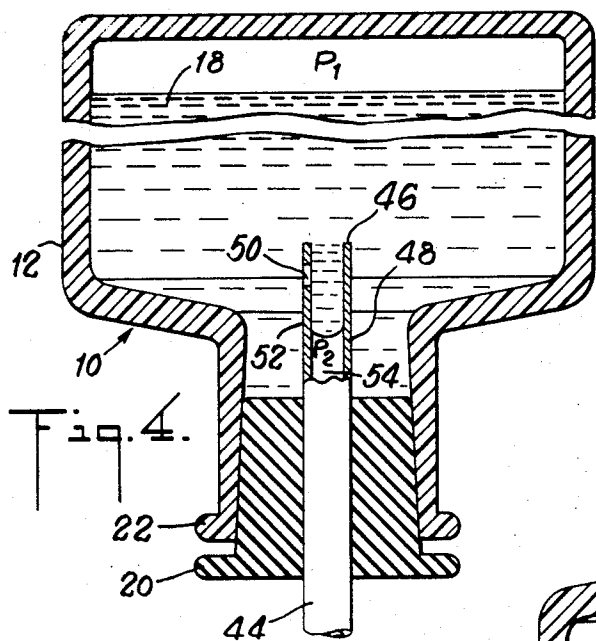
37 Claims, 10 Drawing Figures





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Fig. 2.

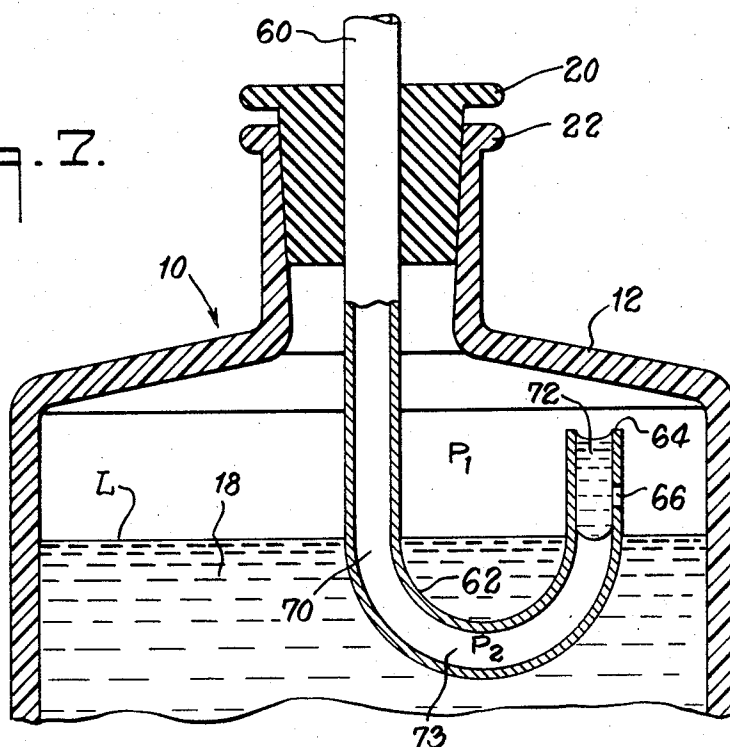
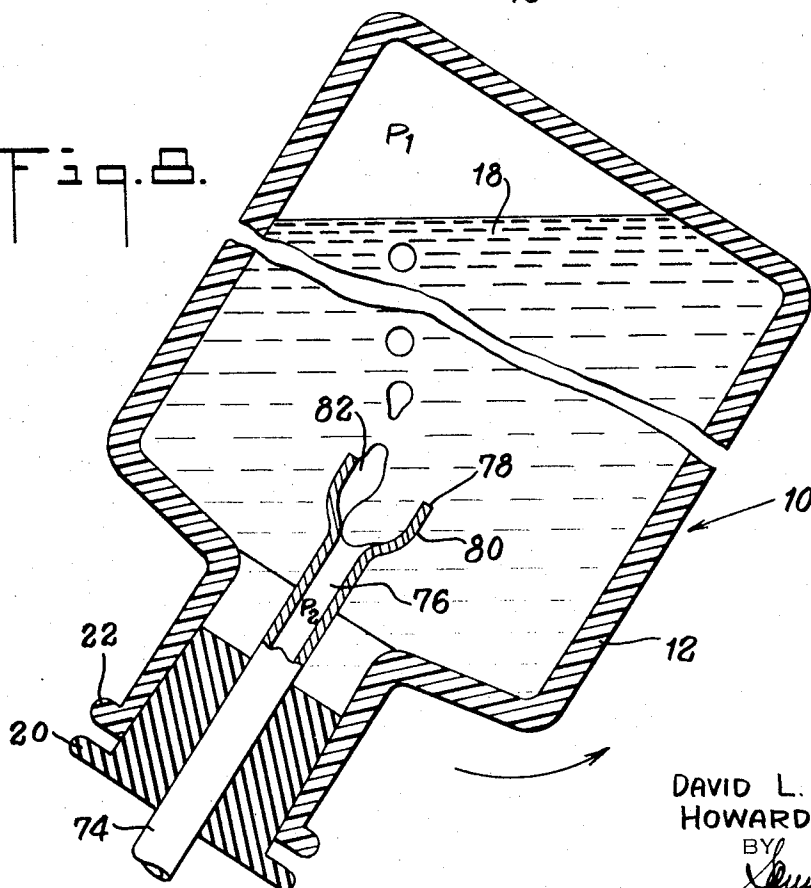


Fig. 3.



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Fig. 9.

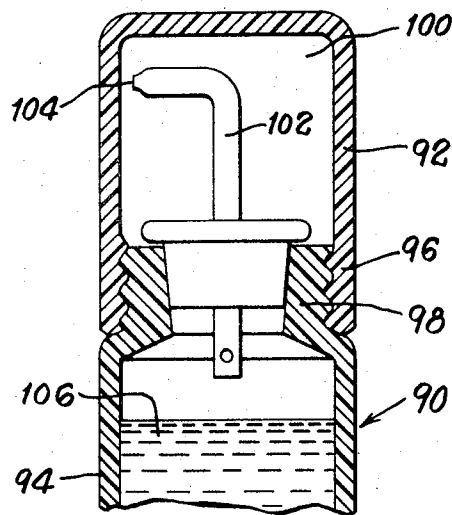
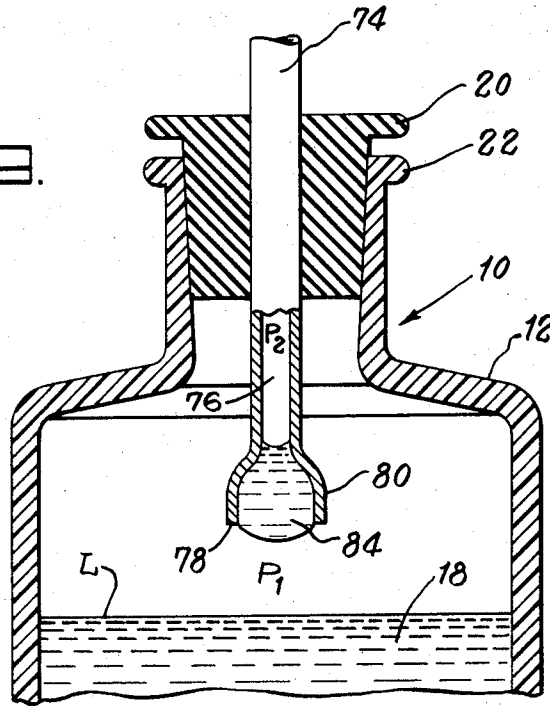


Fig. 10.

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EYE DROP DISPENSER WITH LIQUID METERING DEVICE

The present invention relates generally to dispensing devices and pertains, more specifically, to liquid dispensers of the type including a metering device for enabling the delivery of only a limited amount of liquid from the interior of the dispenser to a dispensing outlet. More particularly, the invention provides an improved eye dropper which enables a measured or limited quantity of liquid to be applied directly to the eye in a most convenient and effective manner.

A wide variety of dispensing containers are presently available for dispensing liquids and many such containers have been developed for dispensing various liquids to be administered to the eyes, nose, mouth and other parts of the body. Among the more popular of such containers are the so-called plastic "squeeze-bottles" which contain liquid in a resiliently depressible synthetic resin bottle and dispense the liquid through a dispensing outlet in response to depression, or squeezing, of the bottle. Such dispensed liquids may be made to emerge as streams, sprays or drops.

In instilling ophthalmic preparations, it is important that the desired amount of medication be delivered to the eye and applied in a gentle and convenient manner. Ordinary eye droppers deliver liquid to the eye by dropping the liquid from above, thus requiring that the head be tilted back while the drops are administered. Squeeze-bottles have been employed as replacements for ordinary eye droppers and require the same general procedure.

It has been found that where liquid medications are self-administered, it is preferable to provide some means by which the liquid may be applied while the head remains essentially in its normal upright position. Thus, dispensers have been developed for ophthalmic preparations where the liquid to be administered is raised vertically from a container and then carried, by a generally right-angled delivery tube, essentially horizontally to a dispensing outlet. These dispensers have not met with wide acceptance, primarily because of their large size and cumbersome construction which renders such dispensers difficult to carry in a pocket or a handbag. Furthermore, such dispensers have been found difficult to operate in that two-hand operation is often required. One-hand operation is preferable in that the other hand is then free to evert the lower eyelid, thereby enabling the patient himself to carry out a necessary manipulation in instilling eye drops in a preferred manner. It would be advantageous to have available an eye drop dispensing container of the squeeze-bottle type which enables eye drops to be self-administered in this more convenient and effective manner.

It is therefore an important object of the invention to provide a liquid dispenser of the type which can be employed with a resilient squeeze-bottle and wherein the squeeze-bottle may be held in an upright position while dispensing a limited quantity of liquid.

Another object of the invention is to provide a simple and inexpensive metering device which enables a liquid dispensing container of the squeeze-bottle type to dispense a measured amount of liquid and to do so while the squeeze-bottle is in an upright position.

A further object of the invention is to provide an improved means for delivering topical ophthalmic medication through the employment of a resilient squeeze-

bottle capable of being held in a vertical, upright position while being operated by one hand to deliver drops of liquid in measured quantities through a generally horizontally disposed dispensing outlet, thus enabling a measured quantity of eye drops to be administered while the head is held in a normal, essentially upright position so that the patient may utilize any conventional, conveniently available vertically oriented mirror to facilitate proper delivery of the drops.

A still further object of the invention is to provide an eye dropper of the type described above which dispenses accurately measured amounts of liquid in a gentle manner and which cannot inadvertently dispense liquid in quantities greater than a predetermined amount, such as, for example, a minim or desired multiples thereof, a minim being a specified unit of medical dosage, equivalent to 0.0616 cc.

Still another object of the invention is to provide an inexpensive liquid dispenser which dispenses an accurately measured amount of liquid and is economically fabricated and easily used.

The above objects as well as still further objects and advantages are attained by the invention which may be described briefly as a liquid metering device for use in a liquid dispenser of the type including a resilient squeeze-bottle with a closed top and a dispensing conduit passing through the top for dispensing liquid from the interior of the squeeze-bottle when the squeeze-bottle is in an upright position, the metering device enabling only a limited amount of liquid to be dispensed through the dispensing conduit, the metering device comprising a delivery tube including a tube portion having a tube wall and an internal passage communicating with the dispensing conduit, the tube portion having a terminal end, means for locating the terminal end of the tube portion above the normal level of the liquid in the bottle when the bottle is in the upright position, and a vent for interconnecting the internal passage with the interior of the squeeze-bottle at a location spaced from the terminal end of the tube portion a distance sufficient to enable a limited quantity of liquid to pass into the internal passage at least between the terminal end and the vent upon inverting the bottle, the internal passage having means for retaining the limited amount of liquid within the internal passage upon return of the bottle to the upright position.

The invention will be more fully understood while still further objects and advantages will become apparent in the following detailed description of preferred embodiments of the invention illustrated in the accompanying drawing, in which:

FIG. 1 is an elevational view, partially sectioned, of an eye drop dispenser constructed in accordance with the invention;

FIG. 2 is an enlarged fragmentary cross-sectional view of a portion of the dispenser taken along line 2—2 of FIG. 1, with the dispenser inverted;

FIG. 3 is an enlarged fragmentary cross-sectional view similar to FIG. 2, but with the dispenser in an upright position;

FIG. 4 is a fragmentary cross-sectional view similar to FIG. 2, but illustrating an alternate metering device;

FIG. 5 is a fragmentary cross-sectional view similar to FIG. 4, but with the dispenser in an upright position;

FIG. 6 is a fragmentary cross-sectional view similar to FIG. 2, but illustrating another alternate metering device;

FIG. 7 is a fragmentary cross-sectional view similar to FIG. 6, but with the dispenser in an upright position;

FIG. 8 is a fragmentary cross-sectional view similar to FIG. 2, but illustrating a still further alternate metering device;

FIG. 9 is a fragmentary cross-sectional view similar to FIG. 8, but with the dispenser in an upright position; and

FIG. 10 is a fragmentary elevational view, partially sectioned, of an alternate dispenser constructed in accordance with the invention.

Referring now to the drawing, and especially to FIG. 1 thereof, an eye drop dispenser constructed in accordance with the invention is illustrated generally at 10 and is seen to include a resilient squeeze-bottle 12 of the type which is constructed of a flexible synthetic resin. The interior 14 of the squeeze-bottle 12 provides a reservoir 16 within which there is contained a liquid 18 to be dispensed in the form of eye drops. A stopper 20 closes the top 22 of the squeeze-bottle 12 and a delivery tube 24 passes through the stopper 20 to provide a dispensing conduit, in the form of the internal passage 26 of the tube 24, communicating with the interior 14 of the squeeze-bottle 12.

At the outside end 28 of the delivery tube 24 the internal passage 26 terminates in a dispensing outlet 30 which, by virtue of the angled configuration of the tube 24 will direct dispensed liquid in a generally horizontal direction, as viewed in FIG. 1. Thus, the tube 24 has a first leg 32 which extends in a generally vertical direction to pass through the stopper 20 and a second leg 34 transverse to the first leg 32 and shown generally perpendicular to the first leg 32 and extending in a generally horizontal direction to the outside end 28 and terminating at dispensing outlet 30. While the first and second legs 32 and 34 are shown perpendicular to one another, the angle between the legs may vary from such a perpendicular relationship while still retaining the advantage of discharging liquid in a direction transverse to the upright direction. By virtue of the angled configuration of the tube 24, eye drops may be administered in a preferred manner with one's head in a generally normal or upright position, the squeeze-bottle 12 in an upright position immediately in front of the head and the dispensing outlet 30 located immediately adjacent the eye to which the eye drops will be applied. In this manner, the dispensing outlet 30 is more easily located at the desired location for effective application of the eye drops while the squeeze-bottle 12 is conveniently held in one hand for ready depression and concomitant dispensing of the liquid. The other hand is then free to evert the lower eyelid. Since the head is held upright, any conveniently available vertical mirror can be employed to view, and thereby facilitate, the operation.

Because of the difficulties involved in controlling the amount of liquid dispensed with each squeeze of a squeeze-bottle where a delivery tube extends into the reservoir of liquid and the dispensing conduit communicates directly with the liquid in the reservoir as the squeeze-bottle is squeezed, eye drop dispenser 10 includes a metering device which assures that only a limited amount of liquid is delivered to the dispensing outlet 30 in response to a squeeze of the squeeze-bottle 12 while enabling that limited amount to be dispensed when the squeeze-bottle is in the upright position shown in FIG. 1. Thus, the portion 36 of the delivery tube 24 which extends into the interior 14 of the

squeeze-bottle 12 terminates at an inside terminal end 38 located above the level L of the liquid 18 in the reservoir 16 and a metering device is provided in this tube portion 36 adjacent the terminal end 38, the metering device being constructed in such a way that the eye drop dispenser 10 may be inverted in order to charge the delivery tube 24 with a limited amount of liquid and is then returned to the upright position in which the squeeze-bottle 12 may be depressed, or squeezed, to deliver the limited quantity of liquid through the dispensing outlet 30. The delivery tube 24 is fixed in place within the stopper 20 fixed relationship between the delivery tube 24 and the stopper 20, and between the stopper 20 and the top 22 of the squeeze-bottle 12, thereby providing means by which the terminal end 38 of the delivery tube 24 is located above the level L of the liquid 18 in the reservoir 16.

In the embodiment illustrated in FIGS. 1 through 3, the terminal end 38 of the delivery tube 24 is spaced from the stopper 20 to establish the tube portion 36 which projects into the interior 14 of the squeeze-bottle 12, and a vent is provided in the form of an aperture 40 extending through the wall 41 of the tube 24 to interconnect the internal passage 26 of the tube 24 with the interior 14 of the squeeze-bottle 12 at a location spaced from the terminal end 38 of the tube 24. When the dispenser 10 is inverted, as seen in FIG. 2, liquid from the reservoir 16 will flow into the tube 24 up to the vicinity of the vent aperture 40 since the vent aperture 40 will tend to equalize the pressure along the internal passage 26 of the tube 24 between the terminal end 38 and the vent aperture 40. Upon further downward flow of liquid beyond vent aperture 40, the vent aperture will be closed and the pressure P_1 within the squeeze-bottle 12 will be reduced relative to the pressure P_2 within the remainder of the internal passage 26 of the delivery tube 24 and the flow of liquid into the tube 24 will cease.

Now, the dispenser 10 may be returned to the upright position, as shown in FIG. 3. The liquid in the tube 24 will tend to drop from the tube. However, a certain amount of liquid in the form of drop 42 will be retained within the tube 24 by capillary attraction. Since the capillary attraction is a function of the diameter of the internal passage 26 of the tube 24 and the surface tension of the liquid, the internal diameter of the internal passage 26 may be made just small enough to provide means by which the desired limited amount of liquid is retained in position within the tube 24, as seen in FIG. 3. By controlling the accuracy of the dimensions of the internal passage 26 and the vent aperture 40, as well as the location of the vent aperture, the limited amount of liquid may be accurately measured. Thus the terms "measured," "metered," and "limited" may be considered as equivalent terms in the instant specification. The liquid which is thus retained at the terminal end 38 of the tube 24 may be ejected through the dispensing outlet 30 by squeezing the squeeze-bottle 12 to increase the pressure P_1 to a pressure greater than pressure P_2 .

It is noted that, in this instance, the limited or measured amount of liquid is retained adjacent the terminal end 38 of the tube 24 and rests below the vent aperture 40 when the dispenser 10 is held in an upright position. Thus, a gradual squeezing of the squeeze-bottle 12 will allow the vent aperture 40 to equalize the pressure both above and below the measured quantity of liquid and the drop 42 will not move up the tube 24. However, the

vent aperture 40 is made with a smaller diameter, and hence a smaller cross-sectional area, than the diameter and cross-sectional area of the internal passage 26 at the terminal end 38 so that a quick squeeze of the squeeze-bottle 12 will cause a sudden change in the internal pressure P_1 which will tend to move the drop 42 of liquid upwardly before the pressure P_2 above the drop can be equalized through the vent aperture 40. Such upward movement of the drop 42 will close the vent aperture 40 and enable the drop to continue its upward travel through the delivery tube 24 without interruption.

In the embodiment of FIGS. 4 and 5, an alternate delivery tube 44 again terminates at a terminal end 46 spaced from the stopper 20 to establish a tube portion 48. A vent aperture 50 is again placed in the wall 52 of the delivery tube 44, but in this instance is more closely adjacent the terminal end 46 of the delivery tube 44 than the vent aperture 40 of the earlier described embodiment. Once again, upon inverting the dispenser 10, liquid 18 will enter the delivery tube 44 and pass beyond the vent aperture 50 until the pressure P_1 within the squeeze-bottle 12 falls sufficiently below the pressure P_2 within the tube 44 to discontinue the flow of liquid. Upon return of the dispenser to the upright position, as shown in FIG. 5, the liquid within the tube 44 will tend to drop, as before. However, here the relationship between the internal diameter of the internal passage 54 of the tube 44 and the location of the vent aperture 50 is such that capillary attraction will retain an amount of liquid sufficient to ensure that the vent aperture 50 remains closed by the liquid drop 56. Hence, upon squeezing the squeeze-bottle 12 to increase the pressure P_1 above the pressure P_2 , the drop 56 of liquid will move upwardly within the delivery tube 44 whether the increase in pressure P_1 is sudden or gradual.

The choice between the embodiment of FIGS. 2 and 3 and the embodiment of FIGS. 4 and 5 may be dictated by the requirements of the treating physician. Thus, the earlier embodiment might be chosen where the physician prefers that the liquid be delivered into the eye from a distance, since in that embodiment no liquid is delivered by gradual squeezing of the squeeze-bottle and the patient must employ a quick squeezing action which will propel the liquid from the dispensing outlet. The later embodiment would then be chosen where the physician prefers that the liquid be delivered onto the everted eyelid with minimal velocity.

Turning now to FIGS. 6 and 7, a further embodiment is illustrated wherein a delivery tube 60 is provided with a U-shaped configuration 62 between the stopper 20 and the terminal end 64 of the tube 60, and a vent aperture 66 in the wall 68 of the tube 60 is spaced from the terminal end 64 of the tube 60 so that when the dispenser 10 is in an upright position the vent aperture 66 is below the terminal end 64 of the tube. Thus, when the dispenser 10 is inverted as seen in FIG. 6, liquid 18 will flow into the internal passage 70 of the tube 60 to the vicinity of the vent aperture 66. Upon return of the dispenser 10 to the upright position, the drop 72 of liquid retained adjacent the terminal end 64 of the tube 60 will drop slightly to close off the vent aperture 66 and allow the internal pressure P_1 within the squeeze-bottle 12 to drop below the pressure P_2 in the delivery tube 60 so that the drop 72 of liquid will be retained in the location shown in FIG. 7 until the squeeze-bottle 12 is squeezed to raise pressure P_1 above pressure P_2 and

expel the drop 72 of liquid through the dispensing outlet at the other end of tube 60. Since the vent aperture 66 is automatically closed by the liquid drop 72 upon return of the dispenser 10 to an upright position, the increase in pressure P_1 necessary to move the liquid through the delivery tube 60 may be gradual, thus assuring that the liquid can be delivered in drop form rather than in a high velocity stream or spray. Alternately, where a larger dosage is desired, the internal diameter of the internal passage 70 may be made larger, in which instance the liquid drop 72 could come to rest at the lowest point 73 of the U-shaped configuration upon return of the dispenser 10 to an upright position. Thus, the U-shaped configuration may provide the means for retaining the limited amount of liquid in the internal passage of the delivery tube for subsequent dispensing. In such an instance, the liquid drop 72 may still be delivered by a gradual increase in pressure P_1 .

The embodiment of FIGS. 6 and 7 is preferred for the dispensing of a relatively large dosage, since all of the liquid which enters the delivery tube while the dispenser is inverted remains in the delivery tube upon return of the dispenser to the upright position. In contrast, the earlier described embodiments a better suited for dispensing more limited doses.

Referring now to FIGS. 8 and 9, a further alternate embodiment is illustrated in which a delivery tube 74 is provided with an internal passage 76 which increases abruptly in internal diameter adjacent the terminal end 78 of the delivery tube 74, as illustrated by a bell-shaped end portion 80 which has an internal diameter greater than the prescribed internal diameter of the internal passage 76. As the dispenser 10 is inverted, as seen in FIG. 8, the enlarged internal diameter of the bell-shaped end portion 80 will enable air to be vented from the internal passage 76 immediately adjacent the bell-shaped end portion 80, as illustrated at 82, enabling liquid 18 to enter the internal passage 76 until pressure P_1 drops below pressure P_2 . Upon return of the dispenser 10 to the upright position shown in FIG. 9, capillary pressure resulting from the prescribed diameter of the internal passage 76 will retain a drop 84 of liquid adjacent the terminal end 78 of the delivery tube 74 which then can be ejected through the delivery tube 74 and the dispensing outlet at the other end thereof by squeezing the squeeze-bottle 12.

The embodiment of FIGS. 8 and 9 is more suited to the dispensing of relatively viscous liquids which require a wider inlet at the terminal end of the delivery tube.

It will be seen that in all of the embodiments of the invention, the terminal end of the delivery tube is spaced upwardly from the level of the liquid in the bottle when the dispenser is in an upright position. Thus, only the limited amount of liquid, and no more, will be dispensed each time the delivery tube is charged by inverting the dispenser.

For sanitary purposes, and in order to prevent evaporation of the liquid within the dispenser, a removable cover may be provided to close the dispenser when not in use. Thus, as seen in FIG. 10, an alternate dispenser 90 is provided with a cover in the form of cap 92 which is removably affixed to squeeze-bottle 94 by means of mating threaded portions 96 and 98. Cap 92 provides a sealed enclosure 100 within which is enclosed the delivery tube 102 so that the tip 104 of the tube is protected against contamination and the dispensing outlet

at the tip of the tube is sealed from the outside atmosphere to prevent evaporation of liquid 106 contained within the dispenser.

The above detailed description of preferred embodiments of the invention is provided by way of example only. Various details of design and construction may be modified without departing from the true spirit and scope of the invention as set forth in the appended claims.

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

1. A liquid metering device in a liquid dispenser of the type including a resilient squeeze-bottle with a closed top and a dispensing conduit passing through the top for dispensing liquid from the interior of the squeeze-bottle when the squeeze-bottle is in an upright position, the metering device enabling only a limited amount of liquid to be dispensed through the dispensing conduit, said metering device comprising:

a delivery tube including a tube portion within the squeeze-bottle and having a tube wall and an internal passage communicating with the dispensing conduit, said tube portion having an open terminal end;

the terminal end of the tube portion being located above the normal level of the liquid in the squeeze-bottle when the squeeze-bottle is in said upright position; and

a vent for interconnecting the internal passage with the interior of the squeeze-bottle at a location spaced from the terminal end of the tube portion a distance sufficient to enable a limited quantity of liquid to pass into the internal passage at least between the terminal end and the vent upon inverting the squeeze-bottle;

said internal passage including means for retaining the limited amount of liquid within the internal passage upon return of the squeeze-bottle to the upright position.

2. The invention of claim 1 wherein the means for retaining the limited amount of liquid within the internal passage comprises a prescribed internal diameter small enough to retain the limited amount of liquid adjacent the terminal end of the tube portion.

3. The invention of claim 2 wherein the vent comprises an aperture in the tube wall spaced from said terminal end of the tube portion for extending between the internal passage and the interior of the squeeze-bottle.

4. The invention of claim 3 wherein the aperture is spaced from said terminal end of the tube portion a distance sufficient to accommodate said limited quantity of liquid within the internal passage entirely between the terminal end of the tube portion and the aperture.

5. The invention of claim 4 wherein said aperture is above the terminal end of the tube portion when the squeeze-bottle is in an upright position.

6. The invention of claim 5 wherein said aperture has a cross-sectional area smaller than the cross-sectional area of the internal passage at the terminal end of the tube portion.

7. The invention of claim 4 wherein said aperture is spaced from the terminal end of the tube portion a distance less than that which ordinarily would be sufficient to accommodate said limited quantity of liquid

within the internal passage entirely between the terminal end of the tube portion and the aperture.

8. The invention of claim 3 wherein said aperture is below the terminal end of the tube portion when the squeeze-bottle is in an upright position.

9. The invention of claim 8 wherein the tube portion is U-shaped.

10. The invention of claim 1 wherein the vent comprises an aperture in the tube wall spaced from said terminal end of the tube portion for extending between the internal passage and the interior of the squeeze-bottle, said aperture being located below the terminal end of the tube portion when the squeeze-bottle is in an upright position.

11. The invention of claim 10 wherein the tube portion is U-shaped.

12. The invention of claim 2 wherein the vent comprises an enlarged portion of the internal passage extending between the terminal end of the tube portion and the prescribed internal diameter of the internal passage, said enlarged portion having a diameter greater than said prescribed internal diameter.

13. The invention of claim 12 wherein the tube portion includes a bell-shaped configuration adjacent said terminal end and said enlarged portion of the internal passage is located within the portion of bell-shaped configuration.

14. The invention of claim 1 wherein the delivery tube includes a first leg oriented in the upright direction for passing through the top of the squeeze-bottle and a second leg angled with respect to the first leg to extend at an angle to the upright direction, and a dispensing outlet in the second leg.

15. The invention of claim 14 wherein the second leg is generally perpendicular to the first leg.

16. A liquid dispenser comprising:

a resilient squeeze-bottle having a closed top and a dispensing conduit passing through the top for dispensing liquid from the interior of the squeeze-bottle;

a delivery tube having an internal passage communicating with the dispensing conduit, said internal passage terminating at an open terminal end located above the normal level of the liquid in the interior of the squeeze-bottle when the squeeze-bottle is in said upright position; and

a vent interconnecting the internal passage with the interior of the squeeze-bottle at a location spaced from the terminal end a distance sufficient to enable a limited quantity of liquid to pass into the internal passage at least between the terminal end and the vent upon inverting the bottle;

said internal passage including means for retaining the limited amount of liquid within the internal passage upon return of the squeeze-bottle to the upright position.

17. The invention of claim 16 wherein the means for retaining the limited amount of liquid within the internal passage comprises a prescribed internal diameter small enough to retain the limited amount of liquid adjacent the terminal end.

18. The invention of claim 17 wherein the vent comprises an aperture extending between the internal passage at a location spaced from said terminal end and the interior of the squeeze-bottle.

19. The invention of claim 17 wherein the dispensing conduit terminates externally of the squeeze-bottle at

a dispensing outlet oriented to discharge liquid in a direction transverse to the upright direction when the squeeze-bottle is in an upright position.

20. The invention of claim 19 wherein the delivery tube includes a first leg oriented in the upright direction for passing through the top of the squeeze-bottle and a second leg angled with respect to the first leg to extend at an angle to the upright direction, and a dispensing outlet in the second leg.

21. The invention of claim 20 wherein the second leg is generally perpendicular to the first leg.

22. The invention of claim 20 including a cover removably engaged with the squeeze-bottle and establishing an enclosure at the top of the squeeze-bottle, said delivery tube including an external portion extending externally of the top of the squeeze-bottle and enclosed within said enclosure.

23. A dispenser for dispensing a limited amount of liquid for direct application to the eye, said dispenser comprising:

a resiliently depressible squeeze-bottle including a top and a reservoir for containing said liquid below the top when the container is in an upright position; a dispensing conduit having a first portion extending upwardly through the top and a second portion including a dispensing outlet for directing dispensed liquid transverse to the upwardly extending portion, said first portion including a terminal end above the surface of the liquid in the reservoir when the squeeze-bottle is in the upright position; and

said dispensing conduit including means at the terminal end of the first portion for enabling only a limited amount of liquid to be dispensed to said outlet upon depression of the squeeze-bottle when the squeeze-bottle is in the upright position.

24. The invention of claim 23 wherein the dispenser includes a delivery tube passing through the top of the squeeze-bottle, said delivery tube having a first leg oriented in the upright direction and a second leg angled with respect to the first leg, said first portion of the dispensing conduit being located in the first leg of the tube and said second portion of the dispensing conduit being located in the second leg of the delivery tube.

25. A dispensing device for dispensing a limited amount of liquid from a resiliently depressible squeeze-bottle for direct application to the eye, the squeeze-bottle including a top and a reservoir for containing the liquid below the top when the container is in an upright position, said dispensing device comprising:

a dispensing conduit having a first portion for extending upwardly through the top of the squeeze-bottle, and a second portion including a dispensing outlet for directing dispensed liquid in a direction transverse to the first portion, said first portion including a terminal end;

means for locating the terminal end of the first portion of the dispensing conduit above the surface of the liquid in the reservoir when the squeeze-bottle is in the upright position; and

said dispensing conduit including means at the terminal end of the first portion for enabling only a limited amount of liquid to be dispensed to said outlet upon depression of the squeeze-bottle when the squeeze-bottle is in the upright position.

26. The invention of claim 25 wherein the dispensing device includes a delivery tube for passing through the

top of the squeeze-bottle, said delivery tube having a first leg oriented in the upright direction and a second leg angled with respect to the first leg, said first portion of the dispensing conduit being located in the first leg of the tube and said second portion of the dispensing conduit being located in the second leg of the delivery tube.

27. A liquid metering device for use in a liquid dispenser of the type including a resilient squeeze-bottle to enable only a limited amount of liquid to be dispensed, said metering device comprising:

a delivery tube including a dispensing conduit, a tube portion having a tube wall, and an internal passage communicating with the dispensing conduit, said tube portion having an open terminal end;

means for affixing the delivery tube in the squeeze-bottle so as to enable the terminal end of the tube portion to be located within the squeeze-bottle; and

a vent extending into the internal passage at a location spaced from the terminal end of the tube portion a distance sufficient to enable a limited quantity of liquid to pass into the internal passage at least between the terminal end and the vent;

said internal passage including capillary means located adjacent the open terminal end of the tube portion for retaining the limited amount of liquid within the internal passage for subsequent dispensing.

28. The invention of claim 27 wherein the vent comprises an aperture in the tube wall spaced from said terminal end of the tube portion.

29. The invention of claim 28 wherein the aperture is spaced from said terminal end of the tube portion a distance sufficient to accommodate said limited quantity of liquid within the internal passage entirely between the terminal end of the tube portion and the aperture.

30. The invention of claim 29 wherein said aperture has a cross-sectional area smaller than the cross-sectional area of the internal passage at the terminal end of the tube portion.

31. The invention of claim 29 wherein said aperture is spaced from the terminal end of the tube portion a distance less than that which ordinarily would be sufficient to accommodate said limited quantity of liquid within the internal passage entirely between the terminal end of the tube portion and the aperture.

32. The invention of claim 28 wherein the tube portion is U-shaped.

33. The invention of claim 27 wherein the vent comprises an enlarged portion of the internal passage extending between the terminal end of the tube portion and the prescribed internal diameter of the internal passage, said enlarged portion having a diameter greater than said prescribed internal diameter.

34. The invention of claim 33 wherein the tube portion includes a bell-shaped configuration adjacent said terminal end and said enlarged portion of the internal passage is located within the portion of bell-shaped configuration.

35. The invention of claim 27 wherein the delivery tube includes a first leg, a second leg angled with respect to the first leg, and a dispensing outlet in the second leg.

36. The invention of claim 35 wherein the second leg is generally perpendicular to the first leg.

37. The invention of claim 27 wherein the vent comprises an aperture in the tube wall spaced from the terminal end of the tube portion and the tube portion is U-shaped.