# United States Patent

[11] **3,572,558**


[72] Inventor **Robert M. Hooker**
**P.O. Box 25, Pine Point, Conn. 06853**



[21] Appl. No. **788,561**
[22] Filed **Jan. 2, 1969**
[45] Patented **Mar. 30, 1971**


[54] **DROPPER DISPENSER**
**4 Claims, 4 Drawing Figs.**


[52] **U.S. Cl.** ..... **222/420**, 138/40
[51] **Int. Cl.** ..... **B67d 47/18**
[50] **Field of Search** ..... 222/420, 421, 215, 422; 138/40, 44; 222/420(up), 421(up), 215(up), 422(up); 138/40(up), 44(up); 222/564



[56] **References Cited**

UNITED STATES PATENTS

| | | | |
|---|---|---|---|
| 2,770,399 | 11/1956 | Gross | 222/215X |
| 3,197,606 | 7/1965 | Hylwa | 222/422X |
| 2,950,608 | 8/1960 | Abbott | 138/40X |

FOREIGN PATENTS

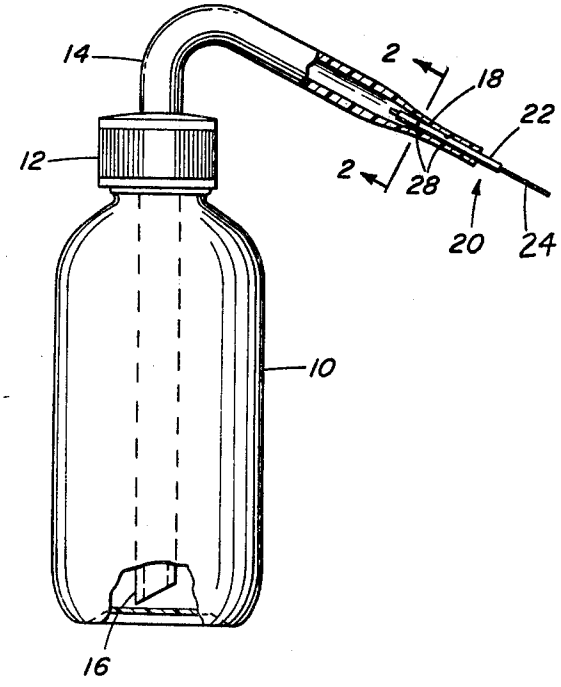
| | | | |
|---|---|---|---|
| 540,878 | 11/1941 | Great Britain | 138/40 |



*Primary Examiner*—Stanley H. Tollberg
*Assistant Examiner*—H. S. Lane
*Attorney*—Blair, Cesari and St. Onge



**ABSTRACT:** The disclosed dropper dispenser includes a plastic squeeze bottle containing the liquid to be dispensed. A tube extends through the bottle cap with its intake end submerged in the liquid and its discharge end fitted to receive and hold a drop dispenser tip. The tip includes a capillary tube through which extends an elongated drop conveying stem; the tube being deformed to engage the stem and prevent lengthwise movement thereof, while affording a liquid passage therebetween.

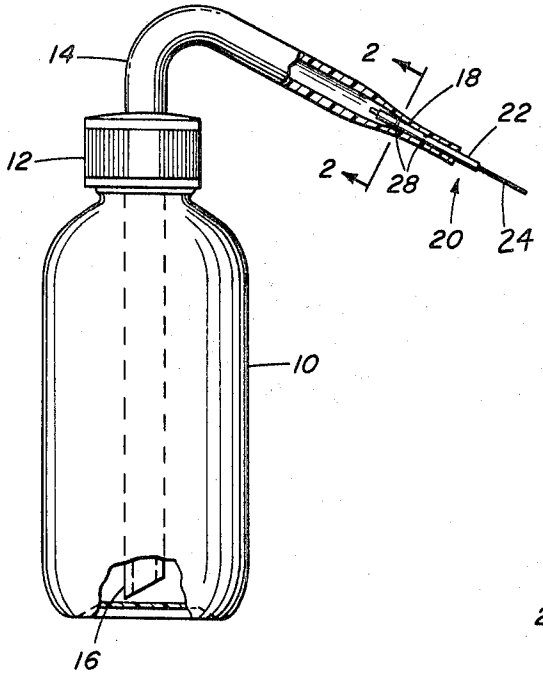



FIG. 1

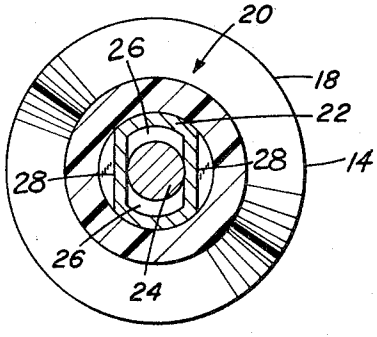



FIG. 2

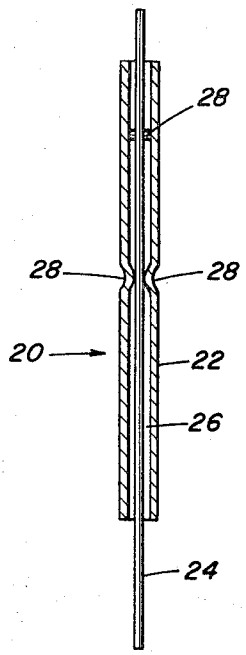



FIG. 3

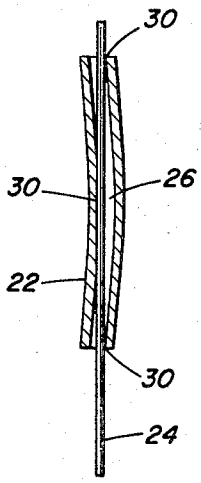



FIG. 4

INVENTOR.
ROBERT M. HOOKER

BY
BLAIR, CESARI AND ST. ONGE

ATTORNEYS

# DROPPER DISPENSER

## BACKGROUND AND SUMMARY OF THE INVENTION

Dropper dispensers are well known in the art. In one basic form, they comprise a squeeze bottle having a small discharge opening from which drops are dispensed under controlled digital pressure. In many situations it is necessary to dispense the drips to a specific point and this can be accomplished with this type of dispenser only with extreme difficulty.

Another type of dropper dispenser is of the so-called "watch oiler" variety. These dispensers include a capillary tube communicating with a liquid reservoir. A wire extends through the tube with sufficient clearance to allow for a small liquid passage therebetween. The wire extends beyond the discharge end of the capillary tube to serve as a drop conveying means, directing drops to a desired spot. In practice, the tip of the wire may contact the spot where drops are to be deposited.

Heretofore, this type of dropper dispenser has been of relative complex design and expensive to manufacture. In many instances the wire is retractable, thus complicating the wire mounting provisions.

According to the present invention, there is provided a dropper dispenser which is simplified in design and thus inexpensive to manufacture. It can be used conveniently by unskilled personnel to dispense a metered amount of liquid in drop form to a precise spot. Alternatively the dispenser can be manually controlled to dispense a stream of liquid. The discharge aperture is never capped, and thus the dispenser of the invention is always immediately ready for use. Yet the dropper dispenser is spillproof and able to preserve its contents substantially free from atmospheric contamination and evaporation for protracted periods. Moreover, the dispenser can be made such as to be reusable and relatively unbreakable.

Basically, the invention is embodied in a plastic squeeze bottle having a cap sealing a fill aperture. A discharge tube extends through the cap with its intake end submerged in the liquid to be dispensed. The discharge end of the tube external of the bottle is fitted with a drop dispensing tip.

The dispensing tip comprises a capillary tube having one open end communicating with the discharge tube and its other open end beyond the end of the discharge tube. A solid stem extends through the capillary tube with sufficient clearance to provide a liquid passage therebetween. The outer end portion of the stem extends beyond the outer end of the capillary tube to serve as a drop conveying element for directing drops precisely to the spot desired.

By exerting digital pressure on the bottle to collapsing its sidewall, liquid is forced through the discharge tube and dispensing tip. With light digital pressure the liquid is dispensed in drop form. Increased pressure causes the liquid to issue from the dispensing tip as a stream.

To retain the stem in place, the capillary tube is suitably deformed to cause its inner sidewall to engage and hold the stem at several spaced points such as to preserve the continuity of the liquid passage therebetween. In one embodiment of the invention, the capillary tube is crimped to produce engagement with the stem at diametrically opposed points. Preferably, several sets of opposed crimps are spaced along the length of the capillary tube, one set angularly offset from the other, to relatively rigidly mount the stem while at the same time preserving the continuity of the liquid passage.

In a second embodiment, the capillary tube is simply bent to offset its ends with the result that its inner sidewall engages the stem at points spaced along the tube length. The stem is thus retained in place without jeopardizing the continuity of the liquid passage.

The invention accordingly comprises the features of construction, combinations of elements, and arrangement of parts which will be exemplified in the constructions hereinafter set forth, and the scope of the invention will be indicated in the claims.



For a fuller understanding of the nature and objects of the invention, reference should be had to the following detailed description taken in connection with the accompanying drawing, in which:

FIG. 1 is an elevational view, partially in cross section, of one embodiment of the invention;

FIG. 2 is an enlarged cross-sectional view of the drop dispensing tip taken along line 2–2 of FIG. 1;

FIG. 3 is an enlarged longitudinal sectional view of the drop dispensing tip of FIG. 1; and

FIG. 4 is an enlarged longitudinal sectional view of a drop dispensing tip constructed according to another embodiment of the invention.

## DETAILED DESCRIPTION OF THE INVENTION

Referring now to the drawing, the overall dropper dispenser constructed according to one embodiment of the invention includes, as seen in FIG. 1, a plastic squeeze bottle 10 formed by conventional methods from a suitable material, such as polyethylene. The bottle 10 is formed having a threaded neck which is engaged by a screwcap 12.

A discharge tube 14 extends through a snug-fitting central aperture in the top of cap 12. The lower intake end 16 of tube 14 terminates just short of the bottom of the bottle 10. The intake end 16 of the tube is preferably cut at an angle to avoid the possibility of clogging. The tube 14 may also be formed of polyethylene.

The portion of tube 14 above the cap 12 is bent to extend laterally and downwardly, as seen in FIG. 1, in gooseneck fashion. It will be appreciated that the discharge tube may have any desired configuration. However, the disclosed gooseneck configuration has been found to be eminently suited for most applications.

The end of the discharge tube 14 external of the bottle 10 is necked-down, as indicated at 18, to receive and hold a drop dispensing tip, generally indicated at 20. The dispensing tip includes, as best seen in the enlarged sectional views of FIGS. 2 and 3, an elongated capillary tube 22 which extends through the necked-down end portion 18 of the discharge tube and is retained in position thereby. This is accomplished, for example, by making the constricted opening in tube end portion 18 a force fit for the capillary tube 22.

An elongated stem 24 extends through the capillary tube 22 with sufficient clearance to provide a liquid passage 26 therebetween (FIGS. 2 and 3). The optimum dimensions of the liquid passage will depend on the consistency of the liquid to be dispensed. For example, a dispensing tip 20 with a stem 0.035 inch in diameter and a capillary tube having an inner diameter of 0.041 inch is satisfactory for dispensing liquids of the consistency of water. The stem and capillary tube may be formed of stainless steel.

To retain the stem 24 in position extending through the capillary tube 22, in one embodiment of the invention the tube is crimped into engagement with the stem. As best seen in FIGS. 2 and 3, the capillary tube is crimped at opposed points, indicated at 28, to collapse the tube sidewall against the stem. As seen in FIG. 2, clearance between the capillary tube and stem is retained between the opposed crimps 28 to preserve the continuity of the liquid passage 26 along the entire length of the capillary tube. Preferably, there is provided an addition set of diametrically opposed crimps 28 (FIGS. 1 and 3) offset 90° from the first to provide substantially rigid mounting of the stem within the capillary tube.

As an additional embodiment of the invention, seen in FIG. 4, the capillary tube 22 is slightly bent while the stem 24 is extending therethrough. As a consequence, the stem is engaged by the capillary tube at spaced points indicated at 30 to frictionally retain the stem in place. Again the continuity of the liquid passage 26 is preserved.

Each embodiment of the invention is operated in the same fashion. Controlled digital pressure on the bottle 10 collapses its sidewall, forcing liquid through the discharge tube 14 to the dispensing tip 20. The liquid is then forced through the con-

stricted passage **26** and, if the exerted pressure is not excessive, forms into separate drops at the outer open end of the capillary tube **22**. With the dispensing tip **20** downwardly oriented, the drops run down the stem to its end from which they are deposited on a desired spot. To insure accuracy of deposit, the tip of the stem may contact the desired spot. By controlling the digital pressure on the bottle **10** any desired number of drops may be dispensed.

If it is not desired to meter out the liquid in drop form, excessive digital pressure is exerted on the bottle **10** and the liquid issues from the dispensing tip **20** as a stream. In the absence of digital pressure, liquid cannot escape from the dispensing tip even when the dispenser is inverted, and thus the dispenser of the invention is spillproof. Removal of the cap **12** permits refilling of the bottle **10** and the dispenser is thus reusable. Since the dispensing tip **20** is never capped the dispenser is always immediately ready for use. Due however to the constricted nature of liquid passage **26**, contamination of the liquid is unlikely.

While the disclosed embodiments of the invention are directed to deforming the capillary tube into engagement with the stem, it will be appreciated that the stem may be deformed into engagement with the capillary tube in order to mount the stem. Moreover, the stem could be spot welded to the capillary tube, producing interengagement analogous to the spaced crimps **28** (FIG. 3).

It will thus be seen that the objects set forth above, among those made apparent from the preceding description, are efficiently attained and, since certain changes may be made in the above constructions without departing from the scope of the invention, it is intended that all matter contained in the above description or shown in the accompanying drawing shall be interpreted as illustrative and not in a limiting sense.

I claim:

1. A dropper dispenser comprising, in combination:
   - A. a plastic squeeze bottle for containing a liquid to be dispensed;
   - B. a discharge tube having an intake end submerged in the liquid and an exhaust end external of said bottle; and
   - C. a dispensing tip fitted in said exhaust end of said discharge tube, said tip including:
     1. a capillary tube having one end communicating with said discharge tube; and
     2. a straight, elongated stem extending through said capillary tube with sufficient clearance to provide a liquid passage therebetween;
        - a. one end of said stem extending beyond the other end of said capillary tube,
     3. said capillary tube being formed having spaced crimps collapsing its sidewall into engagement with opposite sides of said stem, whereby to fixedly mount said stem in its position within said capillary tube, and leave a restricted flow path at the sides of said crimps.

2. The dispenser defined in claim **1** wherein said crimps are formed in said capillary tube at diametrically opposed locations.

3. The dispenser defined in claim **2** wherein:
   1. at least two sets of diametrically opposed crimps are formed in said capillary tube at longitudinally spaced locations:
      - a. one of said sets of opposed crimps being angularly offset from the other.

4. The dispenser defined in claim **1** wherein said exhaust end of said discharge tube being necked-down pursuant to accommodating said dispensing tip.