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J. S. ROSENBLATT

2,277,936

DISPENSER

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*Fig. 4.*

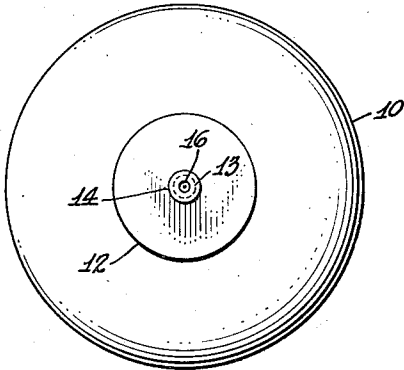


*Fig. 1.*

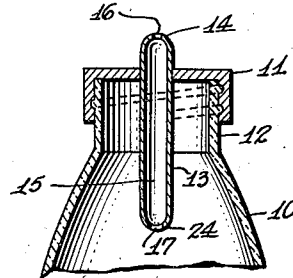


*Fig. 2.*

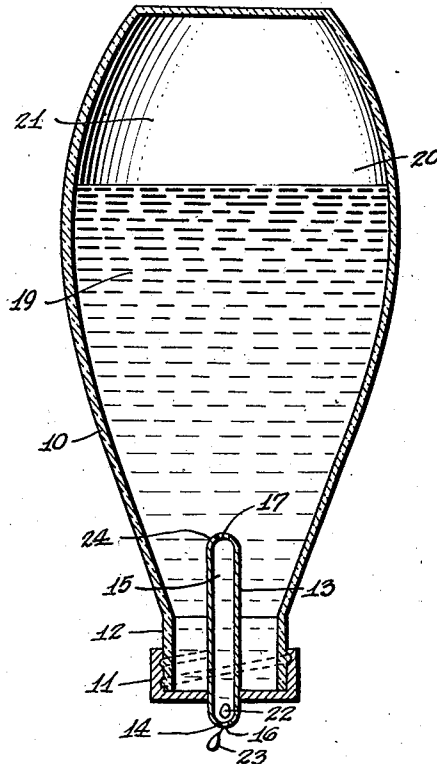
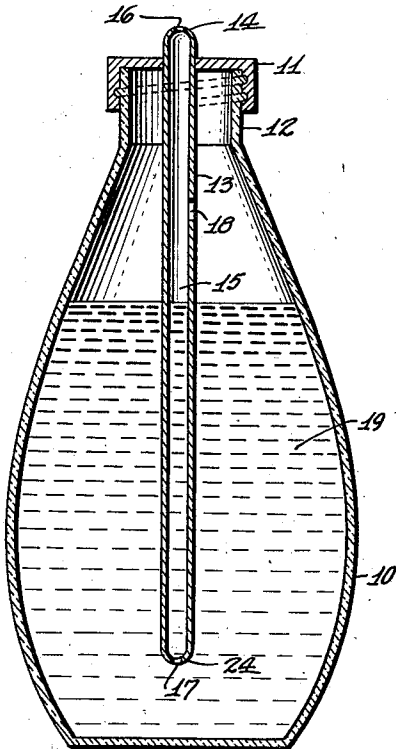


*Fig. 3.*



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## UNITED STATES PATENT OFFICE

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## DISPENSER

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5 Claims. (Cl. 221-148)

This invention relates to an improvement in the art of liquid dispensing, and particularly to dispensing devices, easily constructed, which dispense liquids in drops or in a predetermined quantity from a container or bottle.

Heretofore, a considerable number of bottles or containers have been sold on the market for liquids that should be dispensed in pre-determined quantities. Unless one is skilled in the art of dispensing liquids, it is highly impracticable to control the flow so that the liquid can be dispensed one drop at a time and can be measured in drops or dispensed in a limited predetermined quantity. For the purpose of convenience, reference hereinafter made to a "bottle" is meant to also include "container."

I have invented a device, which, without moving parts, will dispense liquids a drop at a time or in a limited predetermined quantity when the container is inverted. By the application of a properly proportioned siphon or tube I am enabled to regulate the pre-determined flow of liquid (i. e., one drop, two drops, three drops, four drops, etc.). This device may be easily and economically made as an integral part of a bottle or can be made as an appliance or attachment to the bottle by provision on the neck of the bottle by means of snap fastenings, friction joints, threads, and may be wedged into the bottle or permanently attached by means of soldering, welding, amalgamation, molding such as in plastics, etc.

The invention will be described in detail in connection with the accompanying drawing which illustrates diagrammatically a dispensing device, which exemplifies but does not limit the invention.

Fig. 1 is a sectional view of one form of a dispensing device, being shown in an upright position, embodying my invention;

Fig. 2 is a sectional view of the dispensing device in an inverted position showing the liquid being dispensed;

Fig. 3 is a sectional view of another form of dispensing device embodying my invention; and

Fig. 4 is a plan view of the device.

In Fig. 1 of the drawing there is shown a bottle 10 to which the dispensing device 11 may be attached or made an integral part thereof. The dispensing device 11, as shown, consists of a longitudinal tube or siphon 13 which protrudes above the neck 12 of the bottle and preferably extends through the neck 12 of the bottle to a point 24 within the bottle 10. It is immaterial how far the tube or siphon protrudes above

the neck 12. The opening 16 at the outer end 14 is smaller in diameter than the bore 15, to restrain the flow of liquid and air and to regulate the size of the drops dispensed. The neck 12 of the bottle around the tube 13 must be solid so that there is no leakage of air pressure through the neck 12 of the bottle which is around the tube or siphon 13.

Fig. 2 shows an inverted bottle showing the liquid being dispensed when bottle 10 is inverted. The principle or theory upon which the dispensing takes place is due to kinetic energy of the liquid 19 when the bottle is inverted for dispensing, causing a momentary unbalance of pressure between atmospheric pressure at the outer opening 16 and the internal pressure on the opening at 17, thus creating a greater fluid pressure force at opening 17. The air pressure at opening 16 then becomes slightly less than the combined pressure of air 21 in the upper part of the inverted bottle 10 plus the weight of liquid 19 plus the kinetic energy of the liquid in the bottle. This causes the liquid to flow from the bottle 10 and tube 13 through opening 16. These openings 16 and 17 at each end of tube 13 being smaller than the diameter of the tube constrain the liquid from flowing from tube 13 and air from entering. The liquid flows in drops, one drop at a time (see 23). As the liquid flows from the tube 13 and opening 16 an air bubble 22 passes through opening 16 into and through tube 13 into bottle 10 displacing the liquid dispensed. When the kinetic energy is spent, the force at opening 16 will equal the force at opening 17. The condition is then static and liquid can not flow from the bottle until there is a repeated momentary unbalance such as caused by again inverting the bottle.

In Fig. 3 of the drawing there is shown a modified form of dispensing device embodying the principles of this invention. In this form the bottle 10 is provided with a dispensing device 11 attached thereto or made an integral part thereof. The device 11 has extending therethrough a tube 13, which in this form of the invention extends a considerable distance into the bottle. The tube 13 is provided with a fluid inlet port 18 in its side wall just below the neck 12 of the bottle. It is through this port 18 that liquid enters the tube 13 to be dispensed when the bottle is inverted.

When the bottle is in upright position, the tube between its end 14 and the fluid inlet port 18 is filled with air, it being understood that the liquid level will be below the inlet 18. Upon

inverting the container, the liquid will enter the tube through the port 18 while the air trapped between the outer end 14 of the tube and the port 18 will slowly ascend the tube 13 to displace the liquid. The length of tube 13 depends upon the viscosity of the liquid to be dispensed. Accordingly, the ascending air is eventually discharged from the tube through orifice 17 into the container, replacing the amount of liquid which has been dispensed. When the air has traveled the length of the tube and discharged into the container, a static condition will be created and the dispensing of the liquid will cease.

It will, therefore, be seen that by varying the position of the port 18 with respect to the discharge end of the tube, which results in varying the length of the air column between port 18 and the discharge end of the tube 13, the quantity of the liquid dispensed can be controlled and predetermined.

The size or character of the flow dispensed will depend upon the size of the opening 16 at the outer discharge end of the tube. When this opening 16 is restricted, the flow will be in drops depending upon the degree of restriction.

In the construction of my device, I wish to emphasize that no adjustments nor moving parts are required for the proper functioning of the device. The usual methods employed in dispensing are entirely done away with. It is neither necessary to shake the container, employ additional appliances, nor numerous cap fittings. In order to operate the device, all that is necessary is to invert the container once and a predetermined quantity of liquid will be dispensed, the flow ceasing when a static condition is established.

I claim:

1. A dispensing device of the character described, comprising a receptacle for fluid to be dispensed, a single tube fitted in operating relationship with and extending through an opening in said receptacle to a point within said receptacle at a substantial distance below said opening, said tube having restricted outer and inner end openings, said tube being of such a length and so proportioned as to permit a predetermined number of drops of the contained fluid to be dispensed upon inverting the receptacle, when said outer end opening is exposed to the air.

2. A dispensing device of the character described, comprising a container for the fluid to be dispensed, a closure for said container, a single tubular member having inner and outer end openings fitted in operating relationship with and extending through said closure to a point within the said container, said tubular member having its side wall within the container pro-

vided with a fluid entering port in free communication with the interior of the container, said fluid entering port being so proportioned and so positioned on the tubular member as to permit a limited and predetermined quantity of fluid to be dispensed through the outer end of said tube upon inverting the said container, when said outer end opening is exposed to the air.

3. A dispensing device of the character described, comprising a receptacle for the fluid to be dispensed, a single tube having inner and outer end openings fitted in operating relationship with and extending through an opening in said receptacle to a point within said receptacle, said tube having a restricted outer end opening, said tube being provided with an aperture in its side wall in free communication with the interior of the container, said restricted end opening and side wall aperture being so proportioned and positioned as to permit a predetermined number of drops of the fluid to be dispensed upon inverting the container, when said outer end opening is exposed to the air.

4. A dispensing device of the character described, comprising a container for the fluid to be dispensed, a closure for said container, a single tubular member having inner and outer end openings fitted in operating relationship with and extending through said closure and into said container to a point a substantial distance below said closure, said tubular member having its outer end opening restricted and its side wall within the container provided with a fluid entering port in free communication with the interior of the container, said fluid entering port being so positioned on the tubular member as to permit a limited and predetermined quantity of fluid to be dispensed through the outer end of said tube upon inverting the said container, when said outer end opening is exposed to the air.

5. An attachment for a receptacle containing fluid to be dispensed, comprising a closure member for said receptacle and a single tubular member having inner and outer end openings extending through and held in operating relationship with said closure member, said tubular member being provided with an aperture in its side wall closely positioned to said closure member, said aperture being in free communication with the interior of the container, said tubular member and aperture being so proportioned and so positioned with reference to the closure member that when said closure member is placed on a fluid containing receptacle and said receptacle is inverted, a predetermined quantity of fluid will be dispensed, when said outer end opening is exposed to the air.

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