

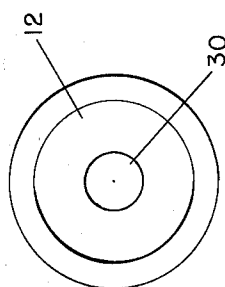
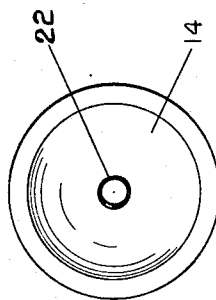
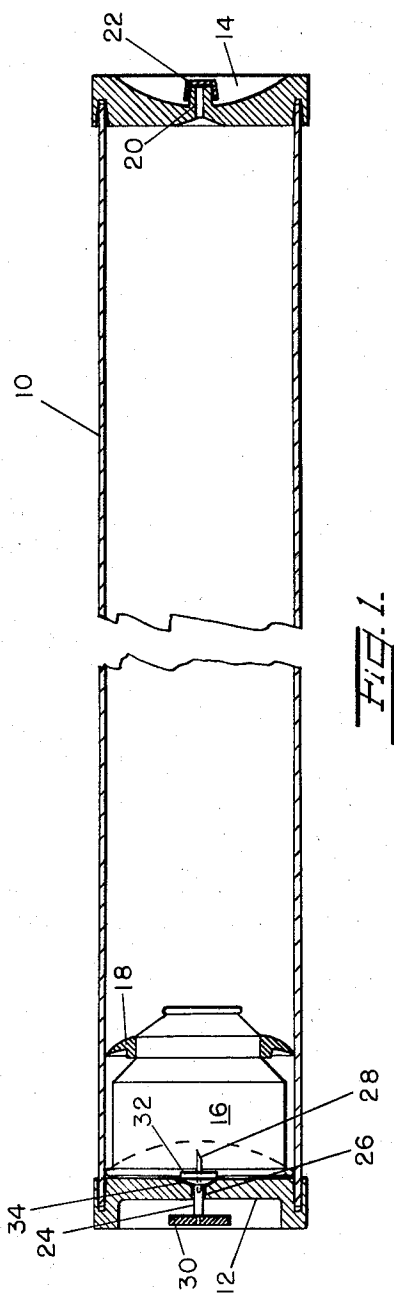
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LIQUID DISPENSER

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LIQUID DISPENSER

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6 Claims. (Cl. 222—80)

This invention relates to improvements in liquid dispensers of the character which employ pressurizing gas as the liquid dispensing medium and includes improvements in the method of dispensing liquid from devices of this type.

The principles of the present invention are particularly applicable to portable hand-held devices for dispensing liquid under pressure in the form of a jet or spray but are also applicable to all devices wherein the pressure for dispensing or discharging liquid is derived from the release of compressed gas from a container therefor.

The principal object of the present invention is greatly to simplify the construction and operation of devices of the above character and to this end the invention contemplates utilizing the container of pressurizing gas as the piston or follower for dispensing the liquid thus to avoid the provision of an additional element for this purpose. The invention further contemplates the provision of a puncturing pin for the container which is combined with the valve which seals the liquid dispenser against the escape of released pressurizing gas.

Other objects and advantages of the invention will be apparent from the following detailed explanation taken in conjunction with the accompanying drawings wherein a preferred embodiment of the principles of the invention has been selected for exemplification.

In the drawings:

Fig. 1 is a longitudinal sectional view partly broken away of a liquid dispenser constructed in accordance with the present invention;

Fig. 2 is a rear end plan view; and

Fig. 3 is a front end plan view.

Referring more particularly to the drawings, wherein like numerals refer to like parts, the cylindrical tube 10 which forms the body portion of the liquid dispenser may be formed of any desired material but preferably is formed of paper either spiral or convolute wound treated by plastic or paint coatings or the like so as to be impervious to liquid. The end closures 12 and 14 may be of wood or molded plastic cemented in place but crimped on thin metal caps may also be used if desired. We have found that such paper cylinders can safely withstand applied pressure of several hundred pounds per square inch and with the use of the inexpensive materials just described the entire device may be expendable and thrown away after use.

The container of pressurizing liquid gas 16, which is shown as normally positioned at the rear end portion of the tube 10, is also preferably cylindrical and carries at its forward end portion an annular flexible seal 18 which extends radially outwardly in slidable engagement with the adjacent interior side wall of the tube 10. Thus, the container 16 and seal 18 collectively form a piston slidable substantially the length of the tube 10 whereby to force the liquid in the tube 10 outwardly through the nozzle 20 formed in the front end closure 14 when the end cap 22 is removed.

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For actuating the device a shaft 24 is reciprocally supported in a central bore 26 provided in the rear end closure 12. A pin 28 is carried at the forward or inner end of the shaft 24, as shown, and is adapted to puncture the container 16 for release of pressurizing gas when thrust inwardly against the adjacent wall portion of the container by pressure or a sharp blow upon the disc 30 carried at the outer or rear end of the shaft 24.

For preventing the escape of pressurizing gas at the rear end of the tube 10 when the container 16 is punctured, the inner end portion of the shaft 24 is provided with a tapered portion or valve 32 and the central bore 26 is provided with a mating seat portion 34. It will be apparent that after the pin 28 is forced inwardly to puncture the container 16 the released pressurizing gas will thrust the valve 32 outwardly against its seat 34 thus to form a seal against the escape of pressurizing gas from the pressure chamber at the rearward end of the device behind the container 16. Thus, the operator after puncturing the container 16 need only to hold the device and direct the stream of discharged liquid as desired.

The liquefied pressurizing gas employed in the container 16 may be similar to that used in domestic and commercial refrigeration systems and the liquefied gas once released from the container 16 evaporates only fast enough to maintain a constant pressure equal to its vapor pressure. We prefer to use a gas having a vapor pressure not substantially in excess of 100 pounds per square inch at 70° F. for which formulas of Freon gas, for example, are available. It will be apparent that the pressure of the released gas is a function only of its temperature and remains constant, even though expansion takes place, so long as any liquid gas remains and that after the last liquid gas is evaporated the chamber pressure will decrease. Accordingly, in our device we propose to employ sufficient liquefied gas to keep the pressure within the device constant until the last payload liquid is expelled from the tube 10.

It is to be understood that the particular device herein illustrated and described is exemplary only of the principles of the invention which embrace all such modified constructions and arrangement of parts as come within the scope of the following claims.

We claim:

1. A liquid dispenser comprising, a cylindrical paper tube for holding liquid to be dispensed, front and rear end closures for said tube, a liquid discharge outlet in said front end closure, a cylindrical container of liquid pressurizing gas positioned within said tube normally adjacent its rear end, the said container forming a piston slidable substantially the length of said tube whereby to force the liquid in said tube outwardly through said discharge outlet, a shaft having a valve portion reciprocally supported in a bore provided in said rear end closure, a pin provided at the inner end of said shaft and adapted to puncture said container for release of pressurizing gas when thrust inwardly against the adjacent wall portion of the container, and a seat provided in said rear end closure for receiving said valve portion when the shaft is thrust outwardly by released pressurizing gas whereby to form a seal against the escape of said released pressurizing gas.

2. A liquid dispenser comprising, a cylindrical tube for holding liquid to be dispensed, front and rear end closures for said tube, a liquid discharge outlet in said front end closure, a cylindrical container of liquid pressurizing gas positioned within said tube normally adjacent its rear end, a flexible seal secured to said container and extending radially outwardly thereof in slidable engagement with the adjacent interior side wall of said tube, the said

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container and seal collectively forming a piston slidable substantially the length of said tube when the pressurizing gas is released from said container whereby to force the liquid in said tube outwardly through said discharge outlet.

3. In a liquid dispenser including a container of liquid pressurizing gas positioned within said dispenser adjacent its rear end, means for puncturing said container to release pressurizing gas for discharging the liquid from said dispenser which comprises, a shaft having a valve portion reciprocally supported at the rear end of said dispenser, a pin provided at the inner end of said shaft and adapted to puncture said container for release of pressurizing gas when thrust inwardly against the adjacent wall portion of the container, and a seal provided at the rear end portion of said dispenser for receiving said valve portion when the shaft is thrust outwardly by released pressurizing gas whereby to form a seal against the escape of said released pressurizing gas.

4. A liquid dispenser comprising, a cylinder paper tube for holding liquid to be dispensed, front and rear end closures for said tube, a liquid discharge outlet in said front end closure, a cylindrical container for liquid gas positioned within said tube normally adjacent its rear end, a charge of pressurizing liquid gas within said container, the said gas having a vapor pressure not substantially in excess of 100 pounds per square inch at 70° F., a flexible seal secured to said container and extending radially outwardly thereof in slidable engagement with the adjacent interior side wall of said tube, the said container and seal collectively forming a piston slidable substantially the length of said tube whereby to force the liquid in said tube outwardly through said dis-

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charge outlet, a shaft having a tapered portion reciprocally supported in a central bore provided in said rear end closure, a pin provided at the inner end of said shaft and adapted to puncture said container for release of pressurizing gas when thrust inwardly against the adjacent wall portion of the container, and a seat for the tapered portion of said shaft forming a part of said central bore, the said tapered portion of said shaft when thrust outwardly against said seat by released pressurizing gas forming a seal against the escape of said released pressurizing gas.

5. In a liquid dispenser, a tubular member for holding liquid to be dispensed and having a forward liquid discharge end and a rearward end, a container of pressurizing gas positioned within said tubular member normally adjacent its rearward end rearwardly of said liquid, the said container being slidably supported within said tubular member whereby to function as a follower when its pressurizing gas is released to discharge liquid from the forward liquid discharge end of the tubular member and means operable from the rearward end of said tubular member for releasing the pressurizing gas from said container.

6. The device of claim 5 additionally including valve means at the rearward end of the tubular member to prevent the rearward escape of pressurizing gas released from the container.

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