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M. MALAKOFF ETAL

3,129,855

AEROSOL PACKAGE

Filed July 17, 1961

FIG. 1.

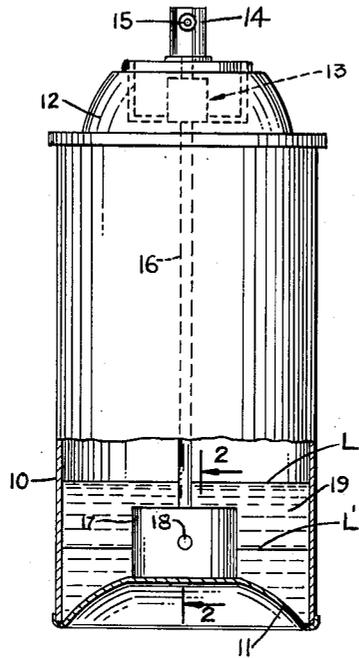


FIG. 3.

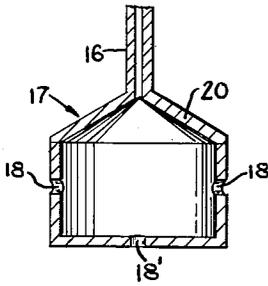


FIG. 4.

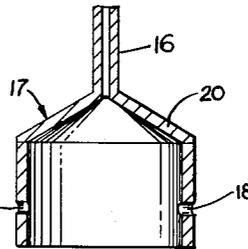
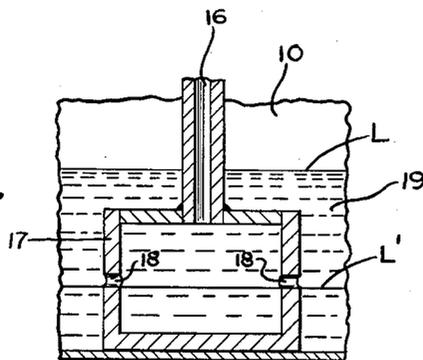


FIG. 2.



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The present invention relates to a pressurized aerosol package adapted to permit the discharge of a liquid from said package in the form of an aerosol, and relates more particularly to a valved aerosol package having means located between the liquid contents and the end of the dip tube leading to the discharge valve which provides a reserve of said liquid after use of said aerosol package has caused the discharge of all of the normally available liquid.

Pressurized aerosol packages for discharging a liquid in the form of a spray are in common use. They operate by the action of a volatile propellant which is present in the package and which has an appreciable vapor pressure at room temperatures. By holding the container upright and then opening a valve at the head of the container the liquid is forced upward under the vapor pressure of the propellant and passes out through a discharge orifice in the form of a fine mist or spray. The propellant itself merely vaporizes off. In ordinary use the liquid is discharged by a series of intermittent operations. When the container is empty it is discarded. For most materials no particular problem is involved although, since the level of the contents cannot be observed, the container may be found to be completely discharged at some inconvenient time. The aerosol packaging of therapeutic compositions for inhalation therapy, for example, poses another problem, however, since such medication is frequently required for the treatment of an acute attack. It can be appreciated that the consequences of an acute attack may be quite serious if the container is found to be empty of the therapeutic composition at a critical time.

It is, therefore, an important object of this invention to provide a pressurized aerosol package of a liquid material which is further provided with an emergency reserve of said liquid material adapted to be discharged from the container at will after the contents available from said container have been exhausted in normal use.

Another object of this invention is to provide a pressurized aerosol package of a liquid in which the discharge of the contents of said package serves as a signalling device for the use of an emergency reserve and for the replacement of the empty aerosol package with a full one.

Yet another object of this invention is the provision of a pressurized aerosol package which can be operated in both upright and inverted position.

Other objects of this invention will appear from the following detailed description and the accompanying drawing.

In the drawing:

FIG. 1 is a side-elevation view, partly broken away, of an aerosol container of this invention showing the outside shell, discharge valve and dip tube as well as a container means which is provided for holding the emergency reserve,

FIG. 2 is a detail view, in section, of the container means taken along the line 2-2 in FIG. 1, and

FIGS. 3 and 4 are detail views, also in section of modified forms of said container means.

Like numerals indicate like parts throughout the views in the drawing.

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Referring now to the drawing and more particularly to FIG. 1, the aerosol container illustrated comprises an outer cylindrical shell 10 fitted with a concave base 11 (which may also be perfectly flat, if desired) and a shaped, generally convex top 12. The container is provided with a discharge valve 13 which is actuated by pressing downwardly on button 14. The contents which are normally under pressure leave through valve 13 when it is opened and pass outwardly through a discharge orifice 15. Communicating with valve 13 is a dip tube 16 which is of sufficient length so that the end is normally below the surface of any liquid in the container. Attached to the lower end of dip tube 16 is a chamber 17 having orifices 18 communicating with the liquid in the container. All of the liquid in the container which is discharged passes through chamber 17 on its way up through the dip tube 16 and is then discharged from the container through valve 13 and orifice 15.

In normal operation the pressurized aerosol package is filled with a liquid 19 which may be at level L. Above the liquid, the open space is charged with a propellant in the gas phase or in the form of an immiscible liquid having an appreciable vapor pressure. Miscible liquids having appreciable vapor pressure are also useful. The pressure of the gas or vapor above or in the liquid forces the liquid into chamber 17 through holes 18 and tends to force it upwardly into dip tube 16. When valve 13 is opened by pressing on the button 14 the liquid is discharged under pressure from discharge orifice 15 in the form of a spray.

When discharging the liquid as a spray the container is normally held in upright position so that the pressure of the gas or vapor will always be exerted on the liquid surface. The liquid will continue to be discharged each time valve 13 is opened until the level of the liquid has fallen to L' as shown in FIG. 2. At that point the gas or vapor in the container can escape freely through orifices 18 and pass from the container through dip tube 16 whenever valve 13 is opened. Thus, when in its normal upright position and with the liquid level at L' no more liquid will be discharged and at this point only gas is discharged. This point can be easily recognized since the sound of gas escaping from valve 13 is distinctly different from that produced as liquid emerges and, in addition, there is no visible spray pattern formed.

However, as shown in FIG. 2, a certain amount of the liquid is trapped in chamber 17 at level L'. If the container is now inverted the liquid in chamber 17 will be brought into contact with dip tube 16. By opening valve 13, this reserve of liquid will be discharged from the container.

Modified forms of the chamber are shown in FIGS. 2 and 3. Thus, in FIG. 3 a further opening 18' may be provided in the base of the chamber to ensure maximum utilization of the contents. Opening 18' allows the reserve contents which cannot enter openings 18 if below this level to enter at the base. Similarly, as shown in FIG. 4, the base of the chamber may be dispensed with entirely. To further ensure maximum utilization of the contents, chamber 17 is preferably provided with tapered shoulders 20 which direct the liquid flow to the dip tube 16 when the container is inverted.

The many propellant systems known to the art which form an immiscible heterogeneous two-phase system with the liquid to be discharged in spray or mist form are suitable for use in the aerosol package of this invention. Descriptions of suitable systems are found in U.S. Patents Nos. 2,719,219, 2,655,480 and 2,868,691. Miscible systems are also effective.

While the chamber 17 is shown as being cylindrical in shape, a similar result is obtained if it is a hollow an-

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nulus and funnel shaped or is relatively flat and disc shaped and is provided with an orifice or orifices at such a level that a portion of the liquid will remain in the chamber as a reserve when the remainder has been discharged in normal use with the container in upright position.

It is understood that the foregoing detailed description is given merely by way of illustration and that many variations may be made therein without departing from the spirit of our invention.

Having described our invention, what we desire to secure by Letters Patent is:

1. In a pressurized aerosol package comprising a closed container, a liquid in said container, a volatile propellant for said liquid and a discharge valve for controlling the discharge of said liquid from said container under the pressure of said propellant, the combination with a dip tube connecting said valve with the liquid at the base of said container of an enlarged and enclosed hollow chamber located at and communicating with the lower end of said dip tube, said chamber being provided with an open-

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ing above the level of the base of the chamber to form an inlet through which the liquid communicates with said chamber and is discharged through said dip tube and valve.

5 2. Structure in accordance with claim 1 wherein the opening is substantially intermediate the height of the chamber.

10 3. Structure in accordance with claim 1 wherein said chamber is additionally provided with an opening in the base thereof.

References Cited in the file of this patent

UNITED STATES PATENTS

489,786	Bonbrake	Jan. 10, 1893
15 1,907,301	Martin	May 2, 1933
2,932,433	Abplanalp	Apr. 12, 1960
2,950,031	Abplanalp et al.	Aug. 23, 1960
2,978,152	Batty	Apr. 4, 1961

FOREIGN PATENTS

20 1,076,343	France	Apr. 21, 1954
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