June 15, 1954

W. TUTTLE

2,681,252

SPRAY DEVICE

Filed Jan. 17, 1951

Fig. 1.

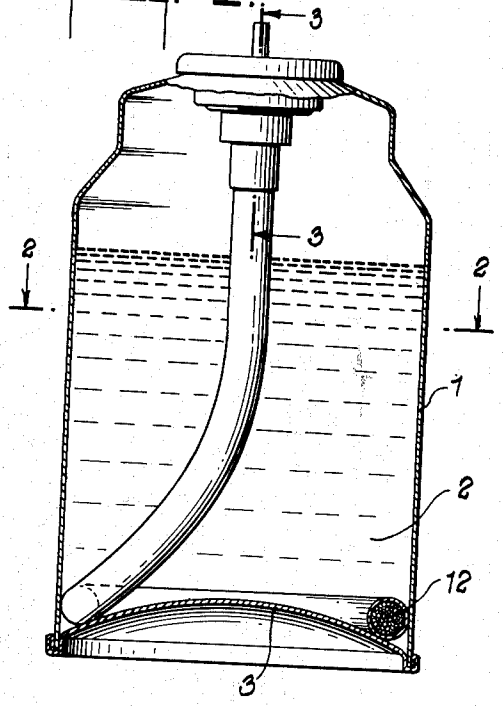



Fig. 2.

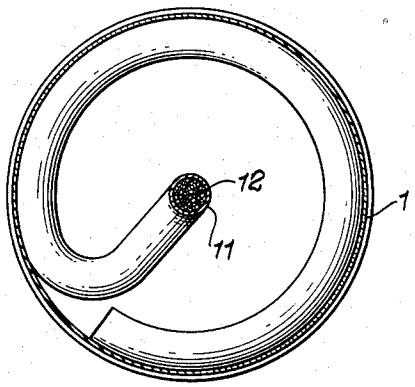
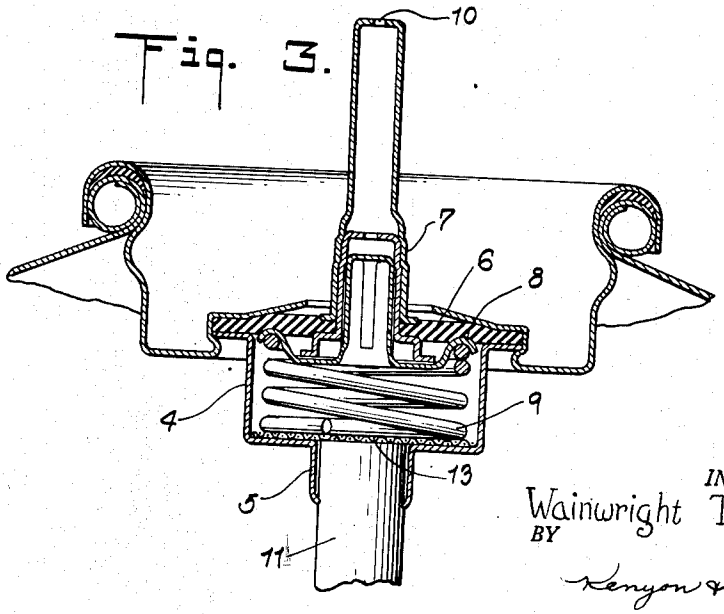



Fig. 3.




INVENTOR.
Wainwright Tuttle
BY
Kenyon & Kenyon
ATTORNEYS

Patented June 15, 1954

2,681,252

# UNITED STATES PATENT OFFICE

2,681,252

## SPRAY DEVICE

Wainwright Tuttle, Milford, Conn., assignor to Bridgeport Brass Company, Bridgeport, Conn., a corporation of Connecticut

Application January 17, 1951, Serial No. 206,341

8 Claims. (Cl. 299—95)

1

This invention relates to a spray device of the type including a container for liquid under super-atmospheric pressure and which is provided with an outlet having a spray orifice for ejecting the container's content.

One form of this type of device is in the nature of a package which is made and sold as a complete unit. The outlet is provided with a valve and the liquid is a gas at atmospheric pressure. The container is of a size handy for manual manipulation. The liquefied gas includes an active ingredient such as an insecticide, deodorant, perfume or the like. The valve is made so that it can be released by finger pressure, and the user picks up the package and operates the valve so as to obtain a spray dispensing the active ingredient.

One of the problems encountered in designing and making a spray device in the above form is to obtain a relatively uniform flow rate through the spray orifice regardless of the position in which the user holds the package. Another problem is to obtain a relatively dry spray, as it is called, which means that the liquefied gas completely converts to its gas phase during its ejection through the spray orifice or soon enough thereafter to avoid the spattering of droplets of the gas while still in its liquid phase.

One of the objects of the present invention is to overcome the above problems to a greater degree than has heretofore been possible and without involving excessively high manufacturing costs. Another object is to produce a spray device of the type described and which operates in a reasonably satisfactory manner regardless of whether or not the container is inverted. Still another object is to produce this type of device in the form of a spray package and which provides for the dispensing of a relatively uniform spray regardless of the position in which the package is held. Other objects may be inferred from the nature of the present invention.

One attempt at solving satisfactorily the mentioned problems involved the use of a metal tube which extended from the outlet of the container down into the latter's liquid content and which contained a wick, the tube being perforated throughout its length. The idea was that the wick would generally acquire its maximum degree of saturation throughout its length regardless of the extent that the metal tube was immersed. This attempt proved to be a failure, the inversion of the container resulting in a wet spray and the rate of spray being excessively irregular

2

when the container was held in various degrees of inversion.

The present invention diverges from the above in that, although a wick-filled tube is used, the tube itself is made from material which is semi-porous to the liquid in the container. A paper tube filled with strands of cotton candle wick strands operates successfully, the paper being of the type which is strong enough to hold together without disintegrating when wet but, of course, not being of a liquid tight variety. Ordinary kraft paper may be used. The tube is connected with the outlet of the container with the wick engaging the entrance end of the outlet. The tube appears to be maintained in a wet or damp condition throughout its lengths whether completely immersed or not in the liquefied gas. The wick naturally remains saturated, which keeps the paper saturated also.

With the above arrangement, a more uniform spray and a drier spray than has heretofore been possible are obtained regardless of whether the container is positioned with the outlet uppermost or is more or less inverted. The liquefied gas feeds through the tube and through the wick when the outlet is connected with the atmospheric pressure, the feeding presumably resulting from a combination of the pressure inside the container and capillary attraction.

The accompanying drawings illustrate one form of the invention, the various figures being as follows:

Fig. 1 is a vertical section of one of the described kind of packages incorporating the principles of the present invention;

Fig. 2 is a cross section taken on the line 2—2 in Fig. 1; and

Fig. 3 on an enlarged scale shows a vertical section of the valve outlet with its spray orifice.

As illustrated, the container 1 is in the form of a commercially available, twelve ounce, seamless tin can of the so-called low pressure type. This can is filled with liquefied gas 2 containing an active ingredient such as an insecticide, deodorant, perfume, etc. The bottom 3 of the can has the familiar concave shape used to resist high internal pressure.

The mouth of the can is closed by a pressed metal assembly shown in detail by Fig. 3. This assembly includes a cup 4 having a feeding tube connection 5 and provided at its top with a completely enclosing, deformable, non-metallic diaphragm 6. An expansion chamber and nozzle assembly 7 projects through this diaphragm 6 and is clamped to it, a base flange 8 seating

against the bottom of the diaphragm 6 in a fluid tight manner under the urge of a spring 9 contained in the cup 4. The inside of this flange 8 communicates with the inside of the nozzle assembly 7 and the latter communicates with a spray orifice 10 through which the can contents is ejected. When the user tilts the nozzle assembly 7, with finger pressure, the flange 8 is tilted so that one of its sides leaves the bottom of the diaphragm 6 and the can contents can find its way up through the assembly 7 and out through the orifice 10. This valve construction is disclosed and claimed by the Loven et al. application Serial No. 785,158, filed November 10, 1947, now Patent No. 2,582,262.

As described so far the illustrated package substantially duplicates one popular commercialized package now on the market. In this prior art commercial form a plastic tube extends from the connection 5 down into the container 1 and to one point in the peripheral valley formed by the can bottom 3. This tube has a wall which is completely liquid tight, the liquid 2 being driven up through the bottom end of the tube when the nozzle assembly 7 is tilted.

In the present instance the outlet in the top of the can 1 connects, by way of the connection 5, with the described semi-porous tube 11 and the latter not only extends down into the peripheral valley formed by the concave can bottom 3 but it loops around in this valley so as to form a substantially complete circle as is illustrated by Fig. 2. As previously indicated this tube may be made of strong paper, such as kraft paper, that does not disintegrate but which is porous to some degree respecting the liquid 2. The porosity preferred is in the nature of a slow filter paper such as is used to filter liquid. This tube 11 is completely filled with cotton candle wick strands 12 as shown. A screen 13 is positioned in the bottom of the cup 4 across the top of the wick filled tube to prevent wick fibres from reaching and clogging the small fluid passages.

In operation the nozzle assembly 7 is tilted with the can 1 or in any position desired, this including a completely inverted position. When the entire tube 11 is immersed in the liquefied gas 2 the spray rate through the orifice 10 is somewhat faster than when the can is almost empty, but the variation is within reasonably satisfactory limits. When the can 1 is partially empty so that only a portion of the tube 11 is directly wet with the liquefied gas, the balance of the tube 11 still remains wet and the spray rate is not excessively more or less than that obtained when a full can is used. This is so regardless of the degree of inversion of the container. Under all of these conditions a satisfactory dry spray is obtained.

Due to the construction illustrated, the tube 11 is more or less directly immersed in the liquid when the container is held in different positions. As shown, the wick completely fills the tube cross sectionally as well as longitudinally.

The semi-porous paper permits liquid to pass through but resists the passage of gas due to surface tension as in the commonly observed ability of a wet pillowcase to hold air. The wicking not only transmits the liquid to the valve but also likewise prevents the passage of gas to the valve. The paper is a better barrier to gas in a thin layer than the wicking alone would be. This combination is essential for reasonably uniform spray rates in different positions of the container and to prevent gas from reaching the valve in any position of the container.



I claim:

1. A spray device including, in combination, a container for liquid under superatmospheric pressure, an outlet for one wall of said container and having a spray orifice for ejecting the container's content, a tube connected with said outlet to feed said content thereto and extending into said container so that varying lengths of the tube are immersed in said content when said container is held in different positions, and a wick in said tube and extending throughout its immersing length, the wall of said tube being porous to a degree causing the wall to resist the passage of gas when the wall is wet with liquid and to pass the liquid when immersed therein.

2. A spray device including, in combination, a container for liquid under superatmospheric pressure, an outlet for one wall of said container and having a spray orifice for ejecting the container's content, a tube connected with said outlet to feed said content thereto and extending into said container so that varying lengths of the tube are immersed in said content when said container is held in different positions, and a wick in said tube and extending throughout its immersing length, said tube being made of paper that is porous to a degree causing the paper to resist the passage of gas when the paper is wet with liquid and to pass the liquid when immersed therein.

3. A spray device including, in combination, a container for liquid under superatmospheric pressure, an outlet for one wall of said container and having a spray orifice for ejecting the container's content, a tube connected with said outlet to feed said content thereto and extending into said container so that varying lengths of the tube are immersed in said content when said container is held in different positions, and a wick in said tube and extending throughout its immersing length, said tube being made of paper that is porous to a degree causing the paper to resist the passage of gas when the paper is wet with liquid and to pass the liquid when immersed therein, and said wick filling said tube cross-sectionally.

4. A spray package including, in combination, a container containing liquefied gas under superatmospheric pressure, an outlet in the top of said container and having a spray orifice for ejecting said gas, and a tube filled with a wick and connecting with said outlet to feed said gas thereto and extending down to the bottom of said container, the wall of said tube being porous to a degree causing the wall to resist the passage of gas when the wall is wet with liquid and to pass the liquid when immersed therein.

5. A spray package including, in combination, a container containing liquefied gas under superatmospheric pressure, an outlet in the top of said container and having a spray orifice for ejecting said gas, and a tube filled with a wick and connecting with said outlet to feed said gas thereto and extending down to the bottom of said container and extending around the periphery of said bottom, the wall of said tube being porous to a degree causing the wall to resist the passage of gas when the wall is wet with liquid and to pass the liquid when immersed therein.

6. A spray package including, in combination, a container containing liquefied gas under superatmospheric pressure, an outlet in the top of said container and having a spray orifice for ejecting

said gas, and a tube filled with a wick and connecting with said outlet to feed said gas thereto and extending down to the bottom of said container, said tube being made of paper that is porous to a degree causing the paper to resist the passage of gas when the paper is wet with liquid and to pass the liquid when immersed therein.

7. A spray package including, in combination, a container containing liquefied gas under superatmospheric pressure, an outlet in the top of said container and having a spray orifice for ejecting said gas, and a tube filled with a wick and connecting with said outlet to feed said gas thereto and extending down to the bottom of said container, said tube being made of paper that is porous to a degree causing the paper to resist the passage of gas when the paper is wet with liquid and to pass the liquid when immersed therein, and said wick being cotton candle wicking.

8. A spray package including, in combination, a container containing liquefied gas under superatmospheric pressure, an outlet in the top of said container and having a spray orifice for ejecting said gas, and a tube filled with a wick and connecting with said outlet to feed said gas thereto and extending down to the bottom of said container, said tube being made of paper that is porous to a degree causing the paper to resist the passage of gas when the paper is wet with liquid and to pass the liquid when immersed therein and said wick being cotton candle wicking, said tube and wick extending around the periphery of said bottom.




**References Cited** in the file of this patent

UNITED STATES PATENTS

| Number | Name | Date |
|---|---|---|
| 52,231 | Walton | Jan. 2, 1866 |
| 394,775 | Kneuper | Dec. 18, 1888 |
| 2,279,705 | Dayhuff | Apr. 14, 1942 |
| 2,313,930 | Gebauer | Mar. 16, 1943 |

FOREIGN PATENTS

| Number | Country | Date |
|---|---|---|
| 298,693 | Italy | July 13, 1932 |