

March 23, 1965

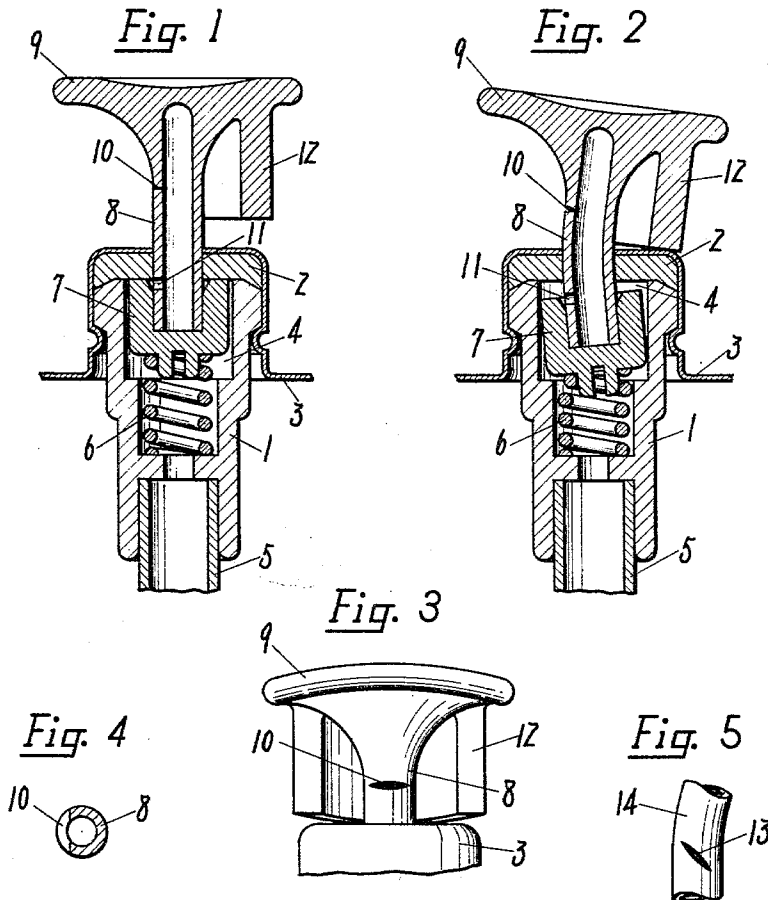
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3,174,694

AEROSOL DISPENSER PUSH BUTTON HAVING A SIDE SLIT

Filed Sept. 29, 1961

2 Sheets-Sheet 1



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Fig. 6

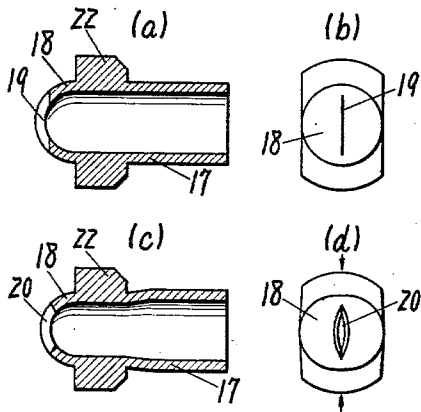


Fig. 9

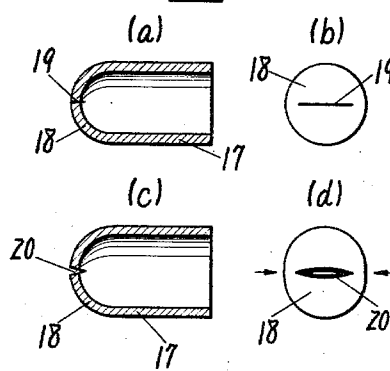


Fig. 7

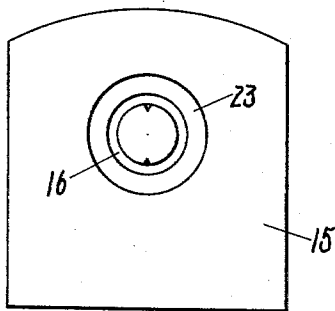


Fig. 10

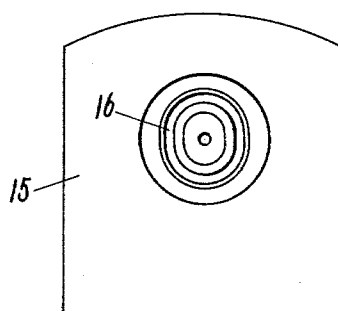


Fig. 8

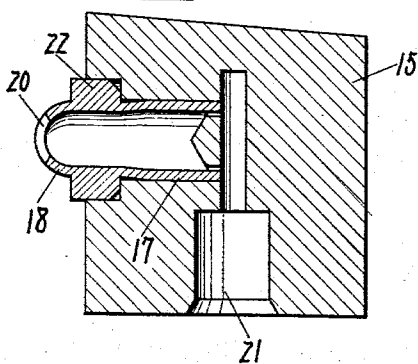
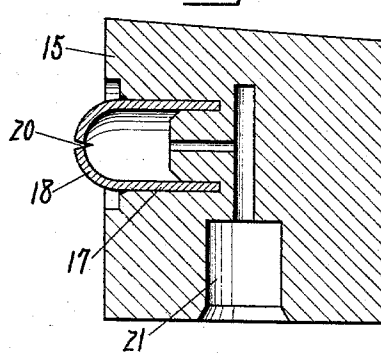


Fig. 11



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The present invention relates to an aerosol dispenser for viscous solution such as paint and lacquer or the like.

An object of the present invention is to provide a spraying means provided in a discharge portion of an aerosol dispenser and through which the spray is emitted an even coating is easily obtained.

Another object of the present invention is to provide a discharge orifice for emitting viscous solution which is free from the formation of droplets which may stain hands and surroundings.

And another object of the present invention is to provide a nozzle piece with which, in substitution for a nozzle piece provided with a conventional small round hole discharge orifice, the above mentioned objects are attained.

For providing the discharge orifice according to the present invention, a curved wall of a member for carrying a solution under pressure is cut sharply open to the inner side of said wall. Accordingly, the spray angle, that is, the vertical angle of the cone of the spray formed, in a cross section in the direction at a right angle to the cut end of the discharge orifice is small, on account of the restriction in the width of the cut end. On the contrary, the spray angle in a cross section in the direction parallel to said cut end can be made wide to an extent of about 160 degrees, because said spray angle is not limited by said cut end. A discharge orifice according to the present invention has also, at least in operation, a spindle-shaped front view and a wedge-shaped cross sectional view in the direction at right angle to the cut end. Accordingly, each of the extremities of the cut end consists of a line and not a face in the wall of said solution carrying means, and no wall side is present from which droplets arise. And, the passing velocity of the discharging solution is maximum at both extremities of the orifice, because the orifice becomes narrower from the center of the orifice to said extremities. Consequently, even if a droplet arises in said extremity of the orifice it is cleared away at once in a mist. This clearing away action is particularly useful when the discharging pressure becomes smaller in the course of the stopping of the discharge. Heretofore, in the spraying of a viscous solution, more particularly in a coating with paints, lacquers or the like, troubles arose from droplets forming at the discharge orifice blowing against the previously coated face or from an accumulation of said droplets dripping down to the hands of the user and the floor. Such troubles do not rise when using an aerosol dispenser provided with a discharge orifice according to the present invention. It is also another advantage with a discharge orifice according to the present invention that the blown area is very wide in one direction and very narrow in another direction at a right angle to the former direction, and when the spray passes to the latter or the narrow direction a wide face is easily coated evenly and without patches. And, it is naturally a resulting merit that a waste of paint is prevented.

Although the novel features which are believed to be characteristic of the invention will be pointed out in the annexed claims, the invention itself as to its objects and advantages and the manner in which it may be carried out may be better understood by reference to the following description taken in connection with the accompanying drawings forming a part hereof, in which:

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FIG. 1 is a vertical sectional side view of a valve having a discharge tube provided with a discharge orifice according to the present invention shown in its off position.

FIG. 2 is a vertical sectional side view of the valve shown in FIG. 1, but in its state of operation.

FIG. 3 is a fragmentary, front view of the valve shown in FIG. 1, but in its state of operation.

FIG. 4 is a lateral sectional end view of the discharge tube shown in FIGS. 1-3, taken across the discharge orifice.

FIG. 5 is a fragmentary, front view of a discharge tube provided with a modified discharge orifice according to the present invention, but in its state of operation.

FIG. 6 shows a nozzle piece provided with a modification of the discharge orifice according to the present invention, in which

FIG. 6(a) is a vertical sectional view.

FIG. 6(b) is a front view.

FIG. 6(c) is a vertical sectional view in the state for being inserted in a push button.

FIG. 6(d) is a front view in the state shown in FIG. 6(c).

FIG. 7 is a front view of a push button for receiving the nozzle piece shown in FIG. 6.

FIG. 8 is a vertical sectional view of the push button shown in FIG. 7 in which the nozzle piece in FIG. 6 is encased.

FIG. 9 shows a modification of the nozzle piece shown in FIG. 6, in which,

FIG. 9(a) is a vertical sectional view.

FIG. 9(b) is a front view.

FIG. 9(c) is a vertical sectional view in the state for being inserted in a push button.

FIG. 9(d) is a front view in the state shown in FIG. 9(c).

FIG. 10 is a front view of a push button prepared for receiving the nozzle piece shown in FIG. 9.

FIG. 11 is a vertical sectional view of the push button shown in FIG. 10 in which the nozzle piece in FIG. 9 is encased.

In FIGS. 1-4, 1 is a valve housing topped with an annular sealing gasket 2 and which is encased tightly in the top wall 3 of a reservoir or container, the remainder of which is not shown. In said reservoir, a viscous solution for example lacquer enamel is filled with a gas expellent for example Freon gas. 4 is a valve chamber. 5 is an eductor tube which is fitted tightly to the valve housing 1 and leads to the bottom of said reservoir. 6 is a valve spring encased within the valve chamber 4 and which supports a valve stem 7. 8 is a discharge tube extending through the wall of said reservoir and said sealing gasket and the lower end of which is encased tightly in said valve stem 7. Said discharge tube is made of a resilient material such as polyethylene resin for being bent by manual pressure on an end of the push button 9 which is formed on the top end of said discharge tube. 10 is a normally closed slit cut sharply and laterally in the wall of the discharge tube 8 with a thin blade. When in operation, the slit 10 forms an opening when tube 8 is bent providing a discharge orifice, as shown in FIG. 2 and FIG. 3, which has a spindle-shaped front view and a wedge-shaped cross sectional view in the direction at right angle to the cut end, and at the same time, an inner orifice 11 which is provided through the wall of lower portion of the discharge tube 8 just above the upper end of the valve stem 7 is exposed in the valve chamber 4, with the result that the solution in the reservoir passes through the eductor tube 5, the valve chamber 4, said inner orifice 11, and the discharge tube 8 and is emitted through said discharge orifice 10. With the above mentioned discharge orifice, a simple structure can be employed in which a plate-formed push button and a discharge tube

can be formed in a body, and no conventional nozzle piece for being encased in a push button is needed. 12 is a stop extending downwardly from the under side of the push button 9, and said stop when abutting said reservoir top wall 13 serves to limit the opening of the discharge orifice 10 by limiting the bending of the discharge tube 8.

In FIG. 5, a modification of the discharge orifice of FIGS. 1-4 is shown. In this modification, a discharge orifice 13 is provided by cutting the wall of a discharge tube 14 in an oblique direction to the axis of said discharge tube. With an aerosol dispenser having a discharge tube provided with this obliquely cut discharge orifice, said orifice is easily kept horizontally or uprightly against a standing wall facing the orifice to said wall, and by turning the whole dispenser to the right and to the left respectively. With this aerosol dispenser, the vertical eductor tube as is apparent in FIG. 1 and FIG. 2, becomes inclined simply when said dispenser is inclined. Consequently, said eductor tube is not kept from sucking action when painting in the vertical and horizontal directions at full width of the spray.

In FIGS. 6-11, 15 is a push button and 16 is a lateral cavity for encasing a nozzle piece in said push button. 17 and 18 are cylindrical portion and nozzle end portion respectively of a nozzle piece. 19 is a cut end of discharge orifice cut with a thin blade. 20 shows a resultant discharge orifice of the cut end 19 caused by a stress acted on the nozzle end portion 18. 21 is a vertical cavity provided in the push button 15 for said push button being topped on a discharge tube of aerosol dispenser. The nozzle piece shown in FIG. 6 and FIG. 8 is provided with a brim 22. Said brim has a front view, as is apparent in FIG. 6(b), of rectangular form, each short side of which is replaced by an arc of a circle, and upon acting a stress on said brim in the direction of the arrows shown in FIG. 6(d), a part of the cylindrical portion 17 is shortened in the vertical direction, and said arcs come to form two arcs in a circle. Thereupon, hereabove mentioned nozzle piece can be inserted in the cavity 16 shown in FIG. 7, and the brim 22 of the nozzle piece is encased in a round seat cavity 23 provided in the outer portion of the cavity 16. Then, said nozzle piece is fixed in the push button 15, as shown in FIG. 8, and thereby the discharge orifice 20 remains as it is in FIG. 6(d). While, the cavity 16 provided in a push button shown in FIG. 10 and FIG. 11 has an oval front view as is apparent in FIG. 10, and in said cavity, a nozzle piece shown in FIG. 9 can be inserted. When a stress in a direction of the arrows shown in FIG. 9(d) is provided, said nozzle piece takes an oval form in front view as is apparent in FIG. 9(d), and is inserted easily in said oval cavity 16 in FIG. 10, and thereby the discharge orifice 20 remains as it is in FIG. 9(d).

Upon using a nozzle piece as shown in FIG. 6 or FIG. 9, a push button in a similar style to a conventional push button of aerosol dispenser can be used. However, it is required to keep the state of discharge orifice at off position equal to that in operation, for providing a hereabove

stated conventional push button but provided with a discharge orifice according to the present invention. And, it is not easy to prepare a nozzle piece provided with a discharge orifice according to the present invention in the state in operation, that is, in the open state by means of a moulding technique, on account of shrinking and deformation of mould material. By means of the hereabove mentioned manner, on the contrary, it is easy to provide said required nozzle piece provided particularly with a discharge orifice most accurate in shape.

Having thus described my invention, what I claim is:

1. An aerosol dispenser comprising a container for a viscous solution under pressure and having an opening, a spring loaded valve mounted in said container and normally closing said container opening, a push button of resilient material having a tubular portion slidably mounted through said container opening and against said valve for opening the same and having a closed end bore for receiving said viscous material from said valve, and said push button tubular portion having a normally straight side slit tangentially of and extending to said bore for being opened upon the manual pressing and lateral bending of said push button in the operation of said valve.

2. An aerosol dispenser comprising a container for a viscous solution under pressure and having an opening, a cylindrical valve housing mounted within said container and having a longitudinal bore and a bottom opening, a spring loaded valve stem positioned in said valve housing bore normally closing said bottom opening, a closed end tube of resilient material slideably positioned through said container opening and housing bottom opening against said valve stem for moving said valve stem to an open position and receiving said viscous material from said valve housing bore and closing said container opening, said tube having a normally closed side straight slit exteriorly of said container for being opened upon the manual pressing of said tube against said valve stem and bending of said tube and a stop carried by said tube exteriorly of said container for engaging said container limiting the bending of said tube.

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