Dec. 12, 1967 SEIICHI KITABAYASHI 3,357,603

REFILLABLE PRACTICABLE AEROSOL DISPENSER

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Fig. 1

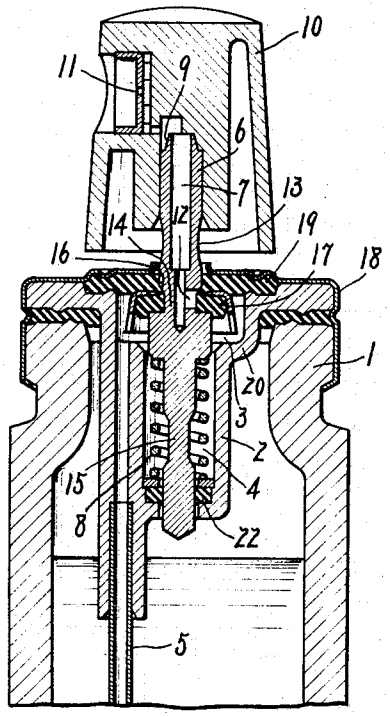

Fig. 2

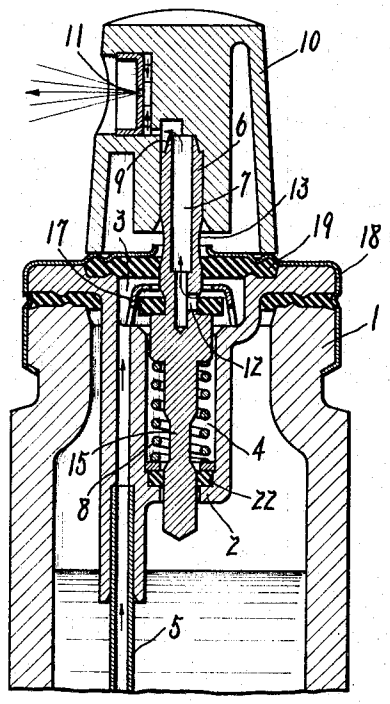

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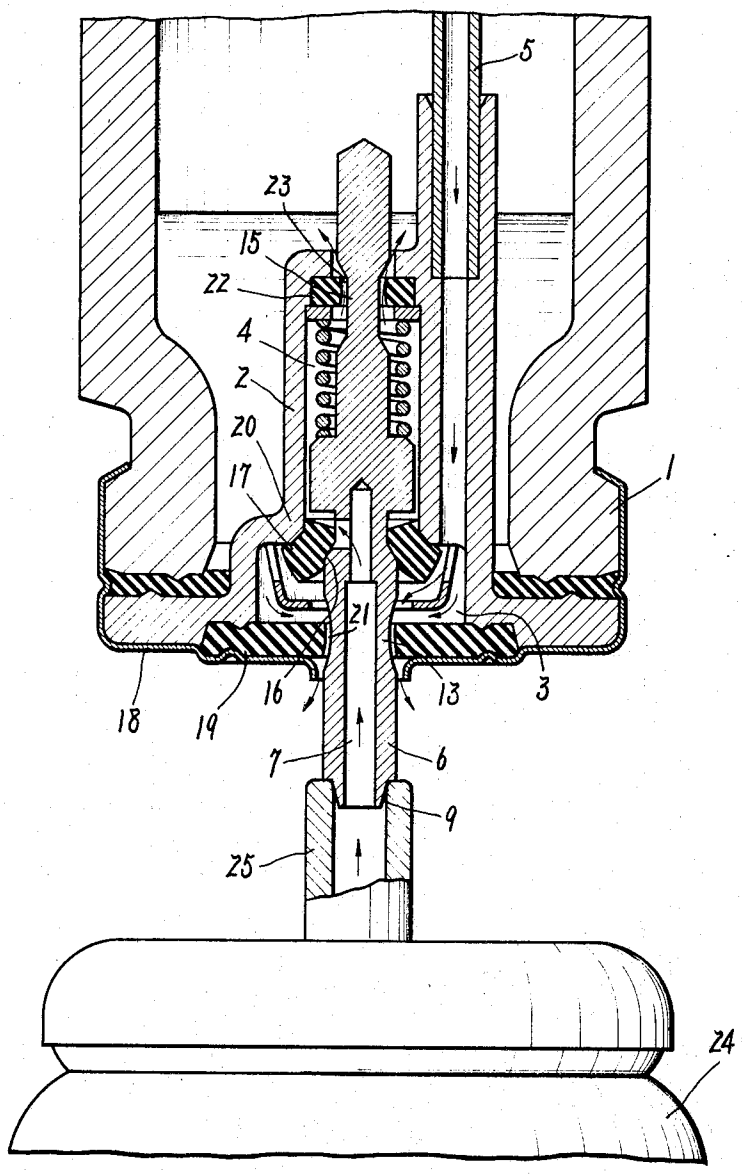
Fig. 3



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3,357,603 REFILLABLE PRACTICABLE AEROSOL DISPENSER

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1 Claim. (Cl. 222—402.16)

ABSTRACT OF THE DISCLOSURE

The present invention is concerned with an aerosol dispenser for spraying solutions container under pressure of gas within a container and which dispenser is normal ly closed to the emission of such solutions, but can be manually opened for the emission thereof or can be connected to a supply container for being refilled with solution and gas while permitting gas within the dispenser to escape therefrom to the atmosphere.

An object of the present invention is to provide aerosol dispensers which can be refilled through the discharge valves of said aerosol dispensers when said discharge valves are connected to a discharge nozzle of a supply container.

A further object of the present invention is to provide refillable aerosol dispensers which receive fuel from supply containers easily and sufficiently while exhausting gas from the dispenser and thus lowering the pressure therein while being fed.

Another object of the present invention is to provide means for supplying solution in said aerosol container by means of supply containers having various discharge nozzle sizes.

Description

An aerosol dispenser according to the present invention comprises a valve housing **2** mounted within the upper inside portion of a container **1** for enclosing compressed gas and solution therein and having upper and lower valve chambers **3** and **4**, and eductor tube **5** connecting upper chamber **3** and the inside bottom container **1**, a valve stem **6** being provided with an axial bore **7** having a closed bottom end and extending from outside container **1** through valve housing **2**, a first valve for opening and closing communication between upper valve chamber **3** and valve bore **7**, a second valve for opening and closing communication between lower valve chamber **4** and valve bore **7**, a third valve for opening and closing communication between upper valve chamber **3** and the outer atmosphere in cooperation with opening and closing of said second valve, a fourth valve for opening and closing communication between lower valve chamber **4** through valve housing **2** with the inside of container.

The embodiment of the present invention, illustrated in the accompanying drawings, will hereinafter be described.

In the drawings:

FIG. 1 is an axial sectional view of an aerosol dispenser according to the present invention and shown in its off position.

FIG. 2 is an axial sectional view of the same aerosol dispenser as shown in FIG. 1 but shown in its position under emission operation.

FIG. 3 is an axial sectional view of the same aerosol dispenser as shown in FIGS. 1 and 2 but shown connected to a supply container nozzle for being filled therefrom.

Referring now more particularly to the accompanying drawings, there is shown a valve stem **6** which has from top to bottom a first coarctate portion **13**, a second coarctate portion **14** and a third coarctate portion **15**. **12** is a side orifice for opening axial bore **7** to the valve stem peripheral face. A portion of said side orifice **12** opens at the second coarctate portion **14** and another portion of the same orifice **12** opens at a stepped portion **16** located at the upper part of coarctate portion **14**. An annular resilient gasket **17** which is as thick as the axial length of coarctate portion **14** encases said coarctate portion. Accordingly, the upper portion of side orifice **12** is to open at certain position of valve stem **6**. As for the structures of the above-mentioned first to fourth valves, the first valve is composed of said side orifice **12** upper portion, an annular resilient gasket **19** which is encased in container top plate **18** at the top side of the valve housing **2** and the annular resilient gasket **17**. At the first position shown in FIG. 1 in which position the valve stem **6** is at its highest position, the side orifice **12** upper portion is closed by gasket **19**. And, at the second position shown in FIG. 2, the valve stem is lowered from said first position and said side orifice **12** upper portion opens. That is, at said first position, said first valve is closed. And so, communication between upper chamber **3** and axial bore **7** is closed. But, at said second and third positions, the same are in communication. The second valve is composed of an annular step **20** which defines upper and lower valve chambers **3** and **4**, gasket **17** and side orifice **12**. That is, at said first position, the whole portion of side orifice **12** is closed by gaskets **17** and **19**, and at said second position, said upper and lower valve chambers communicate with each other. But, at said third position in which the valve stem is at position lowest, the top and bottom faces of gasket **17** respectively engage said valve stem stepped portion **16** and said valve housing annular step **20**. And so, communication between the upper and lower valve chambers is closed and at the same time side orifice **12** opens to lower chamber **4**. Said third valve is composed of first coarctate portion **13** of said valve stem and gasket **19**. That is, at its first and second positions, said valve stem engages gasket **19**. And so, the communication between upper chamber **3** and outer space is closed. But, at said third position, a clearance **21** is caused between coarctate portion **13** and gasket **19** inner peripheral face. Accordingly, upper chamber **3** communicates with outer space. Said fourth valve is composed of a coarctate portion **15** of said valve stem and an annular resilient gasket **22** which is held at the inside bottom of the valve housing **2** by means of a valve spring **8**. That is, at said first and second positions, communication between lower chamber **4** through valve housing **2** to the inside space of the container is closed by engagement of said valve stem and gasket **22**. But, at said third position, a clearance **23** is caused between coarctate portion **15** and gasket **22** inner peripheral face. Accordingly, lower valve chamber **4** communicates with valve housing **2** next container inside space.

In the above description, detailed structures of each valve have been explained. However, various changes as to details of the valves or other parts are possible within the scope of the present invention. An aerosol dispenser according to the present invention has a valve stem and first to fourth valves as described above, and said valve stem has said first to third positions. Accordingly, at the first position, all valves are closed and the dispenser on the whole is in its off position. However, at the second position, solution under pressure in the container is discharged through eductor tube **5**, upper chamber **3** and valve stem axial bore **7**, and push button emission orifice **11**. That is, the valve stem second position is the emission position of the dispenser. For refilling the dispenser with solution and gas, push button **10** is removed from valve

stem 6 and the whole dispenser is put upside down. Next, as shown in FIG. 3, nozzle 25 of a supply container 24 is applied to the top end of valve stem 6 for engagement therewith, and container 1 is pushed against the supply container nozzle. Then, valve stem 6 descends from its first position to its third position in the dispenser moving through the second position. In FIG. 3 the aerosol dispenser is shown in an upside down position. Consequently, the above-mentioned second and third valves open and solution under pressure in supply container 24 pours into the container through the second valve, lower chamber 4 and the third valve. On the other hand, the first valve closes, and communication between upper chamber 3 and axial bore 7 is closed. And, at the same time, the fourth valve opens for letting upper chamber 3 communicate with the outside atmosphere through said valve. Accordingly, gas under pressure present in the container bottom discharges through eductor tube 5, upper chamber 3 and the fourth valve to the atmosphere for lowering the container inside pressure. As a result, the aerosol dispenser fills easily and sufficiently with the supply solution under pressure.

Heretofore, most known aerosol dispensers which are refillable had a valve for manual operation composed of upper and lower stems for allowing separation from each other. During refilling operation said upper stem is drawn for insertion of a supply container nozzle in the top end portion of said lower stem through a gasket normally encased in the top portion of the dispenser container. Accordingly, for providing the fourth valve for discharging exhaust gas as described above, a supply container nozzle is obliged to have a limited radial size, and most supply containers marketed having a pouring nozzle with various radial sizes cannot be used. It is therefore an important advantage of this invention that most supply containers marketed can be used for refilling the present device, because the stem provided in the present device has a tapering upper end which can receive or engage a pouring nozzle with various radial sizes without fail.

Having thus described my invention what I claim is:

An aerosol dispenser which comprises a container 1, a valve housing 2 being fixedly connected to an upper inside portion of said container 1 for enclosing compressed gas and solution therein and having upper and lower valve chambers 3, and 4, an eductor tube 5 placing upper chamber 3 in communication with the inside bottom space of the container at all times, a valve stem 6 being provided with an axial bore 7 having a closed bottom end and extending from exteriorly of said container through valve housing 2, a first valve for opening and closing communication between upper valve chamber 3 and valve bore 7, a second valve for opening and closing communication between said upper and lower valve chambers 3 and 4, and having an open position for opening communication between lower valve chamber 4 and axial bore 7 when the communication between upper and lower valve chambers 3 and 4 is closed, a third valve for opening and closing communication between upper valve chamber 3 and the outer atmosphere in cooperation with the opening and closing of said second valve, a fourth valve for opening and closing communication between lower valve chamber 4 and said container upper inside space, said first to fourth valves being controlled by valve stem 6, said valve stem 6 having a tapering upper end for engaging a supply container feed nozzle, a spring pressing said valve stem from within said valve housing, a push button 10 detachably mounted on said valve stem and having an emission orifice 11 for communicating with axial bore 7, and said valve stem 6 having a first position in which it is normally retained by said spring and in which position said first to fourth valves are closed, a second position in which said stem is moved against said spring and in which position said first valve is open and said second to fourth valves are closed, and a third position in which said stem is moved further against said spring and in which position said first valve is closed and said second to fourth valves are open.

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