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3,221,946

DISPENSER FOR PRESSURIZED RESERVOIR OF THE AEROSOL VARIETY

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Fig. 1

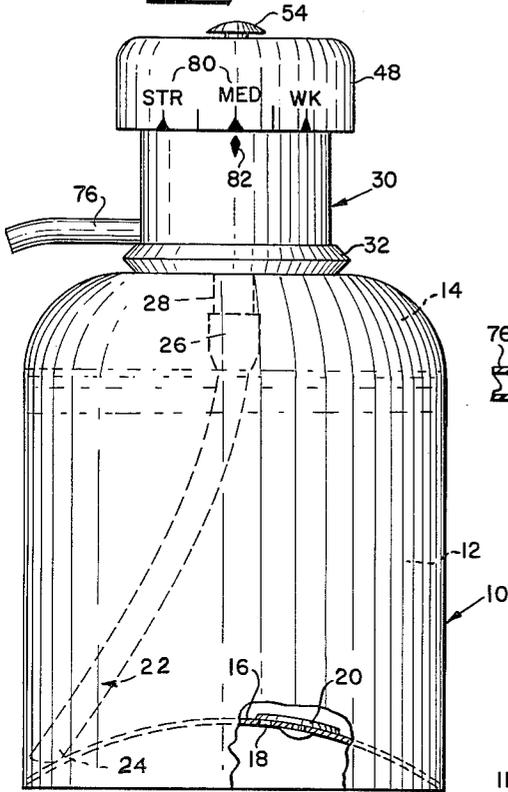


Fig. 2

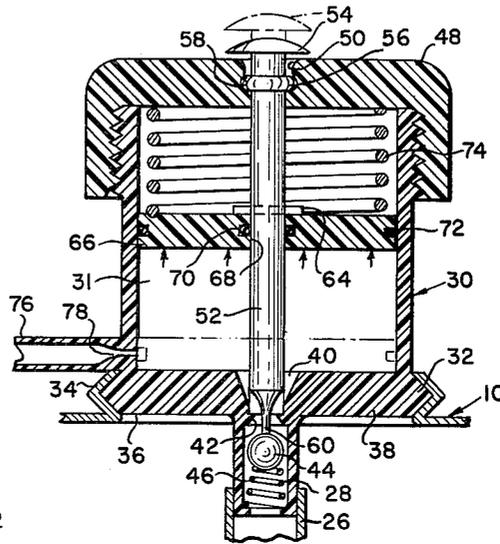


Fig. 5

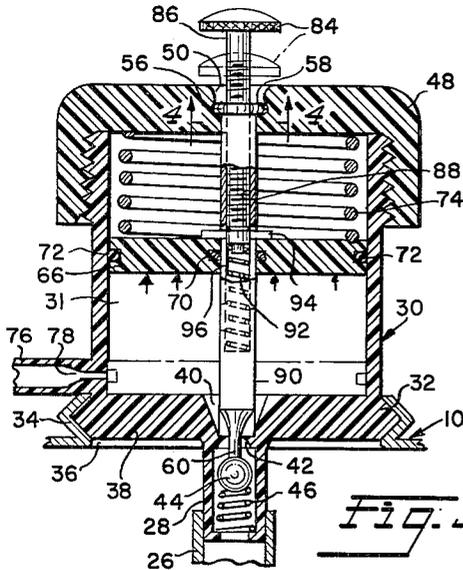
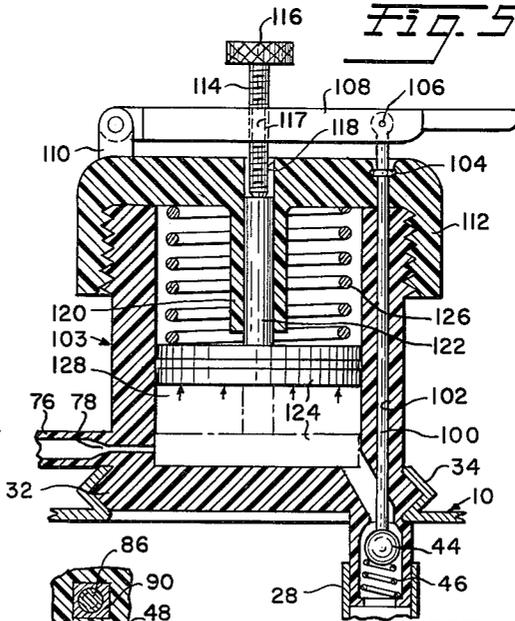
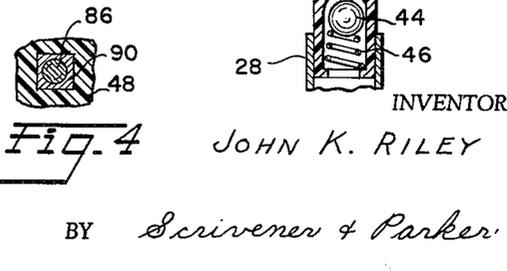


Fig. 3

Fig. 4



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DISPENSER FOR PRESSURIZED RESERVOIR OF THE AEROSOL VARIETY

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10 Claims. (Cl. 222-309)

This invention relates broadly to the art of dispensing fluid material in predetermined measured amounts from pressurized fluid containers or reservoirs of the aerosol variety.

Pressurized containers of the type known as aerosol bombs, bottles or cans are well-known in the art for dispensing, usually as a spray or mist, every variety of fluid including both liquids and gases. The object of the present invention is to provide means whereby a predetermined quality of fluid may be automatically and simply delivered from an aerosol reservoir, not in mist-like form in the case of liquids, but as a measured amount of liquid, as for example, a tablespoon of liquid coffee extract which is intended to be mixed with hot water to provide a cup of coffee. Because the need for delivering measured quantities of fluid is almost universal, it will be apparent that the varieties of liquids and also gases which could be dispensed by the present invention are almost limitless.

Another object of the invention is to provide a dispenser of the foregoing nature whereby means are provided for adjusting the quantity of dispensed fluid and wherein after the adjustment is made, the dispenser thereafter delivers upon each operation the precise preselected quantity.

Other objects and their attendant advantages will become apparent as the following detailed description is read in conjunction with the accompanying drawings wherein:

FIG. 1 is a side elevational view of an aerosol bottle employing a dispenser of the present invention;

FIG. 2 is an enlarged vertical cross sectional view of a dispenser embodying the features of the invention;

FIG. 3 is a vertical cross-sectional view similar to FIG. 2 but showing a second embodiment of the present invention;

FIG. 4 is a broken horizontal cross-sectional view taken subsequently on the line 4-4 of FIG. 3; and

FIG. 5 is a vertical cross-sectional view of a third embodiment of the present invention.

With reference now to the drawings, the numeral 10 designates a typical aerosol container or other fluid pressure reservoir of suitable material such as plastic or metal which may contain a liquid 12 and a space 14 above the liquid for a pressurized, preferably inert, gas such as carbon dioxide or nitrogen usually employed in conventional aerosol bottles. As is customary, the bottom 16 of the container is concave and contains a filling opening 18 normally closed by a mushroom type valve 20 of a rubbery material which not only serves as a check valve but also yields or partly blows out under extreme pressure through the opening to prevent the danger of explosion. An elongated tube 22 is disposed in the container and has a lower open-end 24 adjacent the bottom and an upper end 26 which is sleeved over a hollow cylindrical check valve cage 28 integral with the dispensing mechanism of the invention.

With reference now to FIG. 2, the dispenser of the invention comprises a hollow cylindrical body part 30 containing a trap chamber 31 which is adapted to be rigidly connected to the can 10 in any convenient manner as by an integral annular shoulder 32 about which an upstanding annular flange 34 surrounding an opening 36 in the upper end of the can is pressed to form the rigid connection shown in the drawing. The bottom 38 of the

trap chamber is provided with a central opening 40 which is interconnected past a valve seat 42 with the interior of the cylindrical part 28 containing a ball check valve 44 normally urged by a spring 46 to a position against the seat 42 to disrupt communication between the can or reservoir 10 and the trap chamber 31 in the body part 30.

The upper open end of the body part 30 is threaded to receive a cap member 48 having an outwardly flared central opening 50 therein adapted to slideably receive a plunger 52 provided at its upper end with a button 54. Spaced a suitable distance below the button 54 is an integral collar 56 which is adapted to be snapped, in detent fashion, into an annular groove 58 intermediate the upper and lower ends of the opening 50 through the cap member 48. That is to say, with the cap member 48 being constructed of suitable yieldable plastic material when the operator presses down on the button 54 to move it from the phantom line position of FIG. 2 to the full line position the outwardly flared upper end of the opening 50 permits the collar 56 to be snapped into the groove 58 with very slight effort on the part of the operator. Those skilled in the art will recognize that the collar 56 and groove 58 form a simple, inexpensive detent for which other types of releasable locking means, such as ball type detents, may be substituted.

The plunger 52 extends downwardly through the trap chamber 31 and carries at its lower end a finger 60 in alignment with the ball check valve 44 and when the plunger is in the full line position in FIG. 2 the finger 60 engages the valve 44 to move it from its normally seated position to the open position shown in the drawing. When the plunger is moved upwardly to the phantom line position the finger 60 is withdrawn away from the ball 44 and the latter moves to its normal seated position.

Intermediate the ends of the plunger 52 is a fixed laterally extending bar 64 which is adapted to be engaged by the upper surface of a pressure responsive member such as piston 66 which is slideably received within the chamber 31 and is provided with a central opening 68 whereby the piston member 66 is slideable with respect to the plunger 52. Desirably, the sliding surfaces of the piston are provided with conventional O-rings 70, 72 and a compression spring 74 normally urges the piston 66 to the phantom line position wherein the piston 66 is seated on the bottom of the chamber 31. Extending outwardly to atmosphere from the lower end of the chamber 31 is a spout 76 whose interior end is connected to the cavity through a restricted orifice 78.

In operation, the operator pushes down on the button 54 to move the plunger to its full line position wherein the detent collar 56 is snapped into the groove 58 and simultaneously the check valve 44 is pushed by the finger 60 away from the valve seat 42. Upon this occurrence, pressurized liquid flows upwardly past the valve seat 42 and through the passage or opening 40 where it acts on the underside of the piston 66 to move it upwardly against the downward force of the spring 74. Because the cross-sectional area of the valve seat 42 is considerably in excess of the area of the orifice 78 liquid flows into the trap chamber to move the piston 66 upwardly until it engages the lateral bar 64 whereupon the plunger 52 is moved upwardly to disengage the detent at which juncture the ball check valve 44 closes and further flow of liquid into the chamber 31 immediately ceases. Thereafter, the spring 74 acts downwardly on the piston 66 to move it back to its normal phantom line position independently of the plunger and in so doing the piston forces the liquid in the chamber out through the orifice 78 into the spout 76 from whence the liquid flows to a suitable container.

With reference now to FIG. 1, if it is desired to change the portion of dispensed fluid, suitable indicia 80 in-

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scribed on the cap member 48 may be aligned with a marker 82 on the exterior of the body part 30 as shown in FIG. 1 whereby as the cap member 48 is screwed or unscrewed the detent groove 58 is raised or lowered to adjust the effective vertical spacing of the cross rod 64 with respect to the upper surface of the piston 66 when it is in its normal retracted position. Obviously, when the cap member is screwed downwardly the bar 64 is lowered so that a lesser amount of liquid is dispensed and conversely when the cap member is screwed upwardly.

The embodiment of the invention disclosed in FIG. 3 is substantially identical to that disclosed in FIG. 2 and like reference characters refer to like parts. The principal distinction between the embodiments of FIG. 3 and FIG. 2 is that the former provides means for adjusting the quantity of dispensed liquid independently of the cap member 48. This is accomplished by substituting a knurled knob 84 for the button 54 with the knob 84 being integral with the upper end of a threaded rod 86 received in a threaded passage 88 within a central plunger 90 which is identical in function to the plunger 52 of the embodiment of FIG. 2. As illustrated in FIG. 4 the upper end of the plunger 90 may be square in cross section and is received in a complementarily shaped lower part of the opening 50 whereby the plunger is prevented from rotating when the knob 84 and rod 86 is screwed inwardly or outwardly. Obviously any other suitable spline or guide means could be substituted for the square opening. The lower end of the passage 88 in the plunger 90 contains a spring 92 which normally urges upwardly a cross-member 94 extending outwardly through aligned slots 96 in the side of the plunger. With this arrangement, it will be apparent that when the threaded rod 86 is screwed inwardly it bears down on the upper end of the cross-member 94 and forces this downwardly against the spring 92. When the rod is screwed outwardly, the spring 92 moves the cross-member upwardly. After the vertical position of the cross-member 94 has been suitably adjusted the operator thereafter merely pushes down on the upper surface of the knob 84 to engage the detent collar 56 with its groove 58 and the embodiment of FIG. 3 thereafter operates exactly as has been described for the embodiment of FIG. 2.

The embodiment of FIG. 5 is functionally substantially identical to the previously described embodiments except that it eliminates the sliding engagement of the piston with a central plunger. In the embodiment illustrated in FIG. 5, the ball check valve 44 is disposed at one side of the opening 36 of the can 10 and is moved from its seated to its unseated position by a plunger 100 slideable in a vertical passage 102 in the side wall of the hollow body part 103. The upper end of the plunger 100 is provided at its upper end with a detent collar 104 which cooperates with a complimentary groove, as previously described, and the upper end of the plunger is pivotally connected at 106 adjacent the outer end of a manually operable lever 108 whose inner end is pivotally connected to a bracket 110 integral with the upper surface of the cap member 112. Carried by the lever 108 intermediate the ends thereof is a threaded rod 114 carrying at its upper end a knurled knob 116 whereby the rod 114 may be screwed upwardly or downwardly through a threaded opening 117 in the lever 108. The lower end of rod 114 registers with a central passage 118 in the cap 112 and in a downwardly extending sleeve 120 which slideably receives a second plunger 122 rigidly fixed to the upper side of a piston 124 normally urged by a spring 126 to the phantom line position at the lower end of the trap chamber 128 shown.

The operation of the embodiment of FIG. 5 is substantially identical to that previously described for the embodiments of FIGS. 2 and 3. This is to say, when the lever 108 is pushed downwardly to engage the detent collar 104 with its groove, the ball valve 44 is unseated and liquid flows into the chamber 128 to move the piston 124 up-

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wardly against the spring 126 until the upper end of the plunger 122 engages the lower end of the rod 114 whereupon the lever 108 is moved upwardly to disengage the detent 104 and effect closing of the ball valve 44. Thereafter the piston 124 is moved downwardly by the spring 126 to expel through the orifice the liquid in the chamber below the piston. Obviously, when the rod 114 is screwed downwardly less liquid is trapped in the chamber 128 before the detent 104 is disengaged and when the rod 114 is screwed upwardly a greater amount of liquid is dispensed.

From the foregoing description it should be apparent that the present invention affords a unique and effective means for dispensing predetermined quantities of a liquid and also gases. Actual tests have revealed that the action is extremely rapid with the predetermined quantity of fluid being dispensed in a matter of seconds with no detectable variation in successive preselected dosages.

Though three specific embodiments of the invention have been described it will be apparent to those skilled in the art that the invention is susceptible of a wide variety of changes and modifications without, however, departing from the scope and spirit of the appended claims.

What is claimed is:

1. In combination with a fluid pressure reservoir, a trap chamber connected to said reservoir, a normally closed valve disrupting communication between said reservoir and said trap chamber, plunger means for effecting movement of said valve from its normal closed position to its open position upon movement of said plunger means from a first to a second position to establish communication between said reservoir and said trap chamber, releasable locking means for retaining said plunger means in its second position, a fluid pressure responsive member normally occupying one position in said trap chamber and being moveable in one direction therefrom in response to pressure in said trap chamber, means yieldingly opposing movement of said member in said one direction, and means operatively connected to said plunger means and responsive to predetermined degree of movement of said pressure responsive member in said one direction from its normal position for releasing said releasable locking means and effecting movement of said plunger means to its first position whereby said valve moves to its normal closed position.

2. The combination of claim 1 wherein said trap chamber includes an outlet orifice of substantially less capacity than said valve when in its open position, and wherein said yielding means operates on said pressure responsive member to return it to its normal position upon closing of said valve to expel fluid in said trap chamber through said outlet orifice.

3. The combination of claim 1 wherein said means operatively connected to said plunger means comprises an abutment normally spaced away from said pressure responsive member but in the path of movement thereof so as to be engaged thereby when said pressure responsive member has moved a predetermined distance in said one direction from its normal position.

4. The combination of claim 3 wherein means are provided for adjusting the spacing between said abutment and said pressure responsive member when the latter is in its normal position.

5. In combination with a liquid reservoir under pressure, a trap chamber, a fluid passage communicating said reservoir with said trap chamber, a check valve in said fluid passage normally positively preventing the flow of liquid from said reservoir to said trap chamber, a plunger in axial alignment with said fluid passage and moveable from a first position out of engagement with said check valve to a second position engaging said check valve to move it to its open position and establish communication through said fluid passage between said reservoir and said trap chamber, detent means cooperating with said plunger for releasably locking the latter in its

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second position, a fluid pressure responsive member in said trap chamber normally occupying one position in said trap chamber and being moveable in one direction therefrom in response to pressurized liquid admitted to said trap chamber upon opening of said check valve by said plunger, resilient means normally opposing movement of said pressure responsive member in said one direction, abutment means operatively connected to said plunger and normally spaced away from said pressure responsive member when it is in its normal position and said plunger is in its second valve opening position, said abutment means being in the path of movement of said pressure responsive member and engageable thereby after a predetermined movement in said one direction to effect movement of said plunger to its first position and consequent closing of said check valve, an outlet orifice connecting the interior of said trap chamber with atmosphere, said orifice having less capacity than the passage between said reservoir and said trap chamber when said check valve is in its open position, said yielding means operating on said pressure responsive member to return it to its normal position upon closing of said valve to expel the liquid in said trap chamber through said outlet orifice.

6. The combination of claim 5 including means for adjusting the spacing between said abutment means and said pressure responsive member when the latter is in its normal position and said plunger is in its second position.

7. The combination of claim 5 wherein said pressure responsive member comprises a piston having a central opening therethrough, said plunger slideably and sealingly extending through said opening, and said abutment means comprises lateral extensions carried by said plunger above said piston so as to be engaged thereby when said piston moves said predetermined distance.

8. The combination of claim 7 wherein said adjusting means includes means carried by said plunger for adjusting the verticle position of said lateral extensions with respect to said plunger.

9. The combination of claim 5 wherein said detent means comprises an annular collar carried by said plunger,

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er, and an annular groove in a fixed part of said trap chamber with which said annular collar releasably engages upon movement of said plunger to its second position.

10. In combination with a liquid reservoir under pressure, a trap chamber connected to said reservoir, a piston slideably received in said trap chamber, a plunger integrally connected to said piston, a cover member for said trap chamber, a vertical passage through said cover member slideably receiving said plunger, a lever pivoted at one end to the upper side of said cover member, a second plunger pivotally connected at its upper end adjacent the opposite end of said lever and slideably received in a second vertical passage through the side wall of said trap chamber, a normally closed check valve for controlling communication between said reservoir and said trap chamber, said check valve being in alignment with the lower end of said second plunger, said plunger being moveable by said lever from a first position out of engagement with said check valve whereby the latter is moved to its open position, releasable locking means for retaining said plunger in its second position, and a threaded shaft carried by said lever intermediate the ends thereof and extending axially into the first passage in said cover member for engagement by the upper end of said first plunger carried by said piston when the latter is moved theretowards by pressure of liquid in the trap chamber to move the lever and consequently the second plunger to its first position whereby said check valve moves to the closed position.

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