

Feb. 9, 1960

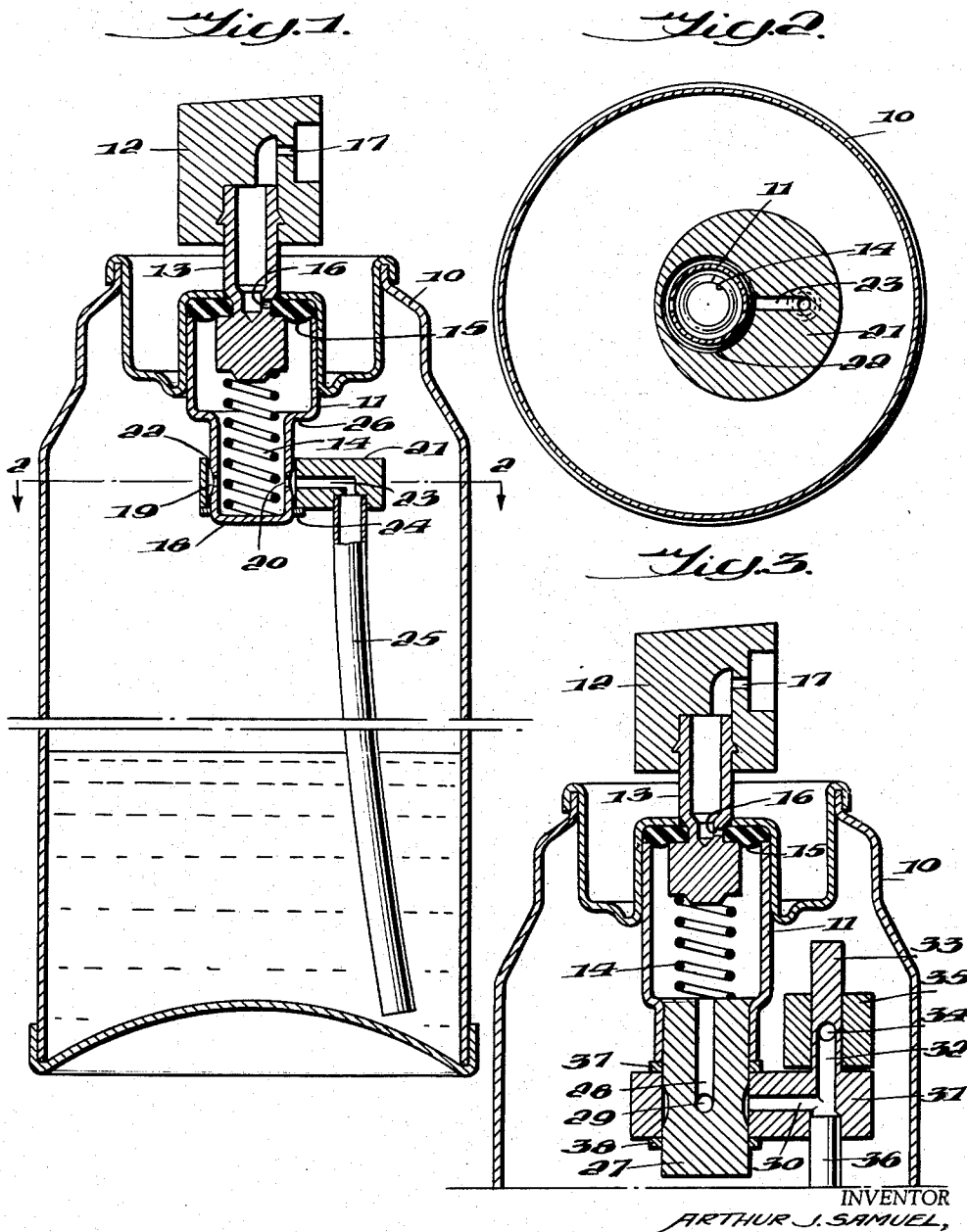
A. J. SAMUEL

2,924,360

AEROSOL DISPENSERS AND LIKE PRESSURIZED PACKAGES

Filed Dec. 23, 1957

2 Sheets-Sheet 1



BY

Harold H. Glick
ATTORNEY

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A. J. SAMUEL

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Fig. 4.

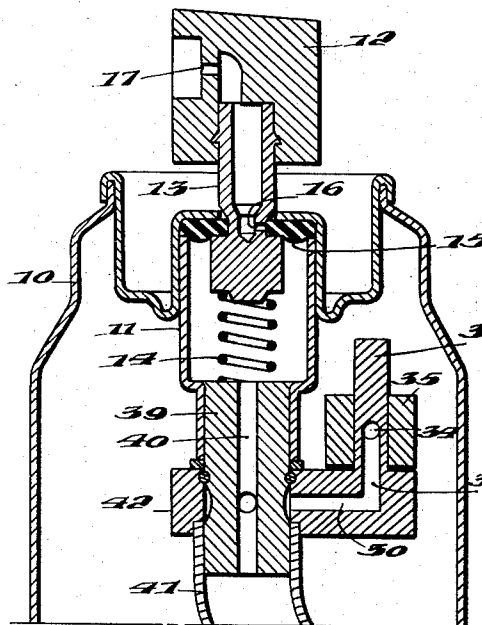


Fig. 5.

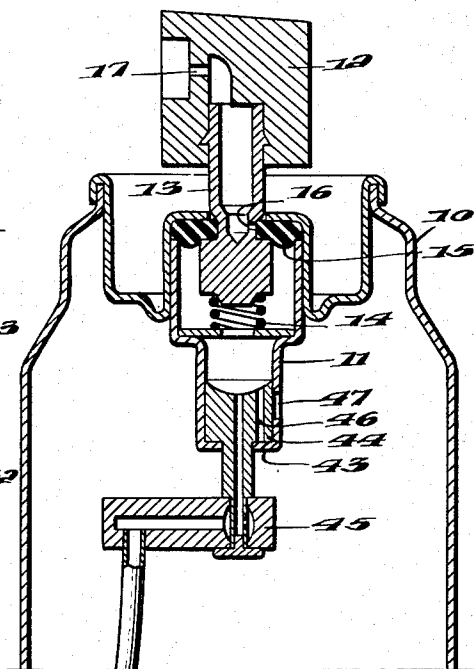


Fig. 6.

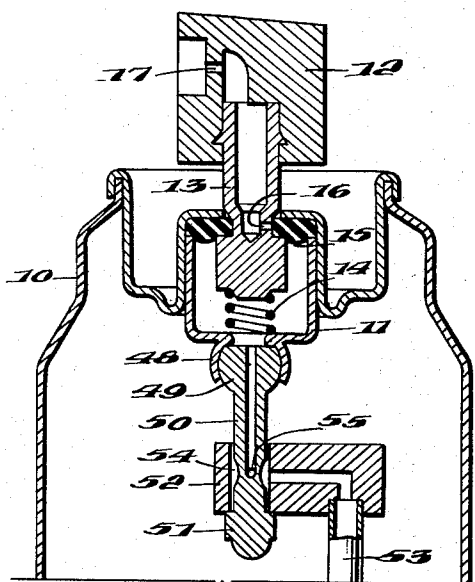


Fig. 7.

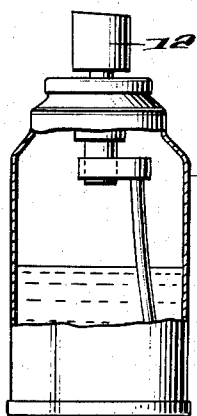
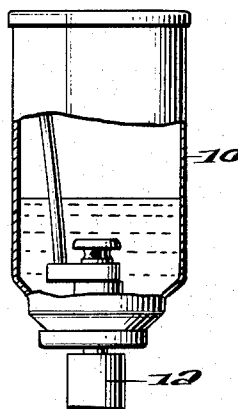


Fig. 8.



INVENTOR
ARTHUR J. SAMUEL,

BY

Harold Bloome

ATTORNEY

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AEROSOL DISPENSERS AND LIKE PRESSURIZED PACKAGES

Arthur J. Samuel, Pittsburgh, Pa., assignor to Gulf Research & Development Company, Pittsburgh, Pa., a corporation of Delaware

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2 Claims. (Cl. 222—394)

This invention relates to improvements in aerosol dispensers and like pressurized packages of the general type wherein an eduction tube extends from a manually actuated discharge valve at or adjacent the top of the dispensing receptacle to a point near its bottom. Such devices have as a primary object to maintain the lower, or inlet, end of the eduction tube immersed in the liquid or powder to be dispensed in order that the propellant gas will not escape ineffectively, for should this occur the resulting loss of pressure would prevent complete evacuation of the contents.

It is not uncommon in such devices to provide an eduction tube which is curved or angularly bent to reach into the angle between the side wall and bottom of the dispensing receptacle, since the bottom is usually dished for greater resistance to internal pressure and the longer tube therefore dips into the liquid at the lowest point at which it may collect. The tube is usually curved in the direction in which the discharge orifice of the finger-pressed valve is pointed in order that the spray may be directed downwardly from a nearly empty receptacle, but the desired orientation is not always maintained and difficulties ensue. In present day manufacture of such dispensers the finger piece in which the discharge orifice is located is pressed onto the stem of the discharger valve and in many instances it is rotatable on the valve stem or with it so that it may be twisted, with the result that the orifice is then directed one way and the eduction tube another. The same undesired orientation is likely to occur if the finger piece accidentally comes off of the stem and is replaced. In either case, if the eduction tube curves upwardly when the receptacle is discharged in horizontal position only gas will be expelled, no matter how the finger piece is turned. Thus, there is no assurance that pressure will be conserved even though the orifice and eduction tube initially have the same side-wise direction.

So long as such a dispenser is discharged in upright position, or is so tilted that any remaining liquid flows to the low point to which the eduction tube extends, the end of the tube will remain submerged until the receptacle is substantially emptied. But the problem of conserving gas pressure as the level of contents is lowered is only partially solved by such a construction because economical use of the remaining contents is not obtainable if the dispenser is tilted in any other direction than the one in which the eduction tube extends. If it is tilted in a different direction, or is rotated in horizontal position to spray upwardly or to either side, the end of the eduction tube becomes uncovered, as is also the case if the receptacle is inverted, and gas alone is then discharged with consequent rapid lowering of pressure. Yet for many purposes a convenient, or even necessary, handling of the dispenser requires that it be tilted and turned in all directions during use as, for example, in applying hair dressing, perfume, bath powder and antiperspirant to the person, or insecticides, lubricants and

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paints to difficultly accessible places, as well as for numerous other applications.

My Patent No. 2,793,794 discloses a dispenser which may be discharged in inverted, as well as upright, position without wasteful loss of the propellant gas. As in prior dispensers, the eduction tube dips into the liquid when the receptacle is upright and the pressure of gas on the surface of the liquid forces it upwardly through the tube when the discharge valve is opened. However, if the receptacle of prior type is inverted the inlet at the end of the tube is exposed and gas alone will be discharged. This disadvantage has been overcome in the aforesaid invention by providing a second inlet in the eduction passageway, near the top of the receptacle. A slidable valve is guided along the eduction passageway to cover this inlet which would otherwise be exposed to permit escape of gas when the receptacle is upright. However, when the receptacle is inverted and the inlet is submerged, this valve shifts by gravity to uncover the inlet and admit liquid to the passageway. Notwithstanding that the remote, open end of the tube is now exposed to the gas phase, pressure is exerted equally outside and inside the tube, and since the liquid is a denser phase it will flow into the eduction passageway through the submerged, second inlet where it has but a short distance to travel to the discharge valve. Accordingly, gas does not uselessly escape when the partly filled dispenser is discharged in either an inverted or an upright position. A limiting factor, however, has been that in some intermediate, tilted positions, and more especially in positions approaching horizontal, the valve controlling the second inlet cannot slide freely because of insufficient inclination of the receptacle.

The present invention is an improvement which has for its object to achieve full utilization of the charge of propellant gas when the dispenser is held in any position, or in continuously varying positions, as dictated by the convenience of the user. In attaining this object the conventional bent or curved tube is swiveled on a fixed portion of the eduction passageway, such as the discharge valve body which extends into the receptacle, the tube being biased by weight to turn bodily into pendulous position when the receptacle is sufficiently tilted. Thus, the end of the tube is gravitationally oriented downwardly and dips into the liquid contents notwithstanding that the receptacle may be turned and rotated while being held horizontally.

A preferred form of the invention employs an eduction tube which is mounted to have orbital movement about the body of the discharge valve, the tube being axially offset from the valve body by means of a connecting member which has an internal flow passage between these laterally separated sections of the eduction passageway. The connecting member may be a disc which is eccentrically rotatable on the valve body, or it may be a bar or other suitable shape having the greater part of its mass lying to one side of its axis of rotation on the fixed part. Thus, the connecting member constitutes an unbalanced weight which swings downwardly when the receptacle approaches horizontal position, carrying the tube with it to dip into the liquid at what is then the low point in the receptacle.

The connecting member also has limited sliding movement along the eduction passageway to cover a second inlet therein near the top of the receptacle, when the receptacle is upright, and to uncover such inlet when the receptacle is inverted. In all positions of inclination, therefore, liquid is admitted to the eduction passageway through one inlet or the other until the dispenser has been emptied of its contents.

While the invention is illustrated and described in connection with various illustrative details, it will be under-

stood that in its broader aspect it is not limited thereto but may be variously embodied within the scope of the claims hereinafter made. Accordingly, in the drawings

Figure 1 is a vertical sectional view of a dispensing receptacle constructed in accordance with this invention, the eduction passageway comprising laterally spaced fixed and rotatable sections between which there is a connecting member mounted for both rotation and sliding movement on the upper, or fixed section;

Figure 2 is a horizontal sectional view, taken along line 2—2 of Figure 1;

Figure 3 is a vertical sectional view of the upper part of a dispensing receptacle in which the connecting member for the sections of eduction passageway is rotatably mounted on the discharge valve body and the upper inlet of the eduction passageway is controlled by a slidable sleeve which is carried by and constitutes a part of the connecting member;

Figure 4 is a modification of the arrangement shown in Figure 3, wherein the upper end of the eduction tube is axially aligned with the flow passage leading to the discharge valve;

Figure 5 is a vertical sectional view of a further modification, wherein a cylindrical head which forms a part of the connecting member between the eduction tube and discharge valve is confined for rotation and sliding movement within the body of the discharge valve or an extension thereof;

Figure 6 is a vertical sectional view of another modification, wherein the section of eduction passageway upon which the connecting member is slidably and rotatably mounted is itself suspended from the body of the discharge valve by a ball-and-socket joint, thereby permitting the assemblage to assume various angular inclinations as the receptacle is tilted; and

Figures 7 and 8 are, respectively, side views of the dispensing receptacle in upright and inverted positions, these views being broken away to illustrate the manner in which the connecting member functions as a valve for control of the inlet adjacent the top of the receptacle.

Referring more particularly to the drawings, the dispensing receptacle 10 has at its top a manually actuated discharge valve the precise design of which does not constitute a part of this invention but which includes a valve body 11 extending longitudinally within the receptacle. In the valve shown for illustration, the finger piece 12 which is attached to stem 13, when depressed against the tension of spring 14, causes the gasket 15 to flex and uncover the port 16, and thereby opens the passage for flow to the nozzle 17.

In the form of invention shown in Figure 1, the tubular valve body 11 is closed at its lower end 18 and immediately thereabove it is formed with an annular channel 19 into which a port 20 opens. A connecting member 21, which may be a disc or other suitable shape, has a drilled hole 22 adjacent one edge for rotatably mounting it on the valve body, and a connecting lateral flow passage 23 which leads to the channel 19 in the valve body when the member 21 rests on the annular shoulder 24. An eduction tube 25 is carried by the connecting member 21 and is preferably curved to extend into the angle between the bottom and side of the receptacle, as shown. The valve body 11 is of stepped diameter to provide a second annular shoulder or abutment 26 for limiting the travel of the connecting member when the receptacle is inverted, in which position the connecting member will have moved past the port 20 to uncover it.

In the modification shown in Figure 3, a plug 27 is fitted into the end of the valve body and in effect constitutes an integral part of the valve body. The central flow passage 28 of this plug communicates through a port 29 and annular channel in the plug, as in Figure 1, with the lateral passage 30 in a connecting member 31 which is retained for rotation on the plug by a split spring ring, as indicated in the drawing, or by any other conventional

fastening which permits one part to rotate on the other while preventing their separation. A branch 32 of the passage 30 leads into a stud 33, which may extend parallel with the axis of the receptacle 10, as shown, or at such an angle thereto that the stud inclines downwardly when the receptacle is held in horizontal position. The stud terminates in an orifice 34 which, in the upright position of the receptacle, is covered by a slidable sleeve 35. If the branch passage 32 were extended to the end of the stud, a cap with slotted skirt or side port could slidably seat on the end of the stud to perform the same function. In either case another branch of the passage 30 leads to the eduction tube 36. In this form of the invention, the connecting member is confined by spring rings 37 and 38, or the like, for rotation on the plug 27 of the valve body.

Figure 4 shows a generally similar arrangement except that in this form the plug 39 is provided with a central flow passage 40 which extends entirely through it, and the eduction tube 41 is carried by the connecting member 42 which is rotatable on the plug.

Figure 5 shows a further modification, wherein the valve body 11 terminates in an inturned flange 43 which confines a reciprocable and rotatable cylindrical head 44 and stem which are attached eccentrically to a connecting member 45 of a construction heretofore described. The portion of valve body which is of stepped-down diameter is somewhat longer than the head 44 and guides the same in the sliding movement which unseats it from the flange 43 when the receptacle is inverted. Thus, in inverted position, liquid may enter the eduction passageway around the flange 43 and through a longitudinal passage 46 in the head 44. A cross orifice 47 also admits liquid when the head is displaced.

In Figure 6, the valve body 11 terminates as a socket 48 which receives the ball head 49 of a depending section 50 of the eduction passageway, such section having an enlargement 51 at its lower end to limit sliding movement of the connecting member 52 thereon. The eccentrically mounted connecting member and the eduction tube 53 carried thereby are rotatable on this section of passageway and open communication is maintained between the flow passages in these parts through an annular channel 54 and intersecting port 55. Manifestly, the annular channel in this and previously described embodiments of the invention may be located in either the fixed or rotatable part. The valve body has been herein termed a "fixed" part in the sense that it is fixed to the body of the dispenser. It will be appreciated, however, that when the dispenser is rolled, the valve body rotates while the eduction tube remains relatively fixed in pendulous position.

In the various embodiments of my invention as herein described, when the receptacle is upright, as shown in Figure 7, the contents to be dispensed are forced by gas pressure into the lower, open end of the eduction tube and upwardly to the discharge valve. When the receptacle is horizontally held, the unbalanced weight of the eccentrically rotatable connecting member causes it to hang downwardly and in so doing the eduction tube follows an orbital path close to the wall of the receptacle. The end of the tube therefore continues to be immersed in the liquid notwithstanding that the dispenser may be rolled by movements of the wrist of the user. As the receptacle is further tilted to the inverted position shown in Figure 8, all remaining liquid rushes to its top and the second inlet, adjacent the top of the receptacle, is then immersed and at the same time is uncovered by movement of the gravity actuated valve. The liquid accordingly enters the second inlet, close to the manual valve, and flows to the discharge orifice. Premature loss of pressure due to a wasteful escape of gas is thereby avoided in this and in all intermediate inclinations of the dispenser, as well as in its upright position.

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What I claim as my invention is:

1. An aerosol dispenser or like pressurized package comprising a receptacle having a manually operated discharge valve at its top and an eduction passageway reaching into the angle between the side wall and bottom of the receptacle, said eduction passageway comprising an upper section extending axially of the receptacle and a lower section movable bodily in an orbital path around said upper section, a connecting member rotatably mounted on the upper section with the greater part of its mass extending to one side of its axis of rotation and carrying said lower section laterally spaced from said upper section, the laterally spaced sections being in fluid communication through an internal flow passage in the connecting member, a first inlet to the eduction passageway at the end thereof adjacent the bottom of the receptacle and a second inlet thereto adjacent the top of the receptacle, means constituting a part of the connecting member adapted to slide along a portion of said eduction passageway and guided thereby to cover said second inlet when the receptacle is upright and to uncover the same when the receptacle is inverted, whereby the contents to be dispensed will be admitted to the eduction passageway in both upright and inverted positions, and whereby in intermediate, horizontal position the unbalanced weight of the connecting member causes it to assume a pendulous position with the end of the eduction passageway dipping into the contents at low level in the horizontally held receptacle.

2. In an aerosol dispenser or like pressurized package having a manually actuated discharge valve thereon, a tubular valve body attached to and extending into the dispenser, an eduction tube in fluid communication with said valve body and orbitally rotatable with respect there-

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to, a member connecting said valve body and eduction tube, said member having an off-center opening into which the valve body fits, the opening in said member and said valve body having bearing surfaces in contact with each other permitting relative rotation of the parts without substantial leakage and said member being formed with a flow passage between the valve body and eduction tube, the bearing surface of one of said relatively rotatable parts being formed with an annular channel into which an orifice in the side of valve body opens, such channel maintaining fluid communication between the parts in all positions which the connecting member assumes relative to the valve body, a stud projecting upwardly from the connecting member spaced from its bearing on the valve body, the internal flow passage in said connecting member continuing through the stud and opening into the interior of the dispenser adjacent its upper end, a valve slidable along said stud and guided thereby to cover the opening in the internal flow passage when the dispenser is upright but to uncover the same when the dispenser is inverted, said eduction tube depending from the connecting member at a distance from the axis of rotation thereof, whereby the unbalanced weight of the connecting member causes the eduction tube to have orbital movement and to assume a pendulous position when the dispenser is horizontally held.

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