Nov. 11, 1952 B. BARON 2,617,686

SPRAY ATOMIZER

Filed April 2, 1951

Fig. 1

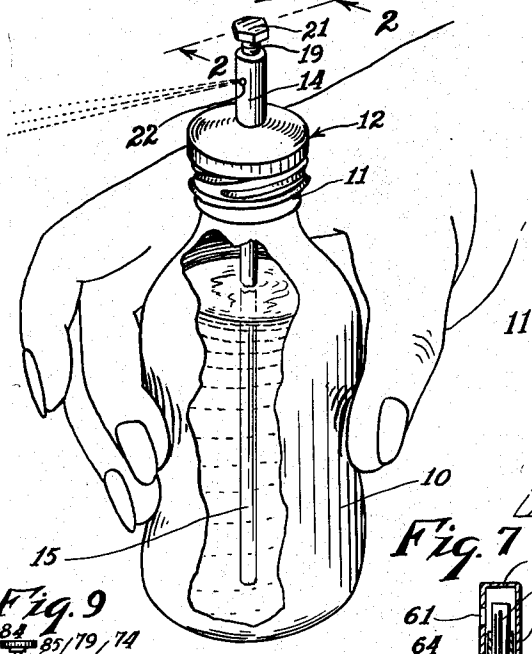


Fig. 2

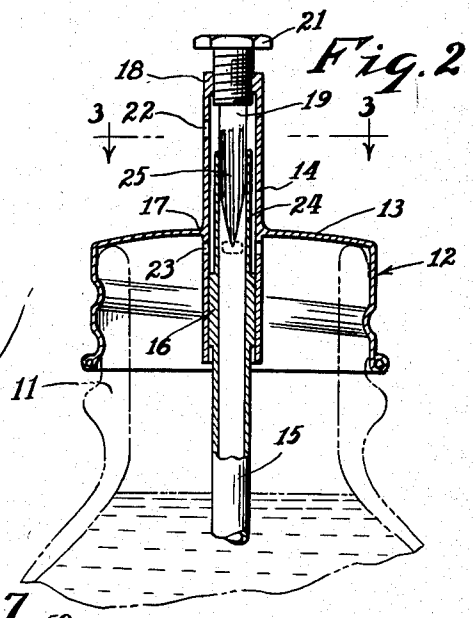


Fig. 7

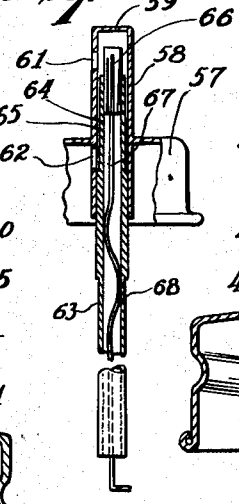


Fig. 9

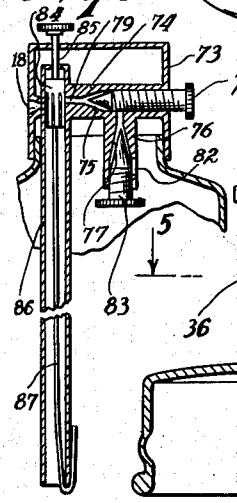


Fig. 4

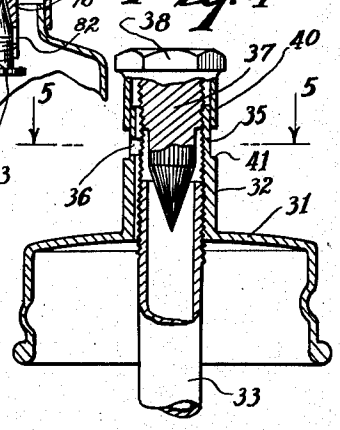


Fig. 6

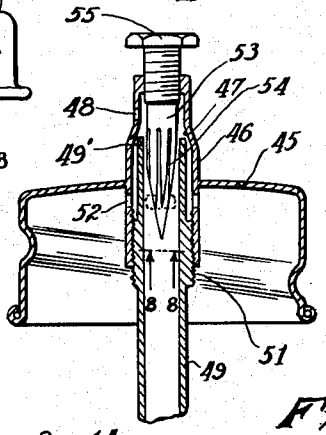


Fig. 8

Fig. 3

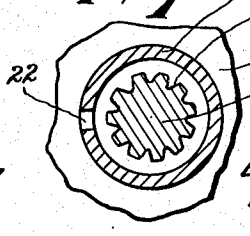
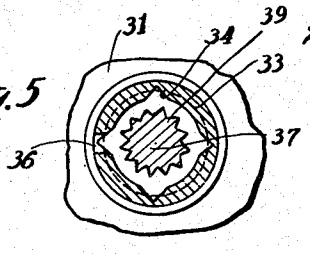


Fig. 5



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Patented Nov. 11, 1952 2,617,686

UNITED STATES PATENT OFFICE

2,617,686

SPRAY ATOMIZER

Barnett Baron, Bronx, N. Y.

Application April 2, 1951, Serial No. 218,763

6 Claims. (Cl. 299—90)

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This invention relates to spray atomizers.

It is an object of the invention to provide a cap head for atomizers that can be connected to the present day type of squeeze bottle so that the contents thereof may be projected in the form of a spray as the bottle is squeezed, and wherein there is within the cap assembly an adjustment for the adaptation of the same to different solutions to be atomized.

It is another object of the invention to provide an atomizer spray assembly adapted for use with squeeze bottles, which is adjustable and suitable to spray paint without becoming clogged and which can of necessity be easily and quickly cleaned.

It is another object of the invention to provide in an atomizer spray cap assembly for squeeze bottles a simple means for adjusting the flow of the liquid and of the air taken from the interior of the bottle to effect the atomizing of the liquid and wherein this adjustment is made by a mere turning of a special throttle valve to control the passage of the liquid from the tube that extends into the bottle and wherein the tube that extends into the bottle can be adjusted relative to the cap and serves as the means for controlling the supply of air.

It is another object of the invention to provide in an atomizer spray cap assembly throttle control valve elements for controlling the flow of air about the liquid elevating tube from either the interior of the cap or from the exterior thereof whereby the air flow can be controlled as well as can the liquid, the valve elements being disposed in passages communicating with the interior of the bottle.

Other objects of the invention are to provide a spray atomizer cap assembly for squeeze bottles which is of simple construction, inexpensive to manufacture, has a minimum number of parts, easy to clean and adjust, compact, of pleasing appearance, and efficient in operation.

For other objects and for a better understanding of the invention, reference may be had to the following detailed description, taken in connection with the accompanying drawing, in which:

Fig. 1 is a perspective view of the squeeze bottle with the spray atomizer head or cap assembly of the present invention attached thereto and with the bottle being squeezed to project a spray therefrom.

Fig. 2 is an enlarged fragmentary and sectional view of the spray atomizer cap assembly taken generally on line 2—2 of Fig. 1.

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Fig. 3 is a fragmentary transverse sectional view taken on line 3—3 of Fig. 2.

Fig. 4 is a vertical sectional view of the spray atomizer cap assembly constructed according to a modified form of the invention.

Fig. 5 is a transverse sectional view taken on line 5—5 of Fig. 4.

Fig. 6 is a fragmentary vertical sectional view of a spray atomizer cap assembly according to another form of the invention wherein the tube that extends into the bottle serves as an adjustable means to control the air supply.

Fig. 7 is a fragmentary vertical sectional view of a still further form of the invention, wherein the valve element is carried on a bendable rod within the tube that extends down into the bottle and is adjustable by the removal of the cap assembly from the bottle and by pushing or pulling on the wire from the lower end of the tube.

Fig. 8 is an enlarged end view of one of the liquid control valve elements.

Fig. 9 is a vertical sectional view of a still further form of the invention wherein valve control elements are utilized for controlling the flow of air from the bottle, said valve elements being accessible from the underside of the cap or from the exterior of the cap.

Referring now particularly to Figs. 1, 2 and 3, 10 represents a squeeze bottle made of plastic and having a threaded neck portion 11. A spray atomizer head or cap assembly 12 is threaded upon the threaded neck portion 11 of the bottle. This cap assembly has a main cap or body portion 13, through the center of which there extends a sleeve 14. This sleeve 14 projects downwardly from the top of the cap to receive a suction tube 15 that has an enlargement 16 tightly fitting the interior of the lower end of the sleeve 14. The tube 15 is thus concentrically mounted in the sleeve 14. The sleeve 14 is soldered as indicated at 17 to the top of the cap and is thereby rigidly secured thereto. The upper end of the sleeve 14 is threaded as indicated at 18 to receive a threaded throttle valve element 19, having a nut portion 21 at its upper end for effecting the turning of the element in the threaded portion 18 of the sleeve 14. A spray outlet opening 22 is provided in one side of the sleeve and through this outlet a spray is projected in the manner as illustrated in Fig. 1 when the bottle 10 is squeezed. The opening 22 is larger than the usual pinhole opening and can easily pass thick liquids like paint without clogging.

Inside of the top of the cap body 13, the sleeve 14 has air holes 23 circumferentially spaced there-

around. The tube 15 has an extension 24 that extends upwardly past the holes 23 and above the top of the cap to have union with the valve element 19. The pointed end of the valve element 19 extends downwardly into the extension 24 of the tube 15 and as it is adjusted the flow of the liquid upwardly from the tube 15 can be controlled. This valve element has a plurality of parallel and circumferentially spaced grooves 25 for receiving the liquid. These grooves 25 are wide at their lower ends and taper upwardly to a diminishing width, Fig. 8. As the bottle 10 is squeezed, the air is forced upwardly from within the bottle entering openings 23 and then upwardly through the sleeve 15 and around the valve element 19 to suck the liquid from the tube 15 and the extension 24 thereof to atomize the liquid and to deliver the spray through the opening 22 in the upper end of the sleeve 14. As the bottle 10 is released, air will again pass into the bottle by reverse flow from the opening 22 downwardly through the tube 14 and thence inwardly through the openings 23.

Referring now particularly to Figs. 4 and 5, there is shown a still further form of the invention. A cap body 31 is provided with an upwardly extending internally threaded sleeve portion 32, to which a long tube 33 that extends downwardly into the bottle is screw fitted. This sleeve projection 32 has a plurality of grooves 34 therein circumferentially spaced from one another and a reduced diameter portion 35. An outlet hole 36 is provided in the reduced diameter portion 35 and through this hole the spray is projected. The grooves 34 permit the upward passage of air from within the bottle as the bottle is squeezed. This upward movement of the air sucks the liquid upwardly through the tube 33. A throttle valve element 37 is threaded in the upper end of the sleeve projection 32 and has a nut formation 38 thereon by which the same can be adjusted in the projection 32. The valve element has a tapered end which is fitted with a plurality of parallel grooves 39 through which the liquid passes as it is elevated in the tube 33. In this manner the liquid flow is controlled. The valve element 37 has a sleeve or skirt portion 40 which is adjustable on the reduced diameter portion of the projection 32 and at times when it is desired to close the cap assembly, the valve element 37 is screwed downwardly and the sleeve or skirt portion 40 will surround the outlet opening 36 and provide a cover thereover. This sleeve or skirt portion 40 will come to rest upon a shoulder 41. In this manner the cap assembly is closed and dirt will be prevented from entering the outlet opening 36.

In Fig. 6, there is shown a still further form of the invention wherein the air can be controlled as well as can be the liquid. The tube that extends down into the bottle is adjustable in the vertically extending sleeve so that it can control the air flow outwardly from the bottle as the bottle is squeezed. A cap or body portion 45 has a central sleeve 46 that is tapered internally at 47 and has a discharge hole opening 48. This sleeve is internally threaded at its lower end and tube 49 having a threaded portion 51 is adjustable therein so that the portion 49' can be adjusted relative to the internal tapered surface 47 to alter the amount of air which is discharged upwardly. Small holes circumferentially spaced from one another, as indicated at 52, are provided in the sleeve 46. A tapered or throttle valve element 53 is threaded in the upper end of the sleeve

46 and is adjustable in the upper end of the portion 49' of the tube 49 thereby to control the flow of the liquid upwardly through the tube 49. This valve element 53 has grooves or throttling portions 54 to improve the upward flow of the liquid.

If it is desired to alter the amount of air flow, the tube 49 is screwed either up or down relative to the tapered surface 47. If it is desired to alter the flow of the liquid, the valve element 53 is screwed up or down in the upper end of the sleeve 46. This valve element has a head 55 to which a wrench can be attached.

In Fig. 7 there is shown a still further form of the invention in which a cap body 57 carries a vertically extending sleeve 58 which is closed at its upper end as indicated at 59. A discharge outlet 61 is provided in the upper end of the sleeve 58 and an air inlet-outlet 62, under the cap body 57, is provided to receive the air from the under side of the cap body 57. A tube 63 is tight fitted in the sleeve 58 and has a reduced diameter portion 64 which provides for an air space 65 through which the air is conducted upwardly upon entering the opening 62. The tube 63 is adapted to extend downwardly into the bottom of the bottle. Slidable in the tube 63 is a serrated valve element 66 which is fitted upon a rod 67 bent at 68 to frictionally retain the rod and the valve element 66 in their adjusted positions within the upper end of the tube 63. The serrations, or grooves, of the valve element 66 are preferably of varying sizes, large at the lower ends and tapering smaller at the upper ends so that the adjustment of the valve element 66 will alter the outlet size of the liquid passing upwardly through the tube 63. Upon removing the cap body 57 from the bottle, access is had to the lower bent end of the rod 66 and by a simple adjustment of either pulling up to pulling upon the rod the valve element 66 is adjusted in the upper end portion 64 of the tube 63.

In Fig. 9, a cap body 73 has an internal transverse portion 74 with a tapered seat 75 therein and a depending formation 76 having a tapered seat 77 therein. A valve element 78 cooperates with the seat 75 and is accessible from the exterior of the cap whereby to control air passing upwardly from the depending formation 76 and through passage 79 in the transverse portion that leads to outlet opening 81. The air enters the depending portion 76 through hole 82 and the amount of air required to have the desired pressure can be accordingly controlled from the exterior of the cap body 73. Also, if desired, the amount of air can be controlled from a valve element located in depending formation 76, as indicated at 83, and which cooperates with valve seat 77.

In order to control the liquid flow, there is provided a valve element 84 similar to the valve element 66 shown in Fig. 7 and which is operable by a screw 85 that is accessible from the top of the cap body. This valve element has the same grooves in the same and will control the flow of the liquid leading the depending tube 86. The valve element 84 will abut the screw 85 and can be held in place at any length along the tube 86 by wire 87 depending therefrom. It will thus be seen that there has been provided in this cap an arrangement similar to the form of the invention shown in Fig. 6 wherein the air flow can be controlled as well as can the liquid. When heavy liquids are used with these atomizers, the air pressure should be increased and the air opening reduced. For the finer liquids a different air pres-

sure is used. With the present atomizer, it has been found that with adequate control, that liquids of different viscosity can be used in this atomizer and dispensed effectively.

It should now be apparent that there has been provided a simple spray cap assembly wherein the flow of the liquid from the bottle can be easily and readily adjusted as well according to one form of the invention the flow of the air from the bottle can be controlled and adjusted. It will also be apparent that the assembly is such that it can be easily disassembled for the purpose of cleaning the parts thereof. This atomizer is particularly adapted for the spraying of paint and can be sold to anyone who intends to paint a surface. The bottle can be the package container for the paint, or the paint can be poured into the bottle at times when it is desired to use the spray cap assembly. It will also be apparent that such an assembly is inexpensive to manufacture and because of its simplicity, it can work with efficiency.

While various changes may be made in the detail construction, it shall be understood that such changes shall be within the spirit and scope of the appended claims.

I claim:

1. An atomizer spray head assembly comprising a main body portion, a vertically extending sleeve element attached to the main body portion and extending upwardly and downwardly therefrom, said sleeve element having an air inlet passage and a spray discharge opening, a tube element concentrically mounted within the vertically extending sleeve and having an upper end spaced from the air inlet passage and serving to direct the upward flow of air under pressure into the vertically extending sleeve, a throttle valve member connected to one of said elements and adjustable in the upper end of the tube and having a throttling portion thereon whereby to control the flow of liquid under pressure ascending in the tube element.

2. A spray atomizer head assembly as defined in claim 1, and said valve element being adjustably connected to the upper end of the vertically extending sleeve.

3. A spray atomizer head assembly comprising a main body portion, a vertically extending sleeve fixed in the center of said body portion and extending downwardly and upwardly from the body portion, said sleeve having an air inlet opening beneath the body portion and a spray discharge opening spaced from the inlet opening, said sleeve having an internal tapered surface below the spray discharge opening, a tube adjustably secured to the lower end of the vertically extending sleeve and adapted to depend into the bottle to receive liquids therefrom, said tube having an upper end portion extending upwardly through the sleeve into proximity with the tapered surface and adjustably cooperating therewith to control the amount of air delivered to the discharge opening, and a throttle valve element adjustable in the upper end of the sleeve and extending into the upper end of the tube to adjustably cooperate therewith to control the flow of the liquid as it is forced upwardly through the tube.

4. An atomizer spray head assembly comprising a main body portion, a vertically extending sleeve element mounted on the body portion and extending upwardly and downwardly therefrom, a tube element concentrically mounted within the lower end of the sleeve element and adapted to depend into the bottom of a bottle, one of said elements having a conical surface and the other of said elements being adjustable relative to said conical surface to regulate the air flow under pressure upwardly through the vertically extending sleeve element, said sleeve element having an air inlet opening and a spray discharge opening, said tube element having a reduced diameter portion to provide an annular upward passage for the air entering the air inlet openings, and a throttle valve element adjustably mounted on the upper end of the vertically extending sleeve element and adjustable in the reduced diameter portion of the tube element to control the upward flow of the liquid under pressure through the tube element.

5. A spray atomizer head assembly as defined in claim 1, and said valve element having a securing wire depending and accessible from the lower end of the tube to adjust the valve element relative to the upper end of the tube, said vertically extending sleeve being closed at its upper end.

6. A spray atomizer cap assembly as defined in claim 1 and said valve element having a skirt portion slidable over the exterior of said vertically extending sleeve and adapted in one position of the valve element to close off the spray outlet passage.

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