

Oct. 30, 1962

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3,061,203

DEVICE FOR EMITTING PAINTING MATERIAL

Filed Sept. 15, 1960

2 Sheets-Sheet 1

Fig. 1

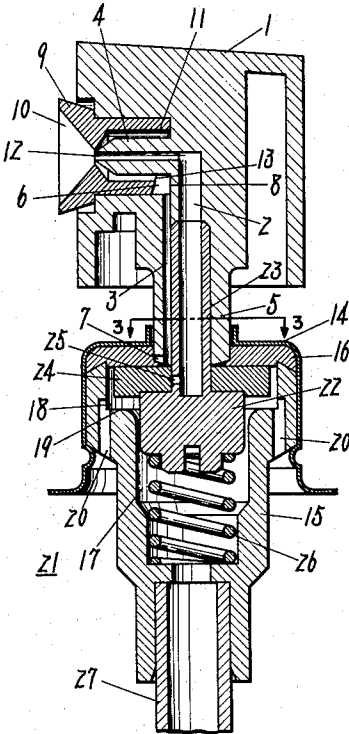


Fig. 2

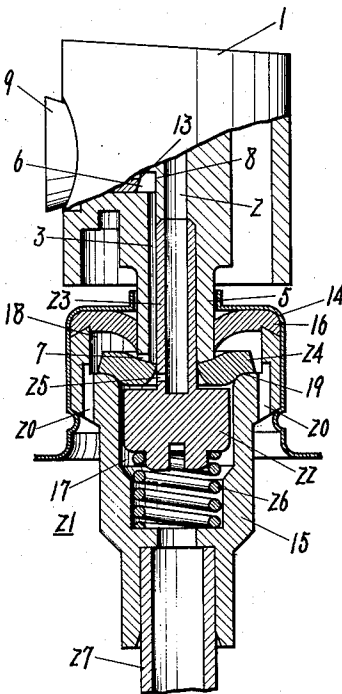


Fig. 3

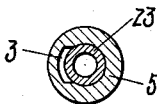
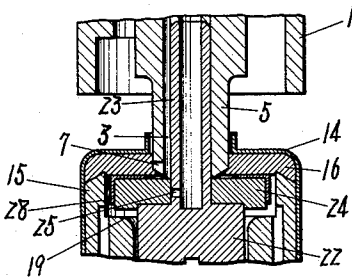


Fig. 4



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Fig. 5

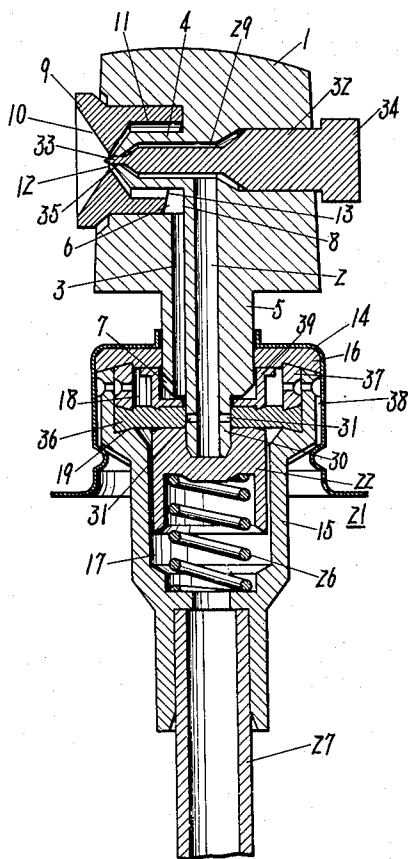
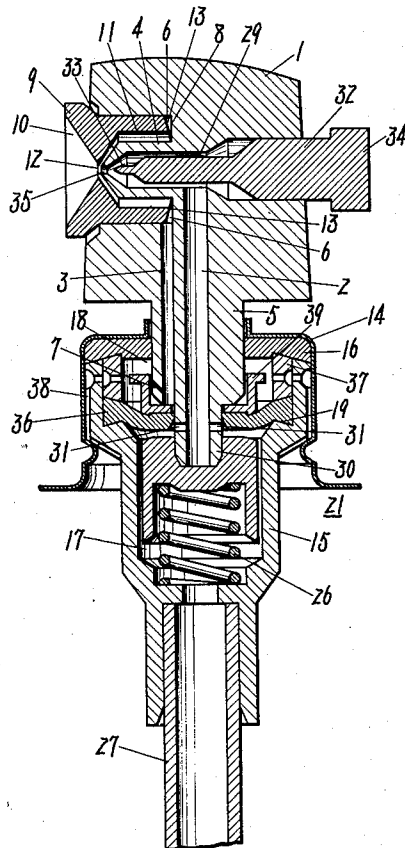


Fig. 6



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DEVICE FOR EMITTING PAINTING MATERIAL
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The present invention relates to aerosol dispensers for paint.

An object of the present invention is to provide devices with which a fine sprayed mist with a large scattering sphere of painting material can be obtained.

Another object of the present invention is to provide the above mentioned devices with the emission nozzle thereof arranged so as to prevent clogging thereof.

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

In the drawings:

FIG. 1 is a longitudinal sectional view of a device according to the present invention shown in its off position and fitted to the top wall of a reservoir.

FIG. 2 is a longitudinal sectional view of the device shown in FIG. 1 but in its state of operation.

FIG. 3 is a lateral sectional end view of the stem column of the device of FIG. 1 and FIG. 2.

FIG. 4 is a longitudinal sectional view of a modification of the device of FIG. 1 and FIG. 2 showing its modified portion.

FIG. 5 is a longitudinal sectional view of another modification according to the present invention shown in its off position.

In FIG. 1 and FIG. 2 a push button 1 is provided with a passage 2 for liquid and a passage 3 for gas. Said passage 2 is provided longitudinally through said push button and leads laterally through an inner nozzle 4. The lower end of said passage 2 connects with a stem pipe 23 of a valve assembly. Said stem pipe is encased in a stem column 5 of said push button. The passage 3 is provided longitudinally through said stem column and said push button proper. The lower portion of said passage 3 forms an inner canal alongside the periphery of the stem pipe 23 and adjacent thereto. The upper end of said passage 3 opens in a corner of a cavity 6 which is provided laterally in said push button. The lower end of said passage 3 communicates with an orifice 7 in the shape of a notch positioned at the lower end of said stem column. Said inner nozzle 4 projects laterally from the bottom 8 of the cavity 6. The stem column 5 extends downwards through the top wall 14 of a reservoir which contains a liquid painting material, for example, lacquer enamel or the like, and a gas expellent, for example dichlorodifluoromethane or the like. Said stem column also extends slidably through the fixed sealing gasket 16. A nozzle body 9 is provided with a conically recessed front 10 and a hollowed rear 11 and is encased rotatably in the cavity 6. Said front recess and hollow rear communicate with each other through a nozzle hole 12. The rear end 13 of said nozzle body is cut off obliquely. A valve assembly is encased tightly within said reservoir by the top wall 14 thereof around the periphery of a valve housing 15 and around the annular fixed sealing gasket 16. The valve housing 15 is topped with said gasket 16 and is provided therein with a valve chamber divided into a main chamber 17 and an upper chamber 18. Said chambers are not separate but are joined to each other by a shoulder 19 of said valve housing. The upper marginal portion of said valve housing is provided with bores 20 which are in communication with said upper chamber 18 and with the upper interior 21 of said reservoir. Said valve chamber contains a plunger 22 which is supported by a valve spring

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26. Said plunger is topped with said stem pipe 23 as a body. Said stem pipe extends through an annular free gasket 24 and the lower end wall of said stem pipe is provided with a side orifice 25. The free gasket 24 is disposed between the shoulder of the plunger 22 and the fixed gasket 16 and is placed above said shoulder 19. Said gasket 24 is also disposed so that the inner side thereof may seal said side orifice 25 at the off position of the device. An eductor tube 27 is fitted to the bottom of the valve housing 15 in communication with the main chamber 17 and with bottom of said reservoir.

When said device is in its off position as is shown in FIG. 1 the passage 3 is shut off from the upper chamber 18 by close contact of the fixed gasket 16 with the free gasket 24, and the passage 2 is also shut off from said chamber 18 by said gasket 24. No liquid is present in each valve chamber because said chamber is in communication through the bores 20 with the upper interior 21 of the reservoir which is filled by an expellent gas and because said upper chamber is in communication with the main chamber 17 within the valve housing 15 and said main chamber is also in communication through the eductor tube 27 with bottom of the reservoir which is filled by a liquid painting material.

When the push button 1 is depressed the free gasket 24 moves downwards due to the downward movement of the lower end of the stem column 5, placing the orifice 7 in communication with the upper chamber 18. Consequently, the upper interior 21 of the reservoir is placed in communication with the emission nozzle hole 12, with the result that said gas in the reservoir is emitted from the nozzle hole 12 and said hole is cleaned away as well as the environments thereof. Besides, said emitted gas at the initial stage of operation result in an effective agent for inducing liquid, in causing the sprayed mist of liquid to be fine from the beginning of emission and the spraying condition to be smooth. Subsequently, the outer edge of the free gasket 24 comes in contact with the shoulder 19 of the valve housing, causing the lower inner side of said gasket to open downwardly in accordance with the downward movement of the stem column 5 and placing the main valve chamber 17 in communication with said stem pipe 23, with the result that said liquid is emitted from the nozzle hole 12. Said emitted liquid comes into collision and is mixed with the emitting gas in producing a fine sprayed mist with a large scattering sphere.

When the push button 1 is released said device begins to recover its original position. In the first place, the orifice 25 is closed by the free gasket 24 in accordance with the elevation of the plunger 22, in causing the stem pipe 23 to be shut off from said valve chambers, with the result that no liquid is allowed to be discharged through the passage 2. In early stage of said closure of the orifice 25, the orifice 7 remains open, causing emission of gas by itself, with the result that the painting material remaining around said nozzle hole 12 is blown away due to the sucking power of the emitting gas. Subsequently, the orifice 7 is closed by the fixed sealing gasket 16 in completing the operation.

A modification of the device shown in FIGS. 1 and 2 is shown in FIG. 4 wherein a metal guard ring 28 encases the side and marginal top portion of gasket 24 for preventing the deformation thereof which may be caused by the infiltration of liquid and also for maintaining the shape of said gasket for providing a precise valve action.

The operation of the device of FIG. 4 is substantially the same as that described for the device of FIGS. 1 and 2 with the stem column 5 entering said guard ring 28 without engaging the same and pressing against gasket 24 to move the same downwardly as in FIG. 2, when button 1 is depressed.

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In FIG. 5 and FIG. 6 a push button 1 is provided with a passage 2 for liquid and a passage 3 for gas. Said passages are provided respectively through said push button proper and the stem column 5 longitudinally. Said passage 2 opens in a cavity 29 which is provided laterally through said push button and extends through an inner nozzle 4. The lower end of said passage 2 extends to the bottom of a boss 30 which projects from the bottom of said stem column 5 and which has side orifices 31 through said boss. The upper end of said passage 3 opens in a corner of another cavity 6 which is provided laterally in said push button. The lower end of said passage 3 communicates with an orifice 7 in the shape of a notch which is positioned at the lower end of the stem column 5. The inner nozzle 4 projects laterally from the bottom of said cavity 6. Said stem column extends downwards through the top wall 14 of a reservoir which contains a liquid painting material, for example, lacquer enamel or the like, and an expellent gas, for example, dichlorodifluoromethane or the like. Said stem column also extends slidably through an annular fixed sealing gasket 16. A nozzle body 9 is provided with a conically recessed front 10 and a hollowed rear 11 and is encased rotatably in said cavity 6. Said front recess and hollowed rear communicate with each other through a nozzle hole 12. The rear end 13 of said nozzle body is cut off obliquely. An adjusting rod 32 with a needle 33 at its conical terminus and a knob 34 at its other end is encased slidably in the cavity 29. Said needle 33 extends through a discharge hole 35 in said nozzle 4. A valve assembly is encased tightly within said reservoir by the top wall 14 thereof around the periphery of a valve housing 15 and around sealing gasket 16. Said valve housing is topped with said gasket 16 and is provided therein with an upper valve chamber 18 and a main valve chamber 17. Said upper chamber is separated from said main chamber by an annular semi-free gasket 36. The margin of said gasket 36 is fixed tightly between the shoulder 19 of said valve housing and a fixing ring 37. Said ring 37 is placed tightly between said fixed gasket 16 and said semi-free gasket 36. The upper marginal wall of said valve housing is provided with passages 38 which are in communication with the upper interior 21 of the reservoir and with the upper chamber 18 through the wall of the fixing ring 37. The main chamber 17 contains a plunger 22 which is supported by a valve spring 26. Said plunger encases the lower end of said boss 30 which extends through said semi-free gasket 36. The side orifices 31 are positioned so that they may be sealed up by the inner side of the semi-free gasket 36 at the off position of the device. The upper chamber 18 contains a cylindrical check ring 39 with central opening in the bottom thereof, and said check ring is disposed between the fixed gasket 16 and the semi-free gasket 36 for pressing up said fixed gasket and pressing down said semi-free gasket at the off position of said device. Said upper chamber also contains the lower end of said stem column 5. The bottom opening of said check ring 39 has said boss 30 extending therethrough. An eductor tube 27 is fitted against the bottom of said valve housing in communication with the main chamber 17 and with the bottom of said reservoir.

When said device is at its off position as is shown in FIG. 5, the passage 3 is shut off from the upper chamber 18 by the close contact of the check ring 39 with the fixed gasket 16 and with the semi-free gasket 36. And the passage 2 is shut off from the main chamber 17 by said semi-free gasket.

When said device is in operation, that is when the push button 1 is depressed the check ring 39 moves downward due to the downward movement of the lower end of the stem column 5, causing the orifices 31 to be positioned in communication with the upper chamber 18. Consequently the upper interior 21 of the reservoir is placed

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in communication with the nozzle hole 12, with the result that said gas in said reservoir is emitted from said nozzle hole. The action and merits of said emitted gas at the initial stage of operation is equivalent to that of the device of FIG. 1 and FIG. 2. Subsequently, the lower inner side of the semi-free gasket 36 opens downwardly in accordance with the downward movement of the stem column 5, causing the orifices 31 to open in the main valve chamber 17, with the result that said liquid in the reservoir is emitted from the nozzle hole.

The spray forming action and the features of the sprayed mist and the merits thereby are equivalent to those of the device of FIG. 1 and FIG. 2. The advantages peculiar to the device described hereabove are as follows. Due to the suppressing action of the check ring 39, said device is free from troubles which may be caused by deformation of the gasket 36 which has to seal the orifice serving passages for liquid. Cleaning of the passages for liquid and passages for gas is easily accomplished by pulling the push button away from the valve assembly on account of the unified structure of push button and said stem pipe as is present in the device of FIG. 1 and FIG. 2. Adjustment of the amount of liquid to be emitted is simply accomplished by shifting the adjusting rod 32. Shutting off of the passages for the liquid from outside is permitted by said needle, when said device is not in use.

The device according to the present invention, as it is composed as stated above, produces a very fine spray of the painting material by collision and mixing action of gas expellent and liquid at the nozzle hole 33, and the scattering sphere of said sprayed mist is very large as compared with conventional aerosol dispensers for painting, enabling painting work to be easy and painted surfaces beautiful. Cleaning of the emission nozzle and the surrounding surfaces takes place automatically due to said initial and final emission of gas without emission of liquid, with the result that an excellent spraying condition is obtained at any time. A constant and appropriate spraying condition is obtained by changing mixing ratio of liquid and gas on account of the adjustability of the opening of the passage for gas.

With above mentioned characteristics and merits a device according to the present invention enables to provide a most appropriate aerosol dispenser for painting service.

Having thus described my invention, what I claim is:

1. An aerosol dispenser for paint comprising a reservoir containing a liquid painting material and a gas expellent, a cover for said reservoir having a cylindrical portion with a top opening, a push button provided with a passage for liquid and a passage for gas with said passages extending between an emission nozzle hole and a stem column of said push button, said stem column slidably extending through and closing said cover top opening and having a side opening within said cover, a plunger having a stem pipe carried by said push button with said stem pipe having a bore in communication with said push button liquid passage and a side opening, a sealing gasket positioned in said cover cylindrical portion and around and beneath said stem column normally closing said column side opening, a valve housing extending in said cover cylindrical portion fixedly retaining said gasket therein and having an upper open top chamber and a lower open top chamber communicating with said upper chamber, said plunger being slidably positioned in said lower chamber, resilient means in said lower chamber supporting said plunger, said valve housing having bores communicating with said upper chamber and the upper portion of said reservoir, an eductor tube communicating with said lower chamber and the bottom portion of said reservoir, and a second sealing gasket freely mounted between said plunger, said stem column and said first gasket and normally closing the opening in said stem pipe, said gaskets openings their respective stem pipe and column side openings upon movement of said stem col-

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umn into said cover releasing gas and liquid from said reservoir.

2. An aerosol dispenser for paint as claimed in claim 1, wherein a metal guard ring encases the side and marginal top portion of said second gasket for protecting said gasket against deformation due to the infiltration of liquid.

3. An aerosol dispenser for paint as claimed in claim 1, wherein means are provided for adjusting the size of said emission nozzle hole in said push button.

4. An aerosol dispenser for paint comprising a reservoir containing a liquid painting material and a gas expellent, a cover for said reservoir having a cylindrical portion with a top opening, a push button provided with a passage for liquid and a passage for gas with said passages extending between an emission nozzle hole and a stem column of said push button, said stem column slidably extending through and closing said cover top opening and having a side opening within said cover communicating with said gas passageway, a stem tube extending from said stem column and having a side opening in communication with said liquid passageway, a valve housing mating with said cover cylindrical portion and having an upper open top chamber and a lower open top chamber, a piston slidably mounted in said lower chamber and abutting said stem tube, resilient means in said lower chamber tending to move said piston against said stem

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tube, a sealing gasket mounted in said cover cylindrical portion around the top opening thereof, a second sealing gasket having said stem tube extending therethrough and normally closing said stem tube side opening, a cylindrical fixing ring having a bottom opening with said stem tube extending therethrough and mounted on said second gasket with said stem column extending therein, a check ring positioned between said gaskets around said fixing ring and having openings therethrough, said valve housing having openings placing said check openings in communication with said reservoir, a tube in communication with said lower chamber and said reservoir for the admission of liquid under pressure to said chamber and said second gasket being deformable upon movement of said stem column into said cover opening, said stem tube side opening to said liquid in said lower chamber.

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