H. O. NORRIS.

PAINT SPRAYER.

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1,427,495. Patented Aug. 29, 1922.

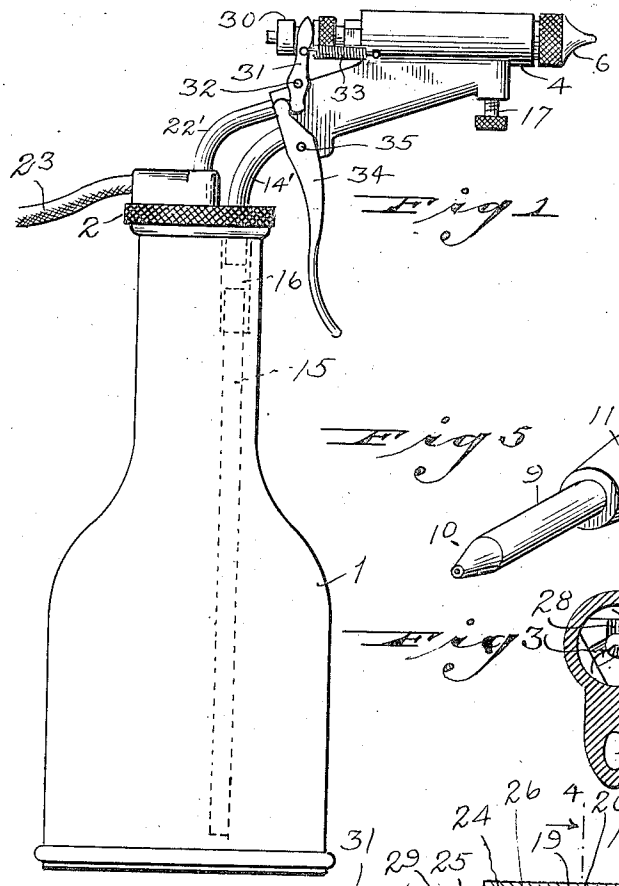


Fig. 1

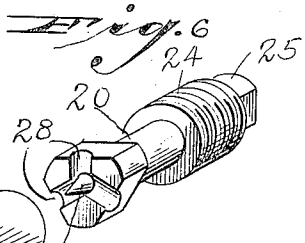


Fig. 6

Fig. 5

Fig. 3

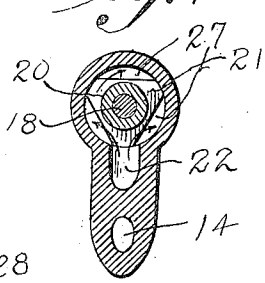


Fig. 4

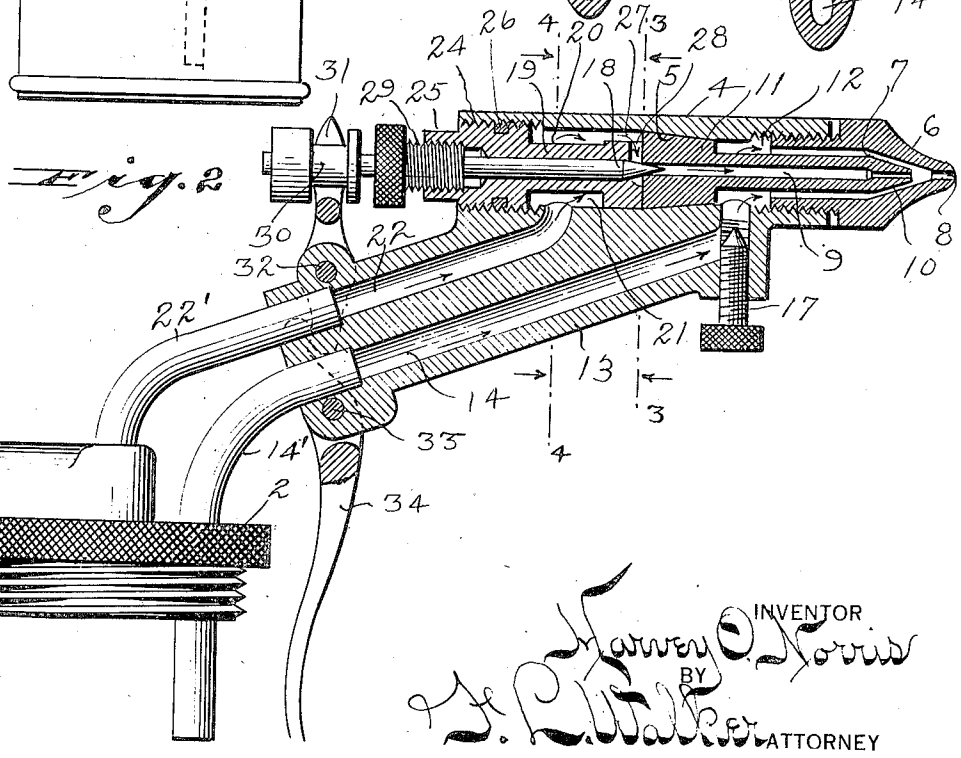


Fig. 2

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PAINT SPRAYER.

1,427,495. Specification of Letters Patent. Patented Aug. 29, 1922.

Application filed June 20, 1921. Serial No. 478,922.

To all whom it may concern:

Be it known that I, HARVEY O. NORRIS, a citizen of the United States, residing at Dayton, in the county of Montgomery and State of Ohio, have invented certain new and useful Improvements in Paint Sprayers, of which the following is a specification.

This invention relates to spraying devices of the air brush type, for applying paint, varnish, stain and like material, but is also applicable to other purposes as for instance, the spraying of disinfectant, insecticide, or in fact any use wherein it is desired to distribute a liquid in the form of a fine mist or spray.

The object of the invention is to simplify the structure as well as the means and mode of operation of such devices, whereby they will not only be cheapened in construction, but will be more efficient in use, positive in operation, uniform in action easily controlled and unlikely to get out of repair.

A further object of the invention is to provide a spray head capable of being easily and quickly disassembled for cleaning and inspection.

A further object of the invention is to provide improved control valve and operating means therefor by which the discharge of the sprayed liquid is regulated.

A further object of the invention is to provide means for controlling the degree of suction exerted upon the fluid to be discharged, thereby adapting the device for operation upon fluid of different density.

With the above primary and other incidental objects in view as will more fully appear in the specification, the invention consists of the features of construction, the parts and combinations thereof, and the mode of operation or their equivalents as hereinafter described and set forth in the claims.

Referring to the accompanying drawings, wherein is shown the preferred, but obviously not the only embodiment of the invention, Fig. 1 is a side elevation of the assembled sprayer in which is embodied the present invention. Fig. 2 is a longitudinal sectional view of the assembled spraying head. Fig. 3 is a transverse sectional view of the spray head on line 3—3 of Fig. 2. Fig. 4 is a similar transverse view on line 4—4 of Fig. 2. Fig. 5 is a detail perspective view of the jet nozzle removed from the head. Fig. 6 is a detail perspective view of the guide element for the needle valve.

Like parts are indicated by similar characters of reference throughout the several views.

In the accompanying drawings 1 is the reservoir or container for the paint or other liquids to be sprayed. This reservoir in the present instance is funnel shape, the neck of the reservoir being so shaped and proportioned as to afford a convenient handle for the device. The reservoir 1 carries a closure cap 2 on which is mounted the spray head.

This spray head comprises a tubular barrel 4, the bore of which is medially contracted or tapered at 5. The angle of this taper is quite acute in relation with the axis of the barrel 4. Screw threaded and hence adjustable upon the forward end of the barrel 4 is a discharge nozzle 6, having therein a tapered counter bore 7 terminating in a minute discharge orifice 8.

Fixedly located within the barrel 4 and extending within the counter bore of the discharge nozzle 6, is a jet nozzle comprising an elongated hollow stem 9 terminating in a tapered or conical head 10 at one end and having at its opposite end an enlarged tapered or conical head 11, which agrees with the medial tapered contraction 5 of the barrel 4. The enlarged rearward tapered head 11 of the jet nozzle is pressed into firm seating engagement in the tapered socket formed by the contraction 5 of the barrel. The elongated hollow stem 9 of the jet nozzle is thus supported in concentric spaced relation with the walls of the barrel 4 and the counter bore of the discharge nozzle 6. The tapered forward extremity 10 of the jet nozzle extends within the tapered portion of the counter-bore of the discharge nozzle 8 wherein its relation is varied by the adjustment of the discharge nozzle. Thus by a rotary adjustment of the discharge nozzle 6, the outlet orifice 8 thereof may be brought more or less closely into proximity to the tapered head of the jet nozzle and the relation of the tapered extremity of the jet nozzle with the tapered wall of the counter bore of such discharge nozzle correspondingly varies. The concentric spaced relation of the jet nozzle stem 9 within the bore

of the barrel 4 affords thereabout a concentric passage 12 which communicates with the outlet orifice 8.

Extending downwardly and rearwardly from the nozzle 4 is an integral portion 13 of the spray head having therein the conduit 14. This conduit 14 is extended beyond the spray head as at 14′ passing through the closure cap 2 of the reservoir within which it is flexibly connected with a suction pipe 15 extending approximately to the bottom of the reservoir or container 1. The flexible joint 16 between the conduit 14′ and the suction pipe may be merely a short length of rubber tubing as at 16. This flexible joint allows the suction pipe 15 to be deflected by gravity, to the lowest portion of the reservoir or tank, regardless of the direction in which the tank or reservoir may be tilted. At the entrance of the conduit 14 into the passage 12 there has been shown an adjustable closure or regulating screw 17 by which the capacity of the conduit 14 may be varied. By the adjustment of the screw 17 the port from the conduit 14 into the passage 12 may be opened and closed to greater or less degree. By this means the spray head is accommodated to fluid of greater or less density or those of more or less viscous nature. As is well known with a given pressure or expenditure of power a greater degree of suction can be exerted through a small orifice than through a large one. Thus with the air pressure as hereafter described, the degree of vacuum exerted through the supply conduit 14 may be varied by the adjustment of the screw 17 to enable the feeding of liquid of different character.

The rearward orifice of the jet nozzle bore forms a valve seat for a reciprocatory needle valve 18, the point of which projects within the bore of the jet nozzle and by its forward movement reduces the inlet orifice of such jet nozzle and in its final adjustment entirely closes the same. The jet nozzle is opened by the retraction of the needle valve rearwardly. This reciprocatory needle valve 18 is mounted in a guide member 19 located immediately in the rear of and bearing upon the enlarged tapered head 11 of the jet nozzle. The guide member 19 is reduced medially as indicated at 20 to form thereabout a concentric chamber 21, within the barrel 4 with which communicates a supply conduit 22 for fluid under pressure preferably compressed air. This conduit 22 is likewise formed in the integral portion 13 of the spray head and is continued or extended as at 22′ to the closure cap 2. This air supply conduit does not extend through the closure cap 2, but is provided with a lateral passage therein with which communicates a supply hose 23 for the air or other fluid under pressure.

The rearward portion or head of the needle valve guide 19 is screw threaded as at 24 for engagement in the rear end of the barrel 4, and to facilitate adjustment is provided with an extending flattened hub or neck 25 for engagement with a wrench. This screw threaded rearward portion has been shown in the drawing provided with a peripheral groove 26 for packing material to prevent the escape of the air or other fluid under pressure. The forward end of the needle valve guide or head formed by the reduction of the medial portion is of polygonal shape. In the drawing it has been shown of a substantially triangular form the angles of such triangular head being truncated concentric with the center of the guide. The lateral flattened faces of the polygonal head of the valve guide member affords intermediate such head and the walls of the barrel 4, longitudinal passages 27 communicating with the concentric air chamber 21, and with which communicate radially disposed notches 28 formed in the forward face of the valve guide member, and which serve to conduct the air or other fluid under pressure to the entrance orifice of the jet nozzle. The air or other fluid under pressure supplied through the conduit 22 enters the concentric air chamber 21 surrounding the medial portion of the valve guide 19, and passes thence through the longitudinal passages 27 and through the radial notches 28 to the jet nozzle and if the needle valve 18 is in retracted position, this fluid under pressure rushes through the bore of the jet nozzle, discharging from the pointed end thereof through the discharge outlet 8 of the main discharge nozzle. This rush of air or other fluid induces a suction or vacuum within the concentric receiving chamber 12 which is communicated through the supply conduit 14 drawing therethrough a supply of liquid which is discharged through the concentric passage 12.

At the rear end of the needle valve guide 19, there is provided a packing gland 29 by which the leakage of air through the valve guide passage is prevented. The needle valve extends rearwardly beyond the extremity of the guide member, and carries a peripherally grooved collar 30 in which engages the bifurcated head of a short operating lever 31 pivoted at 32 to the sprayer head. This pivoted operating lever forms one member of a compound control lever, the other member of which comprises a trigger arm 34 pivoted at 35 with its upwardly extending bifurcated end engaging the downturned arm of the operating lever 31. Retracting springs 33 are attached to the actuating lever 31 and to the sprayer head upon the opposite sides thereof, which tend to draw the needle valve forwardly

and into contact with its seat in the rearward end of the jet nozzle. By the retraction of the trigger arm 34, the needle valve is retracted in the same direction, thereby opening a direct passage for the compressed air through the jet nozzle.

Having thus described my invention, I claim:

1. In an air brush sprayer, the combination with a tank, of a spray head comprising a barrel, the bore of which is medially tapered, an adjustable discharge nozzle at the extremity of said barrel, a jet nozzle mounted within the barrel including a hollow pointed stem of less diameter than the bore of the barrel extending into proximity to the discharge nozzle and an enlarged tapered head seated in the medial taper of the bore of the barrel, there being a concentric passage surrounding the stem of the jet nozzle within the bore of the barrel and leading to the discharge nozzle, a liquid conduit leading from the reservoir to said passage, a valve seat formed upon the rear end of the jet nozzle, a reciprocatory valve member engaging said seat upon the forward movement, a guide for said reciprocatory valve, a conduit for fluid under pressure leading to the bore of the barrel to the rear of the jet nozzle, and manually operated means for retracting the reciprocatory valve to permit the passage of the fluid under pressure through said jet nozzle to induce by suction a flow of liquid from the reservoir and concentric passage for discharge through said discharge nozzle.

2. In an air brush sprayer, the combination with a reservoir, of a spray head comprising a barrel, a discharge nozzle at the end of the barrel, a jet nozzle concentrically arranged within the bore of the barrel in spaced relation with the walls thereof, to form a concentric passage for liquid, said jet nozzle having a head which medially closes the bore of the barrel, a valve seat formed in the rear side of said head, a reciprocatory needle valve, spring actuated into engagement with said valve seat, a conduit for fluid under pressure leading to the barrel in the rear of said jet nozzle head, and means to manually retract the needle valve to permit the escape of fluid under pressure through said jet nozzle to induce a flow of liquid through the supply conduit to the concentric passage and thence through the discharge nozzle.

3. In an air brush sprayer, the combination with a reservoir, of a sprayer head, including a barrel, a discharge nozzle at the extremity thereof, a jet nozzle concentrically positioned within the barrel and of less diameter than the bore thereof to afford thereabout a concentric passage communicating with the discharge nozzle, a supply conduit for liquid leading to said passage, a reciprocatory valve controlling the jet nozzle, a guide for said valve, said guide being medially reduced to form a concentric chamber thereabout within the barrel, a polygonal head upon said valve guide in proximity to the rear end of the jet nozzle, said head having notches in the face therein forming with the flattened faces of the head intercommunicating passages between the concentric chamber and the jet nozzle, the access to which is controlled by said valve, a supply conduit for fluid under pressure leading to said concentric chamber, whereby upon retraction of the valve the fluid under pressure will pass from said concentric chamber through the spaces afforded by the flat faces of the polygonal head and thence through the notches to said jet nozzle to induce a flow of liquid from the reservoir through the concentric passage to the discharge nozzle.

4. In an air brush sprayer, the combination with a reservoir, of a sprayer head comprising a barrel, a discharge nozzle at the extremity thereof, a jet nozzle concentrically located within the barrel to afford thereabout a concentric passage communicating with the discharge nozzle, a supply conduit for liquid leading from the reservoir to said passage, a supply conduit for fluid under pressure leading to the barrel in the rear of said jet nozzle, a reciprocatory valve controlling the passage of the fluid under pressure through said nozzle, spring means for actuating the valve forwardly to arrest the fluid supply, and a compound lever for retracting the valve including a medially pivoted lever, one arm of which is operatively connected with the reciprocatory valve, and a pivoted trigger arm operatively engaging the opposite arm of said lever whereby upon retraction of the trigger arm the valve is retracted in the same direction to release the fluid under pressure to induce thereby a flow of liquid to said concentric passage and thence through the discharge nozzle.

5. In an air brush sprayer, the combination with a reservoir, of a sprayer head comprising a barrel, a discharge nozzle at the extremity thereof, a jet nozzle concentrically located within the barrel to afford thereabout a concentric passage communicating with the discharge nozzle, a supply conduit for liquid leading from the reservoir to said passage, means to regulate the capacity of said conduit independent of the nozzle adjustment, a supply conduit for fluid under pressure leading to the barrel in the rear of the jet nozzle, a valve controlling the escape of fluid under pressure through the jet nozzle to induce a flow of liquid through said conduit to the concentric passage and thence through the discharge nozzle, and means for manually actuating the valve.

6. In an air brush sprayer, the combination with a reservoir, of a sprayer head comprising a barrel, a discharge nozzle at the extremity thereof, a jet nozzle concentrically located within the barrel to afford thereabout a concentric passage communicating with the discharge nozzle, a supply conduit for liquid leading from the reservoir to said passage, an adjustable closure member for said liquid supply conduit, a supply conduit for fluid under pressure leading to the barrel in the rear of the jet nozzle, a valve controlling the escape of fluid under pressure through the jet nozzle to induce a flow of liquid through said conduit to the concentric passage and thence through the discharge nozzle, and means for manually actuating the valve.

In testimony whereof, I have hereunto set my hand this 15th day of June A. D., 1921.

HARVEY O. NORRIS.

Witnesses:
WM. A. SWANEY,
GEORGE C. HELMIG.