Nov. 7, 1950 E. W. VOSE 2,528,927

SPRAYING DEVICE FOR LIQUIDS

Filed Dec. 7, 1944

FIG. 1.

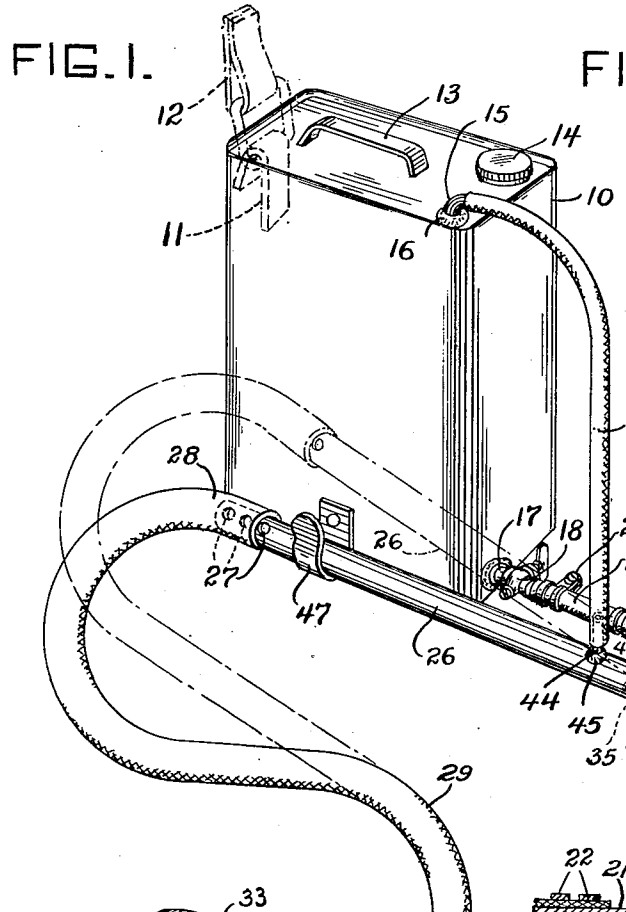


FIG. 4.

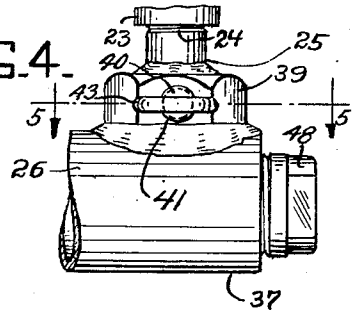
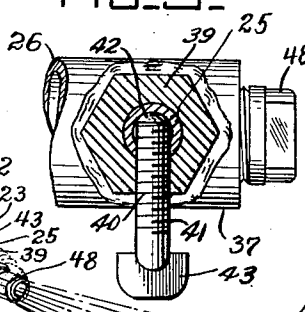
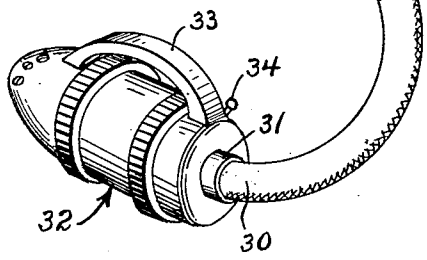


FIG. 5.





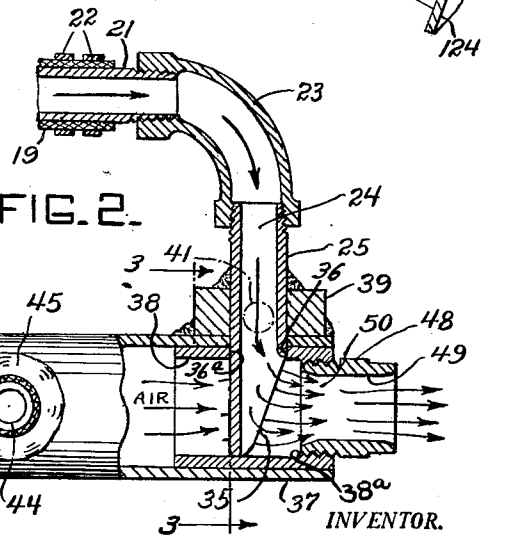
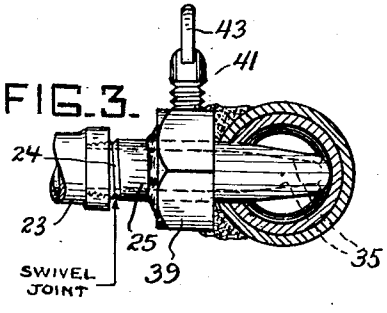


FIG. 2.

FIG. 3.



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SPRAYING DEVICE FOR LIQUIDS

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2 Claims. (Cl. 299—89)

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This invention relates to Improvements in Spraying Devices for Liquids and has for an object the provision of a liquid sprayer simple in form, adapted to be manufactured at extremely low cost, and adapted to be operated by air from a large volume, low pressure source.

Another object of the invention is the provision of a liquid sprayer including a straight air tube, a small conduit connected thereto where the pressure is substantially maximum and leading to a container of liquid to be sprayed for impressing pressure on the surface of the liquid; an injector extending into said tube and spaced apart from the discharge end thereof a predetermined distance to form a mixing chamber between itself and said discharge end; a conduit extending from the bottom of said container and connected to deliver liquid to said injector, and means in the discharge end of said tube for aiding the mixing of the air and liquid and for defining the cone of mixed air and liquid discharged.

A further object of the invention is the provision in a liquid sprayer, of swivel means in the liquid line permitting the discharge from the air tube to be directed in a plurality of directions, the container of liquid remaining undisturbed.

Yet another object of the invention is the provision in the liquid line of a threaded screw for restricting the passage, or interior bore thereof, said screw being of substantially the diameter of said bore, and its end substantially conforming to the interior wall of said bore, whereby liquids (particularly light liquids) are broken up into a plurality of fine streams defined by at least some of said threads, under the urge of the pressure exerted on the liquid supply in the container and by the sub-atmospheric pull generated at the injector in the nozzle or air tube.

Other objects and advantages of the invention will become apparent to those skilled in the art.

Referring to the drawings, which are given by way of example only:

Figure 1 is a perspective view of a complete liquid sprayer and its motor driven blower for supplying a large volume of air at a low pressure at the sprayer;

Figure 2 is a cross-sectional view of the end of the nozzle or air tube, showing details of the injector and the removable member for defining the mixing chamber;

Figure 3 is a sectional view taken along the lines 3—3 of Figure 2;

Figure 4 is a fragmentary elevation of a portion of Figure 2, showing a valve for adjusting the quantity of liquid delivered via the injector; and

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Figure 5 is a cross-sectional view taken along the line 5—5 of Figure 4.

My novel sprayer includes a liquid container or tank 10 which carries at least one hook 11 which may engage a suitable harness 12, worn by the operator. The tank 10 may also be provided with a handle 13 at the top. The top of the tank is also provided with a suitable filler hole, closed by a cap 14, and a fitting 15 may be soldered or brazed to the top with its interior bore communicating with the interior of the tank, the solder being shown at 16.

A bushing 17 is soldered or brazed to a wall of the tank near the bottom thereof. This bushing has a threaded hole formed therein communicating with the interior of the tank, and a shut-off valve 18 has a threaded shank which is screwed into the bushing 17. The other shank of the valve 18 has one end of a hose 19 secured thereto by means of a clamp 20.

The other end of the hose 19 embraces a nipple 21 and is secured thereto by a clamp 22. The nipple 21 threadedly engages an elbow 23, the other end of which threadedly engages the outer end 24 of an injector tube 25, which will be presently described.

An air tube, or nozzle, 26, has several radial holes 27 in alignment near one end thereof. The end 28 of a flexible conduit 29 forms a working fit on the end of the air tube 26, and may be adjusted to cover or uncover one or more of the holes 27 in order to control the air pressure, as will presently be described. The other end 30, of the flexible conduit 29, is connected to the discharge nozzle 31, of the motor driven blower unit 32. This blower unit may be provided with a suitable handle 33 and may have a conveniently located switch 34 for controlling the motor.

The injector tube 25, above referred to, has a beveled face 35 and is mounted in a hole 36 formed near the end 37 of the air tube 26. Within the end of the air tube 26 is a bushing 38, the outside diameter of which forms a fit in the air tube 26, and a portion 38a of the interior bore of which is of reduced diameter and threaded, and defines, between its inner end and the beveled face 35, a mixing chamber for the air and the injected liquid. The bushing 38 has a hole 36a formed therein which is in alignment with the hole 36. The injector tube 25 extends through the aligned holes 36, 36a and is positioned with its beveled face 35 directed toward the end 37, of the air tube. A nut 39 is positioned on the injector tube 25 in contact with the outer wall of the tube 26. This nut is brazed, or soldered, to the outer wall of the tube 26 and is also brazed, or soldered, to the outer wall

of the injector tube 25. A hole 40 is drilled in the nut 39 and through the wall of the injector tube 25 (see Figs. 3 and 5). This hole is threaded and the diameter of a screw 41, fitting said threaded hole, is such that the outer diameter of the screw is substantially equal to the inner diameter of the injector tube 25. The end 42 of the screw is rounded to conform to the interior diameter of the injector tube 25. The screw 41 may be provided with a flat, elongated head 43 to enable the operator to turn it. Spaced apart from the injector tube 25, in the air tube 26, is a nipple 44, which extends through a hole in the wall of the air tube 26, and is brazed thereto, as shown at 45. A flexible tube 46 has its upper end connected to the fitting 15 and its lower end connected to the nipple 44, so that when air is passing through the tube 26 pressure is exerted upon fluid in the tank 10, above the surface thereof via the nipple 44, the tube 46 and the fitting 15. The air tube may be normally snapped into a clip 47, secured to a side wall of the tank 10. The tube may be disengaged from the clip and may be freely swung in several planes about the pipe threads on the end of the injector tube 25, which act as a swivel.

A bushing 48, externally threaded at one end thereof, having a bore 49 formed therein of a predetermined diameter, and streamlined at the point 50, is screwed into the bushing 38, and when positioned therein is slightly spaced apart from the beveled face 35 of the injector tube. The space between the beveled face 35 and the streamlined portion 50 of the bushing 48, forms a mixing chamber within the bushing 38, and restricts the stream of mixed air and liquid so that a deposit of predetermined size may strike the work. With the proportions shown in Fig. 2, and with a given stream of air passing through the air tube 26, the discharge end of the tube 26 may be held 18'' from the work and a deposit of spray approximately 5'' in diameter, will strike the work. Since the blower delivers a large volume of air at low pressure, applicant is, with this device, enabled to apply finishes to surfaces, such as the surface 124 shown in Figure 1, much more rapidly and much more evenly than is possible to obtain with the usual blowguns employing high pressure air at low volume.

The air pressure impressed on the surface of the liquid in the tank is taken from a point at which the air pressure in the tube 26 is highest.

Applicant, by restricting the air tube with the bushing 38 a short distance before the air encounters the injector tube effects a suction, or vacuum, upon the beveled face 35 of the injector tube, which is of the order of 8'' on a water column. The liquid delivered to the injector tube from the tank is, as pointed out above, under pressure and the combined suction and pressure insure the delivery of a certain steady stream of liquid to meet the air stream in the chamber defined between the beveled face 35 and the rear end of the bushing 48. In this chamber the air and liquid are thoroughly mixed and as stated above, the interior bore 49, of the bushing 48, restricts the stream and narrows the diameter of the deposit upon the work.

The screw 41 may be adjusted to regulate the flow of liquid through the injector tube. In using small quantities of liquid and particularly liquids of low viscosity, the screw may be screwed down until its end 42 is in contact with the interior wall of the injector tube 25. When this is done the stream of liquid is broken up into a plurality of small streams which pass through the "V's" of the threads and the interior wall of the injector tube. These streams are ejected with substantial force due to the fact that they are pulled through by the partial vacuum created at the beveled face 35, and they are pushed through by the pressure impressed upon the surface of the liquid in the tank.

What is claimed is:

1. In a device for spraying liquids, a nozzle comprised of an elongated tube having an inlet end, means to connect the said tube to a source of high volume low pressure air, means mounted on said tube intermediate the ends thereof for leading pressure from the interior of said tube to a container of liquid to be sprayed, a tubular bushing mounted in the discharge end of said tube, a pair of aligned holes formed in the wall of said tube and in the wall of said bushing, a short length of pipe positioned in said aligned holes and secured to both said tube and said bushing, said pipe having a beveled face formed thereon communicating with its interior and facing the discharge end of said tube, a second tubular bushing extending into said nozzle from the discharge end thereof and having its inner end spaced apart from said beveled face to form a mixing chamber, the interior of said second tubular bushing being smaller in diameter than the interior of said first tubular bushing to cause a slight compressing of the mixture of air and liquid as it leaves the discharge end of said nozzle.

2. In a device for spraying liquids, a nozzle comprised of an elongated tube having an inlet end, means to connect the said tube to a source of high volume low pressure air, the interior diameter of said tube having a portion of reduced cross-section adjacent to the discharge end thereof, the interior of said portion being parallel to the interior of said tube, a pipe extending into said tube and said portion, said pipe having its axis at substantially a right angle to the axis of said tube and having a beveled portion facing said discharge end, a fitting threadedly engaging said pipe and forming therewith a swiveled connection, means to deliver liquid to said pipe via said fitting, and a tubular member engaging said reduced portion and extending from the discharge end of said nozzle for defining a mixing chamber between itself and said beveled portion, said member having a passage therein, a portion of which is tapered, for reducing the diameter of the mixed stream of air and liquid as it leaves said nozzle.

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