April 23, 1946. E. W. VOSE 2,399,081

SPRAYING DEVICE FOR LIQUIDS

Filed Feb. 11, 1943

Fig. 1.

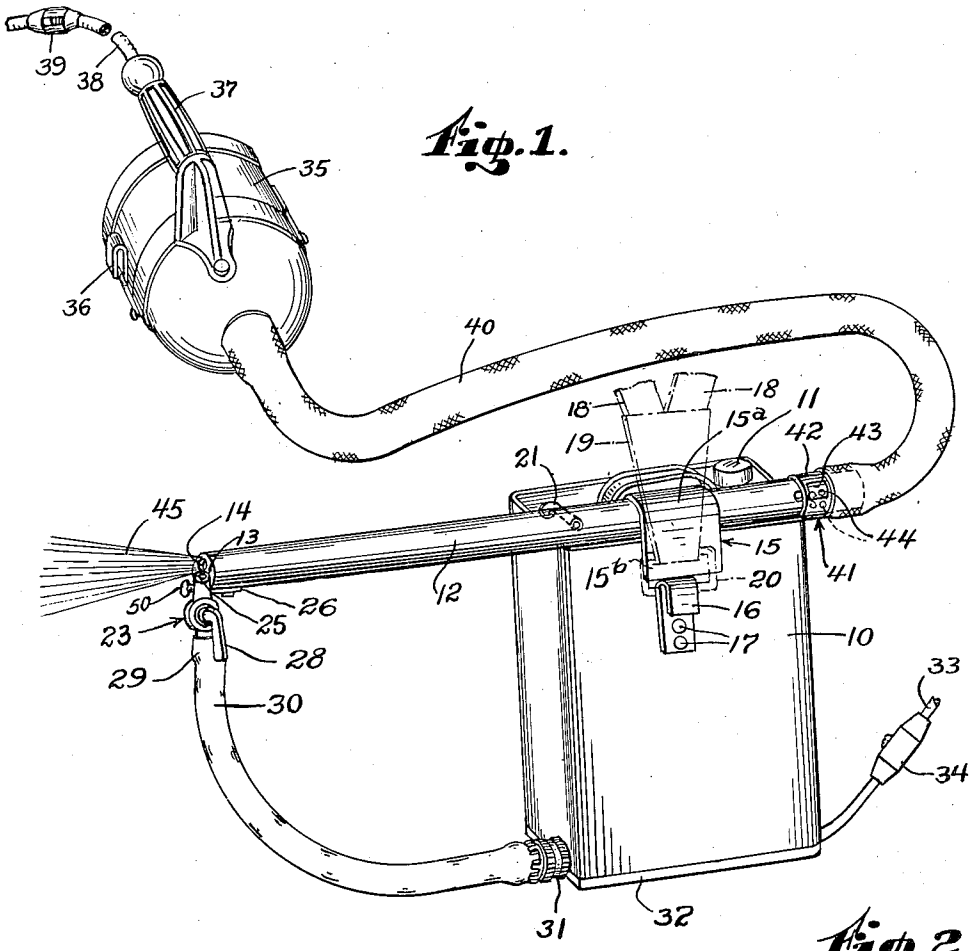


Fig. 2.

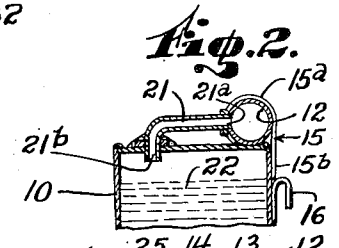


Fig. 3.

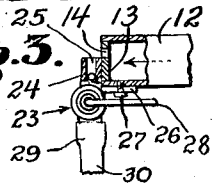


Fig. 4.

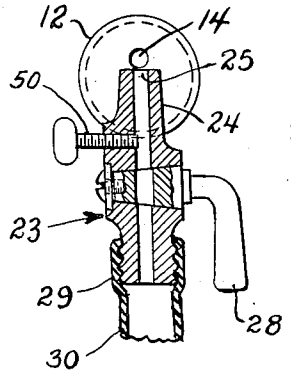
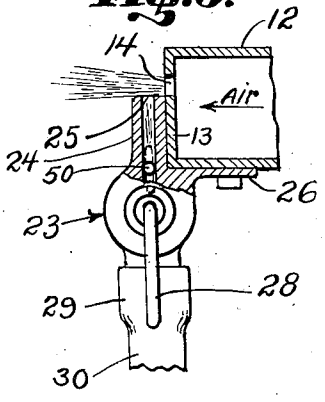


Fig. 5.



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SPRAYING DEVICE FOR LIQUIDS

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Application February 11, 1943, Serial No. 475,471

4 Claims. (Cl. 299—89)

This invention relates to improvements in spraying devices for liquids, and has for a principal object the provision of a liquid sprayer of simple form and of low manufacturing and operating cost which operates at a moderate air pressure provided by a centrifugal fan blower, the entire equipment being easily portable by one operator, thereby making it unnecessary to purchase and operate expensive and complicated air compressing equipment.

With my new and improved spraying device, I can very easily spray comparatively heavy preservatives and waterproofing compounds with a penetrating force and in a volume sufficient to cover very large surfaces rapidly; in fact, I have been able more easily and more efficiently to cover given surfaces in approximately one-fourth of the time required for applying the material to such surfaces with brushes.

A further object of this invention is the provision of a liquid sprayer capable of delivering liquids in large volumes, instead of the limited volume of the compressed air nozzle.

Another object of the invention is the provision of a complete liquid spraying outfit, portable by one operator with a range of operation limited only by an electric cord extending from a standard electric light outlet to a motor driven blower comprising part of the outfit.

Yet another object of the invention is the provision, in a sprayer for liquids, of heating units for controlling the viscosity of the liquids employed.

Other objects and advantages of the invention will be apparent to those skilled in the art upon a study of the following specification and the drawing.

Referring to the drawing, which is given by way of example—

Figure 1 is a perspective view of the complete liquid sprayer with the heating unit, shown in dot-dash lines, applied thereto;

Figure 2 is a sectional elevation of the upper portion of the liquid tank, showing how air pressure is applied to the interior of the tank;

Figure 3 is a section of the end of the air tube and the atomizer mounted thereon;

Figure 4 is an enlarged sectional elevation of the atomizer valve; and

Figure 5 is a sectional elevation similar to Figure 3 but enlarged.

My new and improved liquid sprayer is adapted to be suspended from a strap or other web hanging down from the operator's neck, and this forms a V-shaped harness to which and from which the device may be readily connected and disconnected. I have found that the V-shaped harness is handy because it may be shifted on the operator's body, so that the sprayer can be manipulated with either the right hand or the left hand.

Referring now to Figure 1, the sprayer consists of a tank 10 of such size that its weight will not overload the operator. The tank has a filler hole which is closed by a filler cap 11. Mounted on top of the tank 10, and located preferably in line with one edge thereof, is an air pipe 12. This air pipe projects substantially beyond the tank 10 and has a closure plate 13 mounted in the extreme end thereof.

The closure plate 13 has an orifice 14 formed therein. The diameter of this orifice depends upon the volume of air supplied to the device. One convenient way of securing the air pipe 12 to the tank is by means of a metallic strip 15, the upper portion 15a of which partially embraces the air pipe 12, and the lower portion 15b of which is secured to the side of the tank 10.

A hook member 16 is secured to the side of the tank in any suitable manner, such, for example, by means of rivets 17, and further may be soldered to the side of the tank after having been riveted thereon.

The harness, indicated in dot-dash lines, may include a continuous web portion 18 which loops around the operator's neck, and the ends of which join a frustum-shaped member 19. The member 19 is provided with a metallic link 20 adapted to be engaged by the hook 16 on the tank.

For supplying air pressure to the interior of the tank, a pipe 21 has one end 21a communicating with the interior of the air pipe 12, and has its other end 21b communicating with the interior of the tank above the surface of the liquid 22 therein.

Mounted on the outer end of the air pipe 12, is a valve generally designated by the numeral 23. This valve has one end thereof, designated by the numeral 24, carrying an opening 25. The end surface of the portion 24 is substantially in alignment with the bottom edge of the orifice 14.

The valve may have a bracket portion 26 underlying the end of the air pipe 12, and secured to the air pipe by means of a screw 27. The valve may include a suitable rotor having a handle 28, and a screw 50 for restricting the passage leading to the opening 25. The quantity of liquid flowing therethrough may be accurately controlled within wide limits by these elements.

The other end 29 of the valve has a hose or other flexible conduit 30 connected thereto. The

other end of the flexible conduit is connected to a fitting 31 which communicates with the interior of the tank adjacent to the bottom thereof.

A suitable heater, which in the example herein shown may be an electrical heater and designated by the numeral 32, is provided for heating the tank when employing liquids of low viscosity. A suitable electric cord 33 with a switch 34 therein is provided for connecting the heater to a source of current.

Although any desired source of air may be employed for supplying air to the air pipe 12, I prefer to use a motor driven blower 35, in which a motor and a blower are included in a common casing. This blower may be provided with a hook 36 for suspension on a suitable harness on the operator. A suitable handle 37 may be provided for handling the motor driven blower, and an electric cord 38, including a switch 39, is provided for connection to a source of current. The flexible conduit 40 has one end connected to the motor driven blower 35, and the other end connected to the air pipe 12.

A relief valve 41 is provided on the air pipe 12 for pressure-controlling the quantity of air passing therethrough. This shutter valve may consist of a sleeve 42 having an opening 43 formed therein and adapted to cover and/or uncover a plurality of holes 44 formed in the air pipe 12 within the span of the sleeve 42.

In operating the device, the operator may hang the tank 10 on the harness, and the motor 36 on another suitable harness, and as soon as the current is supplied to the unit 35, air passes through the air pipe 12 and exits therefrom through the orifice 14, thereby causing (provided the valve 38 is open) liquid passing through the valve via the flexible conduit 30 to be atomized, as indicated at 45 in Figure 1.

The preferred way of using the device is to start the air going with the valve 23 closed, and then the operator may regulate the spray by opening the valve in accordance with the conditions. There are many conditions involved; for example, this viscosity varies with the air temperature and humidity conditions. Early in the morning the viscosity is lower, and it decreases as the hottest part of the day is reached. Another thing the operator has taken into consideration is the surface being treated and the thickness of the deposit to be applied thereto. All of these conditions may easily be taken care of by properly adjusting the valve 23, 50, and the relief shutter valve 41.

My new and improved liquid sprayer is light in weight, and delivers a volume as great as can be used by the operator. It is particularly adapted for use on roofs; side walls; floors; tunnels; foundations; the undersurfaces of railroad cars; bridges; the hulls of boats, barges and other vessels; marine pilings; docks and walls; farm buildings; farm machinery; and all types of concrete, etc.

The main uses for which my new and improved device is particularly adapted are: for applying preservatives to wood and metal surfaces; for applying waterproofing and rust-proofing compounds to all kinds of surfaces; for applying various liquids to surfaces for the purpose of damping vibrations; sound-proofing insulation against heat and cold; and to prevent condensation; for applying asphalt compounds to roofs and other surfaces; as a base or binder for granulated solids to be applied immediately thereafter.

The electric heating unit 32, shown diagrammatically in Figure 1, may be provided with a settable thermostatic control so that the liquid in the container 10 may be maintained at a temperature for which said thermostat is set. Since such thermostatically controlled heating units are old and well known in the art, it is not believed necessary to show the same in detail in this application. A typical example of the heating unit which is settable for a plurality of desired temperatures is the modern electric iron which carries a handle and a visual indicator which may be set in accordance with the fabric being ironed.

I employ a large volume of air at a comparatively low pressure. For example, the pressures may run from two ounces to the square inch up to five pounds to the square inch.

Due to the fact that I obtain better results, namely, a more even distribution of the atomized liquid over the surface being treated and these results are obtained in a fraction of the time required to do the same work with paint guns employing high pressure air at low volume, I believe (and this is borne out by the results obtained) that by the use of a large volume of air the atomized liquid is more thoroughly distributed through the air and that this mixture, when it strikes the surface being treated, deposits the liquid thereon uniformly.

I have also found that the use of a large volume of air abetted by the pressure on the surface of the liquid in the container, produces results unobtainable with high pressure air at low volume.

Now, due to the fact that I handle a large volume of air at a low pressure, I am enabled by means of my relief valve 41 to vary the pressure and volume of air through a wide range and make settings in accordance with the viscosity of the liquid being sprayed, so as to deliver a uniform deposit on the surface being treated.

The expression "a source of air of moderate pressure" or "a source of air of large volume and low pressure" may be taken to mean a source of air in comparatively large volume and at a pressure of from between two ounces to five pounds to the square inch.

Although I have herein shown and described, by way of example, a simple embodiment of the invention, it is obvious that many changes may be made in the arrangements herein shown and described without departing from the spirit of the invention as set forth in the following claims.

What is claimed is:

1. In a device for spraying liquids, a straight elongated air tube, a container for said liquid having its upper end secured to said tube adjacent to one end of the tube, said end being adapted to be connected to a source of high volume low pressure air, whereby the air may pass in a straight line therethrough, closure means in the other end of said tube having a fixed aperture formed therein, a valve body mounted on said last mentioned end of said tube and having an open end of a passage therethrough adjacent to and influenced by air passing through said aperture, an open conduit external to and communicating with the interior of said tube and the interior of said container for subjecting liquids in said container to the influence of the pressure of air in said tube, said valve including a lever for adjusting the flow of liquid therethrough, and a second conduit on the exterior of said container having one end connected to the passage in said valve and the other end connected to said container below the level of liquid therein for conveying liquid to said valve, whereby air flowing

from said aperture may cross the open end of said passage and atomize said liquid.

2. The invention as set forth in claim 1 characterized by the feature that a threaded hole is formed in said valve body adjacent to said open end, said threaded hole communicating with said passage and a screw mounted in said threaded hole forms means for an operator to make fine adjustments of the liquid delivered to said open end of said passage, said lever serving to effect coarse adjustments.

3. In a device for spraying liquids, a straight elongated air tube, a container for said liquid having its upper end secured to said tube and positioned adjacent to one end thereof, the said end constituting the inlet end of said tube and adapted to be connected to a source of air delivering an air stream of large volume and at a low pressure, whereby said air may pass in a substantially straight line therethrough the other or discharge end of said tube having an aperture formed therein of a diameter smaller than that of the main body of said tube, a conduit external to and connecting the interior of said tube to the interior of said container above the level of liquid therein for subjecting said liquid to the pressure of said air, an atomizer tube having one end vertical and under the influence of air leaving said aperture, a flexible tube external to said container and having one end connected to said atomizer tube and having its other end connected to said container below the liquid level therein, whereby said liquid may be atomized, and a manually adjusted valve lever on the vertical portion of said atomizer tube adapted to be set in accordance with the viscosity of the liquid being atomized.

4. In a device for spraying liquids, a straight elongated air tube, a container for said liquid beneath and supporting said tube adjacent to one end thereof, said end constituting the inlet end of said tube and being adapted to be connected to a source of air capable of delivering an air stream of large volume and at a low pressure therethrough, the opposite or discharge end of said tube having a fixed aperture formed therein smaller than the diameter of the interior of said tube, a conduit external to both said tube and said container and having its hollow interior connecting the interior of said tube to the interior of said container above the level of liquid therein for subjecting said liquid to the pressure of said air, a vertical atomizer tube mounted on the discharge end of said air tube having one end under the influence of air leaving said aperture, and having its other end connected to said container below the liquid level therein via a second external conduit, whereby said liquid may be atomized, valve means in said vertical atomizer tube including both coarse and fine adjustments adapted to be set in accordance with the viscosity of the liquid being atomized, and settable vent means on said tube communicating with the interior of said tube and the atmosphere for effecting greater or lesser leakage of the air to the atmosphere and consequently conjointly regulating the pressure and volume of the air stream through said air tube and also the pressure impressed on the liquid in said container.

EDWIN W. VOSE.