

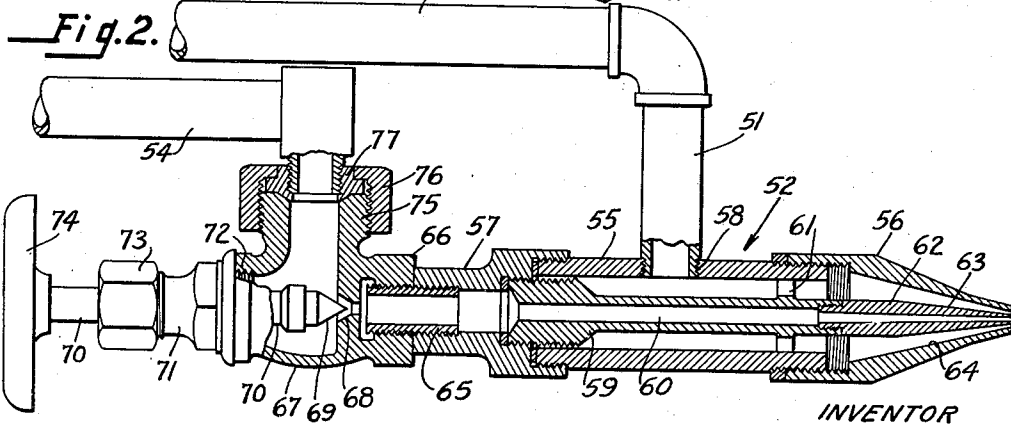
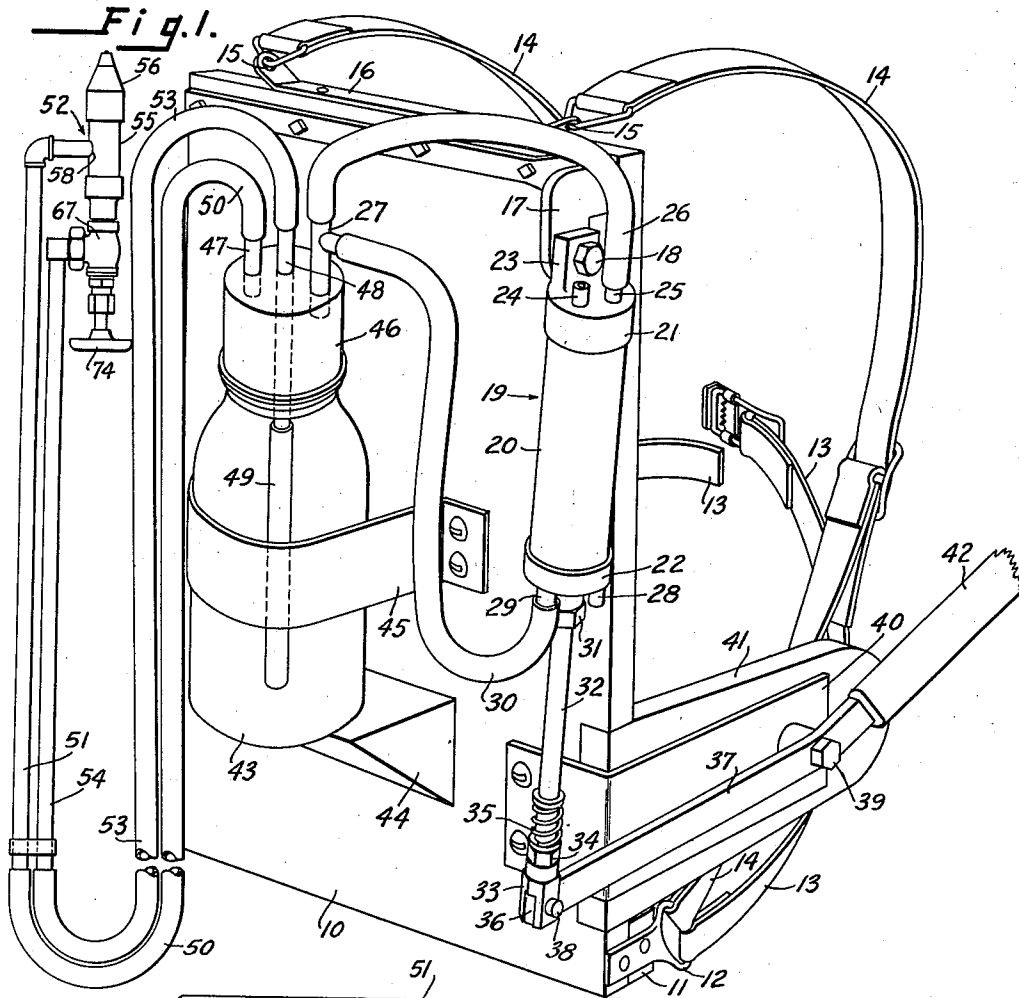
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SPRAYING APPARATUS

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SPRAYING APPARATUS

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This invention relates to spraying apparatus, and in particular, to portable sprayers such as may be carried upon the back of the operator.

One object of this invention is to provide a portable sprayer, like a knapsack, wherein the fluid container and pump are arranged on the back of the operator, the pump being operated by a forwardly extending lever, and the fluid being sprayed in any desired direction by a nozzle connected to the fluid container by a flexible pipe.

Another object of this invention is to provide such a spraying apparatus, wherein a double-acting pump is employed to produce a steady source of compressed air, this being conveyed to the spray nozzle by a separate path from the fluid.

Another object is to provide a rigid support arranged to be held on the back of the operator by straps, this support carrying an air pump and a fluid container as well as a bracket serving as a fulcrum for the hand lever by which the pump is operated, the sprayer preferably including separate conduits for air and for liquid, so as to atomize the liquid at the nozzle by the action of the air.

In the drawing:

Figure 1 is a perspective view of the spraying apparatus of this invention.

Figure 2 is an enlarged side elevation, partly in longitudinal section, of the spray nozzle of this invention.

Referring to drawing in detail, Figure 1 shows the spraying apparatus of my invention as including a base plate 10, which is arranged to be mounted upon the back of the operator, and to this end is supplied with a back rest 11 mounted at the lower edge of the base plate 10. Secured to the back rest 11, which rests against the lower portion of the back of the operator, are clips 12 providing anchorages for straps 13 and 14. The straps 13 encircle the waist of the operator and serve to hold the sprayer in position against his back, whereas the straps 14 pass over his shoulders to holes 15 in the ends of a bracket 16 secured to the top edge of the base plate 10.

Also secured to the top of the base plate 10 is an angle bracket 17 having a pivot bolt 18 threaded therein, and serving as a pivotal connection for the double-acting air pump, generally designated 19. The air pump 19 consists of a cylinder 20, having end caps 21 and 22. The upper end cap 21 is provided with an upwardly extending arm 23 through which passes the pivot bolt 18. The upper end cap 21 is provided with

an inwardly opening check valve 24 and an outwardly opening check valve 25, to the latter of which is attached the flexible conduit 26 leading to one arm of the T-connection 27. Similarly, the lower end cap 22 is provided with an inwardly opening check valve 28 and an outwardly opening check valve 29, to the latter of which is joined the flexible conduit 30, likewise leading to another arm of the T-connection 27. The lower end cap 22 is also provided with a gland 31, through which passes the pump piston rod 32.

On the end of the piston rod 32, within the pump cylinder 20, is a piston (not shown). To the lower end of the piston rod 32 is threaded a clevis 33, this being locked in position by the locknut 34. A coil spring 35, encircling the piston rod 32, serves to absorb the shock which might otherwise occur in the event that the clevis 33 encountered the gland 31. In the slotted portion 36 of the clevis 33 is mounted one end of the hand lever 37 by means of the pivot screw 38. The lever 37 is pivotally secured to the apparatus by means of the fulcrum bolt 39, which is threaded into the angle bracket 40, the opposite end of which is secured to the base plate 10. The arm 41, extending forwardly from the base plate, cooperates with the angle bracket 40 in providing a fulcrum support for the hand lever 37. The forward end of the hand lever 37 is provided with a handle 42 which extends forwardly a sufficient distance to be grasped conveniently by the operator.

The fluid distributed by the spraying apparatus is held by the container 43, which may be either of glass, metal or any suitable material. For purposes of illustration a glass jar is shown, by reason of the fact that it reveals the interior mechanism more clearly. A support 44 is secured to the base plate 10 and serves as a bottom rest for the container 43, whereas a holder 45, consisting of a U-shaped brace encircling the container 43, engages the container 43 at an intermediate point and holds it in position against the base plate 10. The mouth of the container is closed by a top member 46, screwed, bolted or otherwise suitably secured to the container 43.

In the form shown this top member 46 forms a chamber above the container. The third arm of the T-connection 27 passes through the upper end of the top member 46, into the chamber therein so as to discharge air from the air pump 19 into the top member 46, and thence into the container 43. Through the top member 46 also passes the tubular connection 47, with its end

opening directly into the chamber of the top member 46, exactly as in the case of the T-connection 27. The third tube 48 passes downwardly through the upper part of the top member 46, into the container 43, and has mounted on its lower end a flexible tube 49 through which the liquid passes on its way to the spray nozzle.

Attached to the air connection 47 is an air pipe 50, of flexible material such as rubber, and connected to the rigid pipe 51 leading to the nozzle, generally designated 52. Similarly, to the tube 48 is connected a flexible pipe 53 leading to the rigid pipe 54, the latter being likewise connected to the spray nozzle 52.

Referring more particularly to Figure 2, the nozzle 52 is seen to comprise a barrel 55, threaded at both ends. On the forward end of the barrel 55 is mounted the nose cap 56, while on the rearward end is threaded the coupling member 57. The midportion of the barrel 55 is provided with a threaded aperture 58 for receiving the correspondingly threaded end of the pipe 51. Arranged within the barrel 55 and threaded into one end of the coupling 57, is the inner nozzle member 59 having a central bore 60. The inner nozzle member 59 is of reduced diameter, as compared with the inner diameter of the barrel 55, and is provided with projections 61 serving as spacing members to maintain the inner nozzle member 59 in proper position within the barrel. Into the outer end of the inner nozzle member 59 is threaded the nozzle tip 62, having a forwardly tapering portion 63 forming a conical converging space in cooperation with the inner wall 64 of the nose cap 56. Due to the fact that the conical surfaces 63 and 64 converge by different amounts, the space between them forms a tapering annular conical passageway for the air on its way outward through the space between the tip 62 and the nose cap 56.

Threaded into the rearward end of the coupling 57 is the nipple 65, the opposite end of which is threaded into the forward portion 66 of the valve casing 67. The forward portion 66 is provided with a conical valve seat 68, which is adapted to receive the needle valve tip 69 on the valve stem 70. The valve stem 70 is provided with a threaded portion (not shown) engaging corresponding threads in the valve stem support 71, this being threaded into the rearward portion 72 of the valve casing 67. The hollow nut 73 is threaded onto the outer end of the valve stem support 71, and contains a packing encircling the valve stem 70 and arranged to prevent leakage around the valve stem. A hand wheel 74 secured to the outer end of the valve stem 70 serves to turn the latter, and accordingly to move the needle valve portion 69 toward or away from its conical seat 68, thereby regulating the amount of fluid which will pass into the nozzle. Threaded onto the upper portion 75 of the valve casing 67 is a cap 76, which holds a threaded adapter 77 arranged to receive the correspondingly threaded end of the pipe 54.

In the operation of the spraying apparatus of this invention, the container 43 is filled or partially filled with a suitable amount of spraying fluid, this fluid being either an insecticide or any other liquid which is suitable for spraying, such as paints, varnishes, antiseptic or disinfectant solutions, etc.

The operator straps the device upon his back with the straps 14 over his shoulders and the strap 13 around his waist, and carries the apparatus to the place where it is intended to be

used. To use the apparatus the operator moves the handle 42 up and down, thereby causing the double-acting air pump 19 to pump air through the T-connection 27 into the top member 46, above the container 43. This air exerts pressure upon the top surface of the liquid, forcing a portion of it upward into the tube 49, and thence outward through the tube 48, the flexible pipe 53 and rigid pipe 54, into the valve casing 67, and thence outward through the central bore 60 and the tip 62 of the nozzle 52. At the same time air passes from the top member 46, through the tubular connection 47, the flexible pipe 50 and the rigid pipe 51 to the chamber within the barrel 55 of the nozzle 52, thence passing outward through the annular conical passageway between the nose cap 56 and the nozzle tip 62. By screwing the nose cap 56 in or out, and by regulating the hand wheel 74, the quantity and quality, as regards physical condition, of the spray may be readily adjusted, and the nozzle adapted to the effective atomization of liquids of various viscosities and bodies.

The apparatus of this invention, when properly adjusted, is capable of producing homogeneous sprays consisting of globules varying from 10 to 300 microns in diameter according to the purpose and wishes of the operator, from oils varying in viscosity from 34 to 110 Saybolt test at 100° F. when operated at a pressure of 10 to 15 pounds per square inch. Dissolved in the distillate is a toxic agent, such as pyrethrum, this mixture being used where an insecticide is to be sprayed onto plants. By the atomizing action of the apparatus of this invention, the fluid is distributed well over the plant leaves and the oil penetrates to hidden crevices so as to kill the insect life thereon, especially with the use of liquids having low surface tensions, such as hydrocarbon oils.

The sprayer of this invention is also equally effective whether the nozzle is directed upward or downward, in contrast with certain types of hand-operated sprayers which are inefficient except when they are used in a horizontal position. The connection of the flexible air pipe 50 to the tubular connection 47 on the opposite side of the top member 46 from the T-connection 27 causes the pulsations of the double-acting pump 19 to be smoothed out by the cushioning effect of the air within the chamber inside the top member 46.

By thus separately conducting the air and liquid to the nozzle, I cause the air to act upon and atomize the liquid into a mist-like spray. This spray is given the desired direction by the nozzle, and requires only a relatively low air pressure to do this. The usual sprayer, however, conducts only the liquid to the nozzle, and the latter is required not only to direct the spray but also to produce it by mechanical action, thereby requiring a relatively higher pressure and producing larger globules of liquid in the spray.

It will be understood that instead of a glass container, as shown, a metal container might also be used for the fluid.

It will further be understood that it is desired to comprehend within this invention such modifications as come within the scope of my claims and my invention.

Having thus fully described my invention, what I claim as new and desire to secure by Letters Patent, is:

1. An atomizing and spraying apparatus comprising a support adapted to be mounted on the back of the operator, a pump on said support, a

liquid container on said support, an atomizing and spraying nozzle, an air-conducting conduit connected to said pump and arranged to discharge air into the space above the liquid in said liquid container, a liquid-conducting conduit with one end opening beneath the level of said liquid and the other end connected to said nozzle, and a separate air-conducting conduit connecting the space above the level of the liquid in said container with said atomizing and spraying nozzle, the said air-conducting conduit from said pump to said container having a separate connection thereto from said air-conducting conduit connecting said container with said nozzle, whereby the air space above the level of the liquid in said container and the said separate connections thereof serve to damp the pulsations of the pump and to promote the even flow and atomization of the fluid at low pressures.

2. An atomizing and spraying apparatus comprising a support adapted to be mounted on the back of the operator, a double-acting pump on said support, a liquid container on said support, an atomizing and spraying nozzle, an air-conducting conduit connected to said pump and arranged to discharge air into the space above the liquid in said liquid container, a liquid-conducting conduit with one end opening beneath the level of said liquid and the other end connected to said nozzle, and a separate air-conducting conduit connecting the space above the level of the liquid in said container with said atomizing and spraying nozzle, the said air-conducting conduit from said pump to said container having a separate connection thereto from said air-conducting conduit connecting said container with said nozzle, whereby the air space above the level of the liquid in said container and the said separate connections thereof serve to damp the pulsations of the pump and to promote the even

flow and atomization of the fluid at low pressures.

3. An atomizing and spraying apparatus comprising a support adapted to be mounted on the back of the operator, a pump on said support, a liquid container on said support, an upper chamber associated with said liquid container, a plurality of independent air connections opening into said upper chamber, an air conduit connecting said pump with one of said connections, an atomizing and spraying nozzle, an air conduit interconnecting said nozzle with the other of said air connections of said chamber, and a liquid-conducting conduit having one end opening beneath the level of said liquid and the other end connected to said nozzle, whereby the chamber with its separate air connections serves as an air cushion to damp the pulsations of the pump and to insure an even and continuous flow of atomized fluid at low pressures.

4. An atomizing and spraying apparatus comprising a support adapted to be mounted on the back of the operator, a double-acting pump on said support, a liquid container on said support, an upper chamber associated with said liquid container, a plurality of independent air connections opening into said upper chamber, an air conduit connecting said pump with one of said connections, an atomizing and spraying nozzle, an air conduit interconnecting said nozzle with the other of said air connections of said chamber, and a liquid-conducting conduit having one end opening beneath the level of said liquid and the other end connected to said nozzle, whereby the chamber with its separate air connections serves as an air cushion to damp the pulsations of the pump and to insure an even and continuous flow of atomized fluid at low pressures.

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