

Feb. 16, 1960

W. M. SPRENG
SPRAYING MACHINE

2,925,222

Filed Jan. 30, 1957

6 Sheets-Sheet 2

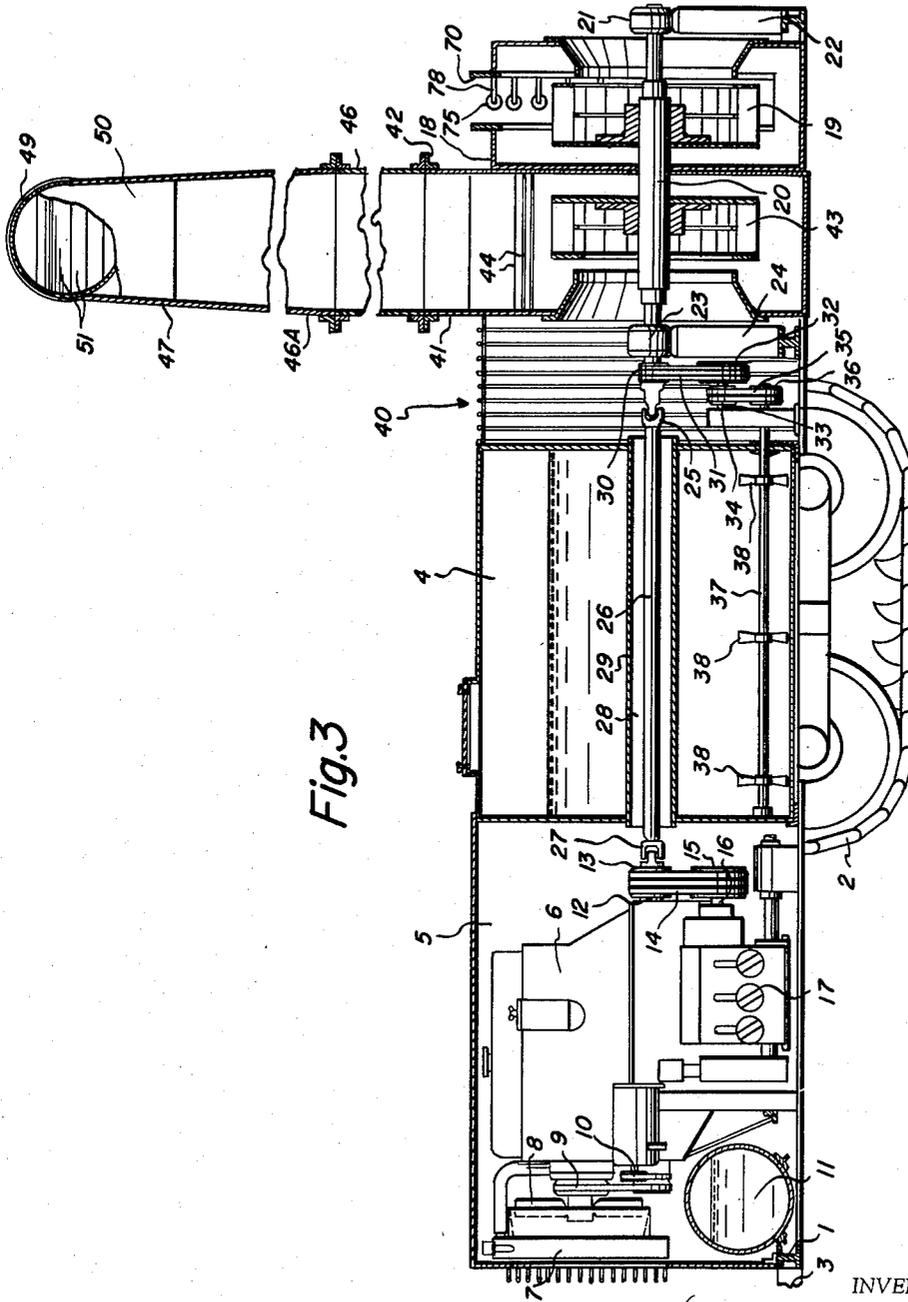


Fig. 3

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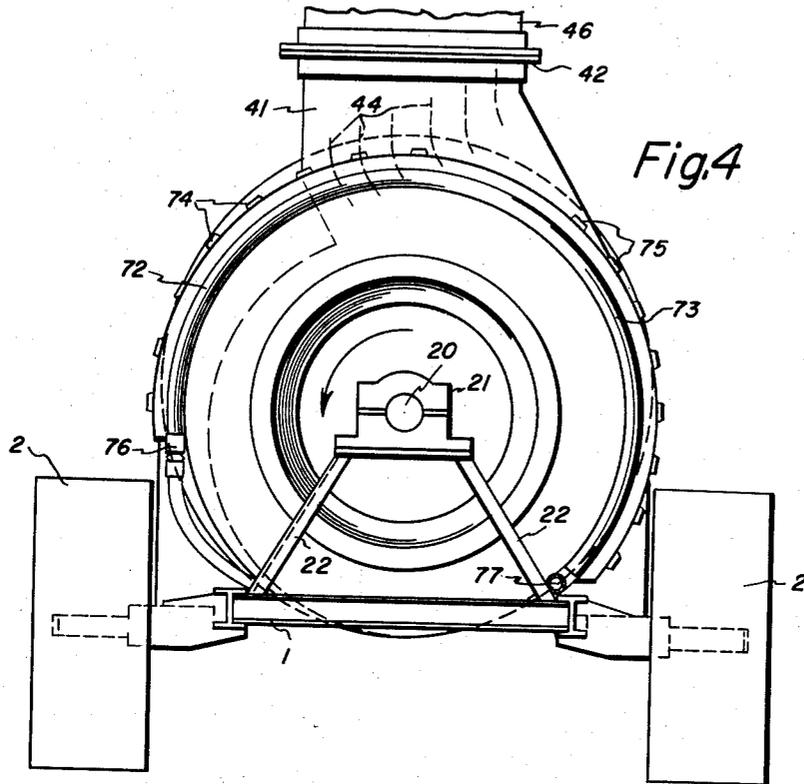


Fig. 4

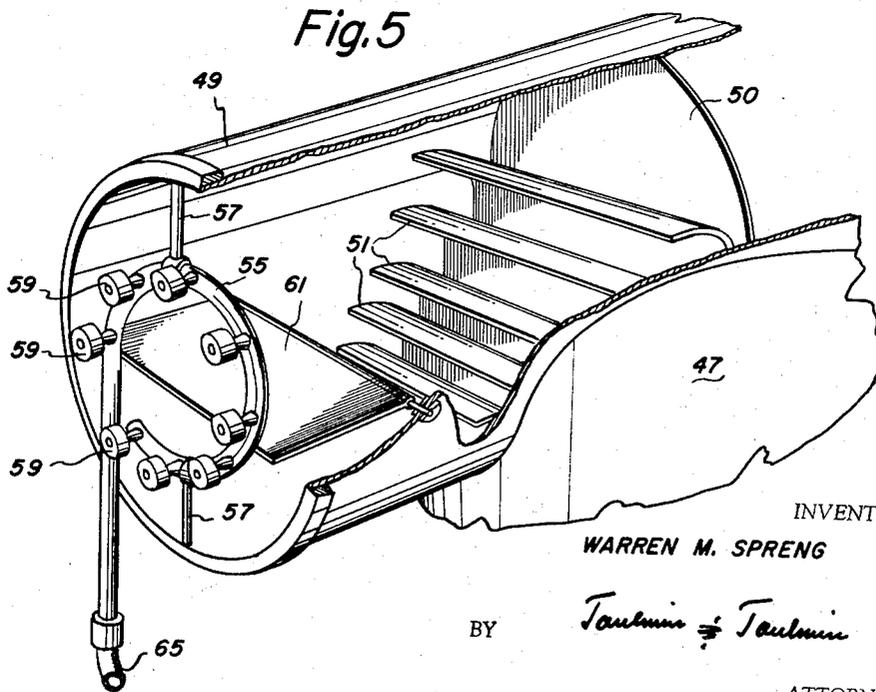


Fig. 5

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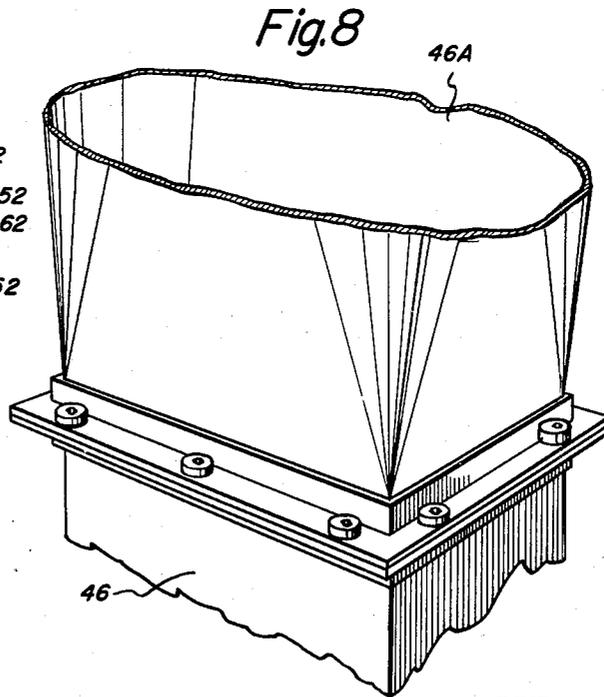
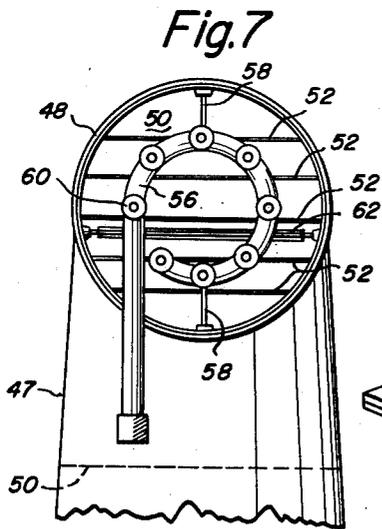
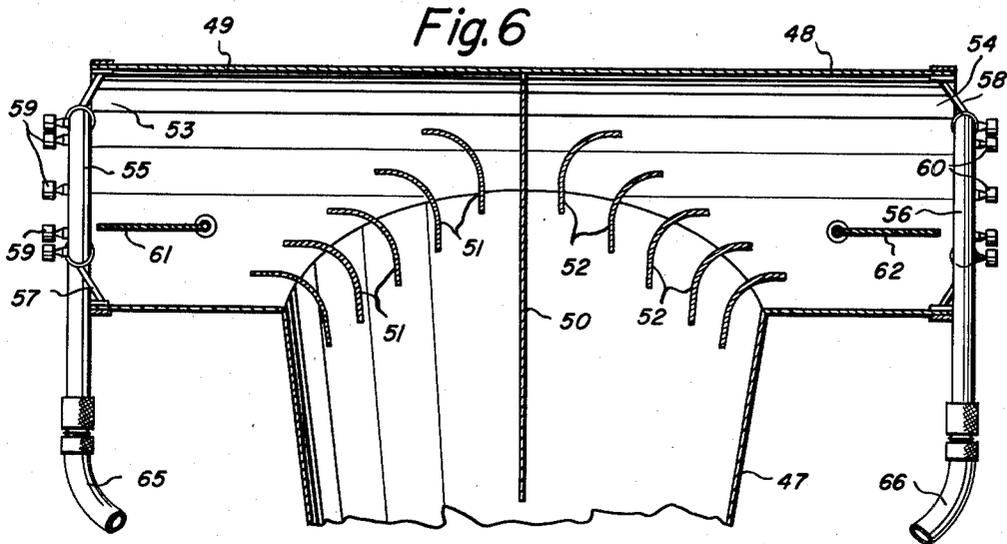
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Fig. 9

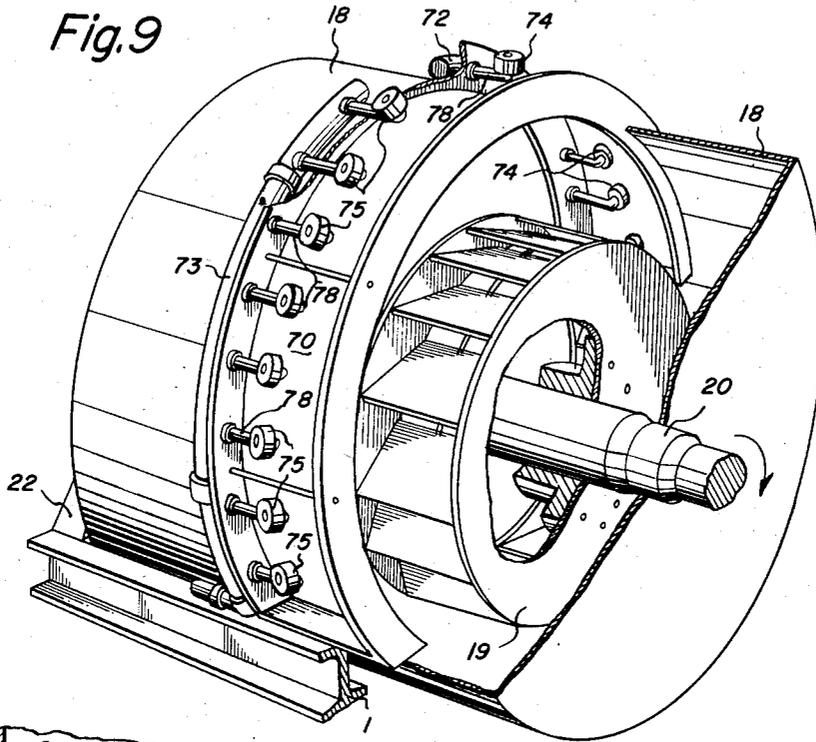
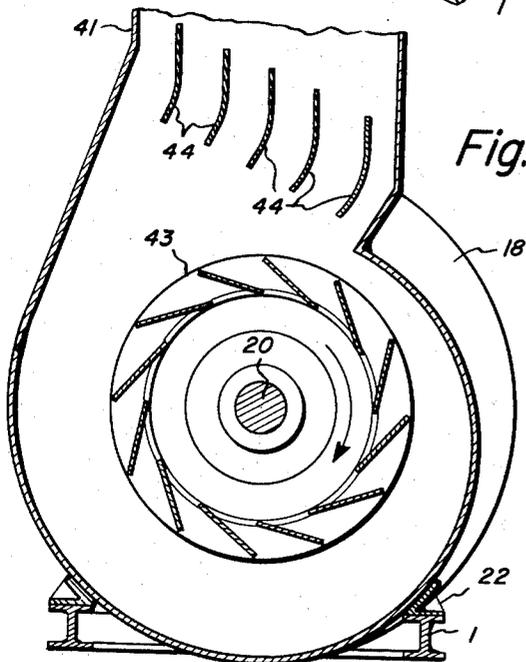


Fig. 10



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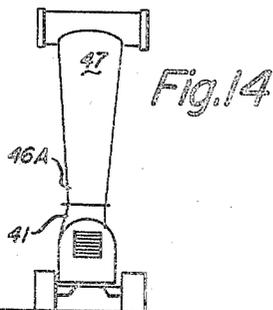
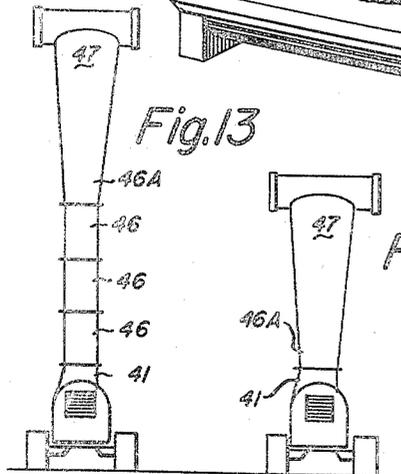
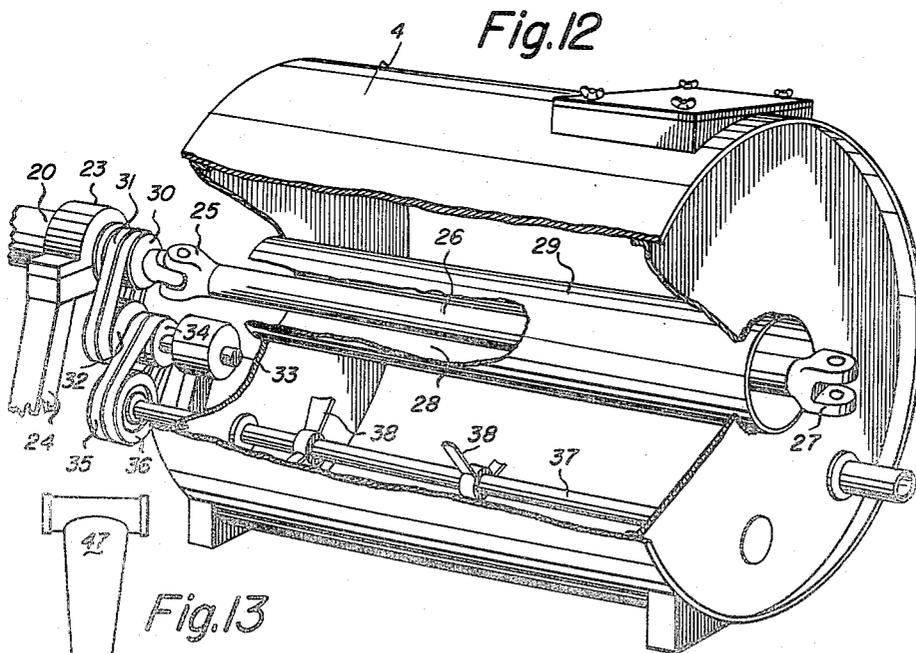
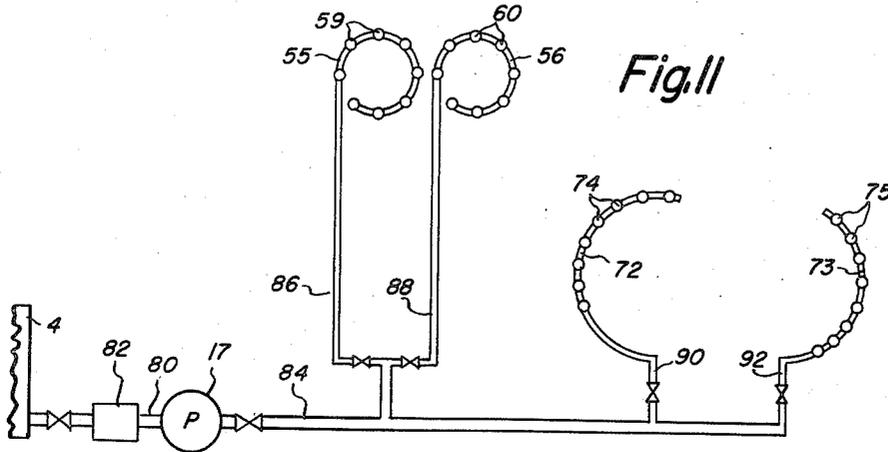
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6 Sheets-Sheet 6



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SPRAYING MACHINE

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Application January 30, 1957, Serial No. 637,269

1 Claim. (Cl. 239—172)

This present invention relates to an improved method and machine for directing finely divided spray material such as insecticides and fungicides on trees, bushes and ground crops. In particular this invention is directed to a machine and method for utilization where plantings are closely spaced and where the foliage of adjacent rows grows close together as in banana, citrus and similar groves.

A primary object of the invention is to provide a method of spraying which involves the enveloping of the trees, crops and other foliage to be sprayed in a soft fog of a spray, which spray is simultaneously directed laterally and downwardly from above the trees, etc. and upwardly and laterally from near ground level.

A principal object of the invention is to provide a mobile spraying machine for dispensing insecticides and fungicides therefrom downwardly and laterally on foliage while simultaneously directing a spray upwardly and laterally, and while the machine operates at a convenient rate of speed, resulting in economical operation and economical application of the spray material.

In the practice of the invention these and other allied objects are achieved by providing in cooperative relation a pair of fans and spray discharge nozzles. One of the fans discharges air to its associated nozzles at near ground level, while the other of the fans discharges air through a tower which forms a vertical duct having upper air outlet means associated with others of the nozzles. Provision is made for directing the air flow to the nozzle arrangements in such manner that the emanating sprays may be discharged simultaneously if desired laterally and downwardly and laterally and upwardly to the foliage under treatment. Further, provision is made for directing sprays from both sides of the machine simultaneously in order that rows of foliage on either side of the machine may be treated at the same time in the passage of the machine.

The invention will be more fully understood by reference to the following detailed description and the accompanying drawings in which:

Figure 1 is a perspective view of a spraying machine constructed according to my invention;

Figure 2 is a front elevation of the spraying machine of invention showing it in the act of applying spraying material to trees on either side of the machine.

Figure 3 is a vertical longitudinal section taken on line 3—3 of Figure 1 and illustrating the construction of the machine of invention and with portions of the tower removed;

Figure 4 is a right end view of the structure of Figure 3;

Figures 5, 6 and 7 are detail views of the structural arrangement of the tower illustrated in Figure 1;

Figure 8 is a detail view illustrating the junction of the upper circular-oval tower portion with the lower rectangular tower portion illustrated in Figure 1;

Figure 9 is a detail view of the ground level outlet slot and its associated blower;

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Figure 10 is a detail view of the tower blower and its associated fan;

Figure 11 is a schematic view illustrating an arrangement of the pump, conduits and spray nozzles of the machine of invention;

Figure 12 is a detail view illustrating the power shaft and spray source arrangement; and

Figures 13 and 14 are elevational views indicating arrangements of the structure of invention for spraying at different levels.

Referring to the drawings in detail, the device of this invention comprises a movable frame 1 composed of H-beams suitably joined and having caterpillar type supporting treads indicated at 2. The frame 1 is adapted for attaching to a tractor or other similar pulling device so that it may be pulled on the treads through an orchard or field which is to be sprayed. To accomplish this purpose the frame has at its forward end a hitch mechanism indicated by the numeral 3.

Mounted on the frame intermediate the length thereof is a tank or reservoir 4, into which the material to be dispensed by the machine is placed. As shown the reservoir or tank 4 is for the purpose of receiving liquid forms of insecticides or fungicides; but it will be understood that under certain circumstances means could be provided for conveying similar materials in other forms.

At the forward end of the frame 1 there is a power unit compartment designated by the reference numeral 5. This compartment includes a suitable engine of the internal combustion type indicated at 6 and having a radiator 7, a fan 8 driven through belting 9, and a generator belt indicated at 10, as well as the other usual accessories of such an engine. The numeral 11 designates a fuel tank for supplying fuel to the engine 6.

The engine 6 is provided with output shaft 12 from which the belts 9 and 10 are driven and which shaft, at an opposite end thereof, is provided with a multi-V belt pulley 13. V-belts 14 pass from the pulley 13 over another multi-V belt pulley designated at 15 and which latter pulley is mounted on a pump shaft 16 of a pump 17. The pump 17 is for the purpose of providing spray material under pressure to the nozzles, as noted more particularly hereinafter.

At the rearward end of the frame 1 there is mounted a blower unit sheet metal casing 18 for a fan 19 which is secured on shaft 20. Shaft 20 is supported at one end from bearing box 21, which is itself mounted on brackets 22 extending upwardly angularly from the frame 1. The shaft 20 is supported at its other end by a bearing block 23 mounted on brackets 24 which are themselves secured to the frame 1 in any suitable manner. Shaft 20 (Fig. 12), by means of coupling 25, is secured to shaft 26 which is itself coupled at 27 to the engine shaft. The shaft 26 passes through an opening 28 formed by partition 29 in tank 4.

Shaft 20 at its inner extremity mounts a pulley 30 over which belt means 31 pass to pulley 32 mounted on jack shaft 33. Jack shaft 33 carries a pulley 34 over which belts 35 pass to a pulley 36 mounted on a bearing supported shaft 37. Shaft 37 extends inwardly of the tank 4 and carries a plurality of agitator paddles designated by the numeral 38. It is generally desirable to agitate the material in the tank 4 and any suitable means may be employed for such purpose.

The numeral 40 designates protectively enclosing grille work adjacent which there is a housing 41 of sheet metal. The housing 41 terminates in an angle flange 42 and forms the base of a tower. Housing 41 is in the form of a volute casing and encloses a fan 43 which delivers air up the inside of the tower. Guide vanes 44 in the housing 41 (Fig. 10) direct the air upwardly.

The tower comprises a sheet metal lower section 46

of substantially rectangular cross-section mounted on the housing 41; upper portions of the tower are designated by the numeral 46-A, the latter being of oval shape in contrast to the lower rectangular portions 46. The circular-oval shape of the upper part of the tower offers less interference and resistance to passage between close grown foliage than does the square cross-section, and accordingly the circular-oval shape is preferred for many applications. It is to be understood, as indicated in Fig. 13, that a plurality of sections 46 may be provided and that the circular-oval portion may be in convenient sectional lengths also.

The upper tower section designated by the numeral 47 is in the general form of a T-shape and has lateral ducts 48, 49. Inwardly and substantially centrally of the tower there is supported a vertical partition 50 which divides the flow of air passing up the tower.

Duct 49 has incorporated therein a plurality of guide vanes 51, while duct 48 has supported therein a plurality of guide vanes 52. These guide vanes direct the air laterally, respectively, to outlets 53, 54 of the ducts 49, 48. A manifold 55 is supported at the outlet of duct 49 and a similar manifold 56 is supported at the outlet of duct 48; suitable brackets 57, 58 are secured to the tower to form supports for the manifolds.

The numeral 59 designates nozzles on the manifold 55, while the numeral 60 designates nozzles on the manifold 56. Each of the ducts 49, 48 is provided with an adjustable pivoted deflector shown at 61 in the duct 49 and at 62 in the duct 48. These deflectors provide for directing portions of the air flow downwardly to the duct outlets.

The outer side of the tower is provided with a plurality of climbing rungs 64, and suitable flexible conduits 65, 66 are retained by the rungs 64 in their passage to the manifolds 55, 56 from the pump.

Referring again to the casing 18, the numeral 70 designates an arcuate slot in the casing through which air is discharged at near ground level. A first manifold 72 is positioned at one side of the casing and a second manifold 73 is at the opposite side of the casing 18.

The manifold 72 does not extend as far below the horizontal center line of the fan 19 as does the manifold 73; this is because the direction of rotation indicated by the arrow in Figure 4 is such that the air tends to flow downwardly on manifold side 72 and upwardly on manifold side 73 of the discharge slot 70.

The numerals 74, 75, respectively, designate nozzles on the manifolds 72, 73. These nozzles 74, 75 are rotatably adjustable on pipe fittings as at 78 (Fig. 3); thus the discharge of the spray may be controlled for maximum effectiveness.

The numerals 76, 77, respectively, designate the inlets to the manifolds 72, 73 for the flow of spray liquid from the pump (Fig. 4).

The pump 17, as may be seen from the schematic view, has the inlet thereof connected to the conduit 80 which communicates with the tank through a suitable strainer 82. Conduit 84 (Fig. 11) connects the pump to branch conduits 86, 88, 90, 92 for the flow of spray liquid to the manifolds 55, 56, 72, 73, respectively. While preferably the conduits to the manifolds at 55 and 56 are flexible as shown in Fig. 1, the conduits may be of any suitable material and may comprise rigid portions in the lower areas and flexible portions in the upper regions.

As may be seen from the perspective view in Fig. 1 the tower is suitably braced by metallic support members generally indicated at 94 extending from the housing to the tower and suitably bolted or welded to the latter.

Operation

Preparatory to putting the machine of invention in operation, the material to be dispensed is placed in the tank 4. The engine 6 is then started and the pump 17 will build up a pressure in the conduits leading to the manifolds and the manifolds themselves.

Assuming that two rows of trees are to be sprayed, the machine of invention is drawn by any suitable vehicle, such as a pick-up truck, between the rows. The fan 19 will direct a spray simultaneously laterally and upwardly from near ground level. The air blown by fan 43 will direct the spray simultaneously laterally and downwardly from above the top of the trees.

The fan, pump and agitator are all driven by the same power source, that is, the engine 6. Thus a finely divided spray material is directed simultaneously both upwardly and laterally near ground level and downwardly and laterally from above the tops of the trees.

It will be understood that this invention is susceptible to modification in order to adapt it to different usages and conditions and accordingly, it is desired to comprehend such modifications within this invention as may fall within the scope of the appended claim.

I claim:

A mobile tower spraying machine for concurrently spraying a pair of rows of trees, said machine comprising a frame mounted on power driven means, a casing supported on said frame, an air blower arranged in said casing including means for driving the blower, a hollow vertically extending tower section connected to said casing and communicating with said blower which blows air upwardly of said tower, a T-shaped duct section of circular cross-section at the top of said tower and communicating therewith, said T-shaped duct section consisting of a duct extending transversely of said tower and communicating with said hollow vertically extending tower section, said transversely extending duct being open at its opposite ends, a partitioning means mounted in said transversely extending duct and depending into said hollow tower section for dividing said transversely extending duct into two equal duct sections whereby the flow of air from the blower and into said transversely extending duct of the T-shaped duct section is evenly divided, a plurality of outwardly curved guide vanes spacedly arranged in each of the divided transversely extending duct sections for directing the air flowing into said divided transversely extending duct sections laterally and outwardly through the open end thereof, a concentrically arranged manifold and circularly disposed spray nozzles mounted in the outer ends of each of said divided transversely extending duct sections, said spray nozzles being connected to a source of liquid spray material under pressure for delivery to said spray nozzles.

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