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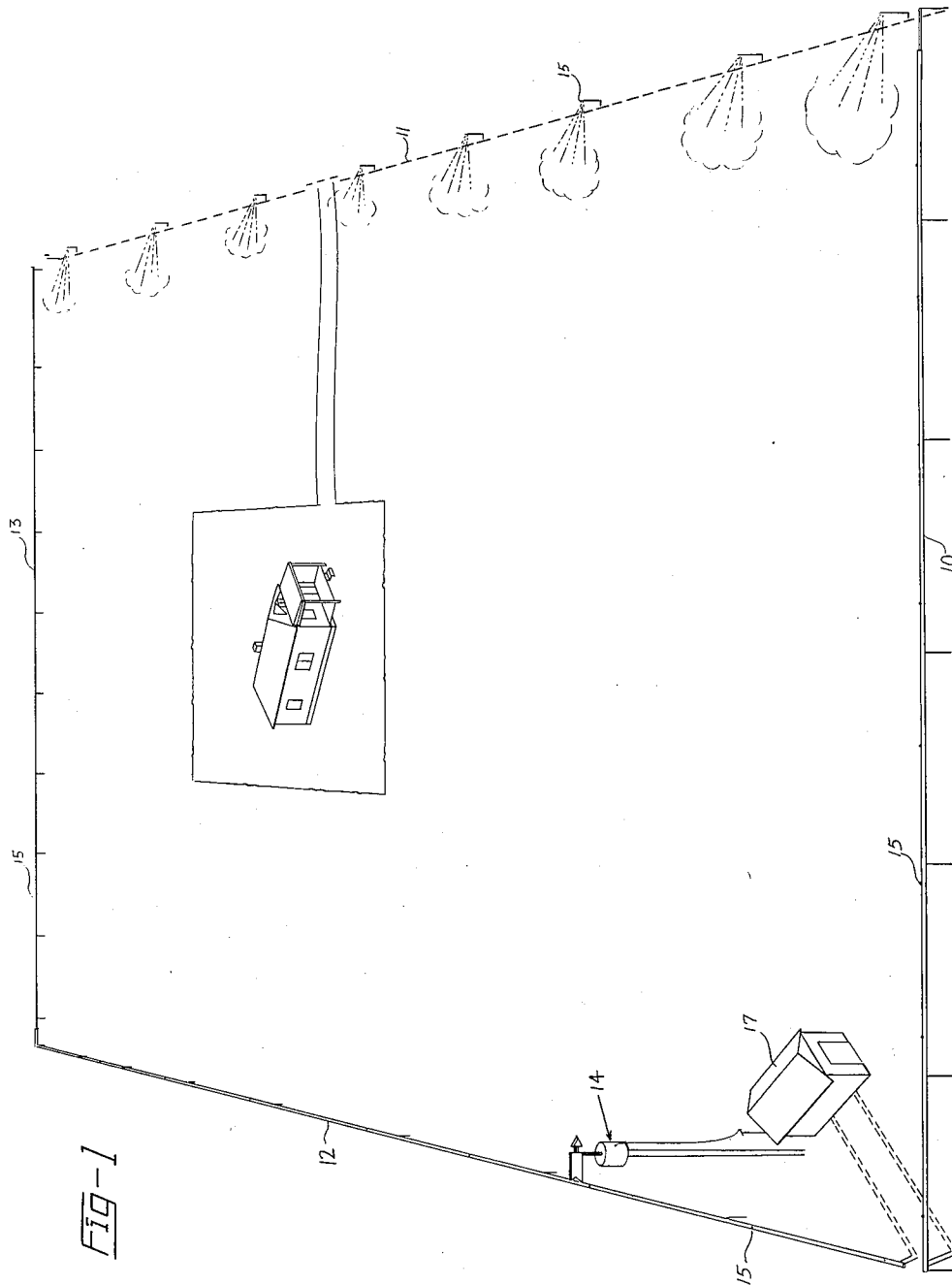
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HUMIDIFIED AIR SPRAY SYSTEM

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HUMIDIFIED AIR SPRAY SYSTEM

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This invention relates to spray systems and is more particularly directed to an automatically operated spray system for emitting a continual flow of humidified air for irrigation, fumigation, fertilization, heating and cooling purposes.

A principal object of the present invention is to provide a system for spraying humidified air which is economical in cost installation and operation.

A further object of the present invention is to provide a spray system capable of emitting from a light mist or imperceptible fog to a heavy liquid spray.

A further object of the present invention is the provision of a spray system characterized as above wherein a continual flow of humidified air or mist is created and automatically discharged up wind, so that wind drift will carry the mist over the area being serviced, notwithstanding any change of wind direction.

A still further object of the present invention is to provide a spray system described above wherein spray pipes are positioned either underground or above ground about the limits of the area to be serviced with automatic control means for directing humidified air and the like to the particular spray pipes that are up wind in position so that the spray emitted may become spread over the desired area.

A still further object of the present invention is to provide a spray system with a spray created by discharging air under pressure below the surface of a body of liquid thereby effecting an agitation and bubbling of the body of liquid.

The invention will be best understood from a consideration of the following detailed description taken in connection with the accompanying drawings forming a part of this specification, with the understanding, however, that the invention is not confined to any strict conformity with the showing of the drawings but may be changed or modified so long as such changes or modifications mark no material departure from the salient features of the invention as expressed in the appended claims.

In the drawings:

Figure 1 is a diagrammatic view of my improved humidified air-spray system as it appears installed on an area of land.

Figure 2 is an enlarged, fragmentary, diagrammatic view of an automatic control apparatus for my improved spray system with certain parts broken away.

Figure 3 is a cross sectional view of a solenoid operated valve.

Figure 4 is a fragmentary sectional view of the outlet to the pressure tank.

Referring to the drawings wherein like numerals are used to designate similar parts throughout the several views, there is shown in a diagrammatic fashion a plot of ground, and the usual appurtenances located thereon, on which area the present invention is installed. The spray system consists in general of a plurality of spray pipes 10, 11, 12 and 13, which are positioned on the boundary lines of the area to be serviced by the spray

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system, and a control mechanism 14 for selectively controlling the flow of humidified air to the spray pipes 10, 11, 12 and 13. All of the spray pipes 10, 11, 12 and 13 are provided along their full lengths with suitable spray nozzles 15, except those portions of the spray pipes 11 and 13 which are positioned within the spray pipes 10 and 12. The pipes 11 and 13 extend through the pipes 10 and 12 respectively only for convenience. However, if desired, the spray pipes may be laid alongside each other rather than one within the other as shown herein. The spray pipes 10, 12 and 13 are shown installed above ground while the spray pipe 11 is shown installed underground. As desired, the spray pipes may be positioned either under or above the ground depending upon existing conditions.

The spray fluid to be emitted by the spray nozzles 15 as humidified air is contained in a relatively large tank 16, in this instance, mounted in a building 17. On the tank 16 there are mounted a motor 18 for driving an air pressure pump 19 whose air discharge line 20 extends into the tank 16 adjacent the bottom thereof so that air under pressure may be discharged into the body of the liquid contained in the tank 16. A discharge outlet 21 is mounted on the tank 16 adjacent the top portion thereof so that it may always be above the liquid level in the tank 16. The opening 22 to the discharge outlet 21 is separated from the remainder of the tank 16 by a pair of concentrically positioned baffle plates 23, 24 having a plurality of openings 25 positioned at the upper portion of the outer baffle plate 23 and a plurality of openings 26 positioned at the lower portion of the inner baffle plate 24. The function of the baffle plates 23, 24 and the openings 25 and 26 is to compel the humidified air under pressure to flow outwardly by means of a devious path so that all the excess moisture contained in the air will collect in the bottom of the baffle plates 23 and 24 where it will be returned to the tank 16 through openings 27 and 28 contained in the bottom of the baffle plates 23 and 24 respectively. An outlet by-pass line 28 connects the bottom portion of the tank 16 and the outlet 21 and has a valve 29 mounted thereon for controlling the flow of fluid therethrough. The function of the by-pass line 28 is explained in detail hereinafter.

The outlet 21 is connected to piping 30 which in turn is connected to a manifold pipe 31 having a plurality of outlets 32 connected thereto. Each of the outlets 32 is connected to an inlet 34 of a valve casing 33. A duct 35 in the valve casing 33 connects the inlet 34 and an outlet 36 which is provided with a valve seat 37. A valve 38 slidably mounted in the outlet 36 is provided with a rod 39 which extends into a chamber 40 contained in the valve casing 33. Within each of the chambers 40 there is mounted a solenoid 41 with an armature 42 slidably mounted in the solenoid 41. The armature 42 is secured to the free end of the valve rod 39 to permit the armature and the valve 38 to operate as a unit. A coil spring 43 mounted about the armature 42 extends between the solenoid 41 and a plate member 44 secured to the lower end of the armature 42; the spring 43 yieldingly urges the valve 38 to its seated or closed position as shown by Figure 3. Each of the outlets 36 of the valve casings 33 is connected to a pipe 45 which in turn is connected to each of the spray pipes 10, 11, 12 and 13. A by-pass pipe line 46 connects each of the outlets 32 directly to each of the pipes 45, and has a hand operated valve 47 mounted in each of the pipes 45.

Each of the solenoids 41 is energized by the control mechanism 14 which consists of a housing 48 supported on a pole 49 whose other end is supported by the earth or ground. The top and bottom walls 53 and 54 of the housing 48 are provided with an opening having bearings 50 mounted therein, in which a shaft 51 is rotatably

mounted. The shaft 51 extends upwardly of the housing 43 and has a weather vane 52 mounted at the upper end thereof. Adjacent the bottom wall 54 there is an annular disk 55 mounted concentrically about the shaft 51, the disk 55 consisting of a plurality of contact members 56 each electrically insulated from the other members 56. Each of the contact members 56 are connected to one side of each of the solenoids 41 by electric wires 58. The other side of the solenoids 41 are connected to a source of energy such as the battery 59 by means of wires 62. Secured to the shaft 51 is a contact maker 60 whose other end is in contact with the annular disk 55. An electric wire 61 which connects the contact maker 60 and the battery 59 completes the electric circuit for energizing the solenoids 41.

In the normal operation of the spray system, the motor 18 is energized and the pump 19 then discharges compressed air to the bottom of the tank 16. The air bubbles through the liquid in the tank thereby agitating the mass of liquid and causing a boiling action thereby. As the bubbles break through the top surface of the liquid, the air becomes moistened and carries moisture particles therealong. The humidified air now passes through the openings 25 in the baffle plate 23, flow downwardly to and through the openings 26 in the baffle plate 24. Any excess moisture in the humidified air will drop to the bottom of the baffles 24 and 23 through the openings 28 and 27 and back into the body of liquid in the tank 16. The humidified air now passes out the discharge opening 22, the discharge pipes 21, 30 and into the manifold 31. Depending upon the direction of the then prevailing wind, the humidified air will be discharged through one of the discharge pipes 32 past the valve 38 whose solenoid has been energized by virtue of the position of the contact maker 60. As shown by the drawings, the humidified air is being discharged through the nozzles 15 in the spray pipe 11 since the wind is moving from that direction across the area being sprayed. The weather vane 52 in its indication of wind direction positions the contact maker 60 on the appropriate contact member 56 to energize the appropriate solenoid valve 38 and thereby cause the humidified air to be discharged by the spray pipes 11, 12, 13 or 14 whichever is up-wind. The wind then carries the humidified air across the area being serviced, and so long as humidified air is being discharged by the spray pipes, there will be humidified air hovering over this area. In the event the wind direction is exactly half way between any two sides of the area being serviced, the contact maker 60 being sufficiently wide to bridge the insulation between the contact members 56, the contact maker 60 will contact the two contact members 56 and energize the two appropriate solenoid valves 38 and cause the humidified air to be discharged by two adjacent spray pipes. As for example, if the weather vane pointed in the direction of the lower right hand corner of Figure 1 where pipe 11 emerges from spray pipe 10, both of the spray pipes 10 and 11 will discharge humidified air, while the wind coming from that direction will blow it over the entire plot of ground. When there is a shift or change in the direction of the wind, the weather vane 52 will follow the change of wind direction, causing the particular solenoid 41 to become de-energized, and the valve 38 by virtue of the coil spring 43 will become seated and thereby stop the flow of humidified air to the spray pipe that had been discharging same. Now with the weather vane 52 in its new position, the contact maker 60 is in contact with a different contact maker 56 thereby completing the electric circuit to another solenoid 41 to open that valve 38 and permit the flow of humidified air to the spray pipe that is now up wind in direction.

By increasing or decreasing the air flow through the pipe 20 into the liquid in the tank 16, the amount of humidity in the air spray can be controlled by the amount of agitation effected by the bubbles passing through the body of liquid. Therefore, the amount of humidity can be regulated from zero to the extreme limit that air can carry, then, if desired, by opening the by-pass valve 29, liquid under pressure will pass through the line 28 into the line 21 and commingle with the humidified air passing through the line 21 to be discharged as a wet spray through the discharge nozzles 15. It can be seen that the entire range from a light mist or imperceptible fog can be created and discharged by this spray device to a heavy liquid spray.

The function of the by-pass lines 46 and the valves 47 is to permit the flow of humidified air to the spray pipe in spite of the fact the particular solenoid has not been energized in the event the system is out of working order or it is desired to obtain a spray from a particular spray pipe notwithstanding the direction the wind is blowing from.

The liquid that may be used in this system may be water or any other liquid in which may be dissolved an insecticide, a fungicide, or a nutrient. Also, water alone may be used in a heated or cooled condition depending upon whether one is combatting a frost or an excessively high temperature climatic condition.

What I claim as new is:

1. A spray device for spraying an area comprising a tank containing water, a pump mounted on said tank, a tube connecting said pump and said tank adjacent a bottom portion whereby air under pressure is pumped into the body of water to create a mist, an outlet mounted in said tank above said water, baffle plates mounted about said outlet, openings in said baffle plates to provide a tortuous path to said outgoing mist for removing excess moisture therefrom, a spray pipe mounted along each side of said area at the perimeter thereof, pipe means connecting said outlet with each of said spray pipes, a solenoid operated valve mounted in each of said connecting means, a vane, a plurality of contact plate members mounted about said vane, each of said contact plate members being connected to a solenoid operated valve, and a contact finger mounted on said vane in contact relation with said contact plate member for operating said solenoid operated valve and thereby causing the mist to be discharged continuously by the up-wind spray pipe.

2. The structure recited by claim 1, a by-pass tube connecting the bottom portion of said tank and said outlet, and a valve mounted on said by-pass tube.

3. A spray device comprising a tank, means for pumping compressed air into said tank adjacent a bottom portion thereof, an outlet for said tank mounted adjacent an upper portion, baffle means mounted in said tank adjacent said outlet, a plurality of spray pipes mounted about the perimeter of an area to be sprayed, means connecting said outlet and said spray pipes, valve means mounted in said connecting means and control means operatively connected to said valve means for controlling the flow of fluid therethrough, said control means being actuatable by wind pressure.

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