MULTIPLE NOZZLE SPRAY HEAD

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1 My invention relates to a multiple nozzle spray head having an internally chambered portion thereof providing a turret for a plurality of separate outwardly directed nozzles which are arranged at spaced intervals therearound, this invention having reference more particularly to a pneumatic atomizing spraying head wherein air and liquid are supplied separately to each nozzle from the interior of the turret portion and discharged together in a manner to atomize the liquid as it is sprayed.

For insecticide spraying, space humidification and other similar purposes, a simple spraying unit is desirable which will effect widespread dispersion of the exterminating liquid, humidifying liquid or other sprayed liquid throughout a large area around the unit. Thus a large space may be exposed to the spray from a single centrally located unit.

For such purposes, it is essential that the liquid be sprayed in such a minute or highly atomized condition that it will diffuse readily and uniformly throughout the surrounding atmosphere and be absorbed thereby without any precipitation. No satisfactory spraying device has been available for this purpose. It is an object of my invention to provide a spray head or spraying unit for such centralized spraying which is highly efficient and insures uniform, widespread dispersion of the sprayed liquid throughout a large area in a non-precipitable state of atomization. Other objects of my invention are to provide a multiple nozzle atomizing unit or spray head of simple compact construction which may be readily manufactured at low cost; to insure equalized distribution of air and liquid to all the spray outlets; to construct the unit or spray head so that the parts thereof are readily accessible; and to provide a unit of this character which is adaptable for permanent installation or as an attachment on a jar or container from which the sprayed liquid is supplied, these and other objects being accomplished as pointed out more fully hereinafter and as shown in the accompanying drawings, in which:

Fig. 1 is a side view of a spray head embodying my invention;
Fig. 2 is an enlarged sectional view on the line 2—2 of Fig. 1;
Fig. 3 is a sectional view of the spray head taken on the line 3—3 of Fig. 2;
Fig. 4 is an enlarged view of the upper portion of Fig. 3 but showing modified spraying facilities;
Fig. 5 is a side view of a modified form of spray head embodying my invention and adapted to be used with a jar type of liquid container;
Fig. 6 is a view similar to Fig. 5 but showing the container supporting stirrup in retracted position for applying or removing the jar; and
Fig. 7 is an enlarged sectional view on the line 7—7 of Fig. 5 with a portion broken away.

2 Referring now to the drawing and particularly Figs. 1, 2 and 3 thereof, the spray head or unit comprises a main body member 11, a turret ring 12 and a retaining screw 13 by which the ring 12 is secured to the body 11.

The body member 11 is provided with two separate inlets 14 and 15 leading inwardly respectively from the opposite sides of the body 11 to separate cylindrical strainer chambers 16 and 17 respectively, which extend upwardly in the body 11 from the lower end thereof. The inlet 14 supplies the liquid to be sprayed and the inlet 15 supplies air for atomizing the sprayed liquid and each inlet 14 and 15 has an internally threaded enlargement at the outer end for connection with a piping system through which the liquid and air are supplied respectively. The outer end enlargement of the inlet 15 is shown at 16 in Fig. 1, and it is to be understood that there is a similar enlargement of the inlet 14 at the opposite side of the body 11.

The top end of the body 11 has a flat face for a gasket sealed connection with the flat bottom face of the turret ring 12, which is secured on the body 11 by the headed retaining screw 13 which is threaded at its lower end into an internally threaded opening 18 centrally located in the top of the body 11. The strainer chamber 16 has at its upper end an extension 20 of reduced diameter, and a lateral passageway 21 leads from the upper portion of the extension 20 to the central opening 18 to provide communication therebetween.

An annular chamber 22 is provided in the upper end of the body 11 concentrically around the central opening 19 and the strainer chamber 17 has at its upper end an extension 23 of reduced diameter which communicates at its upper end with the chamber 22. Each strainer chamber 16 and 17 is internally threaded at its lower end and closed by a threaded plug 24 of a strainer assembly.

Each strainer assembly is alike and comprises a cylindrical strainer screen 25 mounted on a tubular screen holder 26 which latter is secured at its lower end to one of the plugs 24 and at its upper end is reduced in diameter, as indicated at 27, and fits closely within the lower end of the respective openings 19 and 22. The screen 25 is of an external diameter sufficiently less than the diameter of the respective strainer chamber 16 or 17 to provide ample circulation space therearound and the tubular screen holder 26 is provided with a series of longitudinally spaced transverse slots 28 at each diametrical side thereof through which fluid passing through the screen 25 from the respective chamber 16 or 17 is communicated to the central opening 29 of the tubular screen holder 26 and from this opening 29 to the respective openings 20 or 23 of the body 11.

The screen 25 fits snugly on the holder 26 above and below the zone of the slots 28, as indicated
The formation of the turret ring 12 with the annular chamber 33 provides said ring with concentric walls 36 and 37 at the inner and outer sides respectively of the annular chamber 33 and said inner wall 36 has an annular series of openings extending therethrough in each of which is seated a small nozzle tube 38 which extends outwardly through the chamber 33 and through a corresponding opening 39 in the outer annular wall 37, each opening 39 being larger than and concentric with the respective tube 38 to provide an annular discharge opening, from the chamber 33, around the outer end of each nozzle tube 38.

The outer surface of the turret ring 12 is faced off flat at each nozzle location, as indicated at 40, so that the nozzle end projects uniformly, all the way around, beyond the face 40 and the outer end of the nozzle tube 38 is internally beveled as shown. Preferably the inner end is likewise beveled.

In the illustrated structure four such nozzles 38 are employed and arranged at quarter turn intervals around the ring 12. It is to be understood, however, that the number of nozzles may be increased or decreased, depending upon the size of the ring 12 and the volume and distribution of spray desired.

The stem of retaining screw 13, throughout a portion of the length of the center opening of the ring 12, is of a diameter less than that of said center opening so as to provide an annular chamber 41 with which all of the nozzle tubes 38 communicate at their inner ends, and the retaining screw stem has a central bore 42, the lower end of which opens into the central opening 19 of the body 31, and this central bore 42 has a plurality of radial ports 43 leading from the closed upper end thereof into the annular chamber 41.

The spraying unit above described is of siphon type, and the liquid to be sprayed is supplied to the nozzles 38 by the suction created by the air discharge through the annular air outlets 39 around the outer ends of the nozzles 38.

The air is supplied under pressure through the inlet 15 to the strainer chamber 17 and passes therethrough through the strainer screen 25 and screen holder 26 of that chamber and through the passageway 23 and annular chamber 22 to the annular chamber 33 of the turret ring 12, and from the latter chamber the air is discharged through the annular outlet 39.

This air discharge from each outlet 39 exerts an air blast on the respective outlet and creates suction which draws the liquid into the strainer chamber 16 through the inlet 14 and from the chamber 16 through the strainer screen 25 and screen holder 26 of that chamber and through the passageways 20, 21, 19, 42 and 43 into the annular chamber 41 from which it is distributed to and discharged from all of the nozzles 38 into the discharging air from respective outlets 39 and thereby highly atomized and projected outwardly from the location of each respective nozzle 38 projects. Said central opening 45 is concentric with and of a diameter greater than that of the nozzle 38 therein so as to provide an annular air passageway around the outer end of the nozzle, and at a distance beyond the outer end of the nozzle the central opening 45 is contracted to a smaller size as indicated at 49. The inner end of the opening 48 is also flared as indicated at 50.

In Figs. 7, 8 and 9 I have shown a modification of my above described invention for use in connection with an attached jar from which the liquid is supplied to the spraying unit.

This modification is of siphon type, like the unit of Figs. 1, 2 and 3 and is composed of a body 51 with a plurality of radial nozzles 52 substantially midway between the ends of the body, the upper end of which has an internally threaded opening 53 for attachment to a pipe (not shown), by which this unit is supported and through which air under pressure is supplied to the unit for the spraying operation, and the lower end of which said body has a sheet metal cap 54 permanently secured thereto for supporting and enclosing the upper end of the jar from which the liquid is supplied to the spraying unit.

This cap 54 has a stirrup 55 pivoted thereto at opposite sides, as indicated at 56, and adapted to support a jar 57 with the jar neck 58 within the cap 54. This stirrup 55 has a cross strap 59 at the bottom with upward ends 60 for holding the jar 57 in place on the stirrup.

The lower end of the body 51 has a tube 61 threaded into the lower end thereof and this tube 61 has a threaded lower end for attachment thereto of a bent tube 62 of a length to extend down near to the bottom of the jar on the stirrup 55 and the tube 62 has a head 63 on the lower end containing a strainer 64 through which liquid is drawn into the tube 62 from the jar.

The tube 61 which is directly attached to the body 51 has a shoulder 65 above the threaded lower end providing a stop for a jar covering disk 66 which is slidable mounted on the tube 61 and resiliently held against said stop shoulder 65 by a coil spring 68 which encircles the tube 61 and is engaged at its upper end in an annular seat 67 in the lower end of the body 51 around the tube 61 and is engaged at its lower end against the cover disk 65.

With this arrangement, the jar 57 is placed in position by first swinging the stirrup 55 to the side, as shown in Fig. 6, and placing the mouth of the jar against the bottom of the cover disk 65 in the respective position after which the jar 57 is pushed upwardly to compress the spring 66 sufficiently to swing the stirrup to a position directly underneath the bottom of the jar 57, whereupon the spring 66 is permitted to depress the jar to seat on the stirrup 55 between the upturned ends 69 of the cross strap 68.

The cover disk 65 thus clamps against and
closes the mouth of the jar 57 but does not have a sealing engagement therewith as it is necessary to have sufficient leakage therebetween for air relief so that the contents of the jar 57 may be aiphoned through the room.

Above the location of the nozzles 52, the body 51 has a relatively large central bore 68 leading downwardly therein from the threaded opening 53 and terminating in an annular chamber 69 around a central cylindrical dome 70 with a wall portion 71 of the body extending therearound.

This dome 70 has a central cavity in communication with the tube 61 and the nozzles 52 are secured at their inner ends in the dome 70 in communication with said central cavity thereof and each nozzle projects radially outwardly from the dome 70 through the annular chamber 69 and through an opening 72 in the surrounding wall portion 71, said opening 72 being sufficiently larger than the nozzle tube 52 to provide an annular air outlet around the outer end of the nozzle.

Preferably a strainer assembly is provided in the upper end of the body 51 and supported by a ring 73 engaged in an enlargement of the central bore 68 immediately below the larger threaded opening 53.

This ring 73 has an internally threaded central opening in which is secured the threaded lower end of a tubular screen holder 74 which is closed at its upper end and opens at its lower end into the bore opening 68 below the ring 73.

This screen holder 74 has slots in the side wall thereof like the slots 23 of the Fig. 3 structure and also is annularly recessed at the slot locations to provide circulation spaces like the spaces 32 of the Fig. 3 structure and is surrounded by a cylindrical screen 75 which is confined between an annular flange 76 at the top of the holder 74 and the ring 73 in which the holder is screwed.

When this unit is secured, by the threaded connection 53, to a pipe which supplies air under pressure, and a jar 57 containing a liquid to be sprayed is located in position on the stirrup 55, the air passes through the screen 75 and holder 74 into the bore opening 68 and annular chamber 69 and is led through the latter chamber through the annular outlets 72 around the outer ends of the nozzle tubes 52.

This air discharge exhausts air from the tubes 52 and creates suction therein which siphons liquid through the tubes 62 and 61 into the interior of the dome 70 from which it is discharged through all the nozzle tubes in a finely atomized spray commingled with the air discharge from the opening 72.

While I have shown and described my invention in several preferred forms, I am aware that various changes and modifications may be made therein without departing from the principles of my invention, the scope of which is to be determined by the appended claims.

What is claimed:

1. A spraying unit comprising a main body portion, a removable spray head thereon, and a retaining screw whereby the spray head is attached to the main body portion, said spray head having a central opening therethrough and an annular chamber spaced from and encircling said central opening, a plurality of nozzles at intervals around the spray head and extending radially from said central chamber, said retaining screw being engaged through the central opening in the spray head and with the main body portion and having a passageway therein communicating axially with a passageway in the main body portion and radially with the nozzles, said annular chamber in said spray head having an opening therefrom communicating with another passageway in the main body portion, each of said passageways in the main body portion leading to the exterior of said body portion and each having another external outlet with strainer means removably inserted therethrough into the respective passageways.

2. A multiple spray device of the class described which has a plurality of nozzles radially disposed at intervals therearound and comprising a one-piece nozzle holder which has a central cylindrical opening and an annular groove around said opening and inner and outer walls at the inner and outer sides respectively of the annular groove, said walls, opening and annular groove being concentric with one another and said groove opening through one side of the nozzle holder and the central cylindrical opening being extended through the opposite side of the holder, said inner wall having radial openings therethrough in which the inner ends of the nozzles are secured and said outer wall having openings therethrough which are larger than and encircle the nozzles and provide around each nozzle an annular passageway which opens directly into said annular groove.

3. A multiple spray device of the class described which has a plurality of nozzles radially disposed at intervals therearound and comprising a one-piece nozzle holder which has a central cylindrical opening and an annular groove around said opening and inner and outer walls at the inner and outer sides respectively of the annular groove, said walls, opening and annular groove being concentric with one another and said groove opening through one side of the nozzle holder and the central cylindrical opening being extended through the opposite side of the holder, said inner wall having radial openings therethrough in which the inner ends of the nozzles are secured and said outer wall having openings therethrough which are larger than and encircle the nozzles and provide around each nozzle an annular passageway which opens directly into said annular groove, a body by which said nozzle holder is supported, a cap screw which extends through the central opening of the nozzle holder and closes one end of said opening, said cap screw having at the other end of said central opening a threaded engagement with the body by which that side of the nozzle holder which has the annular groove opening therethrough is clamped against the body, said body having two separate passageways therethrough which communicate respectively with the central opening and the annular groove of the nozzle holder.

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REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

<table>
<thead>
<tr>
<th>Number</th>
<th>Name</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>1,238,313</td>
<td>Hammel</td>
<td>Aug. 26, 1917</td>
</tr>
<tr>
<td>1,625,935</td>
<td>Willners</td>
<td>Apr. 18, 1927</td>
</tr>
<tr>
<td>1,786,130</td>
<td>Szodomska</td>
<td>Mar. 10, 1931</td>
</tr>
<tr>
<td>1,813,033</td>
<td>Janovsky</td>
<td>July 7, 1931</td>
</tr>
<tr>
<td>2,239,068</td>
<td>Wood</td>
<td>Apr. 22, 1941</td>
</tr>
</tbody>
</table>