Feb. 26, 1952 E. O. NORRIS 2,587,514

ROTARY DISTRIBUTOR FOR SPRAYING DEVICES

Filed April 5, 1948 2 SHEETS—SHEET 1

Fig. 1.

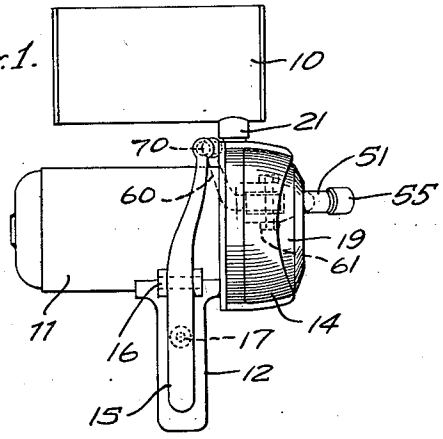


Fig. 2.

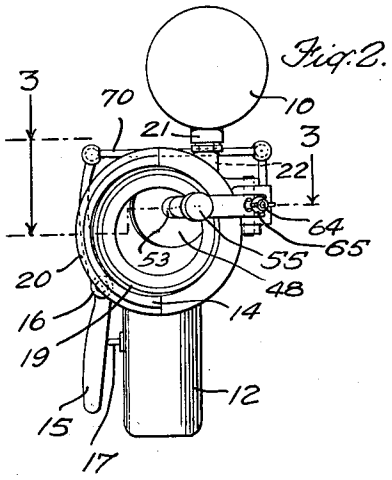
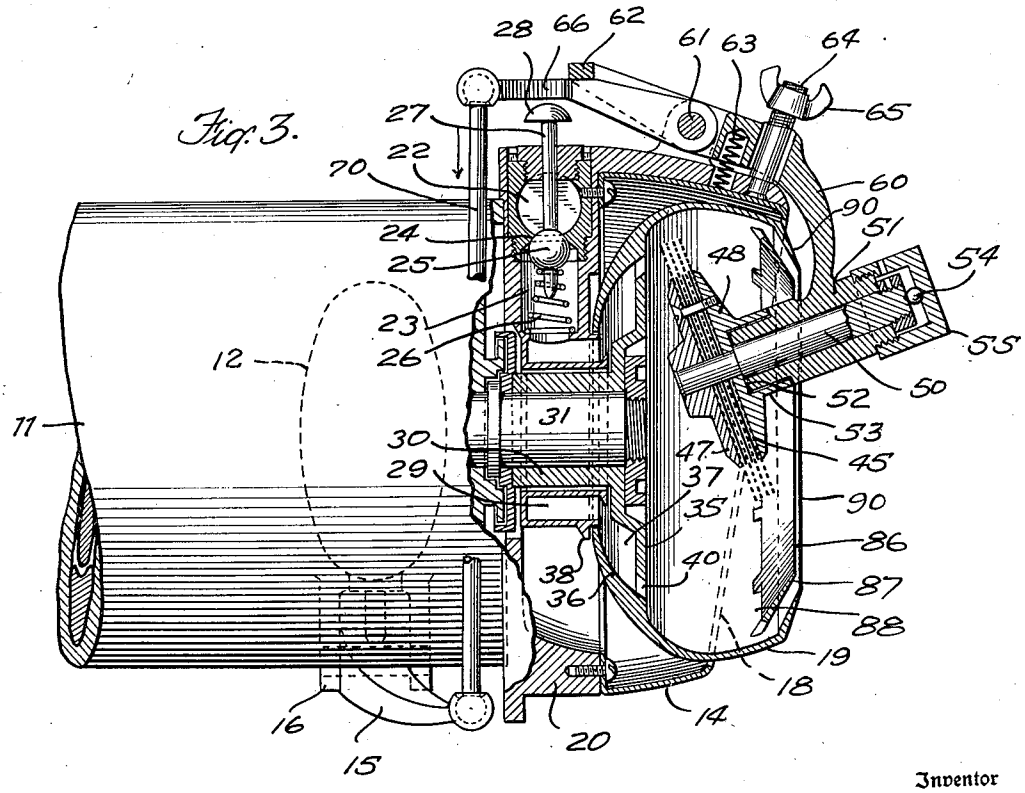


Fig. 3.



Inventor

EDWARD O. NORRIS

By

Attorney

Feb. 26, 1952 E. O. NORRIS 2,587,514

ROTARY DISTRIBUTOR FOR SPRAYING DEVICES

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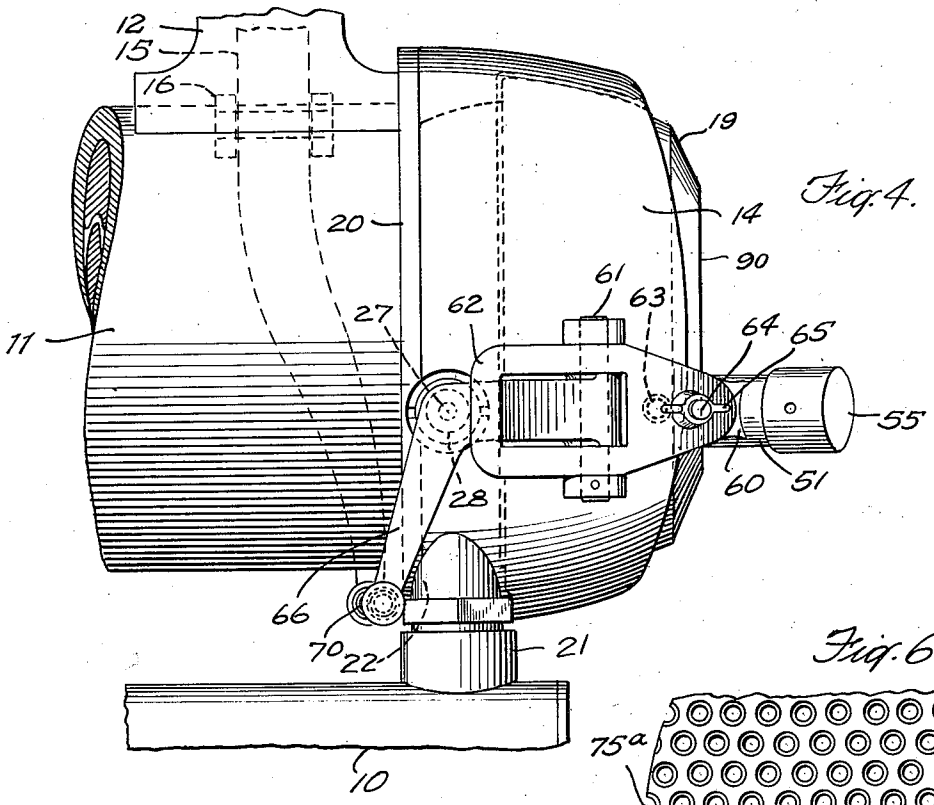


Fig. 4.

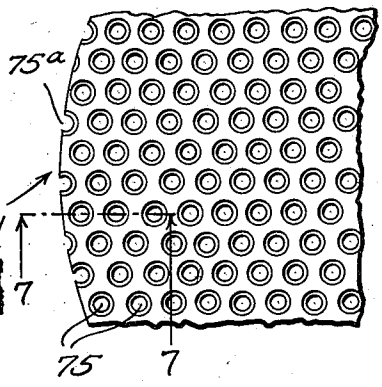


Fig. 6.

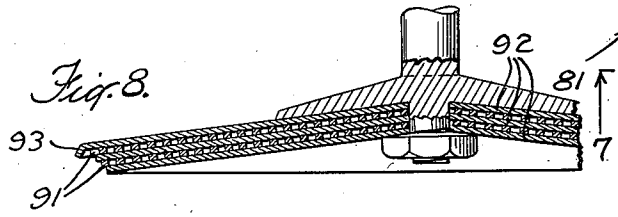


Fig. 8.

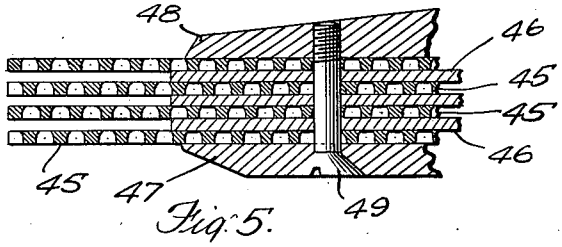


Fig. 5.

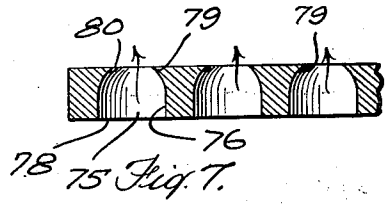


Fig. 7.

Inventor

EDWARD O. NORRIS

By

Attorney

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ROTARY DISTRIBUTOR FOR SPRAYING DEVICES

Edward O. Norris, Westport, Conn.

Application April 5, 1948, Serial No. 18,976

16 Claims. (Cl. 299—63)

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This invention relates to spraying apparatus of the centrifugal type, and more particularly to a rotary distributor adapted to project a liquid from its periphery in the form of a finely divided spray.

An object of the invention is to provide a distributor of the above type having novel and improved characteristics.

Another object is to provide a spraying device including a centrifugal distributor which is capable of operating satisfactorily with liquid having a wide range of viscosities.

Another object is to provide a rotary distributor having novel and improved means to collect liquid at its peripheral edge and to retain the same until it is projected outwardly in the form of a fine spray.

Another object is to provide a rotary distributor of the above type which is capable of producing improved atomization.

Various other objects and advantages will be apparent as the nature of the invention is more fully disclosed.

Although the novel features which are characteristic of this invention are pointed out more particularly in the claims, the nature of the invention will be better understood by referring to the following description, taken in connection with the accompanying drawings in which a specific embodiment thereof has been set forth for purposes of illustration.

In the drawings:

Fig. 1 is a side elevation of a spraying device embodying the present invention;

Fig. 2 is a front elevation thereof;

Fig. 3 is a partial top plan view thereof on a larger scale with parts in horizontal section to show the construction;

Fig. 4 is a partial top plan view showing the control linkages;

Fig. 5 is a partial radial section through the distributor taken on its enlarged scale;

Fig. 6 is a plan view of a portion of one of the distributor discs;

Fig. 7 is a partial sectional view through the distributor taken on the line 7—7 of Fig. 6, but on a larger scale; and

Fig. 8 is a partial section similar to Fig. 5 illustrating a further embodiment of the invention.

Referring to the drawings more in detail, the spray device is shown in Figs. 1 and 2 as comprising generally a receptacle 10 for the liquid to be sprayed, a motor casing 11, a downwardly extending handle 12 attached to the motor casing, and a distributor housing 14. A control lever 15 for controlling the emission of the spray is pivoted at 16 to the upper portion of the handle 12 and is held in extended position by a plunger 17 which is pressed outwardly by a spring, not shown.

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Referring to Fig. 3, the distributor housing 14 is shown in the form of a cup having an inclined front edge 18 forming a front opening to receive a rotary case 19. The distributor housing 14 is secured to a valve housing 20 which in turn is attached to the motor casing 11. A supply duct 21 (Fig. 1) leading from the receptacle 10 terminates in a valve chamber 22 in the valve housing 20. The chamber 22 communicates with a passage 23 by a port formed by a valve seat 24 closed by a ball valve 25 which is seated by a spring 26 and is carried on a valve rod 27 terminating in a cap 28 by which the valve is actuated. The passage 23 communicates with an annular chamber 29 formed in the valve housing 20 and which extends around a rotary hub 30 carrying the case 19 and mounted on the motor shaft 31.

The hub 30 is provided with a radial flange 35 forming the rear wall of the rotary case. The case 19 is provided with an annular lip 36 which projects in back of the radial flange 35 to form a receiving chamber 37 which is open to the annular supply chamber 29. The lip 36 has a running fit with a shoulder 38 on the walls forming annular chamber 29. A plurality of apertures 40 are formed in the radial flange 35 adjacent the peripheral wall of the rotary case 19 to pass the liquid from the receiving chamber 37 to the peripheral wall of the case. The lip 36 flares outwardly so that the liquid received in the chamber 37 is forced along the wall and through the openings 40 into the case 19 by centrifugal force and forms a peripheral layer on the peripheral wall of the case.

The distributor comprises a plurality of discs 45 which are separated by spacers 46 (Fig. 5) and are secured between an end cap 47 and an annular cap 48 by means of screws 49. The distributor disc and caps are carried on a shaft 50 (Fig. 3) which is journalled for rotation in a bushing 51. The annular cap 48 is provided with a radial bearing surface 52 which bears against one end of the bushing 51 and carries a flange 53 which forms a liquid seal to prevent the liquid from entering the bearing. A thrust bearing is provided in the form of a ball 54 seated between the end of the shaft 50 and a cap 55 which is screwed onto the bushing 51.

The bushing 51 is carried by a bracket 60 (Figs. 3 and 4) which is pivoted about a pin 61 and is extended to form a yoke 62. The distributor is

urged outwardly by a spring 63 and its movement is limited by a stop comprising a fixed stud 64 carrying a thumb nut 65.

An arm 66 pivoted about the pin 61 extends beneath the yoke 62 and is adapted when moved outwardly to cause the bracket 60 to pivot clockwise and to thereby retract the distributor within the rotary case 19. The arm 66 is adapted to engage the cap 28 on the end of the valve rod 27 and to depress the valve rod for opening the valve 25 when the arm 66 is moved in a counterclockwise direction as seen in Fig. 3.

The arm 66 is actuated by a link 70 which extends across the top of the motor housing and is attached to the end of the lever 15 and is so arranged that movement of the free end of the lever 15 toward the handle 12 results in opening the valve 25 and in releasing the yoke 62 so that the distributor is moved outwardly about the pivot pin 61 by the spring 63 to a position determined by the setting of the thumb nut 65. A shield 87 having a spray opening 86 is mounted in the case 19 and is provided with openings 88 for the return of intercepted spray to the case.

In accordance with the present invention, the distributor discs 45 are made in the form of a screen having a plurality of spaced holes 75 which, as shown more clearly in Fig. 7, have a cylindrical wall 76 terminating in a round opening 78 at one side of the disc and a tapered wall 79 terminating in a smaller opening 80 at the other side of the disc. Such a disc may be stamped from a screen of the type disclosed in my Patent No. 2,226,383, dated December 24, 1940, which describes in detail a method for manufacturing such a screen. The holes 75 may not be extended entirely through the discs, but may take the form of depressions in the discs if desired. It will be noted that the peripheral edge 81 of the disc, as shown in Fig. 6, cuts through certain of the holes 75*a* so that the peripheral edge of the disc is serrated by the intersected holes. The discs 45 are so disposed on the shaft 50 that the larger opening 78 faces the rear wall 35 of the rotary case.

In the operation of this device, the liquid to be sprayed is placed in the receptacle 10 which communicates through the duct 21 and valve 25 to the annular chamber 29 leading to the rotary case 19. When it is desired to spray, the lever 15 is pressed toward the handle 21, thereby releasing the yoke 62 and allowing the distributor to be moved outwardly by the spring 63 to a position for ejecting spray through the spray opening 86 of the shield 87. Further movement of the handle 12 then causes the arm 66 to engage the cap 28 and open the valve 25, thereby permitting liquid to flow from the receptacle 10 through the valve 25 and passage 23 into the annular chamber 29, thence through the receiving chamber 37 into the case and forming a peripheral layer about the wall thereof. The edges of the discs 45 are positioned to dip into this peripheral layer and are driven thereby to cause the discs 45 to rotate rapidly. At the same time, the discs pick up the liquid in the pockets formed by the holes 75 and retain the same in the pockets until it is thrown out by the centrifugal action of the rapidly rotating distributor. The liquid is thus thrown out in the form of a fine spray in a direction which is determined by the intersection of the plane of the discs 45 with the opening 86 of the shield 87. The portion of the spray which is intercepted by the shield 87 is returned centrifugally along the inner surface of

the shield 87 to the case 19 where it returns to the peripheral film therein. Any liquid thrown off from the edge of the shield 87 is intercepted by the lip 90 of the case 19. Any spray which flows around the edge of the shield 87 flows downwardly around the outer surface of the shield 87 and into the case 19 through the openings 88, thereby providing a sharp cut-off and preventing spattering of the spray.

When the lever 15 is released, the spring-pressed plunger 17 restores the same to its extended position, thereby reclosing the valve 25, and when the arm 66 engages the yoke 62, serving to retract the distributor within the rotary case 19 so that no further spray is emitted.

It will be noted that the arm 66 provides a lost motion control for the valve 25 so that the distributor is raised into spraying position before the valve 25 is opened and the valve 25 is closed before the distributor is retracted to non-spraying position. In this way the distributor is always in spraying position whenever the valve 25 is opened so that accumulation of liquid in the rotary case is avoided.

It is to be understood that gravity feed has been shown merely for purposes of illustration and that the receptacle 10 may be replaced by a pressure feed if desired, in which event the spraying device will operate at any angle to the vertical.

In the embodiment of Fig. 8 the discs 91 are similar to the discs 45 of Fig. 5, but are interleaved between solid discs 92. The upper disc 92 is provided with a lip 93 which dips in the liquid layer in the case 19. The discs 91 and 92 are flexible so that they may be separated slightly by the force of the liquid layer in which they dip and by the centrifugal force on the picked-up liquid.

In this embodiment the lip 93 is flexed by the liquid layer in the case 19 and thus opens a small space between the discs into which the thin liquid seeps. It is also directed against the periphery of the discs by the lip 93. The liquid is then held in the pockets formed by the perforations until it is thrown outwardly by centrifugal force.

The discs are shown as of progressively smaller diameters from the top flanged disc to the bottom disc so that successive discs dip somewhat deeper into the liquid layer for picking up the liquid and being flexed to spread the various discs to provide space for the seepage of the liquid therebetween. They may, however, all be of the same diameter. They may be arranged so that only the lip 93 dips into the liquid layer relying upon the scoop action of the lip to force the liquid against the peripheries of the other discs.

The serrated edge of the discs, shown in Fig. 6, increases the drag of the advancing liquid layer on the discs and thus facilitates the drive of the discs by the peripheral liquid layer into which they dip, particularly when the device is used to spray liquids of low viscosity such as water. The pockets formed by the holes 75 also serve to retain such thin liquids until they are thrown outwardly as a spray by centrifugal force.

When used for spraying water the present distributor constitutes an efficient humidifier inasmuch as it is adapted to produce an extremely fine spray which can be readily taken up by and suspended in an air current. It is also adapted for use as a paint sprayer or for other liquids such as disinfectants.

Although certain specific embodiments have been described, it is to be understood that the

invention is not to be restricted thereto, but that changes and modifications may be made therein as will be apparent to a person skilled in the art.

What is claimed is:

1. A spraying device comprising a distributor disc having a plurality of pockets formed therein, means supplying to said pockets a spray-forming material to be sprayed, and means rotating said disc at a speed to project the material from said pockets in the form of a spray.

2. A spraying device, as set forth in claim 1, in which said pockets comprise apertures extending entirely through said disc.

3. A spraying device, as set forth in claim 2, in which said apertures have flared walls forming a large opening on one face of said disc and a smaller opening on the other face thereof.

4. A spraying device, as set forth in claim 1, in which the peripheral edge of said disc intersects certain of said pockets to provide a serrated peripheral edge.

5. A spraying device, comprising a rotary case having an axial spray opening and an annular peripheral wall forming a channel to carry a film of spray-forming material due to centrifugal action, a distributor comprising a disc mounted to rotate within said case, said disc having a plurality of pockets formed therein to receive said material and being disposed to project a spray of said material centrifugally outwardly from said pockets through said spray opening, and means supplying said material to said disc for spraying therefrom.

6. A spraying device, as set forth in claim 5, in which said pockets comprise holes extending entirely through said disc.

7. A spraying device, as set forth in claim 6, in which said holes are formed by flared peripheral walls arranged to provide a larger opening in one surface of said disc than in the other surface thereof.

8. A spraying device, as set forth in claim 5, in which the peripheral edge of said disc intersects certain of said pockets to form a serrated peripheral edge adapted to pick up said material from said film.

9. A spraying device, as set forth in claim 5, in which said distributor is mounted for movement between a spraying position and a retracted position, the material supply means includes a valve connected to control the supply of said material, and manual means is provided for controlling said valve and for controlling the position of said distributor.

10. A spraying device, as set forth in claim 9, in which said manual means includes a lost motion connection arranged to advance said distributor prior to opening said valve and to close said valve prior to retracting said distributor.

11. In a spraying apparatus, a rotary collecting case having an annular peripheral wall forming a channel to receive a spray-forming material and having an axial spray opening, means supplying a spray-forming material to said case, means driving said case to cause the material to form a peripheral layer on said wall, a distributor comprising a disc having a plurality of pockets therein, means rotatably mounting said distributor in said case with the peripheral edge of said disc dipping into said channel and with the plane of rotation of said disc intersecting said spray opening, said disc being mounted to be driven by the rotating layer of material in said case and to pick up material therefrom in said pockets and to discharge the same centrifugally as a spray, a portion of which passes out through said spray opening and the remainder of which is intercepted by said collecting case and returned to said layer.

12. A spraying device, as set forth in claim 11, in which said distributor is mounted for movement between a spraying position and a retracted position, the material supply means includes a valve connected to control the passage of said material, and manual means is provided for controlling said valve and for controlling the position of said distributor, said valve being opened when said distributor is in spraying position and closed when said distributor is in retracted position.

13. A spraying apparatus, as set forth in claim 11, in which said distributor comprises a plurality of super-imposed discs.

14. A spraying apparatus, as set forth in claim 13, in which alternate discs are perforated and the other discs solid.

15. A spraying apparatus, as set forth in claim 14, in which said discs are of progressively decreasing diameters with their peripheries dipping into and flexed by said layer of material .

16. A spraying apparatus, as set forth in claim 11, in which said distributor comprises a plurality of superposed discs and a peripheral lip is formed on one of said discs and positioned to dip into the layer of material and to scoop the material therefrom onto the peripheries of the other discs.

EDWARD O. NORRIS.

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