

June 22, 1937.

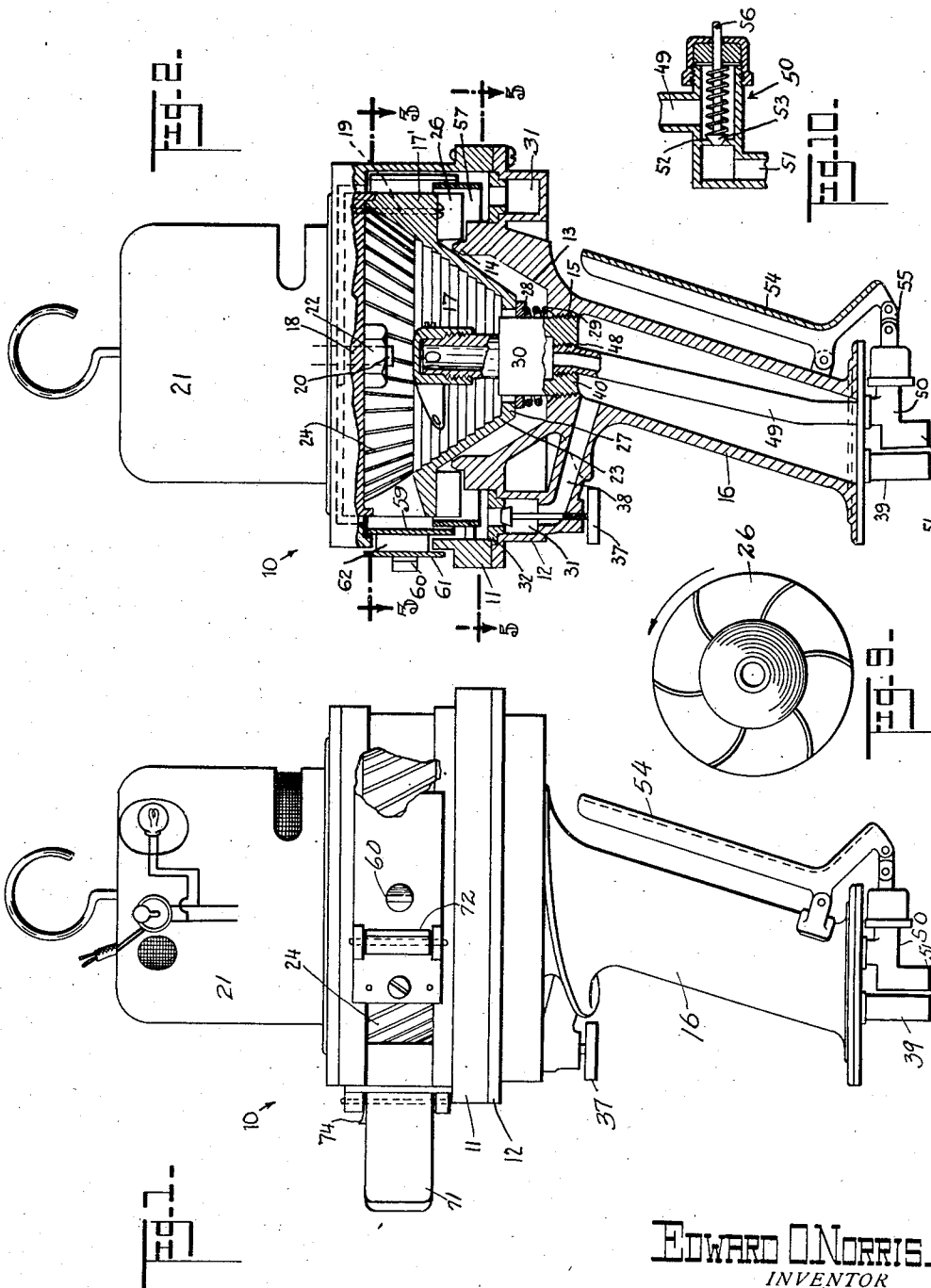
E. O. NORRIS

2,084,621

SPRAYING DEVICE

Filed Sept. 5, 1930

2 Sheets-Sheet 1



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2 Sheets-Sheet 2

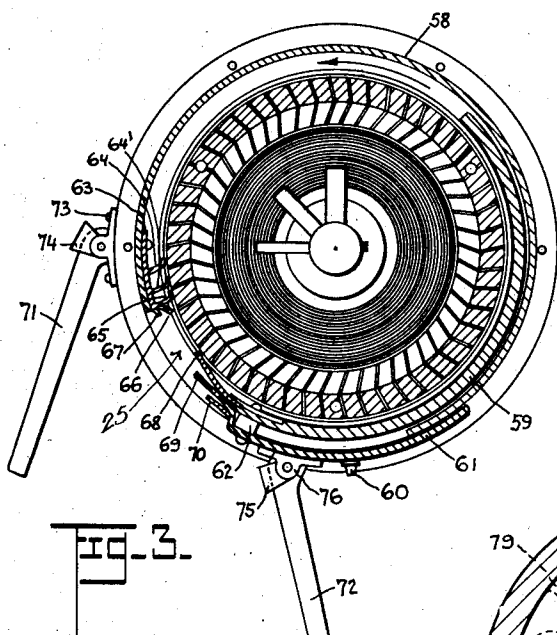


FIG. 3.

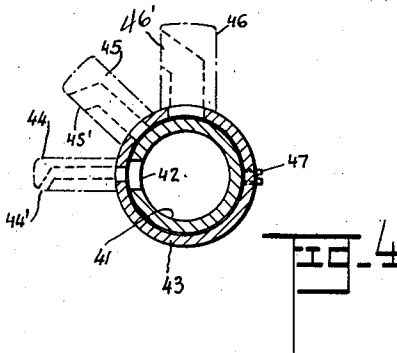


FIG. 4.

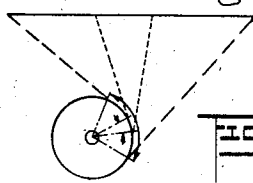


FIG. 7.

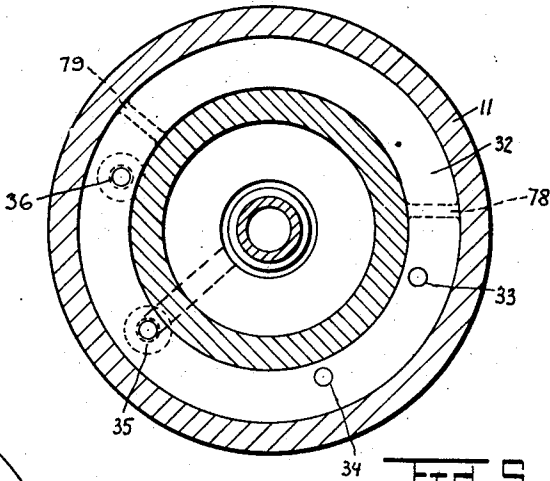


FIG. 5.

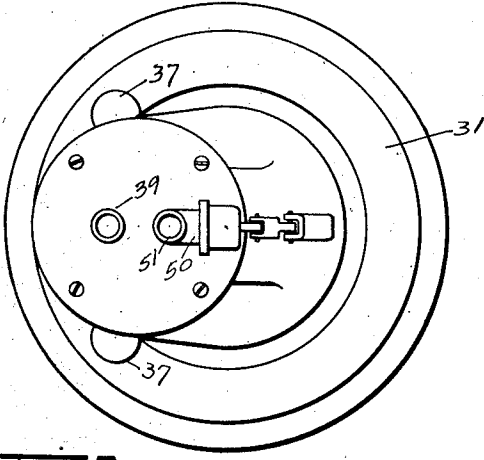


FIG. 6.

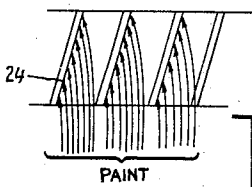


FIG. 8.

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UNITED STATES PATENT OFFICE

2,084,621

SPRAYING DEVICE

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York

Application September 5, 1930, Serial No. 479,900

22 Claims. (Cl. 299—63)

This invention relates to apparatus for spraying liquids and particularly for spraying such liquids as paints, lacquers, stains and varnishes.

In general it is an object of the invention to provide a device of the character described, which is simple of construction, economical to manufacture, which can be expeditiously, safely and conveniently manipulated, and which will efficiently perform the purposes for which it is intended.

A further object of this invention is to provide a spraying device wherein the fluid to be sprayed is controlled so that the fluid leaves on tangential planes through an opening adjustable by means of slides circularly arranged.

A further object of this invention is to provide a spraying device having a conical rotatable distributor and a plurality of feeding nozzles of various diameter, any one of which may be used in supplying the fluid against the inner surface of the conical distributor and in projecting the fluid in the direction of rotation of the distributor.

A further object of this invention is to provide a spraying device with adjustable guides so that narrow stripes can be sprayed without difficulty.

A further object of this invention is to provide a spraying device wherein the fluid is supplied to a conical distributor which is kept under vacuum through centrifugal force and kept sealed by means of washers or fan action or both.

A further object of this invention is to provide a spraying device whereby the entire spray ejected falls onto a surface which is to be treated and does not fly off in fine particles as a dust.

A further object of this invention is to provide a spraying device wherein air is kept out of the machine, thereby greatly increasing the mechanical efficiency of machine.

A further object of this invention is to provide a spraying device whereby a film of substantially uniform depth may be deposited upon a surface despite the tendency of the device gradually to become clogged.

Other objects of the invention will in part be obvious and will in part appear hereinafter.

To these and other ends, the invention consists in certain improvements and combinations and arrangements of parts all as will be hereinafter more fully described, the novel features being pointed out particularly in the claims at the end of the specification.

For a fuller understanding of the nature and objects of the invention reference should

be had to the following detailed description taken in connection with the accompanying drawings, which illustrate a practical embodiment of my present invention, and in which the same reference numerals indicate similar parts in the different figures.

Figure 1 is a side view of the device.

Figure 2 is a view partly in section of the device with movable gate closed.

Figure 3 is a view taken on 3—3 of Figure 2.

Figure 4 is a detail of the nozzles.

Figure 5 is a view taken on 5—5 of Figure 2.

Figure 6 is an end view of the device.

Figure 7 is a diagrammatic view showing the variable areas covered on opening of shutter.

Figure 8 is a diagrammatic view showing flow of fluid to slots.

Figure 9 is a view of the fan.

Figure 10 is a detail of the valve structure.

The centrifugal ejection of liquid has a variety of advantages over the use of air guns for many purposes. Among these advantages are the avoidance of condensed moisture in the shot, when non-aqueous liquids are sprayed, and a marked lessening of the tendency for mist-like particles of the liquid to wander in undesired directions. Indeed, the presence of air is disadvantageous from a number of standpoints.

In the dispensing of liquids for the purpose of coating surfaces, it has been found that the presence of added air in the liquid stream has certain harmful effects and that the absence of air may be beneficial. If a paint, for example, is applied without an air blast, the amount of the constituent which acts as a carrier for the other constituents may be reduced. A portion of the cost of the oil may be eliminated. The other elements are found to deposit themselves upon the surface with greater force and smoothness, necessitating less of the temporary adhesive element.

Furthermore, with no added air in the paint stream, or spray, there is less chance for air blisters to be formed on the painted surface. The absence of added air also does away with paint mist which spoils the sharp edge of an otherwise neat stripe. Hereinafter is described a device which is designed to prevent air from entering into the spray as it is being formed. A rotating enclosed cup receives the fluid against its sloping sides. Centrifugal forces cause the fluid to rise on the interior wall and flow out through slots. A uniform flow through all portions of each slot is assisted by having the slot somewhat at an angle with the vertical which

permits some liquid to rise to the top of the inner sloping surface adjacent each slot before reaching and pouring into the outward leading slot.

5 In the form shown in the drawings the reference numeral 10 indicates a casing which is provided with a portion 11 and another portion 12.

10 The portion 12 is provided at its center with a bowl-shaped hollow portion 13, having an up-standing plate or rim 14. The end of the bowl terminates in a threaded opening 15.

The portion 12 may also be provided with a hollow stem 16 which functions as a handle for 15 the casing and as a reservoir in a manner which will be explained later.

The portion 11 encloses a revolving cone-shaped distributor 17 which may be attached to a disc 18 by means of bolts 19. The disc 18, is 20 attached to a motor shaft 20, of a motor 21, by any suitable means such as a nut 22.

The distributor 17 revolves close to the rim or plate 14 of the hollow portion 13 and has its 25 bottom cut out in alignment with the threaded opening 15.

The distributor 17 comprises a hollow cone-shaped casting with its interior wall made of steps 23 and a number of slots 24 extending from the steps 17 to the disc 18 and formed at an 30 angle with the vertical and at same time at an angle with the radial direction as shown in Figure 3.

The slots 24 extend through the body of the distributor 17 and its outer wall 17' which may 35 be cylindrical in this portion. The wall 17' may be provided with a fan 26, cast with the distributor in one operation.

The conical end 27, of the distributor 17 is in contact with a washer 28, which rests on a 40 spring 29 adapted for forcing the washer upwards. Both washer 28 and spring 29 have openings of diameter equal to the opening 15.

Within the threaded opening 15, there is inserted a fixture 30, which projects through the 45 spring 29, washer 28 and opening in the distributor end 27.

The portion 12, of the casing is provided with a drainage channel 31, which receives all deflected or unused fluid. The drainage channel 50 is provided with a cover 32, which has spaced openings 33, 34, 35, and 36 to receive the excess fluid. Two of these openings 35, and 36, directly beneath the point of fluid ejection are controlled by hand operated valves 37. The channel 31, 55 is divided into two portions by partitions 78 and 79.

The channel 31 connects with the hollow stem 16 through the passage 38. The stem 16 is provided with an offtake pipe 39, which is connected to a vacuum producing device (not 60 shown).

The fixture 30 comprises a hollow outside threaded bushing 40, having a projecting threaded neck 41 at one end. The neck 41 is provided 65 with an aperture 42. A cap 43 internally threaded and fitting over the neck 41, is provided with a set screw 47 to hold the cap in position when in use.

The cap 43 is provided with a series of nozzles 70 of varying diameter, the largest diameter being equal to aperture 42, as shown in Figure 4. The nozzles 44, 45 and 46 have their openings 44', 45', 46', placed on the side of the nozzle so that the fluid projects in the direction of revolution 75 of distributor 17.

The other end 48 of the fixture 30, is threaded and receives a pipe 49 which for convenience is placed in the stem 16, and is connected to a valve 50.

The valve 50 has an intake pipe 51 leading from 5 a tank under pressure (not shown) and the fluid travels through opening 52 which is controlled by stem valve 53 operated by handle 54 through link 55 and rod 56. The fluid then travels into pipe 49. 10

A ring 57, is placed alongside the distributor so as to guide the waste fluid into the channel 31.

The spraying device is provided with an opening 25, which can be controlled at the will of the operator. The opening is formed by a stationary wall 58, and a movable circular gate 59, 15 operated by handle 60, situated on outer plate 61, and connected to movable gate 59, through filler 62.

To the inside of the stationary wall 58 adjacent 20 the opening 25 there is attached a plate 63 upon which there are situated a multiplicity of flanges 64 and 64' adapted to catch the swirl of the fluid as it hits the inside of the casing or stationary wall 58 and to deflect the fluid into bottom of 25 casing. The flange 65, is placed to catch a slight drip of the edges and deflect the drip into the casing 12. The flange 66 catches all excess fluid as the fluid passes in a tangent off the machine. The flange 67 catches the drip and forces it to 30 the bottom of the casing.

The flanges 68, 69, and 70 are attached to the movable gate 59, and function in a similar capacity and deflect to the bottom of the casing 35 any of the swirling fluid not used.

The spraying device is also provided with guides 71 and 72. Guide 71 is attached to the casing at 73 and is kept in place by wedge 74, or any other means. Similarly the guide 72, is attached to the 40 outer plate 61, of the movable gate 59, and is held in place by means of wedge 75, placed between the top ear 76, and the guide 72.

In operation the fluid to be sprayed enters the pipe 51 under pressure and, governed by means 45 of valve 50, it passes through pipe 49 into the fixture 30. There it leaves through one of the nozzles 44, 45 or 46 to impinge against the mid-section of the distributor 17.

Owing to the velocity of rotation of the distributor aided by the directed flow from the nozzle the fluid rises by centrifugal force and tends 50 to escape through the slots 24 and escapes in the form of a succession of thin sheets which break up into fine particles.

The distributor is kept relatively free from air 55 by means of the tight washer 28, or the fan 26, or both.

When a floor is sprayed the device is tilted and by shutting the valves 37 the openings 35 and 36 60 are closed and all excess fluid must be drained through openings 33 and 34.

In Figure 2, the distributor is shown with inclined slots 24. This inclination is for the purpose of receiving the rising fluid at an angle as 65 shown in Figure 3. This arrangement has been found more efficient than vertical slots.

The fluid in leaving the device is compelled by means of the flanges 63, 64, and 65 to leave in a tangential plane and the area to be sprayed depends on the amount the movable gate is opened 70 as indicated in Figure 7.

The various slots and inter-slot distributor portions pass successively past the opening 25 as the distributor rotates and pass, for example, from 75 left to right as viewed through said opening.

Those portions which pass any given point of said opening at a point of time just earlier than certain other portions are designated as being ahead of said portions or forward of said other portions.

Said other portions are designated as rearward of said first-mentioned portions. At any given instant a forward portion may be adjacent one edge of the opening when a rearward portion is adjacent the other edge, the said edges being substantially parallel to the axis of rotation. The first-mentioned edge is termed the forward edge of the opening. The second-mentioned edge is termed the rearward edge of the opening.

It is also a function of the flanges 63, 64, and 65 dependent upon their proximity to the distributor to keep the inside air from emerging to the outside.

The function of flange 66 which also fits close to the distributor is to prevent the air from entering the machine. This is necessary as the machine due to the swirling action of the distributor produces a partial vacuum and there would be a tendency to suck air at that point.

Wherever strips are to be sprayed the guide 71—72 can be used, the edge of the guides running along the extreme edges of area to be sprayed.

The quantity of fluid may be regulated by using the proper nozzle.

As many changes could be made in the above construction and many apparently widely different embodiments of this invention could be made without departing from the scope thereof, it is intended that all matter contained in the above description or shown in the accompanying drawings, shall be interpreted as an illustrative and not in a limiting sense.

It is also to be understood that the language used in the following claims is intended to cover all of the generic and specific features of the invention herein described.

Certain subject matter not claimed or only specifically claimed herein has been claimed or claimed more broadly in my copending application, Serial Number 647,896, filed December 19, 1932, which is a continuation in part of the present case.

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

1. In a spraying device of the class described a revolvable distributing device from which the fluid leaves in fine sheets, a stationary wall partly surrounding said distributing device and an arcuate movable wall adapted to cover the remainder of said distributing device, said movable wall adapted to be regulated for uncovering any desired area from which the fluid is sprayed, a guide on the stationary wall, and a guide on the movable wall.

2. In a spraying device of the class described, a revolvable distributing device from which the fluid leaves in fine sheets, a stationary wall partly surrounding said distributing device, and an arcuate movable wall adapted to cover the remainder of said distributing device, said movable wall adapted to be regulated for uncovering any desired area from which the fluid is sprayed, a guide on the stationary wall, and a guide on the movable wall, and means for adjusting said guides in any desired position.

3. In a spraying device of the class described, a revolvable distributing device from which the fluid leaves in fine sheets, a stationary wall partly surrounding said distributing device and a movable wall adapted to cover the remainder of said

distributing device, a flange arranged at the end of each wall projecting into close proximity to said revolving distributing device and adapted to prevent the air from being drawn into the device and also from being ejected from the device.

4. In a spraying device of the class described, a revolvable distributing device from which the fluid leaves in fine sheets, a stationary wall partly surrounding said distributing device, and a movable wall adapted to cover the remainder of said distributing device, a set of flanges arranged at the end of each wall where the fluid is ejected, said flanges being so arranged as to be in close proximity to the revolving distributing device to catch the swirl of the fluid and other flanges to catch the drip from the fluid as it leaves the device, and means for deflecting the swirl and drip to the base of the spraying device.

5. In a spraying device of the class described the combination comprising distributing means providing a chamber, a casing surrounding said means, collection means formed at one end of said casing adapted to catch the excess fluid, a plurality of inlets to said collection means controlled by valves, certain of said inlets being positioned to be submerged when said device is in one position and others of said inlets being positioned to be submerged when said device is in another position, and an outlet from said collection means.

6. In a spraying device of the class described the combination comprising distributing means providing a chamber, a casing surrounding said means, said means and said casing providing an enclosed space formed between said means and said casing where the excess fluid is deflected, a reservoir for the excess fluid and a plurality of valves controlling the flow from said space to said reservoir, certain of said valves being adapted to be closed when the position of the device is such as to prevent proper operation if the passage of said fluid past said certain valves is permitted.

7. In a device of the class described a revolving circular distributor, a circular casing enclosing the distributor said casing having an opening for fluid ejection, an arcuate gate operative at the opening, said gate being provided with a flange which is in close contact to the distributor to prevent air suction into the device.

8. A spraying device comprising a centrifugal distributor, a member spaced from and surrounding the major portion of the distributor and formed with an opening through which liquid may be ejected, and flange means disposed rearwardly of said opening and extending into close proximity with the periphery of the distributor for preventing egress of the fluid moving with the distributor between the distributor and said surrounding member, and forwardly extending means just at the rear of said opening for preventing the discharge of any liquid caught by the portion of said member beyond said flange means.

9. A spraying device, comprising an inner centrifugal element having a frusto-conical inner surface, means to supply liquid to said surface, and an outer centrifugal element positioned to receive liquid from the wide edge of said surface and comprising a multiplicity of spaced revolvable members having inner edge surfaces sloping with respect to the axis of rotation whereby liquid delivered to the revolvable members will be spread out on their forward surfaces and discharged from the outer ends thereof, said inner edge surfaces and said conical surface being substan-

tially contiguous and the slope of the inner edge surfaces being in the same direction as the slope of the conical inner surface.

10. A spraying device, comprising a casing, a centrifugal distributor within the casing, liquid supply means extending centrally into the distributor from within the casing, and fan means between the distributor and the bottom of the casing for preventing the entry of air into the casing.

11. A spraying device comprising a centrifugal distributor, means to limit the effective spray to the liquid discharged from a limited portion of the peripheral area of the distributor, a ring of generally transverse spaced elements forming a part of the distributor, said distributor being formed with an interiorly disposed conical surface arranged to discharge liquid upon the interior of said ring during the rotation of the distributor, said generally transverse elements being disposed at an acute angle to a plane perpendicular to the axis of the distributor.

12. A spraying device comprising a centrifugal distributor, means to conduct fluid to the interior of the distributor, means spaced from the periphery of the distributor and surrounding the major portion of the periphery thereof for preventing the ejection of spray except in a given direction, a chamber communicating with the space between the distributor and the surrounding member and extending about said conducting means, and means providing a seal between said conducting means and said distributor to prevent the distributor from sucking in air from said chamber.

13. A spraying device comprising a centrifugal distributor, means to limit the effective spray to the liquid discharged from a limited portion of the peripheral area of the distributor, a ring of generally transverse spaced elements forming a part of the distributor, said distributor being formed with an interiorly disposed conical surface arranged to discharge liquid upon the interior of said ring during the rotation of the distributor, said generally transverse elements being disposed at an acute angle to a plane perpendicular to the axis of the distributor, the inner surface of said ring forming substantially a continuation of said conical surface.

14. A spraying device comprising a centrifugal distributor, stationary means surrounding the major portion of the periphery of the distributor and formed with a discharge opening at one side of the device, and an outwardly-extending member carried by said stationary means at the rear edge of said opening in the direction of rotation of the distributor and extending in the direction of the discharge spray, and providing a guide for the rear edge of the spray.

15. A spraying device comprising a centrifugal distributor, means surrounding the major portion of the periphery of the distributor and spaced therefrom and arranged to permit the ejection of spray at one side of the device, said means including a stationary wall and an arcuate movable wall adapted to regulate the extent of said opening, and a flange on said movable wall projecting into such close proximity with the periphery of said distributor that air is substantially prevented from being entrained by the motion of said periphery between said flange and said periphery.

16. A spraying device comprising the combination with a casing having a wall, of a hollow ro-

tatable distributing device within the casing, means for supplying fluid to be distributed to the interior of the distributing device, means in the distributing device for enabling the device to swirl the fluid against the said wall of the casing, a drainage channel at the bottom of the said casing, a hollow stem supporting the casing, and a pipe connecting the said hollow stem with the said drainage channel, the said pipe being adapted to drain fluid collected in the drainage channel into the hollow stem.

17. A spraying device comprising the combination with a casing provided with an aperture for allowing passage of fluid therethrough, of a motor positioned on the said casing, a rotating distributing device driven by the said motor and adapted to eject fluid against the casing as the distributing device rotates, means for supplying fluid to the interior of the distributing device, a drainage channel in a lower portion of the casing for receiving fluid ejected from the distributing device, a hollow stem connected to the drainage channel for receiving fluid passing from the drainage channel, an off-take pipe leading from the said stem for draining the fluid from the stem, the said stem enclosing the fluid supply means and defining a supporting handle for the casing, and a nozzle within the distributing device pointing in the direction of rotation of the distributing device for discharging fluid against the inner surface of the distributing device in the direction of rotation thereof to facilitate unbroken adhesion of the fluid to the surface under centrifugal energy imparted to the fluid by rotation of the device, the said fluid-supplying means including a fixture set in the casing, the said fixture supporting the said nozzle and being in communication therewith for supplying fluid thereto.

18. A spraying device comprising the combination with a casing having a wall, of a hollow rotatable distributing device within the casing, means for supplying fluid to be distributed to the interior of the distributing device, means in the distributing device for enabling the device to swirl the fluid against the said wall of the casing, a collection chamber for the fluid beneath the distributor, an arcuate drainage channel for the fluid in the casing, a plurality of openings between the collection chamber and the channel, and valve means for closing at least one of the said openings for regulating passage of the fluid from the collection chamber to the drainage channel.

19. A spraying device comprising the combination with a casing defining a housing, of a hollow rotatable distributing device within the housing and enclosed thereby, the distributing device defining a fluid-receiving chamber, instrumentalities for supplying liquid to the interior of the said distributing device, openings in the distributing device for ejecting liquid through the said device, an opening in the casing permitting the centrifugal ejection of spray from the casing onto a surface to be sprayed, and guide means extending outwardly from the casing for confining the ejected spray to a limited area and defining the extreme edges of the area to be sprayed.

20. A spraying device comprising the combination with a casing defining a housing, of a hollow rotatable distributing device within the housing and enclosed thereby, the distributing device defining a fluid-receiving chamber, instrumentalities for supplying liquid to the interior of the said distributing device, openings in the distributing

device for ejecting fluid through the said device, an opening in the casing permitting the centrifugal ejection of spray from the casing onto a surface to be sprayed, and guide means mounted on the casing and extending outwardly therefrom beyond the normal course of the spray ejected through the said opening to confine wandering particles of spray within a limited area, the said guide means defining the extreme edges of the area to be sprayed.

21. A spraying device comprising the combination with a casing defining a housing, of a centrifugal distributor within the housing adapted to spray fluid therefrom, an opening in the casing permitting the centrifugal ejection of spray from the casing onto a surface to be sprayed, and relatively adjustable guide means mounted on the housing and extending outwardly therefrom beyond the normal course of the spray ejected through the said opening to confine wandering particles of spray within a limited area, the said

guide means defining the extreme edges of a variable area to be sprayed.

22. A spraying device comprising the combination with a casing having a wall, of a hollow rotatable distributing device within the casing, means for supplying fluid to be distributed to the interior of the distributing device, means for enabling the distributing device to swirl the fluid against the said wall of the casing, a drainage channel within the said casing, a hollow stem supporting the casing and connected to the drainage channel, an off-take pipe leading from the said stem whereby fluid entering the stem from the drainage channel may be withdrawn from the stem, instrumentalities within the distributing device for supplying fluid to the interior thereof, and intake means set in the casing supporting and in communication with the said instrumentalities and passing through the said hollow stem.

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