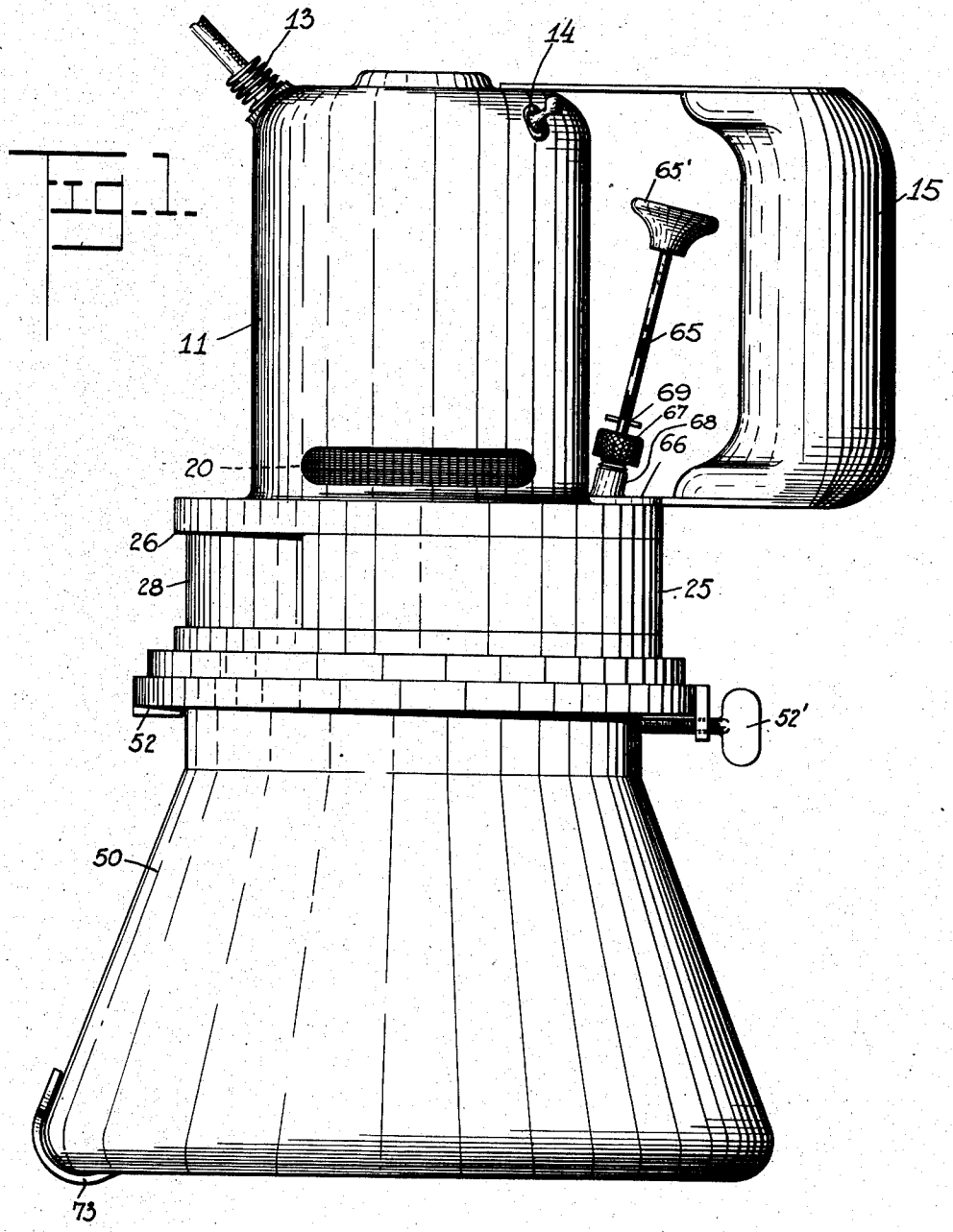
July 13, 1937. E. O. NORRIS 2,086,921

SPRAYING DEVICE

Original Filed June 15, 1931 3 Sheets-Sheet 1

Fig. 1.




INVENTOR
EDWARD O. NORRIS.

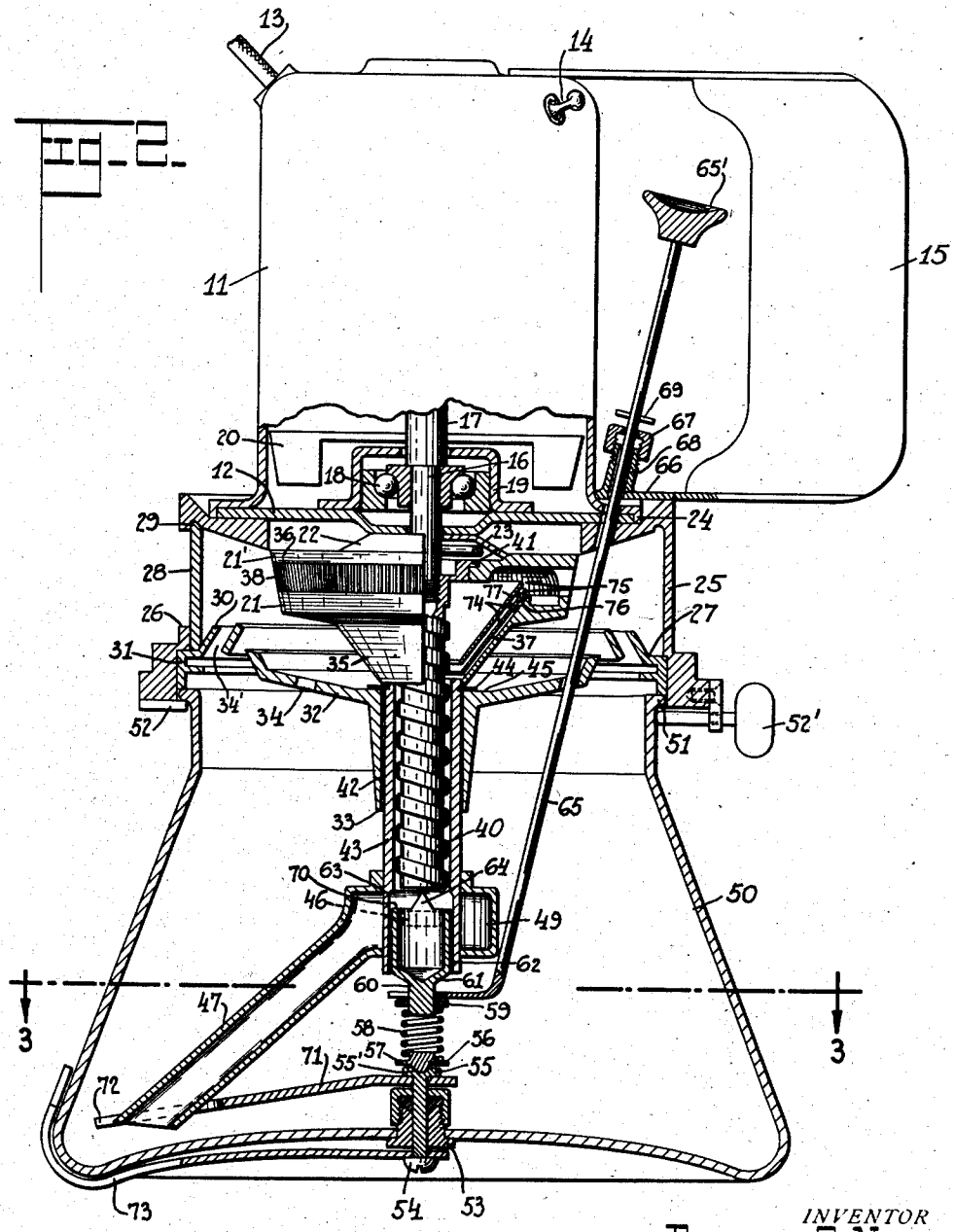
BY Maxwell E. Sparrow
ATTORNEY

July 13, 1937. E. O. NORRIS 2,086,921

SPRAYING DEVICE

Original Filed June 15, 1931 3 Sheets-Sheet 2

Fig. 2.




INVENTOR
EDWARD O. NORRIS.

BY Maxwell E. Sparrow
ATTORNEY

July 13, 1937. E. O. NORRIS 2,086,921

SPRAYING DEVICE

Original Filed June 15, 1931 3 Sheets-Sheet 3

Fig. 4.

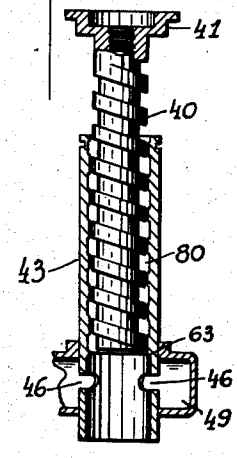



Fig. 5.

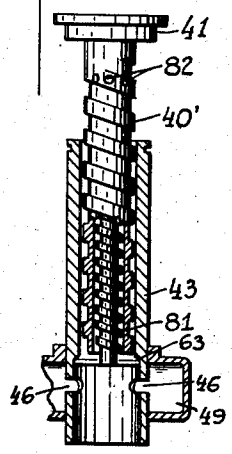
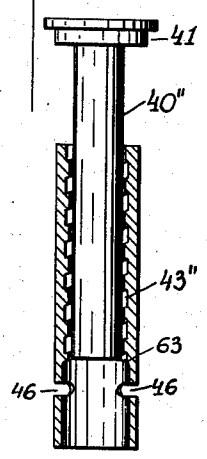



Fig. 6.



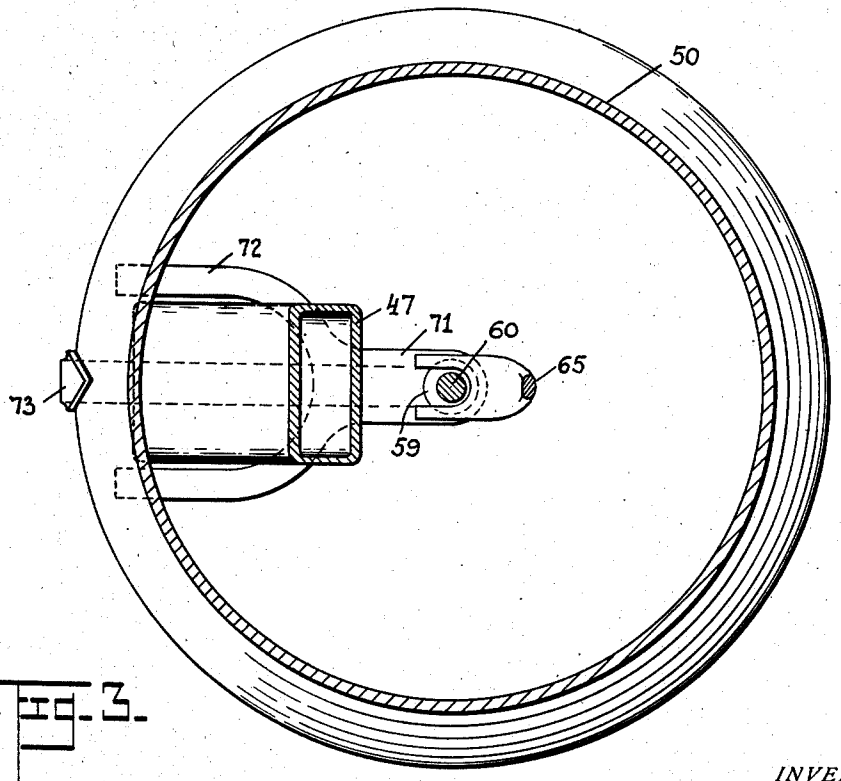




Fig. 3.

INVENTOR
EDWARD O. NORRIS.

BY Maxwell E. Sparrow
ATTORNEY

Patented July 13, 1937 2,086,921

# UNITED STATES PATENT OFFICE

2,086,921

## SPRAYING DEVICE

Edward O. Norris, Port Chester, N. Y., assignor to The Norris Painting Machinery Corporation, Inc., New York, N. Y., a corporation of New York

Application June 15, 1931, Serial No. 544,360
Renewed December 11, 1936

17 Claims. (Cl. 299—63)

This invention relates to spraying devices adapted for spraying paints, lacquers, stains, varnishes, etc., and embodies improvements over the inventions described in my pending applications for United States Letters Patent, identified by Serial Nos. 479,900 and 530,551.

An object of this invention is to provide a portable spraying device having a container and whereby the material within the container is drawn up and fed into a high speed revolving distributor and thrown off therefrom by centrifugal action in a very fine even spray, imparting a smooth, even coat to the object upon which the material is applied.

Another object is to provide improved means for feeding liquid to the centrifugal distributor of a centrifugal spraying device wherein the distributor discharges liquid throughout its entire periphery, but wherein the greater part of discharged liquid is intercepted and recollected.

A further object of the invention is to provide a portable spraying device having a high speed rotatable distributor and a hollow cone, screw conveyor and nozzle associated therewith, and a container, wherein the material from the container is automatically drawn up the nozzle by suction, conveyed by the screw to the cone from which by centrifugal action the material is made to ride the cone and is fed into the distributor from which the material is thrown off therefrom in tangential planes by centrifugal action in a very fine even spray.

A further object of the invention is to provide in a spraying device having a rotatable distributor, automatically feeding means comprising suction, screw propulsion and centrifugal means.

A further object of the invention is to provide in a portable spraying device having a container to hold the material to be sprayed, a rotatable distributor having associated therewith a frustoconical, hollow depending portion, and means to automatically draw the material from the container into the depending portion whereby the material is caused to ride the wall of the depending portion and be fed into the distributor to be delivered from the latter in the form of a fine even spray.

A further object of the invention is to provide a portable spraying device which is simple, economical and rapid in operation, characterized by its ability to deliver the material in a fine atomized spray and which is adapted for use under a varied range of conditions, and which can be used for spraying different materials without requiring any delicate adjustments, the device attaining maximum efficiency at minimum cost.

A further object of the invention is to provide a portable spraying device with a high speed rotatable distributor and with means whereby the material fed into the distributor is broken up and spread uniformly over the entire, inner circumferential wall surface of the distributor.

A further object of the invention is in the provision of a portable spraying device having an encased high speed rotatable distributor and an opening in the casing wall, means to automatically draw the fluid from the container and feed the same in fine sheets into the distributor, means by which part of the fluid is delivered through the casing opening in tangential planes in the form of a spray, the remainder of the fluid being thrown out by centrifugal action within the casing in a swirl and deflected to the bottom of the casing and into the container to be used again.

A further object of the invention is to provide in a spraying device having a rotatable distributor, means to regulate the rate of flow of material into the distributor.

Further objects and advantages of the invention will appear from the following disclosure thereof together with the attached drawings which illustrates a preferred form of embodiment thereof, and in which:

Fig. 1 is a general side view of a form of the invention.

Fig. 2 is a sectional side view of the same.

Fig. 3 is a sectional view of the same taken on line 3—3 of Fig. 2, and looking in the direction of the arrows.

Fig. 4 is a view showing a modified form of part of the distributor-feeding means.

Fig. 5 is a view showing another modified form of the same part of the distributor-feeding means.

Fig. 6 is a view showing a further modified form of the same part of the distributor-feeding means.

In the drawings, the driving means comprises an electric motor (not shown) completely shielded by a housing 11 to which is secured a plate 12. Electrical current is fed to the motor from a source of electrical supply (not shown), by means of the conductors 13, the motor being put in operation by a switch 14. Secured to cover 11 by any suitable means is a handle 15.

The reduced forward end 16 of the motor shaft 17 is supported in a thrust ball-bearing 18 which has its casing 19 secured to the plate 12. A fan 20 is rotatably mounted on the motor shaft 17. A square-threaded spindle 40 is provided with a

shoulder 41 which threadedly engages the reduced extension 16 of the shaft 17. The spindle 40 may be of the single or multiple threaded type. A distributor 21 is provided with a top or cover 21' attached thereto in any suitable manner, the cover 21' being sweated or otherwise secured to the shoulder 41 of the spindle 40. A cup 22 is interposed between the plate 12 and top of the distributor 21, having a string 23 encircling the shaft 16 to prevent any of the fluid material entering the motor.

Secured to the flange 24 of housing 11 by any suitable means is a hollow cylindrical casing body or housing 25 which encircles the distributor 21. The casing body 25 has a wall opening 26 and is provided with a bottom 27 held in position when the device is assembled, in a manner hereinafter described.

The bottom 27 has a depending portion 32 preferably made integral therewith and provided with a centrally disposed bore 33. This bottom is also provided with a plurality of perforations 34 and openings 34' for a purpose hereinafter explained.

The spindle 40 projects through the bore 33 of casing bottom 27 and interposed between the wall 42 and spindle 40 is a sleeve 43 which is rotatably supported inside of the casing bottom 27 by a clamp ring 44 fitting in a groove near the top of the sleeve and resting on the inside wall 45 of the casing bottom 27. The sleeve 43 is provided with elongated openings 46 at its lower end. Sweated or otherwise secured to the sleeve 43 at its lower end is a downwardly-angularly projecting nozzle or throat 47, the openings 46 of the sleeve being within the upper terminal 49 of the nozzle.

A cup or container 50 is provided with outwardly projecting annular rim 51 by which it is supported on the inwardly projecting lugs 52 of the casing or housing 25. A thumb or set screw 52' threadedly engages the housing 25 and projects inwardly under the rim 51 of container 50 and is made to bear against the latter whereby it is rigidly secured to the housing. Securing the container to the housing fixes the positioning of the housing bottom 27 as shown in the drawings.

Projecting through a stuffing box 53 disposed centrally of the bottom of container 50 is a rivet or stud 54 having a flat or upset end 55 provided with an arcuate recess 55'. Seated in the recess is the arcuate end of a stud 56.

The stud 56 is provided with an annular shoulder or flange 57 upon which rests one end of an expansion coil spring 58, the other end of the spring 58 abutting against the shoulder 59 provided on the shank 60 of a plunger 61 which projects within the expanded opening 62 of sleeve 43, a shoulder 63 being formed at the point of expansion. Action of the spring urges the plunger upwardly. The plunger 61 is provided with the pointed lugs 64 formed by continuing the wall of the plunger upwardly, the points normally pressing against the shoulder 63. The plunger 61 normally covers the elongated slots 46 of sleeve 43.

A valve stem 65 has its lower end bifurcated and bent to straddle the shank 60 of plunger 61 above its shoulder 59, the stem 65 passing through the housing bottom 27, housing 25, cover 12, link 66 of handle 15. A perforated cap 67 threadedly engages a perforated stud 68 secured to the link 66 of handle 15, the perforations of the cap and stud being in alinement with the perforation in link 66 whereby to permit the stem 65 to project therethrough. Normally spaced from cap 67 and on stem 65 is provided a pin 69 acting as a stop to limit the downward movement of the plunger stem 65 and plunger valve 61. The degree of depression of the stem 65 and consequently the degree of downward movement of the valve 61 is controlled by the threaded cap 67. It is to be understood that the top of the plunger valve 61 normally extends slightly above the slots 46 which constitute the valve openings so that the active valve opening which is measured by the distance between the top 70 of the plunger and the top edge of the slot may be regulated by the screw cap 67. The stem 65 is provided at its top end with a head 65' to facilitate the operation of the stem.

Secured to the rivet or stud 54 within container 50 and above the stuffing box 53 is a bifurcated lever 71, its bifurcations 72 straddling the nozzle 47 approximate its mouth. An operating lever arm 73 disposed outside container 50 is secured at one of its ends to the stud 54, its other end being curved to conform with the curvature of the bottom edge of the container.

Rotating arm 73 rotates the lever 71 and consequently nozzle 47 secured to the rotatable sleeve.

A circular gate or shutter 28 slidingly engages the housing 25 and the housing bottom 27 whereby to control the size of the opening 26. The gate 28 is guided in a channel 29 in the housing 25 and by the wall 30 of member 31. The distributor 21 preferably comprises an inverted frusto-conically shaped hollow element 35 and a hollow cylindrical element 36. The passage 37 of element 35 is essentially frusto-conical, and the said element 36 is provided with a plurality of circumferentially disposed, equally spaced vertical slots 38 pierced through its wall.

Disposed within the distributor are a plurality of parallelly spaced inverted frusto-conical shells 74, the said shells being stepped as shown at 75 and secured to the distributor wall by rivets 76 or other suitable means, the shells being held in spaced relation through the interposition of the spacers 77.

The operation of the device is as follows:

The fluid to be sprayed is poured or fed into the container 50 by any suitable means and the motor started. The distributor 21 and screw spindle 40 revolve with the motor shaft 17. The valve stem 65 is depressed against the action of spring 58, carrying with it the plunger valve 61. The fluid in the container 50 is drawn or sucked up through the nozzle 47, passes through the slots or valve openings 46 and is conveyed by the screw spindle 40 to the frusto-conical element 35 of the distributor where the fluid is divided or broken up by means of the shells 74, and by virtue of centrifugal action, produced by the fast revolving elements, is made to ride the conical element 35 and shells 74 and is thrown against the inner wall of the distributor from whence it is discharged through the slots 38 thereof. Part of the fluid thrown out by the distributor is emitted through the casing opening in tangential planes in the form of a spray. The remaining fluid impinges against the wall of the casing and in a swirl is deflected to the casing bottom 27, finding its way through the openings 34 and 34' thereof into the container 50.

In the event it is desired to paint floors or ceilings, which necessitates the device being turned, the spout or nozzle 47 is rotated by means

of the lever arm 73 to the required position, it being found preferable to have the mouth of the nozzle facing downwardly with relation to the position the device is held.

The rate of flow of the fluid entering the sleeve is regulated by the cap 67, the plunger valve 61 being moved downwardly a distance equal to the distance between the cap 67 and stop 69. The pointed projections 64 facilitate free movement of the valve.

Figures 4, 5 and 6, show modifications of the screw propulsion means. In Figure 4, the internal surface of the sleeve 43 is rifled as shown at 80. In Figure 5, the screw spindle 40' is hollowed to receive another screw spindle 81, the spindle 81 being secured to the sleeve 43 in any suitable manner. The screw spindle 40' is provided with a plurality of port holes 82 which connect with the hollow thereof so as to afford an outlet into the distributor for the fluid conveyed by the screw spindle 81.

The revolving member as shown in Figure 5, is the screw spindle 40', but it is understood that by making the necessary changes in construction, the sleeve 43 and screw spindle 81 may be made to revolve and the screw spindle 40' made stationary.

Figure 6 shows the spindle 40'' with a smooth surface and the sleeve 43'' rifled or spirally grooved.

As hereinabove described, a high speed rotary pump has been provided which draws the fluid from the container into the distributor at high velocity.

It will thus be seen that there is herein described apparatus in which the several features of this invention are embodied, and which apparatus in its action attains the various objects of the invention and is well suited to meet the requirements of practical use. The term "unvarying flow" as used herein is intended to define a delivery having no material tendency to surge.

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 illustrative and not in a limiting sense.

Reference is made to my copending application Serial No. 569,569, filed October 19, 1931, which is a continuation in part of the present case. Reference is also made to my copending application, Serial No. 647,896, filed December 19, 1932, which is a continuation in part of my above mentioned copending applications Serial No. 479,900, filed September 5, 1930, and Serial No. 530,551, filed April 16, 1931. Reference is also made to my copending application Serial No. 700,307, filed November 29, 1933, which is a continuation in part of my above-mentioned copending application Serial No. 530,551.

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

1. A portable spraying device, comprising a distributor shaft, a centrifugal distributor mounted on said distributor shaft, a member surrounding the major portion of the periphery of the distributor to confine the ejection of liquid to a portion of the periphery of the device, a liquid container forming a part of the device, means to conduct to said container liquid discharged from the distributor but not ejected from the device, and means also forming a part of the device to deliver an unvarying flow of liquid from said container to said distributor, the last-mentioned means comprising rotating impeller means carried on the distributor shaft.

2. A portable spraying device, comprising a centrifugal distributor, a member surrounding the major portion of the periphery of the distributor to confine the ejection of liquid to a portion of the periphery of the device, means extending downwardly from said surrounding member and providing a collection and feeding chamber portable with the device, said downwardly-extending means being arranged to permit the flow of liquid to said chamber regardless of the direction in which the device may be tipped from the vertical, a tube extending into the chamber for conducting liquid therefrom to said distributor, a distributor shaft extending into said tube, and rotating impeller means on said shaft and in said tube for conveying liquid from said chamber to said distributor.

3. A portable spraying device, comprising a centrifugal distributor, a member surrounding the major portion of the periphery of the distributor to confine the ejection of liquid to a portion of the periphery of the device, a liquid container, means to conduct to said container liquid discharged from the distributor but not ejected from the device, and means to deliver an unvarying flow of liquid from said container to said distributor, said delivery means including a screw carried on the distributor shaft.

4. A portable spraying device, comprising a centrifugal distributor, a member surrounding the major portion of the periphery of the distributor to confine the ejection of liquid to a portion of the periphery of the device, a liquid container, means to conduct to said container liquid discharged from the distributor but not ejected from the device, said distributor comprising a frusto-conical member, and a distributor shaft, and rotating impeller means on the distributor shaft for propelling liquid from said container to a point within said frusto-conical member and discharging it against said frusto-conical member.

5. A portable spraying device, comprising a centrifugal distributor, a member surrounding the major portion of the periphery of the distributor to confine the ejection of liquid to a portion of the periphery of the device, a liquid container, means to conduct to said container liquid discharged from the distributor but not ejected from the device, said distributor comprising a frusto-conical member, and delivery means for propelling liquid from said container to a point within said frusto-conical member and discharging it against said frusto-conical member, said delivery means including a screw extending within said frusto-conical member.

6. A portable spraying device, comprising a centrifugal distributor, a member surrounding the major portion of the periphery of the distributor to confine the ejection of liquid to a portion of the periphery of the device, means extending downwardly from said surrounding member and providing a collection and feeding chamber portable with the device, said downwardly-extending means being arranged to permit the flow of liquid to said chamber regardless of the direction in which the device may be tipped from the vertical, a tube extending into the chamber for conducting liquid therefrom to said distributor, means to propel liquid through

said tube, and a nozzle portion extending angularly from said tube into a portion of the chamber wherein liquid may tend to flow when the device is at a given angle to the vertical.

7. A portable spraying device, comprising a centrifugal distributor, a member surrounding the major portion of the periphery of the distributor to confine the ejection of liquid to a portion of the periphery of the device, a liquid container, means to conduct to said container liquid discharged from the distributor but not ejected from the device, a tube extending into the container for conducting liquid therefrom to said distributor, means to propel liquid through said tube, a nozzle portion extending angularly from said tube into a portion of the container wherein liquid may tend to flow when the device is at a given angle to the vertical, and means to adjust said nozzle member to extend into other portions of said container when desired.

8. A portable spraying device, comprising a centrifugal distributor, a member surrounding the major portion of the periphery of the distributor to confine the ejection of liquid to a portion of the periphery of the device, means extending downwardly from said surrounding member and providing a collection and feeding chamber portable with the device, said downwardly-extending means being arranged to permit the flow of liquid to said chamber regardless of the direction in which the device may be tipped from the vertical, a tube extending into the chamber for conducting liquid therefrom to said distributor, means to propel liquid through said tube, and valve means disposed interiorly of the device to control the flow of liquid through said tube.

9. A spray coating device comprising a centrifugal distributor, a member surrounding the major portion of the distributor to confine the ejection of liquid to a portion of the periphery of the device, means providing a liquid chamber beneath said distributor, means to conduct to said chamber liquid discharged from the distributor but not ejected from the device, a tube extending downwardly from within the distributor into said chamber for conducting liquid therefrom directly to the distributor, and means within said tube for feeding liquid therethrough.

10. A spraying device comprising a centrifugal distributor, a casing formed with an ejection opening at one side of the device along a sector of the distributor and arranged to intercept liquid discharged in all directions except toward said opening, a container arranged for the reception of non-ejected liquid, a distributor shaft, and means to feed liquid from said container to the interior of the distributor, said feeding means including rotating impeller means carried on said distributor shaft.

11. A spraying device comprising a centrifugal distributor, a casing formed with an ejection opening at one side of the device along a sector of the distributor and arranged to intercept liquid discharged in all directions except toward said opening, a container arranged for the reception of non-ejected liquid, a feed tube extending from within said container to said distributor, a distributor shaft extending within said feed tube, and rotating impeller means carried on said shaft within said tube.

12. A spraying device comprising a centrifugal distributor, a casing formed with an ejection opening at one side of the device along a sector of the distributor and arranged to intercept liquid discharged in all directions except toward said opening, a container arranged for the reception of non-ejected liquid, a feed tube extending from within said container to said distributor, a distributor shaft extending within said feed tube, rotating impeller means carried on said shaft within said tube, and means to control the flow of liquid through said tube under the influence of said rotating means.

13. A spraying device comprising a centrifugal distributor, a casing formed with an ejection opening at one side of the device along a sector of the distributor and arranged to intercept liquid discharged in all directions except toward said opening, a container arranged for the reception of non-ejected liquid, a feed tube extending from within said container to said distributor, a distributor shaft extending within said feed tube, and rotating impeller means carried on said shaft within said tube, said rotating impeller means having a material clearance with the interior of said tube.

14. A spraying device comprising a centrifugal distributor, a casing formed with an ejection opening at one side of the device along a sector of the distributor and arranged to intercept liquid discharged in all directions except toward said opening, a container arranged for the reception of non-ejected liquid, a distributor shaft, and means to feed liquid directly from said container to the interior of the distributor, said feeding means including rotating impeller means carried on said distributor shaft.

15. A spraying device comprising a centrifugal distributor, a casing formed with an ejection opening at one side of the device along a sector of the distributor and arranged to intercept liquid discharged in all directions except toward said opening, a liquid supply reservoir removably mounted on said device to permit re-filling, means for the reception of non-ejected liquid in association with supply liquid for re-feeding therewith, a distributor shaft, and rotating impeller means mounted on the distributor shaft for feeding the liquid to the distributor.

16. A spraying device comprising a centrifugal distributor, a casing formed with an ejection opening at one side of the device along a sector of the distributor and arranged to intercept liquid discharged in all directions except toward said opening, a liquid supply reservoir removably mounted on said device to permit refilling, and means for the reception of non-ejected liquid in association with supply liquid for re-feeding therewith.

17. In a spraying device, a centrifugal distributor, means partly surrounding said distributor, means for collecting and redelivering liquid discharged against said surrounding means, means for supplying additional liquid to said distributor along with the redelivered liquid, means to control said redelivery means and said supply means, and an actuator member for said control means.

EDWARD O. NORRIS.