

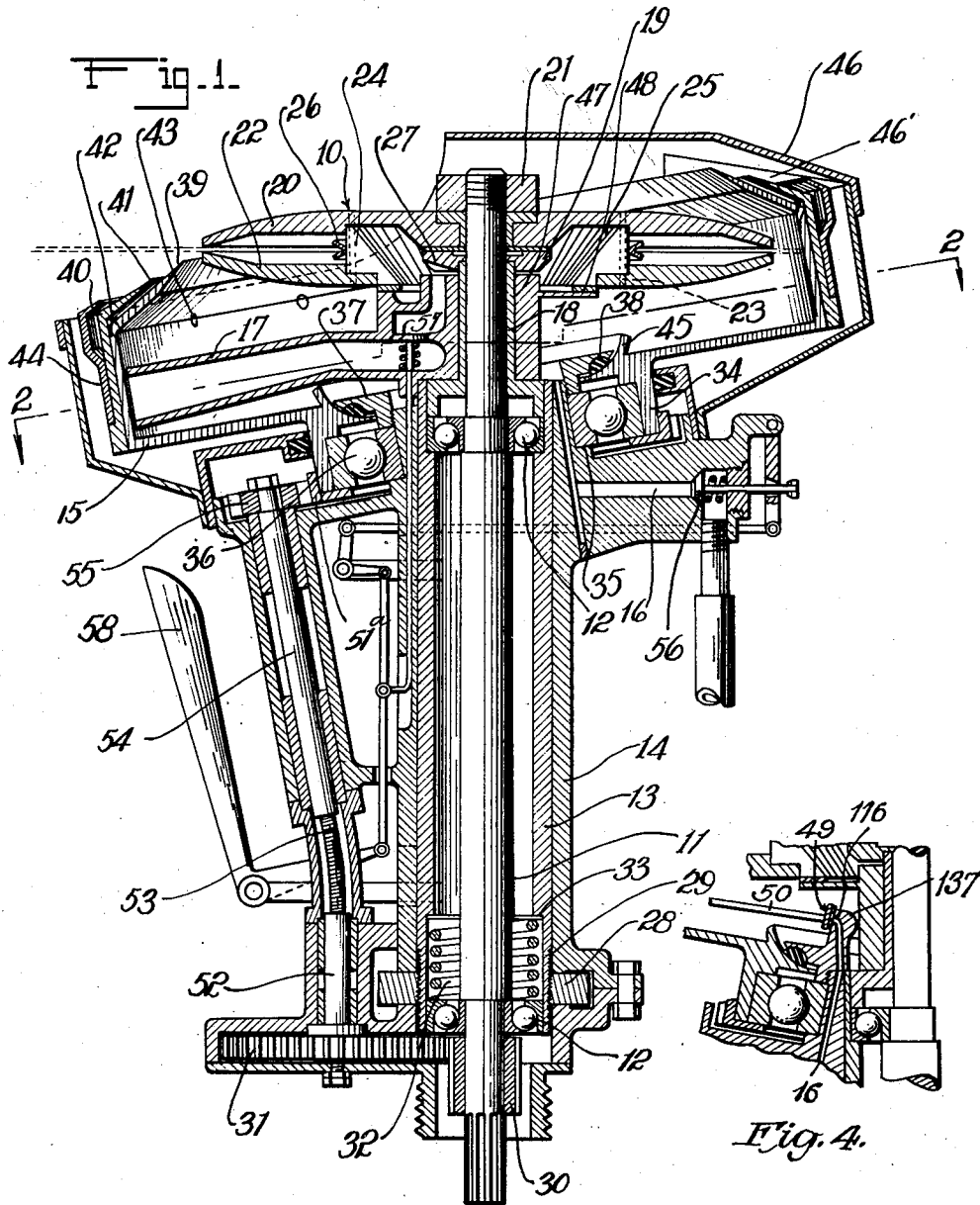
Dec. 8, 1936.

E. O. NORRIS

2,063,048

SPRAYING DEVICE

Original Filed May 7, 1932 2 Sheets-Sheet 1



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Fig. 3.

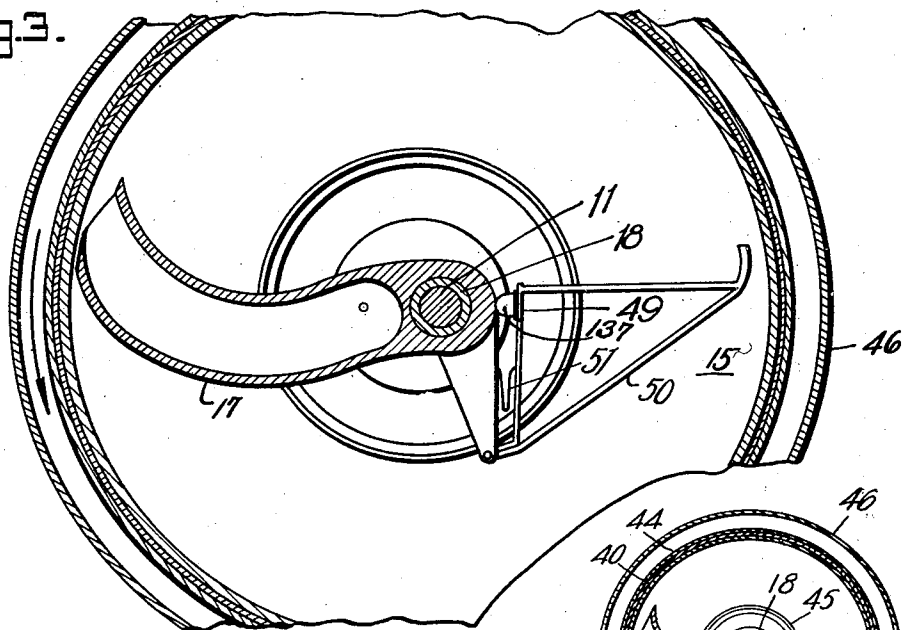


Fig. 5.

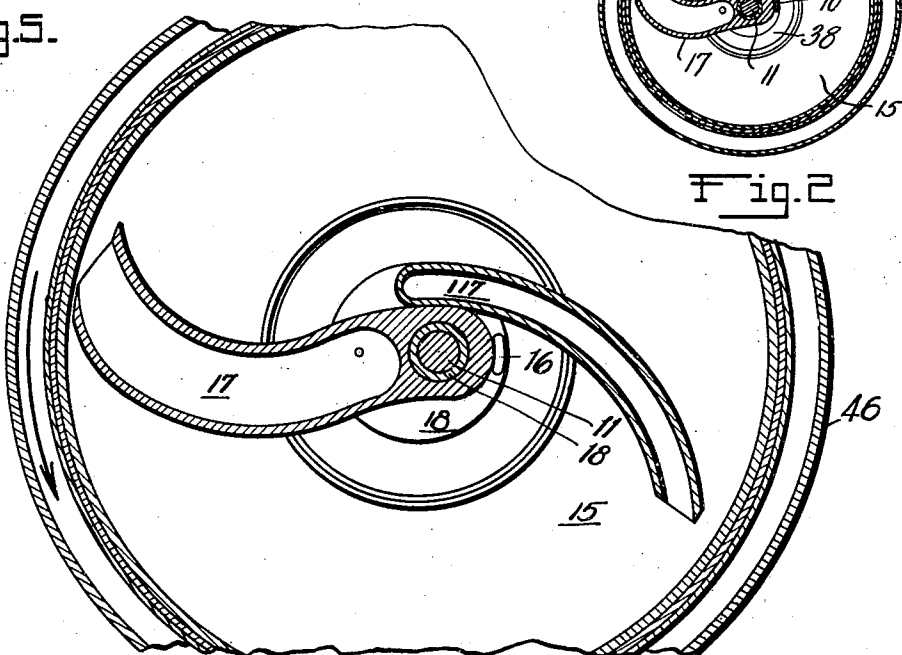
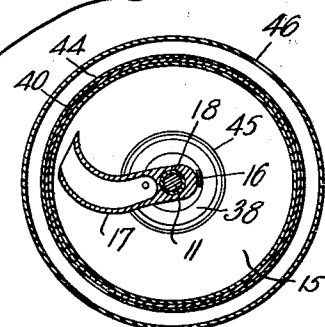


Fig. 2



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SPRAYING DEVICE

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48 Claims. (Cl. 299—63)

This invention relates to spraying devices and more specifically to centrifugal sprayers.

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

Another object of the invention is to provide a centrifugal sprayer which may be operated from any position and against any object.

Another object is to provide a centrifugal sprayer which will retain the spray which flies off in non-useful directions no matter what the orientation of the sprayer itself is.

Another object is to provide a device for spraying in a defined band by projecting material from between rotating plates, the edges of which are bent toward each other.

Another object is to provide a device for uniformly atomizing spray by splashing material off from whirling grooves, through rotating slots, and past diverting planes.

Another object is to provide a centrifugal sprayer whereby the width of a band of sprayed material may be governed by sliding a distributor in or out of a container which partially encloses the distributor. Another object is to provide a continuously operating sprayer by driving such a slidable distributor and a rotatable container simultaneously from a single source and independently of the position of the distributor.

Another object is to provide a centrifugal sprayer wherein the material is supplied to the distributor by means of pressure arising from the kinetic energy of rotation of the reservoir. Another object is to provide a centrifugal sprayer which conserves the material distributed in non-useful directions by catching it in such an aforesaid reservoir and immediately redistributing it.

Another object is to provide a centrifugal sprayer wherein the portion sprayed in non-useful directions is caught and centrifugally held in rotating means which partially surround the centrifugal distributor. Another object is to provide a centrifugal sprayer wherein the aforesaid means rotates about an axis which is at an angle with the axis of the distributor.

Another object is to provide a centrifugal sprayer which automatically drives off old material before a new operation is begun.

Another object is to provide a centrifugal sprayer which controls the quantity sprayed by shutting off the main source from the immediate

rotating reservoir when the material thrown against the outer wall of said reservoir becomes deep enough radially to strike and move a valve lever.

Another object is to provide a spraying device which may receive material in pulsations from a source but which delivers material continuously and without pulsation.

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

The invention accordingly comprises the features of construction, combination of elements, and arrangement of parts, which will be exemplified in the construction hereinafter set forth and the scope of the application of which will be indicated in the claims.

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, in which:

Fig. 1 is a cross section of a device constructed in accordance with the invention;

Fig. 2 is a cross section of the device shown in Fig. 1, taken along the lines 2—2, and on a reduced scale;

Fig. 3 is a similar view on the same scale as Fig. 1 showing a modified form of inlet;

Fig. 4 is a fragmentary transverse sectional view through the center of the device shown in Fig. 3, looking toward the bottom of Fig. 3; and

Fig. 5 is a sectional view similar to Fig. 3 showing an additional modification of the device shown in Figs. 1 and 2.

In centrifugal spraying devices there must be some means for collecting the excess spray which comes off in directions in which no spray is needed. In spraying a wall the material which is shot off in other directions than toward the wall, must not be allowed to be wasted or to damage other objects. In some cases a fixed hood partially encircling the rotating head may be helpful but when the entire device is turned into other positions there are inherent difficulties. The hood may fill up and flood the head or the opening of the hood may be so placed that material intercepted immediately falls out onto the floor.

The herein described invention has a rotating cup which catches the excess spray and retains it by centrifugal action in whatever position the device may be held. The inner surface of the cup is so arranged that once spray is therein, it will be led away from the mouth of the cup by the whirling motion. The cup is set at an angle with

the plane of the distributor and is positioned to intercept a portion of the spray. It is movable so as to interrupt varying amounts of spray by cutting down the angular extent of the unintercepted spray. Grooving on the outer edge of the cup tip catches spray deposited there and returns it by centrifugal action to the interior of the cup. Pick-up mechanisms take advantage of the kinetic energy of the rotating material in the cup to return the material to the distributor again. Fresh material is introduced into the cup and is similarly carried into the distributor. A valve may control this introduction. It may be opened by the centrifugal action of the material when the cup has a certain minimum quantity of material therein. Certain novel features within the distributor for producing a firm even spray and certain novel mechanical arrangements for simultaneously operating the different parts will be hereinafter explained.

Referring now to the embodiment of the invention shown in the drawings, 10 denotes generally a rotatable distributor suitably supported. It may be fixed to a main shaft 11, which rotates on anti-thrust bearings 12 within the non-rotating inner sleeve 13. A fixed outer sleeve 14 surrounds the inner sleeve and may serve as the means which carries a cup 15, which is rotatable thereon in a plane at an angle with the distributor 10. The cup is larger than the distributor and the latter extends into the chamber provided by the former. An independent power train leads from the shaft to the cup. Fresh material is supplied to the distributor preferably by way of the cup. A passage 16 therefor may lead from the exterior of the device to the interior of the cup. Means in the cup transport the fresh and the excess material to the distributor. Such means may comprise the helical conduit 17 from the outer part of the cup chamber to the interior of the distributor and fixed to the non-rotating inner sleeve.

Although the invention contemplates the provision of any of a variety of forms of centrifugal liquid distributors, in a spray coating device embodying the invention, the following is a preferred form: A bushing 18 for the main shaft 11 is fixedly countersunk into an end of the inner sleeve 13. On the other end of this bushing an annular splasher 19 is fixed extending radially from the shaft 11. A disk 20 is held against the splasher by a nut 21. A second coaxial disk 22 is suitably spaced from the first disk as by bolts 23. The interior faces of the disks may approach each other near the periphery, as shown. Supported between the disks there may be atomizing means such as the annular ring 24 which has passages therethrough, for example, the slots 25 which may have radial and axial components. There may be means, preferably of a radius greater than the ring, for directing material against the inner disk faces. The surfaces of an annular member 26 attached to the periphery of the ring 24 extend toward both of said faces and serve this purpose. Material may be brought into the distributor in any desired manner. An annular opening in the disk 22 permits the fixed conduit 17 to lead into the distributor and discharge against the splasher 19, which may have a grooving 27. This grooving may have any conformation, but preferably has a radial component and grows deeper as the radius increases. There may be several grooves.

Means are provided for moving the distributor in and out of the cup 15, which is rotatably fixed on the outer sleeve 14. The inner sleeve 13 which

carries the main shaft 11 and the distributor thereon may be longitudinally slidable within the outer sleeve. This may be accomplished by a manually-operated nut 28 rotatably fixed in the outer sleeve which coacts with threads 29 on the inner sleeve whereby the latter is given a relative motion. A pinion 30 fixed on the main shaft is axially long enough to mesh for all shaft positions with the pinion 31 in the power train leading to the rotatable cup. There may be within the inner sleeve, a thrust-bearing take-up spring 32 lying between an interior shoulder 33 on the inner sleeve 13 and the thrust bearing 12.

The fixed outer sleeve 14 supports the rotatable cup in any desired way. As shown, the cup has an annular hub 34 riding on antifriction bearings 36 which are supported by a shoulder 35 on said sleeve, the plane of said shoulder being at an angle with the plane of the distributor 10. The main shaft 11 extends through the part of the cup called the bottom, although due to the position of the entire device it may be uppermost. An annular member 37 coaxial with the cup and fixed to the outer sleeve, extends between the latter and the bottom of the former as a packing. There may be further packing 38 between the member 37 and the cup. The annular cup lip 39 extends from the cup wall 40 toward the cup axis with the result that when material from the distributor at any time reaches any part of the lip, there is a centrifugal component tending to lead the material toward the interior of the cup.

An annular groove 41 in the exterior of the lip of the cup extends farther from the cup axis as it becomes deeper, and a plurality of passages 42 lead from it to openings 43 in the cup chamber. The entrance to the groove is at a less distance from the center of the cup than are the passages. Any material caught on the outer lip passes by centrifugal force farther into the groove but material within the cup cannot be thrown out as the outer end of the groove has a smaller rotating axis. An outer removable flange 44 may be attached about the cup wall to provide a temporary chamber between itself and the cup to catch material deposited around the top of the cup when it is held in upright position. An annular ring 45, integral with or attached to the bottom of the cup chamber, may assist in throwing freely-introduced material against the walls of the cup. A guarding shield or casing 46 associated with the fixed sleeve 14 may surround the greater portion of the sides and top of the cup except in the direction in which spray is actually being delivered. Attached to shield 46 there may also be a scraping element 46' adapted to catch any splashed material and divert it into the cup 15.

Suitable means within the cup for conducting the material to the distributor may take the form of a helical fixed conduit 17 having a sleeve 47 surrounding the fixed bushing 18 on the main shaft and extending from the outer part of the cup chamber through the annular opening in the distributor disk 22 and into the distributor. It may be provided with a flange 48 for covering the remainder of the opening. As shown in Fig. 5, there may be a second fixed helical conduit 117 attached to the fixed bushing 18 and leading into the distributor. This conduit 117 does not extend radially as far as conduit 17. If for any reason there is an excess of material in the cup, such that conduit 17 cannot accommodate all of it, it will build up inwardly from the outer

wall of the cup chamber and will flow into the conduit 117 and be delivered to the distributor.

The passage 16 in the fixed sleeve 14 may lead directly into the base of the cup, as shown in Figs. 1 and 2, or may lead through a casting 137 to a valve 49 within the cup 15 (see Fig. 3). A pivoted lever 50 which carries the valve 49 (shown in closed position), may be held, as by the spring 51, so as to maintain the valve in open position normally. The lever 50 may extend radially a certain distance so that when the layer of liquid held against the side wall of the cup 15 by the centrifugal action of the cup has attained a given thickness it will press against the outer end of the lever 50 sufficiently to counteract the pressure of the spring 51 and urge the valve toward the outlet 116 of the passageway 16. When an excess of the material thrown against the outer wall of the cup chamber crowds in toward the axis of the cup, it will rotatively brush against the lever and move it, whereby the valve is operated and less material is admitted to the cup.

The cup may be rotated at a different speed than the distributor. It may be supplied with energy independently or from the main shaft 11 which actuates the distributor. In the latter case it may be desirable to use a reduction gear train. Preferably such a train has housing attached to or integral with the fixed sleeve 14 and extends from the pinion 30 on the main shaft to a ring gear 51a on the rotatable cup. The train preferably comprises in turn a pinion 31 meshing with pinion 30, a stub shaft 52, a flexible shaft 53, another stub shaft 54, and a pinion 55 thereon and meshing with said ring gear 51a. Power may be transferred from the main shaft to the rotatable cup by means of bevel gearing.

Lever mechanism may be provided on the fixed sleeve 14 around the main shaft 11 for opening poppet valves 57 and 56 in the conduit 17 and the passage 16 respectively. It may be so arranged that the former opens before the latter as the bell crank trigger 58 is progressively moved, there being a slight play in the levers leading to the latter. These valves close in the reverse order so that any final amount of material left in the cup will be thrown off after the fresh supply is shut off. The device in this way cleans itself.

The operation of the device is as follows: The main shaft 11 is actuated by being connected to a source of power. It rotates within the inner sleeve 13 and turns the distributor 10 attached to its end. The fixed sleeve and trigger 58 are gripped in the hand of the operator and the latter moved at will. The shaft 11 simultaneously turns the rotatable cup, the speed of which is relatively slower, due to the reduction gearing. A preferred speed of the distributor is 22000 R. P. M. with a cup R. P. M. of 1000. Material flies off the distributor, one portion escaping past the rim of the cup and hitting the object to be sprayed. The remainder which is intercepted by the cup rim is thrown centrifugally into the larger part of the cup chamber. There it is whirled into the open end of the conduit 17 and the kinetic energy of the material carries it through the conduit and into the distributor again. In the meantime more fresh material is entering the cup through the valves 56-49 and is similarly carried to the distributor. Should it be desired to have a broader band of material available the inner sleeve 13, the shaft, the bushing 18, conduit 17, and the distributor are all

moved axially by manipulating the nut 28 so that the inner sleeve slides along the outer sleeve. The distributor then will have a greater portion of its periphery extending outside the cup with a resultant broader angular extent of spray. It is obvious that the entire device may be portable and that no matter at what angle it is held, the excess spray is not only caught but retained by the spinning cup.

The device operates quietly and efficiently. It has the decided advantage of being able to receive material from pump and to distribute it without there being any fluctuations in the quantity of the delivered material, although it comes from the pump to device in a rhythmically variable amount. The rotation set up in the cup irons out all such rippling.

Since certain changes may be made in the above composition of matter and different embodiments of the invention could be made without departing from its scope, it is intended that all matter contained in the above description shall be interpreted as illustrative and not in a limiting sense.

It is also to be understood that the following claims are intended to cover all of the generic and specific features of the invention herein described, and all statements of the scope of the invention which, as a matter of language, might be said to fall therebetween.

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

1. In a device of the character described, the combination comprising centrifugal distributing means, and rotatable means having a centrifugal collecting action adapted for receiving and retaining a predetermined portion of the material distributed, irrespective of the position of the device with respect to the horizontal.

2. In a device of the character described, the combination comprising centrifugal distributing means having an axis which may be positioned in any plane, and means adapted for receiving and retaining a portion of the material distributed to prevent ejection except from a given portion of the periphery of the device, the relative positions of the distributing means and the receiving means being adjustable axially to vary the extent of the ejected spray.

3. In a device of the character described, the combination comprising two distributing disks rotatable about an axis and a cup rotatable about another axis and adapted to receive material from said disks, the rim of said cup being bent toward said second axis, and means projecting into the path of said material in said cup and adapted to lead said material to said disks.

4. In a device of the character described, the combination comprising rotatable means having a wall and providing a chamber and an opening thereinto, the periphery of said opening extending toward the axis of rotation, an annular groove extending into said wall outside said periphery and leading away from the axis of rotation and perforations leading from said groove into said chamber whereby material deposited on the outer edge of said means is conducted into said means.

5. In a device of the character described, the combination comprising centrifugal distributing means, rotatable means adapted for receiving material thereinto from said distributing means, and means external of said rotatable receiving means for receiving material received by the outside of said rotatable receiving means, and means

for conducting into said rotatable receiving means material received by said external means.

6. In a device of the character described, the combination comprising a centrifugal distributor, a rotatable cup adapted for receiving a portion of the material distributed, having a wall and providing a chamber and an opening thereinto, the periphery of said opening extending toward the axis of rotation, an annular groove extending into said wall outside said periphery and leading away from the axis of rotation and perforations leading from said groove into said chamber whereby material deposited on the outer edge of said cup is conducted into said cup.

7. In a device of the character described, the combination comprising a casing provided with an aperture, centrifugal distributing means, and rotatable means adapted for receiving a portion of the material distributed and positioned within said casing, said distributing means extending into said rotatable means and adapted for ejecting through said aperture the remainder of the material discharged therefrom, said casing including a cover member extending from the side thereof opposite the ejection side at least to a point substantially in line with the axis of the distributor to prevent access to the rotating parts at the side of the device opposite the ejection side.

8. In a device of the character described, the combination comprising rotatable distributing means provided with slots having radial and axial components and an inner sloping surface, and rotatable deflecting means within the orbit of said distributing means and provided with grooving, the depth of said grooving increasing with the radius and in the axial direction in which said surface slopes back from the axis of rotation.

9. In a device of the character described, the combination comprising centrifugal means adapted for distributing in a predetermined plane, means rotatable in another plane and adapted for retaining material and for giving said material angular momentum, and a fixed guide projecting into the path of said material and leading to said centrifugal means.

10. In a device of the character described, the combination comprising centrifugal means adapted for distributing in a predetermined plane, means rotatable in another plane and adapted for retaining material, and adapted for giving said material angular momentum, and a fixed helical guide projecting into the path of said material, and leading to said centrifugal means.

11. In a device of the character described, the combination comprising two distributing disks rotatable about an axis, a cup rotatable about another axis and adapted to receive material, and a fixed tube projecting into the path of said material in said cup and adapted to lead said material to said disks.

12. In a device of the character described, the combination comprising two distributing disks rotatable about an axis, a cup rotatable about another axis and adapted to receive material from said disks, and a fixed tube projecting into the path of said material in said cup and adapted to lead said material to said disks.

13. In a device of the character described the combination comprising rotatable means adapted for containing material, means adapted for introducing material into said rotating means, and means adapted for being operated by a given quantity of rotating material and for controlling said introducing means.

14. In a device of the character described the combination comprising a rotatable cup adapted for throwing material against the outer wall thereof, a conduit for leading material into said cup, a valve associated with said conduit, and a hinged arm extending toward the wall of said cup, adapted to be moved by said material when said material attains a predetermined inner radius and adapted to shut said valve.

15. In a device of the character described, the combination comprising a rotatable cup, adapted for throwing material against the outer wall thereof, a conduit for leading material into said cup, a valve associated with said conduit, and a hinged arm extending toward the wall of said cup, adapted to be moved by said material when said material attains a predetermined inner radius and adapted to shut said valve, and means for holding said arm normally so that said valve is open.

16. In a device of the character described, the combination comprising two distributing disks rotatable about an axis, a cup rotatable about another axis and adapted to receive material from said disks, said material assuming an annular shape upon rotation, a fixed tube projecting into the path of said material in said cup, and adapted to lead said material to said disks, a conduit for leading material into said cup, a valve associated with said conduit, and a hinged arm extending toward the wall of said cup, adapted to be moved by said material when it attains a predetermined inner radius and adapted to shut said valve.

17. In a device of the character described, the combination comprising distributing means, rotatable means adapted for receiving material from said distributing means, means adapted for conducting material from said rotating means to said distributing means, means adapted for controlling the passage of said material in said conducting means, means adapted for introducing new material into said rotating means, means adapted for controlling the passage of said new material in said introducing means, means adapted for operating said first-mentioned controlling means, and means adapted for operating said second-mentioned controlling means.

18. In a device of the character described, the combination comprising distributing means, rotatable means adapted for receiving material from said distributing means, means adapted for conducting material from said rotating means to said distributing means, means adapted for controlling the passage of said material in said conducting means, means adapted for introducing new material into said rotating means, means adapted for controlling the passage of said new material in said introducing means, and means adapted for operating said first mentioned controlling means before said second mentioned controlling means.

19. In a device of the character described, the combination comprising two distributing disks rotatable about an axis, a cup rotatable about another axis and adapted to receive material from said disks, a fixed tube projecting into the path of said material in said cup and adapted to lead said material to said disks, a source of fresh material, a pipe leading from said source into said cup, a valve controlling said tube, a second valve controlling said pipe, and a lever mechanism for operating said first valve, and a lever mechanism for operating said second valve.

20. In a device of the character described, the combination comprising two distributing disks rotatable about an axis, a cup rotatable about an-

other axis and adapted to receive material from said disks, a fixed tube projecting into the path of said material in said cup and adapted to lead said material to said disks, a source of fresh material, a pipe leading from said source into said cup, a valve controlling said tube, a second valve controlling said pipe, and a lever mechanism for operating said first valve before said second valve.

21. In a device of the character described, the combination comprising centrifugal distributing means having an axis, rotatable means adapted for retaining a portion of the material distributed and having a second axis, means for shifting one of said means longitudinally of one of said axes, and means for simultaneously driving said distributing and said rotatable means.

22. In a device of the character described, the combination comprising centrifugal distributing means having an axis, rotatable means adapted for retaining a portion of the material distributed and having a second axis, means for shifting said distributing means longitudinally of its axis and means for simultaneously driving said distributing and said rotatable means.

23. In a device of the character described, the combination comprising an outer housing, an inner housing slidable therein, a main shaft rotatable in said inner housing, distributing means fixed to said main shaft, a pinion fixed to said main shaft, a second shaft at an angle with said main shaft, a gear, a stub shaft, and a flexible shaft connecting said second shaft and said pinion, said pinion meshing with said gear for various positions of said main shaft, a ring gear rotatable on said outer housing having an axis at an angle with said main shaft, gearing connecting said second shaft and said ring gear and means attached to said ring gear and adapted for receiving a portion of the material distributed from said distributing means.

24. In a centrifugal spraying device, in combination, a centrifugal distributor, a receiving member which has a periphery disposed in a plane at an angle to the plane of rotation of the distributor and intersecting the field of discharge therefrom to confine the ejection of liquid to a portion of the periphery of the device, and means within the receiving member to return the received liquid interiorly of the distributor without conducting it outside of the receiving member.

25. In a centrifugal spraying device, in combination, a centrifugal distributor, a receiving member which has a periphery disposed in a plane at an angle to the plane of rotation of the distributor and intersecting the field of discharge therefrom to confine the ejection of liquid to a portion of the periphery of the device, and means for adjusting the relative positions of the distributor and the receiving member to vary the extent of the ejected spray.

26. In a centrifugal spraying device, in combination, a centrifugal distributor, and a receiving member rotatable on an axis at an angle with the axis of the distributor, the periphery of said receiving member intersecting the field of discharge from the distributor to confine the ejection of liquid to a portion of the periphery of the device, and the receiving member being spaced from the distributor and having an interior surface extending outwardly from said periphery to permit the receiving member to collect the liquid discharged thereagainst and to hold it externally under the influence of centrifugal action resulting from the rotation of the receiving member,

27. In a centrifugal spraying device, in combination, a centrifugal distributor, a receiving member rotatable on an axis at an angle with the axis of the distributor, the periphery of said receiving member intersecting the field of discharge from the distributor to confine the ejection of liquid to a portion of the periphery of the device, said receiving element being spaced from the periphery of the distributor throughout the major portion of its extent to permit free passage of liquid transversely of the periphery of the distributor, and means to redeliver the received liquid interiorly of the distributor, the interior of said receiving member extending outwardly from said periphery.

28. In a centrifugal spraying device, in combination, a centrifugal distributor, and a receiving member rotatable on an axis at an angle with the axis of the distributor, the periphery of said receiving member intersecting the field of discharge from the distributor to confine the ejection of liquid to a portion of the periphery of the device, said receiving member having a sloping inner surface adjacent its periphery.

29. In a centrifugal spraying device, in combination, a centrifugal distributor, and a receiving member rotatable on an axis at an angle with the axis of the distributor, the periphery of said receiving member intersecting the field of discharge from the distributor to confine the ejection of liquid to a portion of the periphery of the device, said receiving member having an inwardly extending rim terminating at said periphery.

30. In a centrifugal spraying device, in combination, a centrifugal distributor, and a receiving member rotatable on an axis at an angle with the axis of the distributor, the periphery of said receiving member intersecting the field of discharge from the distributor to confine the ejection of liquid to a portion of the periphery of the device, the periphery of the receiving member extending into proximity with the periphery of the distributor at the points of intersection with the field of discharge, and having a cutting edge at its periphery.

31. In a centrifugal spraying device, in combination, a centrifugal distributor, a receiving member rotatable on an axis at an angle with the axis of the distributor, the periphery of said receiving member intersecting the field of discharge from the distributor to confine the ejection of liquid to a portion of the periphery of the device, and means for adjusting the relative positions of the distributor and the receiving member to vary the extent of the ejected spray.

32. In a centrifugal spraying device, in combination, a centrifugal distributor, a receiving member rotatable on an axis at an angle with the axis of the distributor, the periphery of said receiving member intersecting the field of discharge from the distributor to confine the ejection of liquid to a portion of the periphery of the device, said receiving member being spaced from the periphery of the distributor throughout the major portion of its extent to permit free passage of liquid transversely of the periphery of the distributor, and said receiving element having an inwardly extending rim terminating at said periphery and being formed with a cutting edge at said periphery, and means to redeliver the received liquid interiorly of the distributor.

33. In a centrifugal spraying device, in combination, a centrifugal distributor, a rotary collecting member having a periphery at an angle to

the plane of rotation of the distributor and intersecting the field of discharge therefrom to confine the ejection of liquid to a portion of the periphery of the device, said collecting member being arranged to collect the received liquid for redelivery interiorly of the distributor, and means within the collecting member to return the collected liquid interiorly of the distributor without conducting it outside the collecting member.

34. In a centrifugal spraying device, in combination, a centrifugal distributor, and a rotary collecting member having an inwardly extending flange the periphery of which is at an angle to the plane of rotation of the distributor and intersects the field of discharge therefrom to confine the ejected liquid to a portion of the periphery of the device, said collecting member being arranged to collect the received liquid for redelivery interiorly of the distributor.

35. In a centrifugal spraying device, in combination, a centrifugal distributor, and a rotary collecting member having an inwardly extending flange the periphery of which is at an angle to the plane of rotation of the distributor and intersects the field of discharge therefrom to confine the ejected liquid to a portion of the periphery of the device, said collecting member being arranged to collect the received liquid for redelivery interiorly of the distributor, said flange extending into proximity with the periphery of the distributor at the points of intersection with the field of discharge.

36. In a centrifugal spraying device, in combination, a centrifugal distributor, a rotary collecting member having a periphery at an angle to the plane of rotation of the distributor and intersecting the field of discharge therefrom to confine the ejection of liquid to a portion of the periphery of the device, said collecting member being arranged to collect the received liquid for redelivery interiorly of the distributor, and redelivery means extending to the outside of said collecting member where the liquid is built up by centrifugal action due to the rotation thereof, so as to act as a scoop.

37. In a centrifugal spraying device, in combination, a centrifugal distributor, a rotary collecting member having a periphery at an angle to the plane of rotation of the distributor and intersecting the field of discharge therefrom to confine the ejection of liquid to a portion of the periphery of the device, said collecting member being arranged to collect the received liquid for redelivery interiorly of the distributor, and means to rotate the distributor at a high speed and the collecting member at a lesser speed.

38. In a centrifugal spraying device, in combination, a centrifugal distributor, a cup having a periphery at an angle to the plane of rotation of the distributor and intersecting the field of discharge therefrom to confine the ejection of liquid to a portion of the periphery of the device, said cup being arranged to collect the liquid discharged thereagainst for re-delivery interiorly of the distributor, and means within the cup to return the collected liquid interiorly of the distributor without conducting it outside of the cup.

39. In a centrifugal spraying device, in combination, a centrifugal distributor, a cup having a periphery at an angle to the plane of rotation of the distributor and intersecting the field of discharge therefrom to confine the ejection of liquid to a portion of the periphery of the device, said cup being arranged to collect the liquid discharged thereagainst for redelivery interiorly of

the distributor, and redelivery means, said redelivery means and said cup being relatively rotatable.

40. In a centrifugal spraying device, in combination, a centrifugal distributor, a cup having an inwardly extending flange the periphery of which is at an angle to the plane of rotation of the distributor and intersects the field of discharge therefrom to confine the ejected liquid to a portion of the periphery of the device, said cup being arranged to collect the liquid discharged thereagainst for redelivery interiorly of the distributor.

41. In a centrifugal spraying device, in combination, a centrifugal distributor comprising a pair of spaced members having inner surfaces which converge toward their periphery, means to supply liquid to the interior of said distributor, centrifugal means within said distributor for forming a generally circular spray within the same, and means for causing the spray to be distributed on each of said surfaces.

42. In a centrifugal spraying device, in combination, a centrifugal distributor comprising a pair of spaced members having inner surfaces which converge toward their periphery, means to supply liquid to the interior of said distributor, centrifugal means within said distributor for forming a generally circular spray within the same, and means comprising a plurality of generally transverse fins having sloping inner surfaces for causing the liquid to be distributed onto each of said converging surfaces.

43. In a centrifugal spraying device, in combination, a centrifugal distributor comprising a pair of spaced members having inner surfaces which converge toward their periphery, means to centrifugally discharge a supply of liquid at the interior of the distributor, and means providing an annular surface disposed at an angle to the radius of the distributor for assuring that liquid is distributed on each of said converging surfaces.

44. In a centrifugal spraying device, in combination, a centrifugal distributor comprising a pair of spaced members having inner surfaces which converge toward their periphery, means to supply liquid to the interior of said distributor, centrifugal means within said distributor for forming a generally circular spray within the same, and means comprising a pair of diverging annular surfaces in the path of the discharged liquid for assuring that the liquid is distributed on each of said converging surfaces.

45. In a centrifugal spraying device, in combination, a centrifugal distributor comprising a pair of spaced members having inner surfaces which converge toward their periphery, means to supply liquid to the interior of the distributor, a grooved inner member for centrifugally discharging the supplied liquid to provide a generally circular spray within the distributor, and means for causing the spray to be distributed on each of said converging surfaces.

46. In a centrifugal spraying device, in combination, a centrifugal distributor comprising a pair of spaced members having inner surfaces which converge toward their periphery, means to supply liquid to the interior of said distributor, centrifugal means within said distributor for forming a generally circular spray within the same, means for causing the spray to be distributed on each of said surfaces, and a receiving element which has a periphery disposed in a plane at an angle to the plane of rotation to

the distributor and intersecting the field of discharge therefrom to confine the ejection of liquid to a portion of the periphery of the device and which is arranged to collect liquid discharged thereagainst for re-delivery interiorly of the distributor.

47. In a centrifugal spraying device, in combination, a centrifugal distributor, a rotary collecting member having a periphery at an angle to the plane of rotation of the distributor and intersecting the field of discharge therefrom to confine the ejection of liquid to a portion of the periphery of the device, said collecting member being arranged to retain the collected liquid for re-delivery interiorly of the distributor, means to deliver liquid from said collecting means to

the interior of the distributor, and means to feed additional liquid to said collecting means.

48. In a centrifugal spraying device, in combination, a centrifugal distributor, a rotary collecting member having a periphery at an angle to the plane of rotation of the distributor and intersecting the field of discharge therefrom to confine the ejection of liquid to a portion of the periphery of the device, said collecting member being arranged to collect the received liquid for re-delivery interiorly of the distributor, valve controlled means to deliver liquid from said collecting means to the interior of the distribution, and means to feed additional liquid to said collecting means.

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