

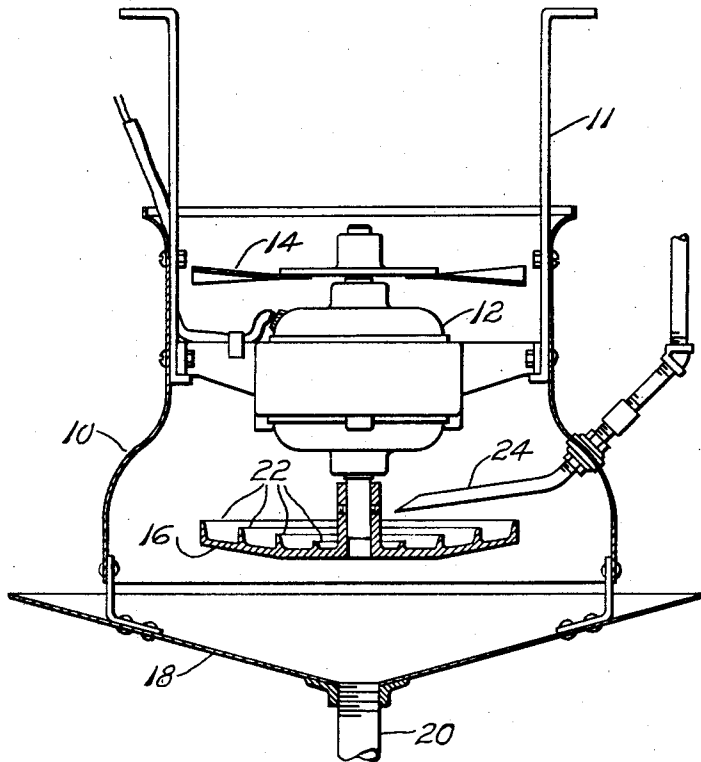
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CENTRIFUGAL ATOMIZER

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UNITED STATES PATENT OFFICE.

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CENTRIFUGAL ATOMIZER.

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To all whom it may concern:

Be it known that I, ALBERT J. LOEPSINGER, a citizen of the United States, residing at Providence, in the county of Providence and State of Rhode Island, have invented certain new and useful Improvements in Centrifugal Atomizers, of which the following is a specification.

This invention relates to improvements centrifugal atomizers and particularly to the atomizing means therefor. Humidifiers of this type aim to introduce moisture into the atmosphere in minute particles, to simulate as nearly as possible a natural fog. In machines which throw water centrifugally from a rotor against fixed impact blades, the water, in passing over the surface of the rotor, is apt to gather and run in little rivulets to the edge. When this occurs it flies against the blades in more or less concentrated sections, and the fog produced is not of uniform density or consistency, being laden with relatively large globules in the region adjoining the blades where the concentrated sections impinge, and being of less density than should be in the spaces between. To overcome this unequal distribution of the water, it has been proposed to arrange the water distributor with radial corrugations of one shape or another, so that a stream of water upon striking the distributor will be physically subdivided initially, and in leaving its edges will be expelled in a more or less corrugated sheet, thereby striking the blades at different levels and over a larger area. But in such devices, it is not at all certain that the water in running over the distributor does not concentrate in the bottoms of the corrugations, and leave it in as many concentrated sections as there are corrugations upon it. Because of this insufficiency it has also been proposed to arrange one or more sets of moving blades beyond the edge of the corrugated distributor, further to break up the discharged water by impact, as it flies outward. But as these blades are obliged to take the water as it is delivered from the distributor, the effect remains, notwithstanding the increased mechanical complication, that in the zone where the concentrated sections have their impact the fog particles are considerably denser than in the intervening spaces.

By the present invention the desired uni-

formity of artificial fog is produced without increasing the number of fixed or rotating parts, by successive spreadings of the film or sheet of water over the rotor, until at the time of its ultimate expulsion into the atmosphere it is free of all drops or over-large globules and is of extremely uniform consistency. The primary object of the invention is the provision of a rotating distributing element adapted to receive at its center a stream or concentrated supply of water and then by successive breakings of this water into smaller masses combined with spreading of the fragments each time a mass of water is broken, finally to deliver the water in such a very thin film or sheet that the water will be in the form of very minute particles as it finally leaves the distributing element.

This object is attained by providing a rotor, having a series of spreading and distributing elements set farther away from the axis, each having a relatively flat surface against which water may strike abruptly and be spread; and having a portion adapted for delivery by centrifugal discharge of the water thus spread; the distributors being so arranged with respect to each other that water is thrown from each outward against the next until finally is thrown into the atmosphere. In the instance herein illustrated these elements take the form of a series of upstanding concentric ridges on a circular plate, successively farther away from the axis and each a little higher than its predecessor. The water, being supplied to the rotor at or near its center, within the first ridge, may centrifugally flow to the crest of such ridge in the usual rivulet manner, and may there be thrown off centrifugally in sizable drops. In flying outward, however, these drops strike against the upstanding inner face of the next succeeding ridge, whose peripheral speed is greater than that of the ridge from which the drops were discharged, and consequently greater than that of the drops. The drops will therefore be spread out along this second ridge both because this ridge is traveling much faster than the drops which strike it, and because each drop on striking the ridge tends to flatten itself and spread over the surface. Owing to the short distance between where these drops strike the surface

and the crest of the ridge, the water does not have an opportunity to gather again in rivulets, before it is discharged by the second ridge against the third. This latter in turn is moving at greater peripheral speed than the discharging ridge, and in consequence a further thinning of the water occurs upon impact. The same result is, repeated with each succeeding ridge until, when the final ridge is reached, the water will have been spread and thinned so thoroughly that, as it leaves the last crest and flies into the air passage of the humidifier, it is completely broken up into fine fog particles which float off with the air into the surrounding atmosphere. Because of the spreading of the original rivulets the discharge from the final crest is substantially uniform, so that the resulting fog produced by the apparatus is of uniform density. Although the invention is herein described as it may be applied for atomizing water for use in humidifying air, it may be applied for other uses or with other liquids. It is intended that the patent shall cover, by suitable expression in the appended claims, whatever features of patentable novelty exist in the invention disclosed.

In the accompanying drawing, the single figure is an elevation, in medial section, of a humidifier embodying a rotor constructed in accordance with the principles of the present invention.

Referring to the drawings, the humidifier illustrated comprising an open topped casing 10, supported on hangers 11, on which is also mounted a motor 12 carrying at one end of its extended shaft a fan 14 and at the other end a rotor 16. Below the casing, and projecting a suitable distance beyond its edge, is the pan 18 into which any excess of moisture may drop, to be carried off in the drain pipe 20. The space between the lower edge of the casing and the pan constitutes a circular nozzle or outlet for air driven downward through the casing by the fan, and the fog produced in that vicinity at the periphery of the rotor is taken up by this air as it passes.

The rotor 16 is substantially a flat plate or disk having on its upper surface a series of concentric ridges 22 which lie one beyond the other away from the axis, and each of which is higher than those between it and the axis. Water is fed to the rotor by a feed pipe 24, which terminates near the hub of the rotor so that the stream falling therefrom strikes within the hollow between the hub and the first concentric ridge. As the water falls on the moving plate it flows outward thereon under the influence of centrifugal force. The skin tension of water is such that in apparatus of this sort it often flows in small rivulets and it is assumed that the water does so in the present in-

stance. But when it reaches the crest of the first ridge it is thrown off into space and strikes the inner wall of the second ridge which for the moment may be assumed to be twice as far from the axis as is the first ridge, and hence has a peripheral speed twice that of the first. In consequence, the water will strike a surface moving twice as fast as itself. The mere impact of this water on the second ridge surface will cause it to flatten or spread out somewhat; and, in addition, the wiping action of the faster moving wall upon which it lands will augment this flattening effect and actually spread the water to a marked degree, so that it is in the form of a thinner film on the wall of the second ridge. Almost at once it is carried up this wall and thrown from its crest or distributing edge across to the third ridge, where a similar spreading and thinning effect occurs, for this third ridge, being farther away from the axis, is moving with greater peripheral speed than is the second ridge. From the third ridge the water is thrown in a still thinner sheet to the fourth and, in this case, the last ridge, where once more the film is further spread and distributed. At the crest of this last ridge the water is subjected to such powerful centrifugal force, as compared with its skin tension, that a large percentage of it flies off in minute particles and floats off in the air blast as fog through the circular nozzle into the atmosphere. Such few particles as are too heavy to be thus carried off are thrown through the blast against the casing 10 where they either spatter themselves into finer particles capable of being taken up by the blast or drain down the casing wall and drop into the pan 18 below. If any such are blown along by the air, they will strike the pan before its extended edge is passed so that only the very fine particles ultimately reach the atmosphere.

I claim:

1. An imperforate liquid-distributing rotor having distributors, set successively farther from its axis and delivering one to another; the receiving portion of a distributor having a surface against which the liquid is thrown abruptly by a preceding distributor and on which it is spread; and its delivery portion being adapted for centrifugal discharge of the liquid thus spread.
2. An imperforate liquid distributing rotor having a series of delivering edges set successively farther from its axis; and a series of abrupt receiving surfaces interposed between said edges and adapted to receive the liquid delivered therefrom, and to spread it; the liquid passing in succession from edge to surface and to edge.
3. An imperforate liquid atomizing rotor having a series of concentric distributors arranged in a plane approximately at right an-

gles to the axis, and successively farther away therefrom; combined with means for supplying liquid to the innermost distributor; each distributor being in such angular relation to the axis that it is adapted to spread by impact upon its own surface the liquid received by it and to discharge against the next succeeding distributor the liquid thus spread.

- 10 4. An imperforate liquid atomizing rotor having on one face concentric distributing surfaces, successively farther away from the axis, the discharging portion of one surface being opposite the face of the next succeeding surface, with clear space intervening, said distributing surfaces being approximately parallel to each other and set at such an angle to the direction of discharge, approximating a right angle, that liquid
- 15 20 thrown from the discharging portion of one impinges abruptly on the face of the next outer and flows upward and outward thence to the discharging portion thereof.

5. An imperforate liquid distributing
- 25 rotor comprising a series of concentric distributing surfaces arranged approximately parallel to the axis of the rotor and at different distances therefrom, having delivery portions set at different positions along the
- 30 said axis so that liquid centrifugally leaving

the delivery portion of one surface impinges against another of said surfaces further removed from said axis.

6. An atomizing rotor or a humidifier comprising a rotating imperforate plate 35 having concentric ridges arranged approximately in a plane, but having crests outstanding progressively further from the plane; and means for supplying liquid to said plate within the innermost ridge, 40 whereby it is thrown from the crest of each ridge against the face of the next succeeding ridge, and is thrown from the last said ridge into the atmosphere.

7. An atomizing rotor for a humidifier 45 comprising an imperforate plate rotating on a vertical axis; concentric ridges upstanding and inclined slightly from the vertical, on said plate at different distances from said axis, the crest of each ridge being 50 at a greater elevation than those between it and the axis; and means for supplying liquid to said plate within the innermost ridge, whereby it is thrown from the crest of each ridge against the face of the next 55 succeeding ridge, and is thrown from the last said ridge into the atmosphere.

Signed at Boston, Massachusetts this eleventh day of February, 1924.

ALBERT J. LOEPSINGER.