

No. 810,450.

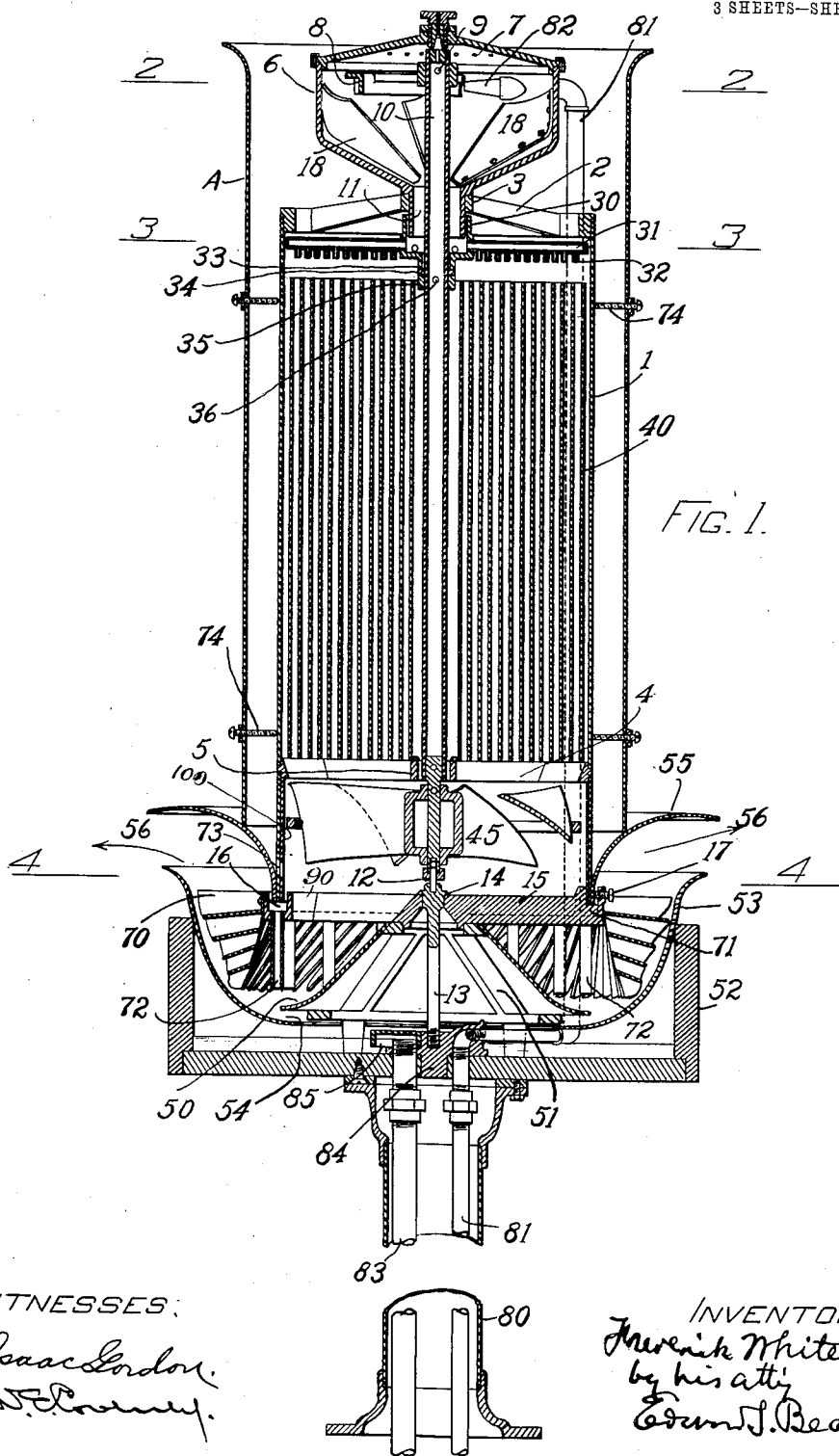
PATENTED JAN. 23, 1906.

F. WHITE.

APPARATUS FOR TREATING AIR.

APPLICATION FILED SEPT. 4, 1903. RENEWED NOV. 11, 1905.

3 SHEETS—SHEET 1.



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3 SHEETS SHEET 2.

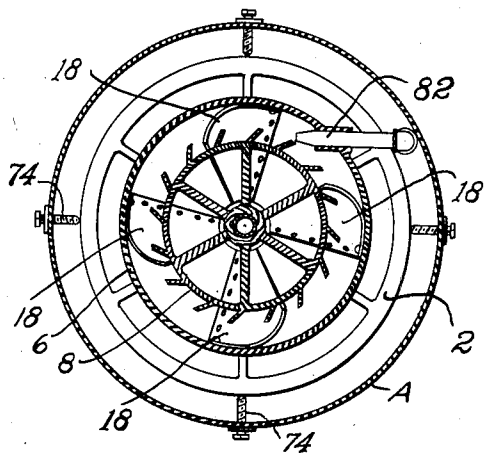


FIG. 2.

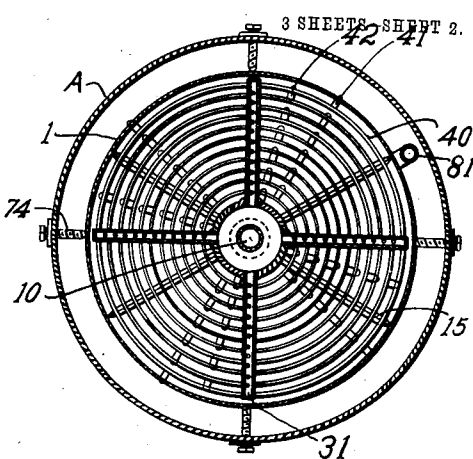


FIG. 3.

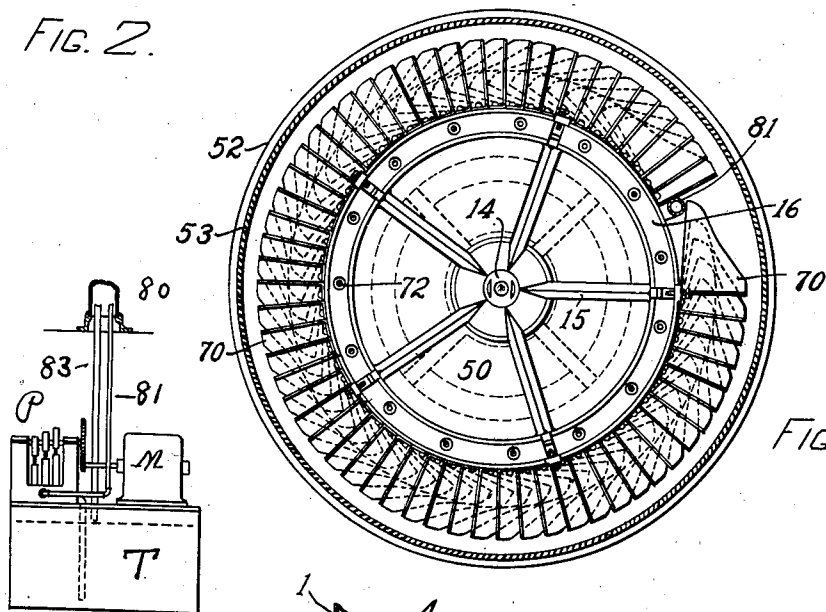


FIG. 4.

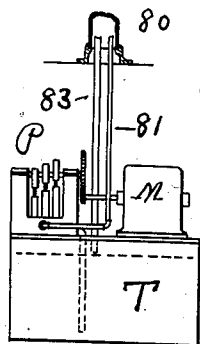


FIG. 6.

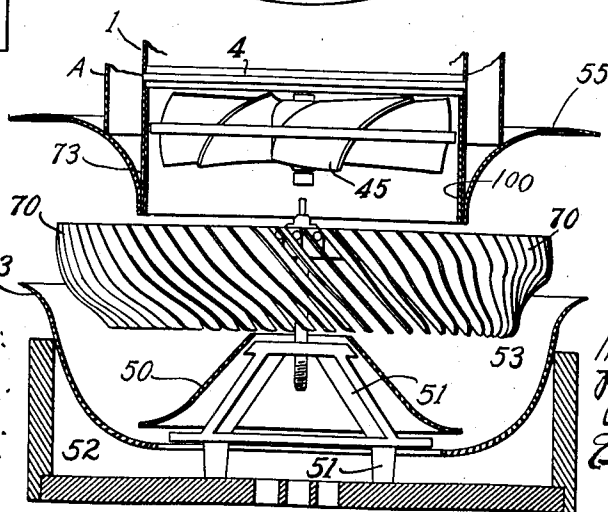


FIG. 5.

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3 SHEETS—SHEET 3.

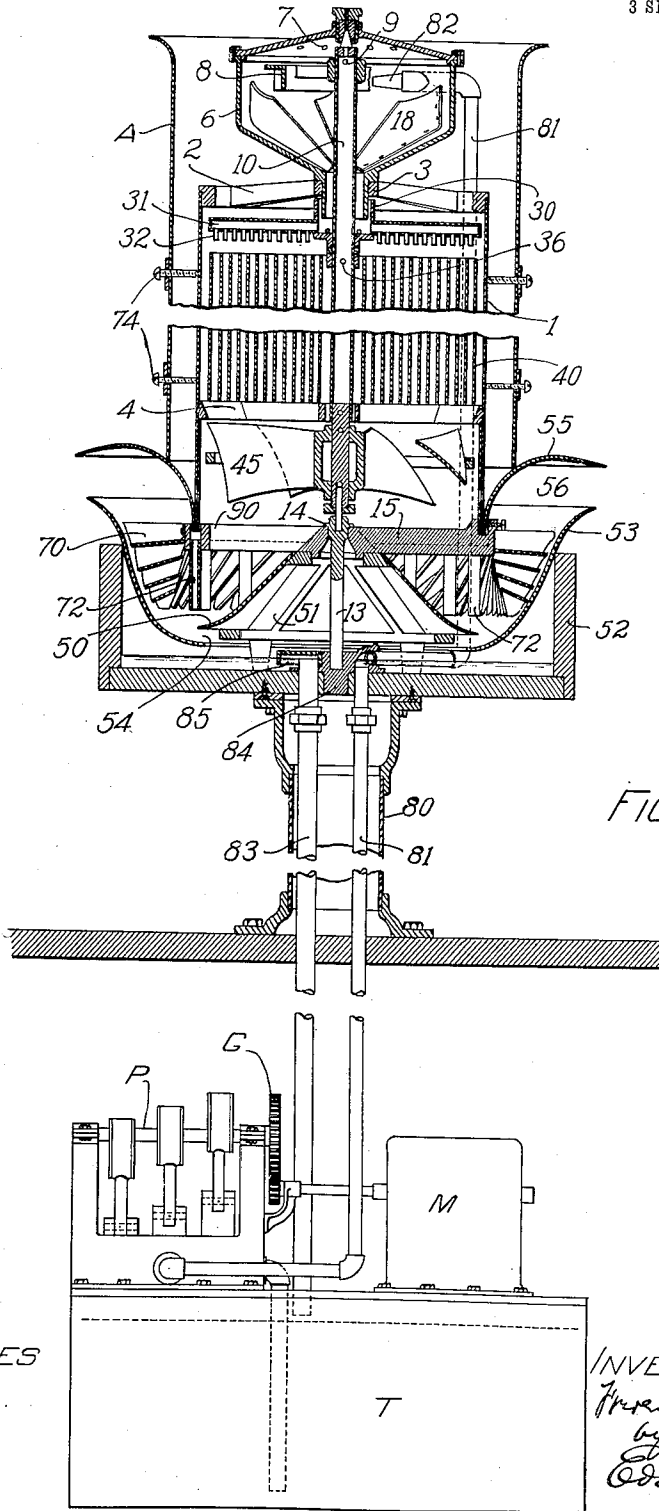


FIG. 7.

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UNITED STATES PATENT OFFICE.

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APPARATUS FOR TREATING AIR.

No. 810,450.

Specification of Letters Patent.

Patented Jan. 23, 1906.

Application filed September 4, 1903. Renewed November 11, 1905. Serial No. 286,790.

To all whom it may concern:

Be it known that I, FREDERICK WHITE, a citizen of the United States, residing at Boston, in the county of Suffolk and State of Massachusetts, have invented certain new and useful Improvements in Apparatus for Treating Air, of which the following is a specification, reference being had therein to the accompanying drawings.

Figure 1 is a vertical central section of my improved apparatus mounted on a pedestal, within which the water-feed and water-return pipes are shown inclosed. Fig. 2 is a transverse view, mainly in section, at a line corresponding to 2 2 of Fig. 1 and illustrates particularly the arrangement of anti-swirling plates on the inside of the water-wheel casing. Fig. 3 is a transverse view, mainly in section, at a line corresponding to line 3 3 of Fig. 1 and shows particularly the construction of the liquid-distributor. Fig. 4 is a transverse view, partly in section, at a line corresponding to 4 4 of Fig. 1 and shows particularly the baffle-plates which prevent liquid from splattering out through the air-escape passage at the lower end of the apparatus. Fig. 5 is a view, partly in central vertical section, of the lower end portion of my apparatus, but shows said baffle-plates in side elevation. In this view the lower end of the cylinder is lifted out of operative position in relation to the baffle-plates, and the baffle-plates are left out of their normal position in relation to the pan. Fig. 6 is a diagrammatic view showing my apparatus connected with a water-supply tank and a motor-driven pump. Fig. 7 is a central vertical section of one form of my invention and shows an installation thereof in which a part of the apparatus is in a lower and the remainder in an upper room.

The objects of this invention are to perfect the practical operation and commercial desirability of the apparatus shown in my pending application.

In the drawings, 1 is an open-ended cylinder or main casing.

2 is a transverse bridge-piece having a central ring 3, preferably slightly raised above the upper end of cylinder 1. Bridge-piece 2 is made fast to the upper end portion of cylinder 1, which near its lower end is provided with a transverse open bridge-piece 4, made fast to cylinder 1 and having a central ring 5.

6 is a water-wheel casing, the upper portion of which is vented by the perforations 7 to prevent the formation of a vacuum within the water-wheel casing above the water therein, and this I find in practice to be an important matter.

8 is a water-wheel of any suitable construction made fast at 9 to the central vertical shaft, 10, which is partly within the water-wheel casing and extends downwardly through the discharge-port 11 of the water-wheel casing and through said ring 5 to ball-bearing mechanism 12 at its lower end, this ball-bearing device being mounted on a vertical bolt 13, the upper flange 14 of which clamps against the upper side of a horizontal open bridge-piece 15, having an annular trough 16 in its upper side, into which trough the lower end of cylinder 1 is set and therein fastened by suitable fasteners 17.

Discharge-port 11 of the water-wheel casing is made, preferably, circular and sets in ring 3 with its lower end opening into the cup 30, which forms the body of the liquid-distributor. The vertical walls of cup 30 are opposed to the lower end walls of the discharge-port 11, a slight space being left between the opposed walls of the cup and of the discharge-port for admission of air, so that no vacuum can be formed within the distributor to impede the proper continuous outflow therefrom of the water or other liquid falling from the water-wheel casing through discharge-port 11 into the distributor.

I find it important to prevent the water from swirling continuously around within the water-wheel casing in order to secure a continuous and uniform discharge of water or liquid from that casing, and I accordingly provide the interior of the water-wheel casing with one or more, preferably four, anti-swirling plates 18, these plates extending upwardly within the chamber of the water-wheel casing from underneath the water-wheel and from the inner end of the discharge-port 11 and rising within the water-wheel casing, preferably well up the sides of the water-wheel, the rotation of which, were it not for the plates 18, would cause the water or other liquid to swirl continuously around within the casing, and so retard the direct and continuous outflow of the liquid through the discharge-port 11.

It is desirable to drive shaft 10 at a very considerable rate of speed, for the shaft carries an air-fan 45, which preferably sucks air downwardly through the apparatus and then
 5 expels the air from the lower end portion thereof; but I find in practice that it is highly desirable to rotate the liquid-distributor somewhat slowly in order to prevent the liquid from being thrown mostly against the
 10 main casing 1 and also to prevent the water from being thrown over the top of the casing 1.

In order to secure a uniform distribution of the water within casing 1 and to prevent
 15 the distributor from throwing the water out through the upper end of casing 1, I provide the distributor with radial tubular distributing-arms 31, preferably four, as shown in Fig. 3, each arm having a series of discharge-nozzles 32 and the tubular arms opening into the cup-shaped body portion of the distributor, which is formed with an annulus 33, through which main shaft 10 passes in very slight frictional contact with the inner
 25 wall of the annulus. To make it clear in Fig. 1 that the distributor is loose on shaft 10, I have shown in Fig. 1 a slight space between the inner wall of annulus 33 and the shaft. The lower end of annulus 33 rests on
 30 a washer 34, tight on the main shaft and supported on a collar 35, which is pinned to the shaft at 36. By this construction I obtain the rotation of the distributing-arms 31 of the distributor at a much lower rate of speed
 35 than that at which shaft 10 is rotated; and I consequently prevent the liquid within the arms from being carried unduly toward the outer ends of the radial distributing-arms by centrifugal force, and so obtain within the
 40 arms a practically uniform supply of liquid for approximately uniform and continuous discharge upon a series of plates 40, which are set vertically on the transverse open frame 4 and which are of considerable length
 45 and are arranged at distances apart within casing 1. The nozzles 32 extend downwardly from the under side of the radial distributing-arms, and this arrangement is important to prevent upward spattering of the
 50 water.

When the distributor operates to distribute the liquid over and on the upper ends of the plates, the liquid then flows down film-like on the plates and through the interspaces
 55 and frame 4 over fan 45 and between the wings thereof and through the open frame 15 upon the cone-shaped deflector 50, as explained below. Plates 40 may be of any desired form and so, also, may be casing 1; but in the preferred construction, as already
 60 stated, casing 1 and plates 40 are cylindrical. Consequently I prefer to make the plates 40 in the form of open-ended sheet-metal cylinders, and these are held stationary at distances apart by a series of lateral studs 41,

which are clearly shown in Fig. 3, the outer end of one of the studs being fastened in cylinder 1 and projecting inwardly against the outer wall of the outermost interior cylinder 40 and another stud, as at 42, Fig. 3, having
 70 one of its ends fastened in the outermost cylinder 40 and projecting laterally therefrom against the next inner cylinder, and so on as to all the cylinders, whereby they are all spaced at distances apart and held in fixed
 75 relation one to another and all held in fixed relation to casing 1.

Beneath the lower ends of plates 40 I mount the air-fan 45, fast on shaft 10. For the reason that it is practically easier to pull
 80 air through a conduit than it is to push it through the conduit, fan 45 is shown as a suction-fan and is mounted at the lower end of casing 1 within the same. This air-fan sucks or pulls the air through the upper open end
 85 of casing 1 and through the interspaces between plates 40, thereby causing the air to move over liquid distributed on the plates and descending the same to wash, purify, or impregnate the air, as may be desired, and
 90 then expels the air from the lower portion of the apparatus.

When the liquid passes the fan in its downward descent, it is preferably directed upon the cone 50, which is supported by a frame
 95 51, which rests in the bottom of the liquid-receiving pan 52. Within pan 52 there is mounted a bowl-shaped deflector 53, having a large perforation in its bottom for the escape of the liquid from the deflector 50, the
 100 liquid falling first into the bowl-shaped air-deflector 53 and passing through the water-escape opening 54 into pan 52. The air-deflector 53 passes outwardly and upwardly above the rim of pan 52 and in conjunction
 105 with the outwardly and upwardly curved flange 55, which is mounted at the lower end of casing 1 and forms an air-discharge space, (indicated by the arrow 56 in Fig. 1.) The air-fan forces the air downwardly out of the
 110 open-ended casing 1 upon the cone-like covering 50 of the frame 51. The air is deflected by the cone 50 outwardly from the apparatus between the deflector 53 and the flange 55. The baffle-plates 70 each stand crosswise to
 115 the inclined vanes 45 of the air-fan. (See Fig. 6.) It is important that as much air as possible should be passed through the machine each minute of its operation, and it is equally important that there should be no
 120 outward spattering of the fluid thrown off by the fan over and between the vanes of which the fluid falls. The relative crosswise inclination of the vanes of the fan and of the baffle-plates accomplishes this object. To
 125 prevent the water from being spattered out through the air-escape passage 56, (which would cause a rain to fall on the heads of occupants or furniture within the room,) I find it important to mount within or at the air- 130

passage 56—that is, at the lower end of casing 1—a series of baffle-plates 70, against the under sides of which any outwardly and upwardly spattering water or liquid strikes and is then turned back into the bowl-shaped deflector 53 or on the deflector 50 foreescape into the pan 52. It is very important, however, that the baffle-plate 70 should be so formed and arranged as not to prevent the free and continuous discharge of air outwardly through passage 56 or from the apparatus. The form and arrangement of baffle-plates herein illustrated I find to be one which prevents the outward spattering of water and at the same time secures the outward escape of the air. The baffle-plates 70 as now arranged are secured at their upper ends, as plainly shown in Figs. 1 and 4, to the rim of the frame-piece 15 and are inclined downwardly, overlapping one another at distances apart. The lower ends of the baffle-plates are in the present form made narrow enough to permit the lower portions of the baffle-plates to project down into the bowl-shaped deflector 53. The use of baffle-plates at the air-escape passage of the present form of apparatus, and comparable devices, is novel and important for reasons stated. I find that the baffle-plates are most effective when they are inclined as shown—that is, in a direction which is opposite to the direction of the inclination of the blades of the air-fan 45.

I have met a difficulty in mounting at the air-escape a device which will turn back the outwardly-spattering water without interfering with the free and continuous exit of the air; but the means described I find to be free from objection.

Water of condensation forms on the outer surface of main casing 1 and on both surfaces of the outer casing A, which I prefer to use. This outer casing A is an open-ended cylinder, which it is desirable to use in installations where ornamental effects are desired. The bottom of the trough 16 in frame-piece 15 is formed with a number of upwardly-extending lugs 71, on which the lower end of casing 1 rests, and from the bottom of trough 16, between lugs 71, a number of depending discharge-tubes 72 extend downwardly to permit the escape of water from the trough in the pan 52. Considerable fluid runs down the inner wall of casing 1 into trough 16, so that there is a pretty constant flow of water downwardly through the discharge-tubes 72. I find in practice that the air-current from the fan tends to throw water falling out of trough 72 downwardly and outwardly, so that there is a tendency to spatter outwardly from the apparatus unless the discharge-tubes 72 are used to carry the fluid well below the under edge of the casing and even then unless the baffle-plates 70 are also used that the air-current will blow the falling water outwardly with such force as to cause some out-

ward spattering from the apparatus. The air-fan for the best results should be wholly within the casing 1, which should extend somewhat below the fan, and to prevent all noticeable outward spattering from the apparatus it is very necessary (for most uses of it) to use both the trough with the discharge-nozzles and also the baffle-plates (or equivalent functional devices) below the lower end of casing 1 and in the air-escape passage. Water of condensation which flows down the walls of casing A into the trough formed between the inner wall of flange 55 and the outer wall of main casing 1 escapes into the trough 16 through suitable perforations at 73. Casing A rests on flange 55 and is laterally supported by screw-studs 74, which extend from the inner side of casing A to main casing 1.

The apparatus above described is commonly installed with its upper end a little distance below the ceiling of a room, and for neatness of appearance and economy of floor-space I now in accordance with one feature of my present invention mount the pan 52 which supports the other described parts of the apparatus on a vertical tubular standard 80, within which the liquid-supply conduit 81 is led to the water-jet nozzle 82, which directs the impelling current of liquid against the water-wheel to drive it. The liquid-escape conduit 83 is also within the tubular support 80, and its upper end instead of entering directly into pan 52 enters the chamber of a block 84, the chamber opening on its under side at 85 into the pan and quite near to the bottom of the pan, so that when there is a little water in the pan a water seal for the escape-conduit 83 is formed, as indicated in Fig. 1. The purpose of sealing the water-escape conduit is to prevent the air driven downwardly by the air-fan from escaping except through the passage 56—that is, the seal prevents any of the downwardly-driven air from going out through the water-escape conduit 83. In general practice the water-escape conduit 83 leads to an ice-water tank T, from which the water-supply conduit 81 extends to a pump P and thence to a nozzle 82, as indicated diagrammatically in Fig. 6. If air were to be driven down into the ice-tank through the water-escape conduit, the economy of the apparatus would be diminished, because the air so driven into the ice-water tank would lower the temperature more or less and increase the rapidity with which ice were melted.

The foregoing apparatus may be varied in form without departure from the several features of my invention, and the apparatus may be used for many purposes. If the apparatus be supplied with ice-water or brine, it will act to cool the air drawn through the apparatus and to purify it, and the cooled and purified air in the room will be kept in

motion to the comfort and health of occupants. Moreover, humidity may be lessened. On the other hand, by running hot or warm water through the apparatus under different conditions the apparatus may be used for humidifying the air in mills and other places where a humidified atmosphere is desired.

It is commercially important that my apparatus should operate as silently as possible, especially in offices, hospitals, restaurants, stores, living-rooms, and the like, and it is for this reason that the concentric cylinders and other parts are mounted in fixed relation one to another, so that there will be no rattling of parts when the machine is in operation. For the same reason I fix a lining 100, of felt or other sound-deadener, on that portion of the main casing which is opposite the outer ends of the blades of the air-fan, so that the water which the blades hurl against that portion of the main casing when the machine is in operation makes but little or no noise thereon. For like reason the outer ends of the tubular distributing-arms are closed, as shown, so that the fluid going through the apparatus is not by said distributing-arms hurled against the opposed wall of the main casing, as would be the case if the arms were open at their outer ends; but in this connection the closed ended radial distributing-arms are preferable, because if they were open-ended they would throw the fluid against the opposed wall of the main casing, so that it would spatter outwardly of the machine. It is of the utmost importance to prevent any and all outwardly spattering from the apparatus, whether it is used for cooling or purifying air in rooms or for humidifying in mills. The apparatus is intended for overhead use, as a general rule, and it would be a serious objection to have the machine spatter fluid going through it out on the occupants and furniture, and in humidifying uses the spattering would be objectionable, because it would result in producing uneven humidity in the room, wherein evenness of humidity without the falling of particles of water is desired for the best results. A plurality of the fluid or liquid escapes or discharge-nozzles 32 are provided for each radial distributing-arm between its outer and inner end, so that the fluid going through the machine may be evenly distributed over and between the upright cylinders or plates. If there were no escapes on the radial arms except, for example, at their outer ends, centrifugal force would cause the fluid to be hurled therefrom and no even distribution of fluid could be secured on the cylinders or plates 40. Even distribution is important.

By installing the apparatus proper near the ceilings of rooms the more vitiated air at the ceiling is drawn into contact with the fluid going through the machine, and the

mounting of the apparatus on the upper ends of the hollow pedestals through which the conduits run results in the pedestals being warmed or cooled, according to the temperature of the liquid going through the conduits, so that the pedestals themselves act to a certain extent as air warmers or coolers, and when cold fluid is going through the pipes the outer surfaces of the pedestals receive a certain amount of moisture from the air and in a measure aid the apparatus proper in drying the air.

I find in practice that both the baffle-plates 70 in the space between the two air-deflecting flanges 53 and 55 and the downwardly-extending fluid-escape tubes 72 are important in preventing the air-suction fan 45 from blowing fluid into the outer air. The tubes 72 drain the trough 16, and the baffle-plates prevent fluid from being blown out through the space between the flanges 53 and 55. In apparatus of this kind it is important that no liquid should be thrown out on persons or goods.

Motor M and pump P are operatively connected by suitable interworking gears, as at G. The water-wheel may be driven in any other suitable manner than that shown, and by the term "water-wheel" I mean to include any suitable motor device for driving shaft 10.

I do not herein claim the water-wheel casing, as the same forms the subject-matter of my pending application, Serial No. 206,006, filed May 2, 1904, for United States Letters Patent.

What I claim is—

1. The combination of a vented motor-wheel casing having interior antistirling plates; a motor-wheel within said casing and fast on a shaft, the casing having a liquid-escape at its lower end; means for directing a fluid-jet against said motor-wheel to rotate the same and said shaft; a liquid-distributor loose on said shaft but in frictional connection therewith, and thereby driven at a speed less than that of the motor-wheel, said distributor having a cup-like portion into which the liquid-discharge of the motor-casing discharges, and also having a plurality of radial, lengthwise-chambered distributing-arms provided with liquid-escapes on their under sides; a series of concentric cylinders mounted endwise at the liquid-escape side of said distributing-arms; means for keeping said cylinders in fixed position relatively to each other; an air-fan fixed on said shaft, the cylinders being between said distributing-arms and said fan; an open-ended main casing exterior to said cylinders; means for supporting said motor-casing in fixed relation to an end of said casing; means for securing said cylinders in fixed relation to said main casing; the distributor, cylinders, and air-fan being within the main casing; an air-deflecting flange

extending outwardly from the casing; an air-deflector extending outwardly from the casing and mounted at a distance from said flange, thereby forming a lateral air-escape from the main casing; a liquid-receiving pan below the main casing, said flange and deflector; a fluid-supply conduit to said jet; a fluid-escape conduit from said pan; a trap for said fluid-escape conduit; and a series of baffle-plates mounted in the air-escape and severally inclined crosswise to the blades of the air-fan.

2. The combination of a vented motor-wheel casing having interior antiscwirling plates; a motor-wheel within said casing and fast on a shaft, the casing having a liquid-escape at its lower end; means for directing a fluid-jet against said motor-wheel to rotate the same and said shaft; a liquid-distributor loose on said shaft but in frictional connection therewith, and thereby driven at a speed less than that of the motor-wheel, said distributor having a cup-like portion into which the liquid-discharge of the motor-casing discharges, and also having a plurality of radial lengthwise-chambered distributing-arms provided with liquid-escapes on their under sides; a series of concentric cylinders mounted endwise at the liquid-escape side of said distributing-arms; means for keeping said cylinders in fixed position relatively to each other; an air-fan fixed on said shaft, the cylinders being between said distributing-arms and said fan; an open-ended main casing exterior to said cylinders; means for supporting said motor-casing in fixed relation to an end of said main casing; means for securing said cylinders in fixed relation to said main casing; the distributor, cylinders and air-fan being within the main casing; an air-deflecting flange extending outwardly from the main casing; an air-deflector extending outwardly from the main casing and mounted at a distance from said flange, thereby forming a lateral air-escape from the main casing; a liquid-receiving pan below the main casing, said flange and deflector; a fluid-supply conduit to said jet; a fluid-escape conduit from said pan; a trap for said fluid-escape conduit; and a series of baffle-plates mounted in the air-escape and severally inclined crosswise to the blades of the air-fan; and a tubular pedestal on which the pan is mounted and within which said two conduits are contained.

3. The combination of a vented motor-wheel casing having interior antiscwirling plates; a motor-wheel within said casing and fast on a shaft, the casing having a liquid-escape at its lower end; means for directing a fluid-jet against said motor-wheel to rotate the same and said shaft; a liquid-distributor loose on said shaft but in frictional connection therewith, and thereby driven at a speed less than that of the motor-wheel, said distributor having a cup-like portion into which

the liquid-discharge of the motor-casing discharges, and also having a plurality of radial, lengthwise-chambered distributing-arms provided with liquid-escapes on their under sides; a series of concentric cylinders mounted endwise at the liquid-escape side of said distributing-arms; means for keeping said cylinders in fixed position relatively to each other; an air-fan fixed on said shaft, the cylinders being between said distributing-arms and said fan; an open-ended main casing exterior to said cylinders; means for supporting said motor-casing in fixed relation to an end of said main casing; means for securing said cylinders in fixed relation to said main casing; the distributor, cylinders and air-fan being within the main casing; an air-deflecting flange extending outwardly from the main casing; an air-deflector extending outwardly from the main casing and mounted at a distance from said flange, thereby forming a lateral air-escape from the main casing; a liquid-receiving pan below the main casing, said flange and deflector; a fluid-supply conduit to said jet; a fluid-escape conduit from said pan; a trap for said fluid-escape conduit; and a series of baffle-plates mounted in the air-escape and severally inclined crosswise to the blades of the air-fan; an open-ended, outer casing extending from said flange beyond the farther end of the main casing, and means for holding the outer casing in fixed relation to the main casing.

4. The combination of a vented motor-wheel casing having interior antiscwirling plates; a motor-wheel within said casing and fast on a shaft, the casing having a liquid-escape at its lower end; means for directing a fluid-jet against said motor-wheel to rotate the same and said shaft; a liquid-distributor loose on said shaft but in frictional connection therewith, and thereby driven at a speed less than that of the motor-wheel, said distributor having a cup-like portion into which the liquid-discharge of the motor-casing discharges, and also having a plurality of radial, lengthwise-chambered distributing-arms provided with liquid-escapes on their undersides; a series of concentric cylinders mounted endwise at the liquid-escape side of said distributing-arms; means for keeping said cylinders in fixed position relatively to each other; an air-fan fixed on said shaft, the cylinders being between said distributing-arms and said fan; an open-ended main casing exterior to said cylinders; means for supporting said motor-casing in fixed relation to an end of said main casing; means for securing said cylinders in fixed relation to said main casing; the distributor, cylinders, and air-fan being within the main casing; an air-deflecting flange extending outwardly from the main casing; an air-deflector extending outwardly from the main casing and mounted at a distance from said flange, thereby forming a lateral air-

escape from the main casing; a liquid-receiving pan below the main casing, said flange and deflector; a fluid-supply conduit to said jet; a fluid-escape conduit from said pan; a 5 trap for said fluid-escape conduit; and a series of baffle-plates mounted in the air-escape and severally inclined crosswise to the blades of the air-fan; a sound-deadener on that portion of the main casing which is opposed to 10 the outer ends of the air-fan.

5. The combination of a vented motor-wheel casing having interior antiscwirling plates; a motor-wheel within said casing and fast on a shaft, the casing having a liquid- 15 escape at its lower end; means for directing a fluid-jet against said motor-wheel to rotate the same and said shaft; a liquid-distributor loose on said shaft but in frictional connection therewith, and thereby driven at a speed 20 less than that of the motor-wheel, said distributor having a cup-like portion into which the liquid-discharge of the motor-casing discharges, and also having a plurality of radial, lengthwise-chambered distributing-arms provided with liquid-escapes on their undersides; 25 a series of concentric cylinders mounted endwise at the liquid-escape side of said distributing-arms; means for keeping said cylinders in fixed position relatively to each other; an 30 air-fan fixed on said shaft, the cylinders being between said distributing-arms and said fan; an open-ended main casing exterior to said cylinders; means for supporting said motor-casing in fixed relation to an end of said 35 main casing; means for securing said cylinders in fixed relation to said main casing; the distributor, cylinders, and air-fan being within said main casing; an air-deflecting flange extending outwardly from the main casing; 40 an air-deflector extending outwardly from the main casing and mounted a distance from said flange, thereby forming a lateral air-escape from the main casing; a liquid-receiving pan below the main casing, said flange and deflector; a fluid-supply conduit to said 45 jet; a fluid-escape conduit from said pan; a trap for said fluid-escape conduit; and a series of baffle-plates mounted in the air-escape and severally inclined crosswise to the blades 50 of the air-fan; the main casing having a fluid-escape hole through its wall into the space between the opposed walls of the main casing and flange.

6. The combination of a vented motor-wheel, casing having interior antiscwirling 55 plates; a motor-wheel within said casing and fast on a shaft, the casing having a liquid-escape at its lower end; means for directing a fluid-jet against said motor-wheel to rotate 60 the same and said shaft; a liquid-distributor loose on said shaft but in frictional connection therewith, and thereby driven at a speed less than that of the motor-wheel, said distributor having a cup-like portion into which 65 the liquid-discharge of the motor-casing dis-

charges, and also having a plurality of radial, lengthwise-chambered distributing-arms provided with liquid-escapes on their undersides; a series of concentric cylinders mounted endwise at the liquid-escape side of said 70 distributing-arms; means for keeping said cylinders in fixed position relatively to each other; an air-fan fixed on said shaft, the cylinders being between said distributing-arms and said fan; an open-ended main casing exterior to said cylinders; means for supporting 75 said motor-casing in fixed relation to an end of said casing; means for securing said cylinders in fixed relation to said main casing; the distributor, cylinders, and air-fan being with- 80 in the main casing; an air-deflecting flange extending outwardly from the main casing; an air-deflector extending outwardly from the main casing and mounted a distance 85 from said flange, thereby forming a lateral air-escape from the main casing; a liquid-receiving pan below the main casing, said flange and deflector; a fluid-supply conduit to said jet; a fluid-escape conduit from said pan; a 90 trap for said fluid-escape conduit; and a series of baffle-plates mounted in the air-escape and severally inclined crosswise to the blades of the air-fan, the motor-wheel being near the upper end of the main casing; and the fan being 95 a suction-fan whereby air is drawn into the upper end of the main casing and sucked downwardly over films of fluid gravitating down the walls of the upright cylinders.

7. The combination of a vented motor-wheel casing having interior antiscwirling 100 plates; a motor-wheel within said casing and fast on a shaft, the casing having a liquid-escape at its lower end; means for directing a fluid-jet against said motor-wheel to rotate 105 the same and said shaft; a liquid-distributor loose on said shaft but in frictional connection therewith, and thereby driven at a speed less than that of the motor-wheel, said distributor having a cup-like portion into which 110 the liquid-discharge of the motor-casing discharges, and also having a plurality of radial, lengthwise-chambered distributing-arms provided with liquid-escapes on their undersides; 115 a series of concentric cylinders mounted endwise on the liquid-escape side of said distributing-arms; means for keeping said cylinders in fixed position relatively to each other; an 120 air-fan fixed on said shaft, the cylinders being between said distributing-arms and said fan; an open-ended main casing exterior to said cylinders; means for supporting said motor-casing in fixed relation to an end of said 125 main casing; means for securing said cylinders in fixed relation to said main casing; the distributor, cylinders, and air-fan being within the main casing; an air-deflecting flange extending outwardly from the main casing; an air-deflector extending outwardly from 130 the main casing and mounted a distance from said flange, thereby forming a lateral air-es-

cape from the main casing; a liquid-receiving pan below the main casing, said flange and deflector; a fluid-supply conduit to said jet; a fluid-escape conduit from said pan; a trap for said fluid-escape conduit; and a series of baffle-plates mounted in the air-escapes and severally inclined crosswise to the blades of the air-fan, the fluid-escape of the motor-casing extending into the cup-like portion of the distributor but out of contact therewith.

8. The combination of a fluid-supply tank; a motor; a pump driven thereby; a pan; a fluid-escape conduit from the pan into the tank; an air-treating apparatus mounted above said pan, and comprising a vented motor-wheel casing; a motor-wheel within said casing; a shaft on which the motor-wheel is fast; a fluid-distributor loose on said shaft but driven by frictional connection therewith, and below the motor-wheel casing, the latter discharging into the distributor and the motor-wheel casing being provided with interior antiscwirling plates; a series of open-ended, vertical sheet-metal cylinders fixed at distances apart; a main casing; an air-suction fan fast on said shaft and below the lower ends of said cylinders; a tubular standard on the upper end of which said pan is mounted; and a conduit from said pump to the motor-wheel casing and discharging pumped fluid against the wheel to rotate it, both conduits being within the tubular standard.

9. In air-cooling apparatus, a main casing; an open motor-wheel-casing-supporting frame on its upper end; a motor-casing on said frame; a motor-wheel within said casing; a shaft on which the motor-wheel is fixed; a fluid-distributor loose on said shaft but in frictional connection therewith; a collar fixed on said shaft, the distributor resting on said collar; an air-fan fast on said shaft; a series of vertically-mounted concentric cylinders of varying diameters between the fan and distributor; the motor-casing discharging into the distributor and the distributor having a plurality of radial, lengthwise-chambered arms closed at their outer ends, and formed with liquid-escapes on their under sides; the main casing extending below the fan and above the distributor; a pan below the main casing; a fluid-escape conduit from the pan; and a conduit entering the motor-casing and discharging against the motor-wheel therein.

10. In air-treating apparatus, the combination of a motor-wheel casing having an interior antiscwirling plate and a fluid-discharge on its under side; a motor-wheel within said casing; a shaft on which the motor-wheel is fast; a fluid-distributor on said shaft, the motor-wheel casing discharging into the distributor; means for supporting the distributor on said shaft, the distributor being driven by frictional connection with the shaft

and having a radial, lengthwise-chambered distributing-arm formed with a fluid-escape; a series of plates separated one from the other, and over and between which the fluid from the distributor flows; an air-fan fast on said shaft; the plates being between the distributor and the fan; a pan below the fan; an air-escape passage above the pan; and means in the air-escape passage to prevent outward spattering of fluid while permitting the escape of air through said passage.

11. In air-treating apparatus, the combination of a shaft; a motor-wheel fixed thereon; an air-fan fixed thereon; a fluid-receiving distributor loose thereon but in frictional connection therewith and thereby rotatable at a speed less than that of the motor and fan; a series of separated non-absorbent plates between the distributor and fan, and over and between which the distributor distributes; an open-ended main casing exterior to the distributor, the plates and the fan; means for rotating the motor; and means of supplying fluid to the distributor.

12. In air-treating apparatus, the combination of a shaft; a motor-wheel fast on it; an air-fan fast on it; a fluid-distributor mounted on it in frictional connection therewith and having lengthwise-chambered, radial arms, closed at their outer ends, and the arms each having a plurality of fluid-escapes between their outer and inner ends; and a series of plates spaced apart and mounted between the radial arms and air-fan; means for rotating the motor-wheel; and means for supplying the distributor with fluid.

13. The combination of a rotatable shaft; an air-fan fast thereon, and driven thereby; a liquid-distributor loose on the shaft, and means for supplying liquid to said distributor.

14. The combination of a rotatable shaft; an air-fan fast on the shaft, and thereby driven; a fluid-distributor loose on the shaft and comprising a central liquid-receiving cap and a plurality of lengthwise-chambered radial distributing-tubes; means for supplying fluid to the distributor; and a series of concentric cylinders mounted endwise below the distributor and receiving on their surfaces the fluid from the distributor.

15. The combination of a vented water-wheel casing having an outlet; a water-wheel shaft; a water-wheel fast on the shaft; a conduit for the wheel-driving current and entering the casing in operative proximity to the water-wheel; a liquid-distributor loose on said shaft, the water-wheel casing discharging into said distributor; and a series of concentric, endwise-mounted cylinders below said distributor, the distributor discharging thereon; and an air-fan fast on the shaft.

16. The combination of the motor-wheel casing having interior, antiscwirling plates; a motor-wheel within said casing; an air-fan; means for exposing fluid from said casing to

a current of air; a frictionally-driven fluid-distributor for distributing fluid from said casing on said exposing means; a shaft on which the motor-wheel and fan are fixed; the casing discharging the motor-driving fluid to the distributing means which distribute it over the exposing means; and the fan causing air to travel over the fluid on the exposing means.

10 17. The combination of a vented water-wheel casing having an outlet; a water-wheel shaft; a water-wheel fast on the shaft; a conduit for the wheel-driving current and entering the casing in operative proximity to the water-wheel; a liquid-distributor loose on said shaft, the water-wheel casing discharging into said distributor; and a series of concentric, endwise-mounted cylinders below said distributor, the distributor discharging thereon; and an air-fan fast on the shaft, the fan expelling air from the apparatus and having laterally-inclined vanes; a series of baffle-plates opposite the outer ends of the vanes and set crosswise to the vanes.

25 18. The combination of a motor-wheel and its casing with a rotatable shaft and a water-distributor on the shaft, the distributor traveling at a speed less than that of the shaft.

30 19. The combination of the outer casing with a troughed support therefor having fluid-discharge outlets; a shaft; an air-fan fast on the shaft; plates within the casing on which fluid is exposed; means for supplying fluid to the plates; and means for rotating the shaft.

35 20. The combination of a shaft; means for

rotating it; an air-fan fast on the shaft; a casing within which the shaft and fan are contained; means within the casing for exposing fluid to air caused by the fan to travel downwardly through the casing; a fluid-distributor frictionally driven from said shaft; a pan below the casing, leaving an air-escape space between the lower end of the casing and the upper edge of the pan for the outward escape of air from the casing; a cone-like support within the pan and above the upper portion of which the casing is supported, the walls of the support inclining downwardly and outwardly; an air-deflector extending upwardly from within and outwardly of the pan; an upwardly and outwardly extending flange at the lower end of the casing, the air-escape passage being between said deflector and flange; and means in said passage to permit the exit of air through and to prevent fluid from spattering outwardly therethrough.

21. The combination of the outer casing; the troughed support therefor; an air-suction fan within the casing and near the troughed support; the air-deflecting flanges one above the other at a distance apart; a series of baffle-plates arranged edgewise in said space between said flanges; and a series of downwardly-extending fluid-escape tubes opening out of said trough.

In testimony whereof I affix my signature in presence of two witnesses.

FREDERICK WHITE.

Witnesses:

W. E. COVENY,
EDWARD S. BEACH.