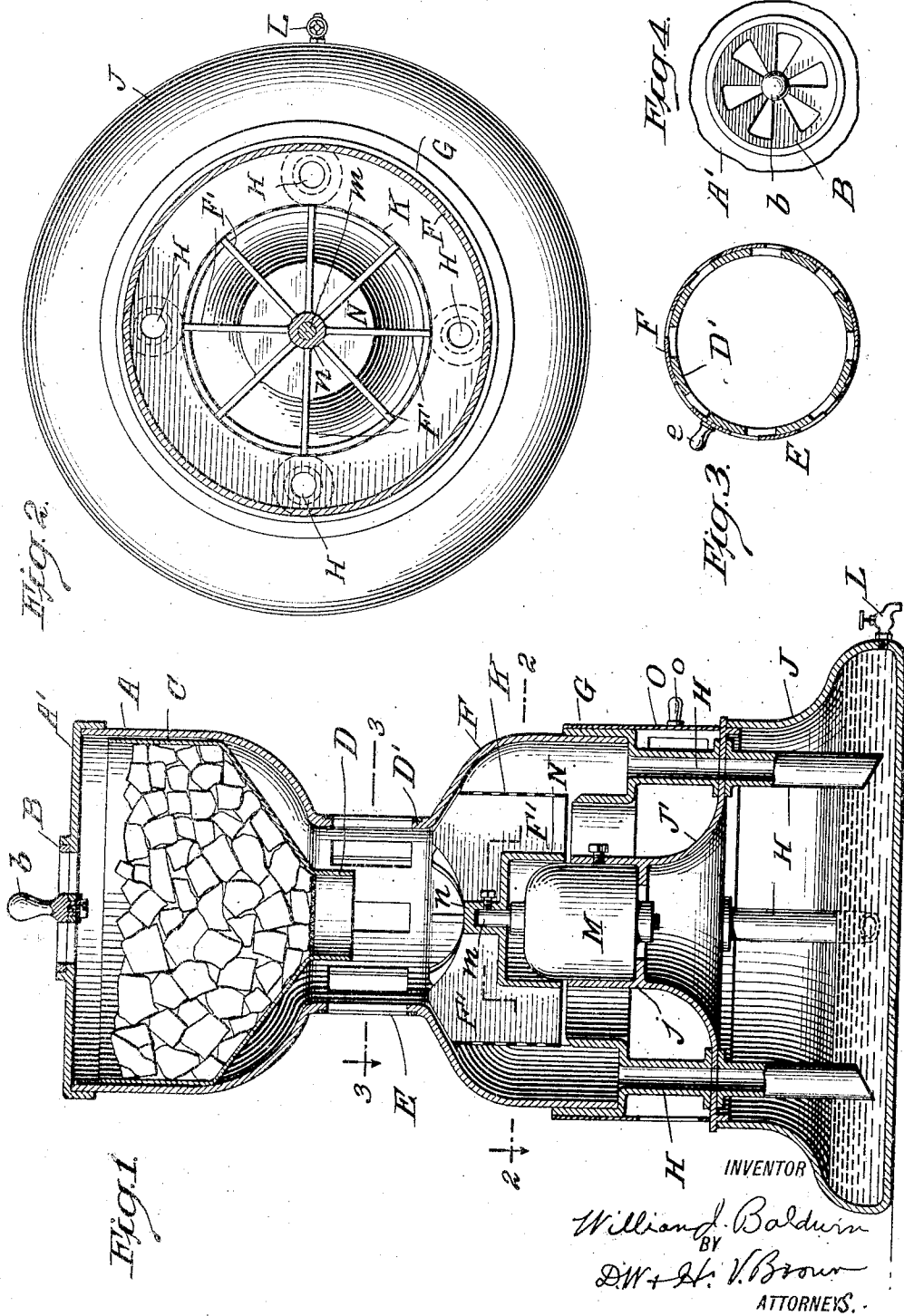


W. J. BALDWIN.
ART OF COOLING AND DRYING AIR.
APPLICATION FILED SEPT. 26, 1917.

1,292,562.

Patented Jan. 28, 1919.



UNITED STATES PATENT OFFICE.

WILLIAM J. BALDWIN, OF BROOKLYN, NEW YORK.

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Specification of Letters Patent.

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Application filed September 26, 1917. Serial No. 193,249.

To all whom it may concern:

Be it known that I, WILLIAM J. BALDWIN, a citizen of the United States, and a resident of the borough of Brooklyn, in the county of Kings and State of New York, have invented certain new and useful Improvements in the Art of Cooling and Drying Air, of which the following is a specification.

10 This invention relates to improvements in the art of cooling and drying air, and as well to the process as to the apparatus.

The invention is useful, among other purposes in the ventilation of apartments in hospitals, hotels and private living apartments; and one especial use is as a "table air cooler", for cooling the air at dining tables in hotels and other buildings. For the apparatus, by which the process is operated, can be made in such small sizes that one of them can be put on a table, and, if desired, concealed in foliage and flowers, or by other decorative devices, and furnish dry cooled air to the great comfort and satisfaction of the diners, especially in hot muggy weather.

The invention is based upon the application of the following principles, among others:—

30 The hygrometric quality of air, that is, its ability to take up watery vapor, depends among other things upon the temperature of the air; the ability of the air to take up watery vapor rising as the temperature of the air rises. The moisture remains in the air as a gas at the temperature and pressure of steam at the same temperature as the air is. This gas is somewhat lighter, in its specific gravity, than the air, and can not, therefore, while in this gaseous condition, be separated from the air by the centrifugal force of rotation.

If, however, we lower the temperature of the air, we diminish its ability to contain 45 watery vapor; and, if the air is near the saturation point for its given temperature, then, by lowering the temperature of the air below its saturation temperature, we condense the watery vapor, and, so to say, squeeze it out of the air in the form of dew or other appreciable vapor (not a true gas) of water, and we thereby put the water into a form in which the centrifugal force arising from rotation of the air and such dew

or vapor will drive said dew or vapor out 55 of and separate it from the air, if we provide separate receptacles for the water and prevent its return into the air.

By the proper application of the steps of cooling the air to separate the watery gas, 60 condensing it into the form of a dew or vapor which can be affected by centrifugal force, so as to separate it from the air, and preventing the return of the water into the dried and cooled air, we can ultimately 65 deliver the air free from the moisture and at any desired low temperature. We can, therefore, deliver air for ventilation and other purposes cooled and dry, and this is a matter of great utility and importance. 70

In the performance of my process, I can, as will appear from what has been hereinbefore stated, use melting ice as the air cooling agent. (and which is, in fact, one of the most convenient agents in use and 75 most readily obtained). For, although the melting of the ice tends to make the air very damp, up to its point of saturation and even beyond, so that such damp air would be very unpleasant for many people; 80 yet, as will be plain from what has been before said, I can bring the air to a temperature at which the excess moisture, that has been added to it from the melting of the ice, will be separated, and will be seized 85 upon by the centrifugal force and thrown out of the air; leaving the air cooled and dry and agreeable.

Of course, other cooling agents than melting ice can be employed; in fact, any method 90 for cooling the air may be used in connection with this invention, and the claims are therefore not limited to a process in which the cooling agent is ice, but include the use of any and all air cooling agents. 95

In the drawings, which accompany the specification to aid the description, a simple form of apparatus, which is adapted to be used as a table air cooler, is illustrated: but 100 of course, the invention is not limited to such a cooling apparatus. In said drawings, Figure 1 is a longitudinal vertical section of a table air cooler. Fig. 2 is an enlarged plan and horizontal section on the plane of the broken line 2—2. Fig. 3 is a 105 section on the plane of the line 3—3 of Fig. 1, and illustrating a rotary air outlet damper, located below the ice container.

Fig. 4 is a horizontal section and plan of the valve or damper at the air inlet, which opens into the vessel containing the cooling substance.

5 A, is a vessel preferably of metal and of cylindrical cross section, provided with a removable cover A', having an air inlet passage controlled by a valve or rotary damper B, with a handle *b* to rotate the same, and containing a receptacle C for ice or other air cooling substance. When ice is to be used, said receptacle C is preferably formed of suitable wire mesh or perforated sheet metal, and the mouth or outlet sleeve 10 D of said receptacle C (which receptacle is preferably of conoidal shape at its lower part), is also closed by perforated sheet metal or wire mesh as indicated.

Said vessel A is connected by a perforated sleeve D' with the open flanged upper end of an inverted bell F, which is fitted at its open lower edge into an annulus G, which is provided with any suitable number of hollow legs H—H; said legs serving as 25 drain pipes to convey the water which is separated out of the air to the liquid receptacle J, from which the water may be removed when necessary by a cock L. Since the suction induced by a fan draws in air 30 through said perforated sleeve D, I prefer to increase the control over the amount of air by equipping said sleeve D with a rotary damper E, provided with a handle *e*, so that said damper or valve E may be adjusted to 35 the amount of air which it is desirable to admit through said damper.

In said bell F is located a rotor or fan provided with any suitable number of blades F', and revolved by any suitable motor M, 40 preferably an electric motor. Secured to the outer end of said fan blades F', is a perforated screen of wire mesh or any suitable metal K. A convenient construction for connecting the fan blades with the motor is to 45 fasten the hollow rotor boss *n* of the hub N to the motor shaft *m* as indicated in Fig. 1, so that the water falling on the top of hub N is broken into a spray and thrown outward. Suitable bearings for the axis of 50 said rotor and the shaft of said motor are provided in the stationary part of the apparatus; and I preferably form the cover of said water receptacle J with a central upward extension *j*, in which is secured the stationary outer case of said motor M. 55

I prefer to provide an air outlet valve or damper O around outside of said flange G and said legs H—H, so as to regulate the escape of the cooled air; *o* being a handle 60 to rotate said damper O; and I also prefer to arrange said damper O so that it can be when desired, lifted up so as to provide an unobstructed escape for the cooled air from all around the apparatus. It may be preferable, however, in some cases, to have one 65

part of said damper O imperforate, and the other part more or less perforated, so that by shifting the damper to different positions, the direction of the escape of the cooled air may be varied as desired. 70

The process is operated by the use of said apparatus as follows:—Air entering said vessel A through the open inlet damper B, at whatever temperature and hygrometric condition the atmosphere may be, is drawn 75 down through the ice by the suction induced by said fan blades F', being cooled as it passes through the ice, so that its point of saturation is lowered, and the watery gas is condensed into dew or watery globular 80 vapor. The swiftly revolving fan imparts high rotary velocity to the air and the free dew or watery vapor therein (hereinafter termed water) and throws said water out of the air and out through said revolving screen 85 K, which prevents the return of the water to again mix with the now dried and cooled air. The water therefore falls down and passes through said hollow legs H—H into said water receptacle J, from which it is 90 drawn off as desired by a cock L. The dried and cooled air, (being lighter than the water, and the space outside of said screen K within said bell F being closed against the escape of air) remains within said screen K, and 95 passes down and outwardly through the opening or openings in said outlet damper O, supplying delightful cool and dry air at the table.

It will be understood that said apparatus 100 can be located in any desired place or position, as being suspended from ceilings, supported on walls, or placed in other positions, and that in all cases, the process operates in substantially the same manner as 105 hereinbefore explained.

It will also be readily understood that the volume of air admitted through said inlet valves B and E, can be regulated according to the degree of opening of said valves, and 110 that the volume of the dried and cooled air discharged can be thereby regulated as well as by said discharge valve or damper O.

Now having described my improvements I claim as my invention: 115

1. The combination in apparatus for cooling and drying air of a receptacle provided with air inlet and outlet for air cooling material, a fan operatively connected with said receptacle to induce a flow of air through 120 said cooling material and to expel the watery vapor by the centrifugal force induced by said fan, a perforated screen outside of said fan, a closed receptacle outside of said screen provided with outlets for the expelled water, 125 and a separate discharge conduit for the cooled dry air from the interior of said screen.

2. The combination in apparatus for cooling and drying air, of a receptacle for air 130

cooling material, a fan adapted to break water into a spray and to expel water from the cooled air, a channel connecting the said receptacle with the fan within the periphery of said fan, and separate air passages for the dry and cooled air and for the water expelled therefrom.

Signed at New York city, in the county of New York and State of New York, this 21st day of September, A. D. 1917.

WILLIAM J. BALDWIN.

Witnesses:

WILLIAM PATTERSON,
WALTER N. HARRIS.