Feb. 8, 1927. 1,616,545

J. F. PERKINS

AIR COOLING DEVICE

Filed April 6, 1925

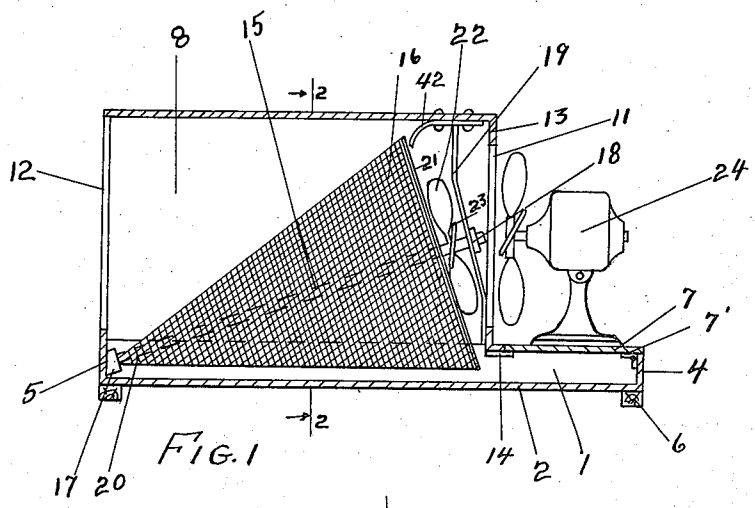


FIG. 1

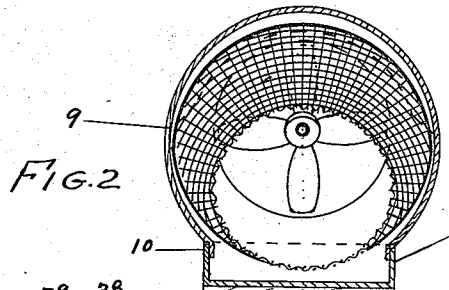


FIG. 2

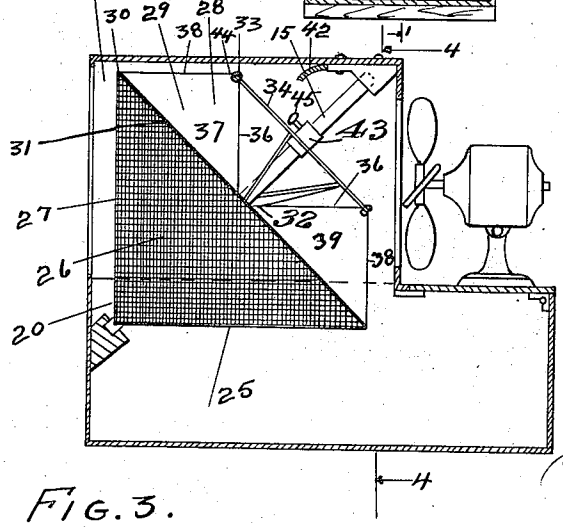


FIG. 3.

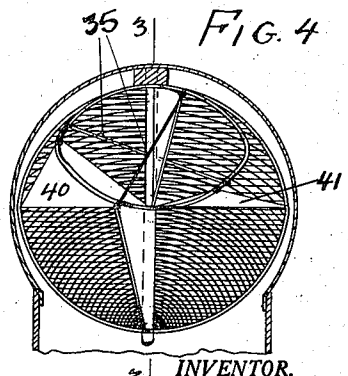


FIG. 4

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UNITED STATES PATENT OFFICE.

JAMES F. PERKINS, OF HAYWARD, CALIFORNIA.

AIR-COOLING DEVICE.

Application filed April 6, 1925. Serial No. 21,060.

My invention is an air-cooler and humidifier intended to cool air by the evaporation of water and humidify the air by the moisture taken up by a current of air. My invention comprises, as illustrated, a device having a pan for water, an arrangement for raising a thin film or globules of water and a casing to direct a current of air through the device. The cooler and humidifier is operated by the air current and it is preferable to use a portable electric fan for this purpose.

The embodiment of my invention shown herein, comprises a tank and a casing mounted above the tank, open at the front and back, and having a conical shaped wire or fabric netting rotating on a tilted axle. The axle and the conical shaped wire mesh fabric is positioned so that as the cone rotates one part dips into the tank and lifts a certain amount of water which clings to the wire and to the interstices of the mesh. The current of air being blown through the casing and the exposed part of the cone causes the air to absorb some of the moisture and become cooled as well as humidified. The device may be driven in any suitable manner, but a simple way is to mount propeller blades similar to fan blades on the axis or on the cone surrounding the axis and blow a current of air by an electric fan against these blades.

In its broad aspects my invention comprises a method and apparatus for humidifying and also cooling air if desired, in that the current of air rotates the device for lifting the water into the path of the current of air and this current takes up the moisture. While my process and its application is substantially the same, whether applied to a small portable device or to a large installation in the ventilating plant of a building, the basic principle is substantially the same.

My invention may be used with water of the ordinary temperature, and the hotter and drier the air is, the more rapidly it will take up moisture and become cooled. Should it be desirable ice-water may be used as I have provided a place for introducing packed ice or a block of ice. When used in a ventilating plant for buildings, it may be desirable to use hot water in order to heat the air at the same time it takes up the moisture. The device may also be used as a simple way of lifting a liquid to be vaporized to give a pleasant odor, disinfect a room, or in a case of treatment of convalescents or people with lung diseases, with air saturated with salt moisture by evaporating a brine, in a sufficient current of air to carry some of the salt in the minute globules of water held in suspension in the air. Other uses of my device will be apparent as well as different ways of using my method of evaporation of a liquid in a current of air or other gases.

My invention will be more readily understood from the following description and drawings in which:

Figure 1 is a longitudinal section of my humidifier with the casing and tank shown in section and the conical screen in side elevation.

Figure 2 is a vertical cross-section of Figure 1 on the line 2—2 in the direction of the arrows, illustrating one side of the cone dipping into the tank with the blades at the front end.

Figure 3 is a slight modification of the construction of Figures 1 and 2 in which the conical mesh is a right-angled cone, that is, with the right angle at its apex, and with the fan-blades directly attached to the base of the cone. In this construction the blades, whether in the lower or upper position of their rotation, have one edge at right angles to the current of air. This is a vertical longitudinal section, on the line 3—3 of Figure 4. Figure 4 is a vertical cross-section of Figure 3 on the line 4—4 in the direction of the arrows, illustrating particularly the sheet-metal blades attached to the base of the conical screen.

Referring particularly to Figures 1 and 2 the water-tank is designated by the numeral 1 and is constructed with a base 2, sides 3, front and rear ends 4 and 5, and is supported by short legs 6. The front end of the tank is covered by a lid 7 hinged to the front wall 4 as shown at 7′ so that it may be opened to allow ice to be introduced, water to be poured into the tank and the latter to be cleaned.

The casing or housing is indicated generally by the numeral 8 and is preferably constructed to form part of a cylinder 9 made of a piece of curved sheet metal. The cylinder 9 is joined to the walls 3 by flanges 10 and is suitably secured thereto. The casing 8 is open at front and back 11 and 12 and may have an inturned flange 13

at each end if desired. The flange 13 may be secured to a horizontal part 14, which forms one side of the support for the lid 7.

A shaft or axle 15 to support the wire screen 16 is pivoted in an inclined position having a bearing 17 at its lower end in the tank and a bearing 18 at its upper end supported by a bracket 19 or the like secured to the cylinder 9 and the flange 13 as shown. The shaft has a framing of any desired type over which is stretched a mesh fabric in the shape of a cone, with the apex 20 adjacent the bearing 17 and the base 21 facing the front open end 11 of the casing. A fan or wind-wheel 22 is suitably secured to the axle 15 and has blades 23 suitably shaped to rotate the axle 15 and the screen 16.

The air current is preferably developed by an electric fan 24 of the ordinary type, which may be mounted on the shelf 7. Although the axle and the fan 22 are inclined to the current of air, they are readily rotated, and continuously dip different sections of the circumference of the cone into the water. This mesh cone lifts some of the water, which is taken up by the current of air, thereby humidifying the air as well as cooling it. It is obvious that an absorbent fabric such as gauze, cotton, linen or the like may be used.

The device shown in Figures 3 and 4 operates on the same principle but shows a much shorter casing 8. In this construction the cone is made right angular, that is, its apex 20 forms a right angle so that when the lower segment 25 of the mesh cone 26 is submerged in the tank, the vertical segment 27 is substantially at right angles to the draft of air from the electric fan 24. In this construction the wind-wheel 28 is preferably constructed of a series of triangular blades 29, which are secured at their outer corners 30 to a ring 31, forming the base of the cone, their inner corners 32 being secured to the axle or shaft 15, and their apex 33 being secured to a ring 34, of wire or the like. This ring preferably has cross-wires 35 secured to the axle 15, although this is not necessary. The apex of each blade is on a radial line somewhat offset from the radial line of the base 31, and therefore forms an inclined surface against which the wind blows. The feature of this construction is that the inner edges 36 of the blades are substantially at right angles to the current of air when in the vertical position, when the blades are in the upper part of their rotation, as indicated by the blade 37. The edges 38 of the blades are in a similar vertical position in reference to the current of air, when the blades are in the lower part of their position, as indicated by the blade 39. As many blades as desired may be used but there are only four shown, the other two being designated 40 and 41. It will be noted that during part of its rotation, that is, on the right hand side of Figure 4, the blades may not have very much driving function, depending upon the angle at which they are set. However, this is immaterial for if they are set at a large angle they will have a larger driving wedge function in the other positions.

If it is found that the air blown by the electric fan tends to pass over the top of the coned netting, a deflector 42 may be secured to the top of the casing 8, (as shown in Figures 1 and 3) by rivets or the like and extend part way down the sides to deflect the air towards the center.

Various types of fans or air-wheel blades may be secured to the cone shaped screen in order to cause its rotation.

The cross wires 35 may be connected to a collar 43 slidably mounted on the axle 15 and attached thereto by means of eyelets 44. This arrangement allows the collar 43 to be moved slightly up and down on the inclined shaft, to be turned, and to be locked by means of a set screw 45.

My invention may be materially modified as to method of operation and in detailed construction to suit different circumstances, such as the size of the installation to make different types of portable devices.

Having described my invention what I claim is:—

1. In a humidifier of the character described, a tank adapted to contain a body of liquid, a rotatably mounted conical screen having an open base and having its axis inclined to the surface of the liquid and having its lowermost surface element substantially parallel to and slightly below the liquid surface, means for forcing an air blast through the non-submerged portion of the screen from the open base thereof and means fixed relative to the screen utilizing the air blast for rotating the screen.

2. In a humidifier of the character described, a tank adapted to contain a body of liquid, a rotatably mounted conical screen having its axis inclined to the surface of the liquid and having an open base and having its lowermost surface element substantially parallel to and slightly below the liquid surface, means for forcing an air-blast through the non-submerged portion of the screen from the open base thereof, and a fan fixed relative to the screen near the open end thereof utilizing the air blast for rotating the screen.

In testimony whereof I affix my signiture.

JAMES F. PERKINS.