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PORTABLE HUMIDIFIER

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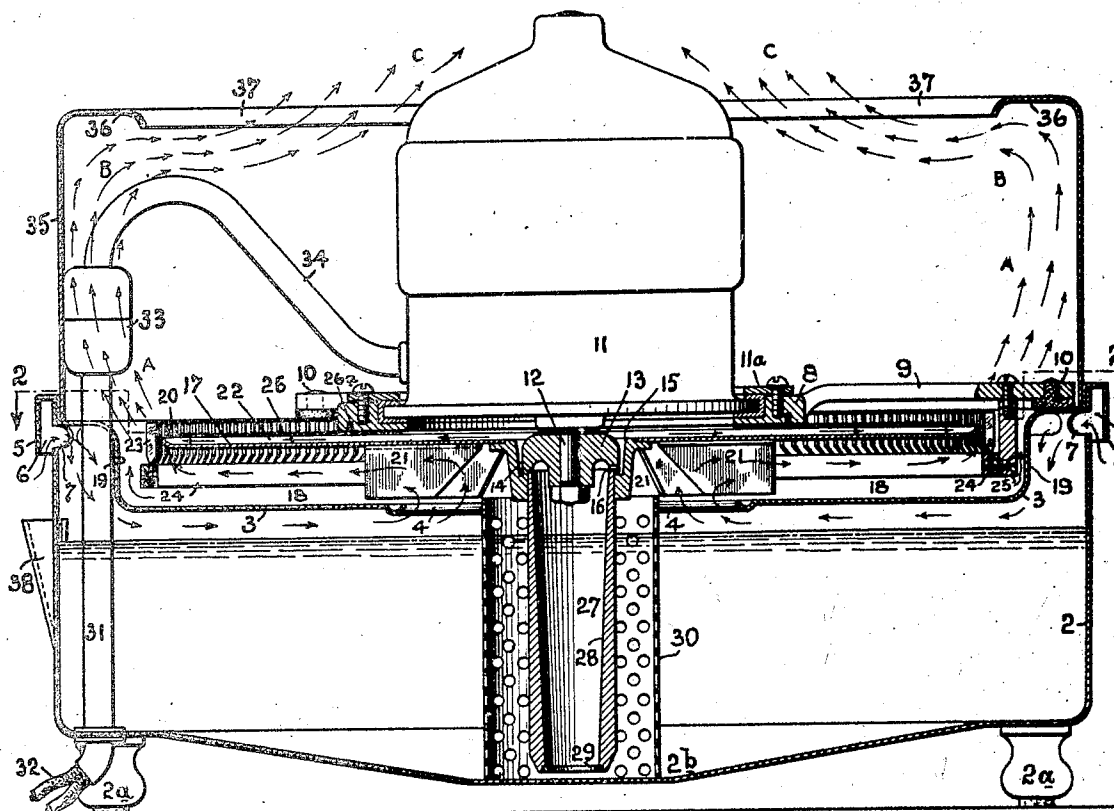


FIG. 1

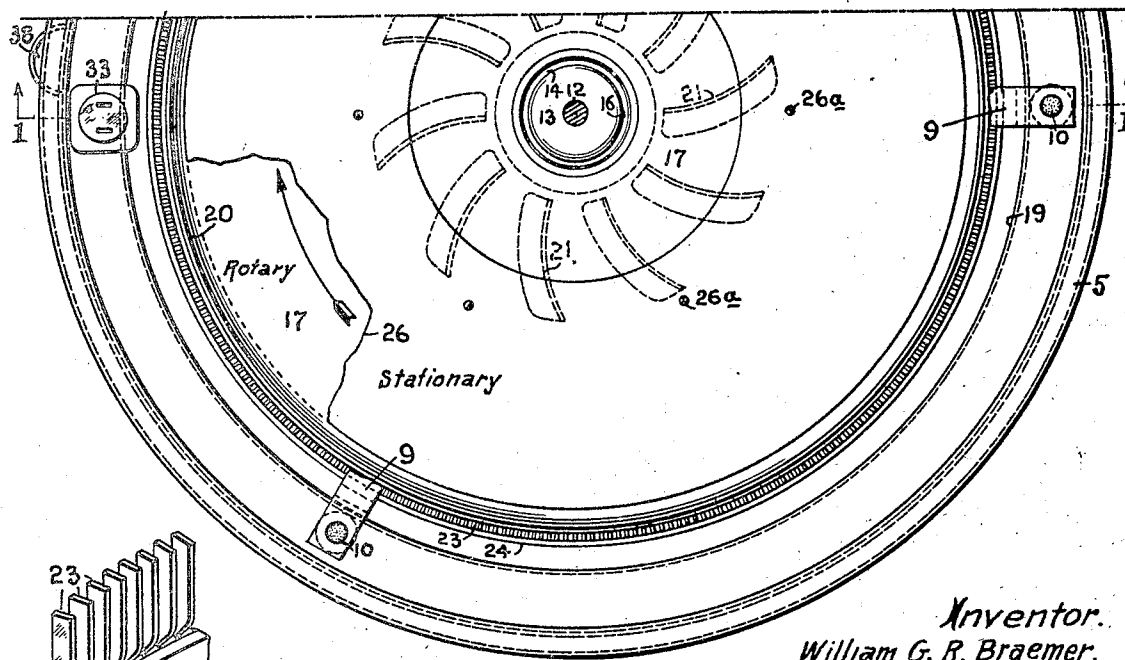


FIG. 2

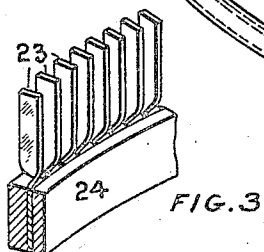


FIG. 3

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PORTABLE HUMIDIFIER

Application filed September 1, 1928. Serial No. 303,595.

The object of my invention is to provide a simple, inexpensive and efficient construction of a portable humidifier adapted for use in homes, offices and other places, where a low relative humidity normally exists and far below that which should be provided for comfort with the temperature existing therein.

With the above and other objects in view, the nature of which will be more fully understood from the description hereinafter, the invention consists in the novel construction of a portable humidifier, as hereinafter more fully described and defined in the claims.

For the purpose of illustrating my invention, I have shown, in the accompanying drawing, the embodiment thereof which is at present preferred by me, since the same is in form to give satisfactory and reliable results.

Referring to the drawing: Fig. 1 is a vertical sectional view of my improved humidifier, taken on line 1—1 of Fig. 2; Fig. 2 is a horizontal section of the same, taken on line 2—2 of Fig. 1; and Fig. 3 is a perspective view, on a larger scale, showing the construction of a portion of the dissipating or baffle means for mechanically vaporizing the water film.

2 illustrates a circular tank preferably formed with supporting feet 2a whereby it is sustained above the table or place of support, said tank being open at the top and provided about its upper edge with a plurality of air inlet ports 7. Furthermore, the bottom of the tank is preferably depressed, as at 2b, to cause the water level to become relatively low, and whereby, with a given minimum of water, the central rotary centrifugal pump is caused to be operative by insuring a sufficient minimum depth into which the rotary member of the pump extends, as hereinafter more fully described.

Fitting over the upper edge of the tank 2 is the flanged portions 5 of a transverse annular diaphragm plate 3 which extends downward into the tank 2 but at a level above the water therein, as indicated in Fig. 1. This diaphragm 3 is open at its center, as indicated at 4, and near its outer portion it is provided with a vertical annular wall 19, for

purposes later to be described. The flanged portion 5 of this annular diaphragm forms, with the outer portion of the body 2, an annular channel 6 open at the bottom to the atmosphere and adapted to guide the air upwardly thereinto and then laterally through the aperture 7 into the space within the tank and below the diaphragm 3 thereof.

Arranged within the upper portion of the tank 2 is a spider frame having a ring-shaped center 8 and radial arms 9, the outer ends of the arms being cushioned at 10 upon the upper and outer portion of the annular diaphragm plate 3. An electric motor 11, preferably flanged at its lower part, is fitted to the ring-shaped portion of the spider 8 and clamped in position by the clamping ring 11a. In this way, the motor is firmly secured to the spider and the spider to the annular diaphragm plate 3. Any other suitable manner of securing the motor to the spider may be employed, if so desired.

Arranged slightly below the spider is a disk 17 lying in a substantially horizontal plane and preferably having its circular perimeter curved slightly upward as at 20, the center of the said disk being secured to a hub 13 which, in turn, is secured to the electric motor shaft 12 and by which the disk is given a high rate of revolution. The hub of the disk is made with a deep annular groove 14 at its upper part and providing a preferably flaring annular wall 15, the upper edge of which is on a level with the inner or central portion of the disk 17, and the hub so provided is furnished with a transverse aperture 16, for purposes to be later described.

Secured within the lower part of the hub 13 is the upper end of a cylindrical pump barrel 27, said upper end being substantially level with an aperture 16 opening through the hub into the lower part of the annular groove 14. The interior wall 28 of this tubular pump barrel is slightly tapering, being largest at the top and smallest at the bottom, and the bottom portion is extended down very closely to the bottom of the depressed portion 2b of the tank 2, and preferably fitted thereat with an annular ring 29 providing an opening into the pump barrel and

a slight inwardly extending shoulder below the bottom of the tapering wall.

Surrounding the pump barrel 27 is a perforated cylindrical screen 30 of a suitable character to protect the pump from receiving any objectionably large obstructing matter. The operation of this pump depends upon centrifugal action, the slight flare in its interior wall 28 causing the water to rise as a film upon said interior wall and finds its way through the aperture 16 into the annular channel 14, and thence again rises under centrifugal action over the flaring wall 15 to the top level of the revolving disk 17. In this manner, the annular groove 14 is substantially filled with water at all times and delivers therefrom in a radial manner the water upon the disk 17 which, under centrifugal action, spreads over the upper surface of the disk in a gradually increasing attenuated condition in that the film delivered to the disk at the center thins out as it covers the increasing area over which it is required to spread. In this manner, the water film which leaves the perimeter of the disk 17 is exceedingly thin or attenuated and is being revolved at a high rate of speed and, under centrifugal action, tends to fly off from the edge of the disk and break up into mist.

To assist this action and dissipate the attenuated film of water into a fine mist, I provide an annular row of dissipating blades or baffles 23 arranged about the perimeter of the disk 17 in an annular frame 24, and the blades thereof made flat and in substantially radial planes with respect to the disk. As the annular film leaves the disk 17, it strikes the dissipating blades and breaks the film up into a fine mist. The slight upward inclination to the water film, induced by the curvature 20 of the perimeter of the disk, tends to direct the mist in an upward direction, as indicated by the arrows. The annular frame 24 is secured to downwardly extending brackets 25, the upper ends of which are secured to the arms 9 of the spider and the lower ends to the annular frame 24, as more fully shown in Fig. 1.

Secured to the under portion of the centrifugal disk 17 and adjacent to the hub 13 thereof, I provide a number of blower or fan blades 21 which are preferably secured to the disk and extend downward toward the open center 4 of the annular diaphragm 3. These blades are extended radially beyond the edge of the opening 4, but their inner ends are preferably made oblique and terminate immediately above the said opening 4 of the diaphragm. In this manner, the air which passes between the water and the diaphragm 3 is permitted to pass upwardly through the opening 4 and between the blower or fan blades 21, thereby providing free circulation of the air into the fan or blower with a minimum resistance. Furthermore, this air han-

dled by the fan is driven radially through the annular air passage 18 above the annular disk 3 and below the bottom surface of the water film producing disk 17. In this manner, the air being circulated is entirely out of contact with the water film being produced, so that there is no detrimental or disturbing effect of the air upon the water.

When the air reaches the perimeter of the disk 17, it continues under the annular frame 24 through the spaces between the blades 23 of the dissipator and assisting in further dissipating the water into vapor. Moreover, there is a large portion of the air current which passes beyond the annular frame 24 and vertically upward between the dissipator blades 23 and the wall 19 of the annular diaphragm 3, and said air assists in directing the mist upward as indicated by the arrows in Fig. 1.

35 is an upper casing which fits snugly down into the upper portion of the annular disk 3 and by which it is supported. This upper casing 35 is curved inward at its upper end, indicated at 36, and the annular flange so provided leaves a large central opening 37 which surrounds the upper part of the electric motor 11. It will be understood that this upper casing operates as a guiding means for the vapor which rises from the humidifier proper at A, and as indicated, the said vapors are directed centrally from B to C toward and above the motor and thereafter dissipated into the room, so that a person standing close to the humidifier would not become wet with moisture.

Immediately above the horizontal disk 17 is arranged an annular plate 26 parallel to the disk 17 and preferably of slightly less diameter. This plate 26 is secured to the ring-shaped part 8 of the spider by means of screws 26a and when in position, provides a shield above the revolving disk 17 and a very narrow radial passage 22 between the disk 17 and plate 26, all of which will be readily understood by reference to Fig. 1.

In the preferred form, as shown, the plate 26 is stationary and will prevent the fingers from coming in contact with the revolving disk, if for any reason they be thrust down into the humidifier. Moreover, in filling the tank with water, it is only necessary to pour the water through the opening 37 at the top of the upper casing and permit it to be received upon the ring-shaped part 8 of the spider and the plate 26, thus protecting the revolving disk 17 from any distortion or injury by the weight of the water carelessly introduced. When the water is received in this manner, it passes into the space 18 above the annular diaphragm 3 and thence flows inward and down through the annular aperture 4 into the tank 2. When filling the tank 2 by pouring the water into the upper open end of the casing 35, the attendant may gage the

proper height of the water in the tank 2 by observing its rise through the side opening 38 in the tank.

The electric current may be supplied to the electric motor 11 in any suitable manner, but this is conveniently done as shown in Fig. 1. A tube 31 is secured to the bottom of the tank 2 and extends somewhat above the tank and contains the electric wires 32 and one member of a suitable coupling 33 at its top. 34 is a tubular portion secured to the motor and containing the electric wires therefor and which are provided at the other end with the other portion of the coupling 33. This coupling 33 may be of any of the usual plug structures in common use.

It will be understood that, by reason of the motor and rotating parts being in perfect dynamic balance, so as to run smoothly and without material vibration, the weight of the motor and connected parts retain the operative means in proper running position within the tank and yet permit the electric motor 11, the revolving disk 17 and dissipator blades or baffles 23, together with the blower 21 and the pump 27, to be bodily lifted out of the humidifier tank by first removing the casing 35 and separating the circuit coupling 33. This gives full access to the humidifier mechanism for repairs, cleaning or other purposes.

The general shape of the upper casing 35 may be varied in design to suit the fancy of the maker or user of the device, and it will be readily understood that such shapes may embody characteristics of urns or artistic designs of other characters, so that, aside from efficiency, the device may have pleasing artistic qualities.

Under cold air conditions, a relatively small amount of moisture exists in the normal air and when said air is heated to 70° F. in the winter time, it becomes relatively sixteen times drier than it was at a zero temperature, and this small amount of normal moisture gives to the air the characteristic which is commonly designated as low relative humidity.

Experience has demonstrated that comfort and health require a relative humidity of from 35% to 40% of what would be saturation of the air at the given temperature of 68° or 70° F., which would be obtained by radiators or other heating means common for heating buildings.

Just as high relative humidity in summer-time is debilitating and exhausting, so in winter-time, with highly heated rooms, a low relative humidity is objectionable in causing a dry skin and attendant conditions which induce colds and other diseases, and especially is this the case where the heating means are radiators within the rooms as distinguished from hot air and indirect heating wherein the outside air is delivered into the room after being heated; but even in the latter case, the

humidity is too low to meet the physical requirements of the occupants. My improved portable humidifier produces a fine vapor so thoroughly attenuated that it is absorbed into the atmosphere readily and quickly, whereby it is diffused through the room or compartment under natural circulation and increases the relative humidity to the desired degree, namely to 35% to 45% with a room temperature of 68° to 70° F.

A machine of the character here described, twelve inches in diameter, will cause the vaporization of approximately one and one-half pounds of water per hour, the same being sufficient to properly humidify the air of three or four average rooms or of a large office, having about four thousand cubic feet of space, for example, and during average winter conditions.

It will now be apparent that I have devised a novel and useful construction which embodies the features of advantage enumerated as desirable, and while I have in the present instance shown and described the preferred embodiment thereof which has been found in practice to give satisfactory and reliable results, it is to be understood that I do not restrict myself to the details as the same are susceptible of modification in various particulars, without departing from the spirit or scope of the invention.

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

1. A humidifier comprising a tank having its upper portion provided with an annular diaphragm plate open at its center, a motor supported above the annular diaphragm plate, a horizontal rotatable disc secured to the motor shaft and arranged above the annular diaphragm plate, a centrifugal water pump of tapered cylindrical form axially arranged below the motor and rotated by it and extending through the central aperture of the annular diaphragm plate, fan blades secured in close relation to the under side of the horizontal disc and arranged between it and the annular diaphragm plate and immediately above the central opening therein, stationary dissipating means arranged in annular form about the perimeter of the horizontal disc, and a casing above the tank extending above the disc and dissipator means for directing the humidified currents of air upwardly above the motor, said rotatable disc being secured to the motor shaft by a hub having in its upper surface a deep groove terminating at its top with the rotatable disc and provided at its bottom with a transverse aperture communicating with the interior of the centrifugal pump.

2. A humidifier comprising a tank having its upper portion provided with an annular diaphragm plate open at its center, a motor supported above the annular diaphragm

plate, a horizontal rotatable disc secured to the motor shaft and arranged above the annular diaphragm plate, a centrifugal water pump of tapered cylindrical form axially arranged below the motor and rotated by it and
5 extending through the central aperture of the annular diaphragm plate, fan blades secured in close relation to the under side of the horizontal disc and arranged between it and the
10 annular diaphragm plate and immediately above the central opening therein, stationary dissipating means arranged in annular form about the perimeter of the horizontal disc, and a casing above the tank extending above
15 the disc and dissipator means for directing the humidified currents of air upwardly above the motor, said rotatable disc being secured to the motor shaft by a hub having in its upper surface a deep groove terminating at its top with the rotatable disc and provided at its bottom with a transverse aperture communicating with the interior of the centrifugal pump, said groove gradually tapering upwardly and outwardly.

25 In testimony of which invention, I hereunto set my hand.

WILLIAM G. R. BRAEMER.

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