Feb. 19, 1935. W. L. FLEISHER 1,991,976

CONDITIONING UNIT

Filed Sept. 18, 1931

Fig. 1.

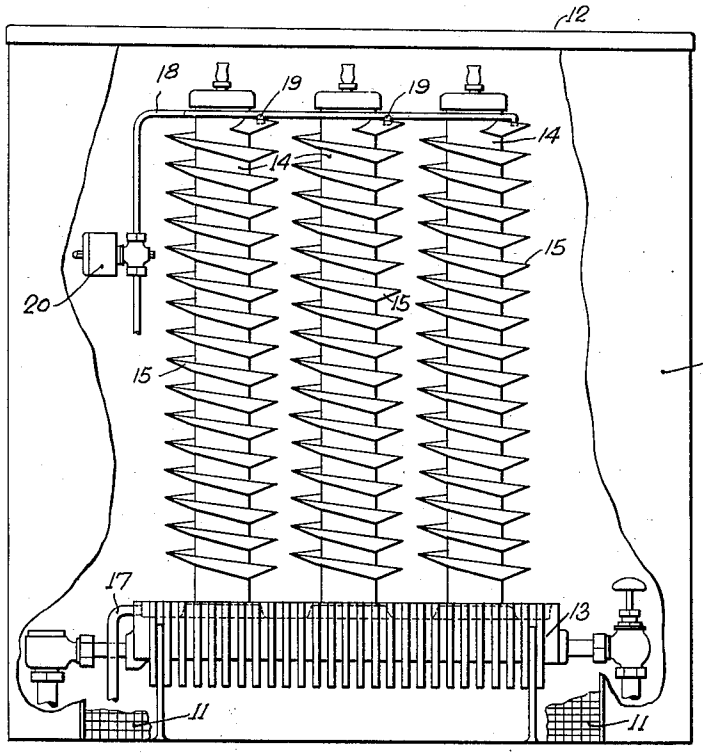


Fig. 2.

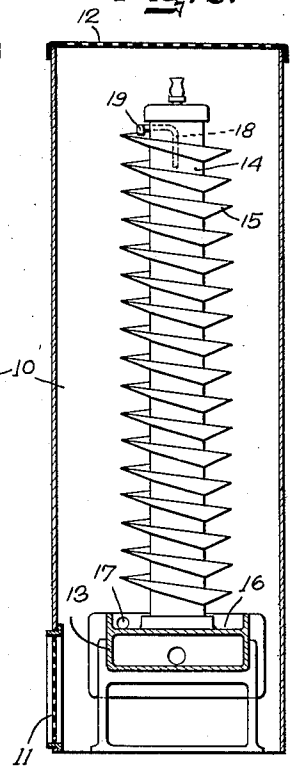


Fig. 3.

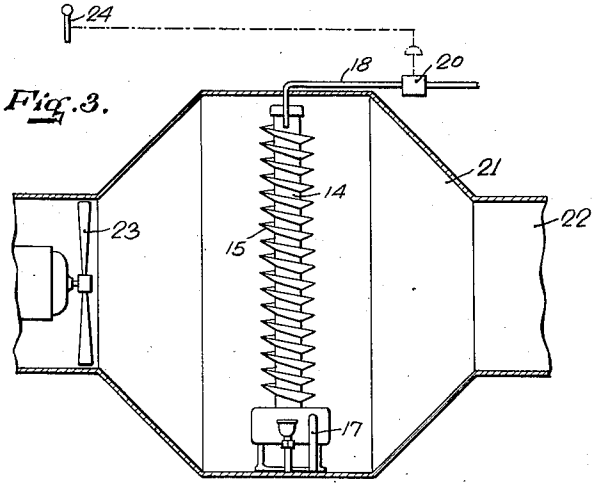
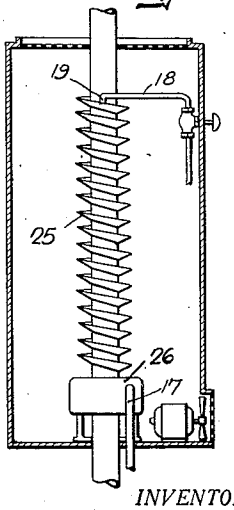


Fig. 4.



INVENTOR.
WALTER L. FLEISHER,
BY
Duell, Dunn & Anderson
ATTORNEYS.

Patented Feb. 19, 1935 1,991,976

UNITED STATES PATENT OFFICE

1,991,976

CONDITIONING UNIT

Walter L. Fleisher, New York, N. Y.

Application September 18, 1931, Serial No. 563,480

4 Claims. (Cl. 261—15)

This invention relates to an air-conditioning unit and especially a humidifier which embodies structurally and functionally improved characteristics.

It is an object of the invention to provide an apparatus of this character which will be of extremely simple construction and embody relatively few parts, which may be assembled readily to furnish a unitary apparatus operating over long periods of time with freedom from difficulty.

A further object of the invention is that of constructing a humidifier which may be employed advantageously to maintain or to control the air condition within an enclosure, and in which virtually all moving parts may be entirely eliminated, if desired. Thus, the cost of maintenance will be reduced to a minimum figure, aside from the fact that the present apparatus may be employed in association with structures already in existence.

A still further object is that of providing a humidifier which will quickly condition the atmosphere of the enclosure to bring the moisture content up to the desired degree, whereupon the apparatus may function automatically to maintain the condition which is desired.

With these and further objects in mind, reference is had to the attached sheet of drawing, illustrating one practical embodiment of the invention, and in which

Figure 1 is a side view of a humidifying unit with certain of the parts broken away to disclose underlying construction;

Figure 2 is a transverse sectional view thereof;

Figure 3 shows a humidifier arranged in a duct, and

Figure 4 shows the humidifier associated with a riser, pipe or tube.

Referring primarily to Figures 1, 2 and 4, it will be noted that a casing has been indicated at 10, this casing being provided with inlet openings 11 and discharge openings 12. Obviously, as will hereinafter appear—this casing might be dispensed with but it is preferred that the same be employed so that a neat and unitary article is presented.

Disposed within the casing is a radiator or heating element including, in the present exemplification, a hollow base portion 13, from which a series of tube units 14 extend upwardly. Steam is to be circulated through the base and tubes. However, any other desired heating expedient may be employed. For example, electrical resistance elements might be disposed within the tubes; a gas flame or products of combustion could be utilized to heat the same; vapor or hot water might circulate through a proper tube or series of tubes, etc.

It is thus immaterial what source of heat is employed, or the material of which the tubes are constructed. However, it is preferred that these tubes be of material having relatively high heat-conductive qualities and that they be substantially round in cross section. Although obviously, any other suitable configuration might be resorted to.

Now, according to the present invention, it is proposed to employ fins or strips of metal, disposed one around each of the tubes 14, as has been indicated at 15. Additionally, it will be noted that the strip is, in each instance, inclined inwardly towards the outer face of the tube. Consequently, a trough-shaped channel is provided, extending downwardly throughout the entire length of the band or fin, and as a result, if water is introduced into the upper end of this trough it will flow downwardly in contact with the outer face of the tube and thus to the greatest extent be evaporated. To assist in this evaporation the band is preferably formed of metal, such as copper or aluminum. Materials such as these, having a high coefficient of transmission, will serve to transmit to a maximum amount the heat emanating from the tube 14 so as to induce evaporation on the part of the water as it moves downwardly.

Any water which has not evaporated completely after it is moved down the entire length of the band or strip will pass into the trough 16 which may preferably be formed integral with the base 13 and thus escape through the overflow opening 17.

With a view to controlling the flow of water into the upper ends of the channels provided by the fins or strips, a manifold 18 may be employed, which has outlet nozzles 19 in line with the channels and which nozzles are either individually controlled, or, as is preferable, the flow of fluid through the manifold and out the nozzles may be controlled by a valve 20 which may be manually shifted, or coupled to a thermostat or humidostat operating from the moisture content of the enclosure to be conditioned.

Obviously, due to the fact that the heat originates in a vertical column, there is a tendency for a flue action to take place and for the air to pass over the finned tube, carrying with it the moisture evaporated by contact with the hot surfaces.

Due to the fact that this contact is continuous

throughout the entire length of the fin, it will be found that under ordinary circumstances, by the time the liquid or water has traversed only a small distance of the strip it will be entirely evaporated.

With humidifiers embodying the subject matter of the present invention it will be found that accurate levelling is not necessary. If desired, a power fan, such as shown in Fig. 4, may be employed in connection therewith to induce ready circulation of air. Regardless of the latter feature, however, it will be found that by the present invention a heater construction is provided which is extremely efficient. When—as is intended according to the present invention—the apparatus is utilized as an air conditioning unit, it is preferred that, as shown, it take the form of what might be termed a spirally finned humidifier. In such form, as well as in analogous forms, liquid is distributed as a film in contact with the evaporating element, as well as the fin extending therefrom.

It will be appreciated that the latter will have substantially the same temperature as the prime heater or tube, due to its being actually or virtually an integral part thereof. In line with this, it will of course be appreciated that the fin or strip need not necessarily be sloped as acutely inwardly as has been shown in the drawing. It is preferred, however,—in order to comply with commercial requirements—that a perceptible slope be given so there shall be no danger of the liquid spilling over the edges of the film. The angle of the downwardly spiral fin may be varied with the diameter of the tube, so that the flow is more or less rapid proportionate to the entire path that the water travels in order that the length of time that the water is held in contact with the tube can be varied proportionately to the amount of water necessary to be evaporated, and also proportionate to the area of the evaporating element and the temperature of the latter, thus affording, by the very nature of the invention, practically an automatic method of varying the humidifying effect. The downwardly spiralling slope could be changed for a natural system or a fan system because with the fan system the evaporation would be more rapid and consequently the length of the spiral ribbon or fan could be shorter, due to the greater evaporation accomplished by rapid circulation of air. Thus, with different diameter tubes, but the same amount of water to be evaporated and the same temperatures inside the tubes, the number of turns around the tube per inch could be inversely proportionate to the diameter, account, of course, being taken of the increased velocity and the skin tension of the water against the tube and fin.

In case it is desired to utilize the present invention as a central heater and humidifying device, it may, as shown in Fig. 3, be enclosed within a chamber 21, having intake and outlet openings connected to ducts 22 and within one of which a power blower 23 may be positioned. Again, in this case the valve 20 may be coupled to a suitable controller 24, by means of which varying conditions may be compensated for.

If, as shown in Fig. 4, it is desired to apply the invention to a riser, this may be done by simply securing thereto in any suitable manner a spirally disposed and inwardly sloped fin element 25 and arranging at the lower end—if necessary—a catch basin 26 to receive any unevaporated liquid.

It is believed unnecessary to point out the numerous different applications of the invention. Suffice it to say that the basic function thereof will be along the principle hereinbefore described and that numerous changes in constructions and rearrangements of the parts might be resorted to without departing from the spirit of the invention as defined by the claims.

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

1. In a device of the character described, a conduit for conveying attemperating medium, a continuous helically wound extended surface of thin material capable of rapid heat conduction and integral with the conduit for aiding transfer of heat between the medium within the conduit and the atmosphere outside the conduit, the extended surface serving to collect and feed condensate to a depository in combination therewith, the extended surface causing thin surfaces of condensate to be produced thereon.

2. In a device of the character described, a conduit, extended surface on the outside of the conduit, the material of said surface being capable of rapid heat conduction, means for feeding liquid to said surface when evaporation of said liquid for humidification purposes is desired, liquid receiving means in combination with said surface, the extended surface being arranged on the conduit to deliver condensate to the liquid receiving means when the temperature of a conditioning medium within the conduit is below the dewpoint of the surrounding atmosphere, the surface being arranged to cause liquid thereon to assume a thin layer capable of rapid evaporation for the purpose of increasing the heat transfer capacity of the conduit.

3. In a conditioning apparatus, a riser, means for extending the surface of the riser, comprising a surface wound about the outside thereof to form a continuous trough, said surface comprising a thin heat conducting material wound helically around said riser and forming an angle with the axis of said riser substantially greater than forty-five degrees, means for feeding liquid to the trough when the temperature within the riser is higher than the temperature of the surrounding atmosphere, and means for collecting condensate from the trough when the temperature of the riser is lower than that of the surrounding atmosphere.

4. In a device for conditioning air, a riser, means comprising a helically wound surface of thin material in contact with the riser, the material of said surface being capable of rapid heat conduction and causing increased efficiency in heat transfer between a medium within the riser and the atmosphere surrounding the riser, means for feeding liquid to the surface to cause evaporation thereof, and means for receiving condensate from the surface when air conditions surrounding the riser require dehumidification.

WALTER L. FLEISHER.