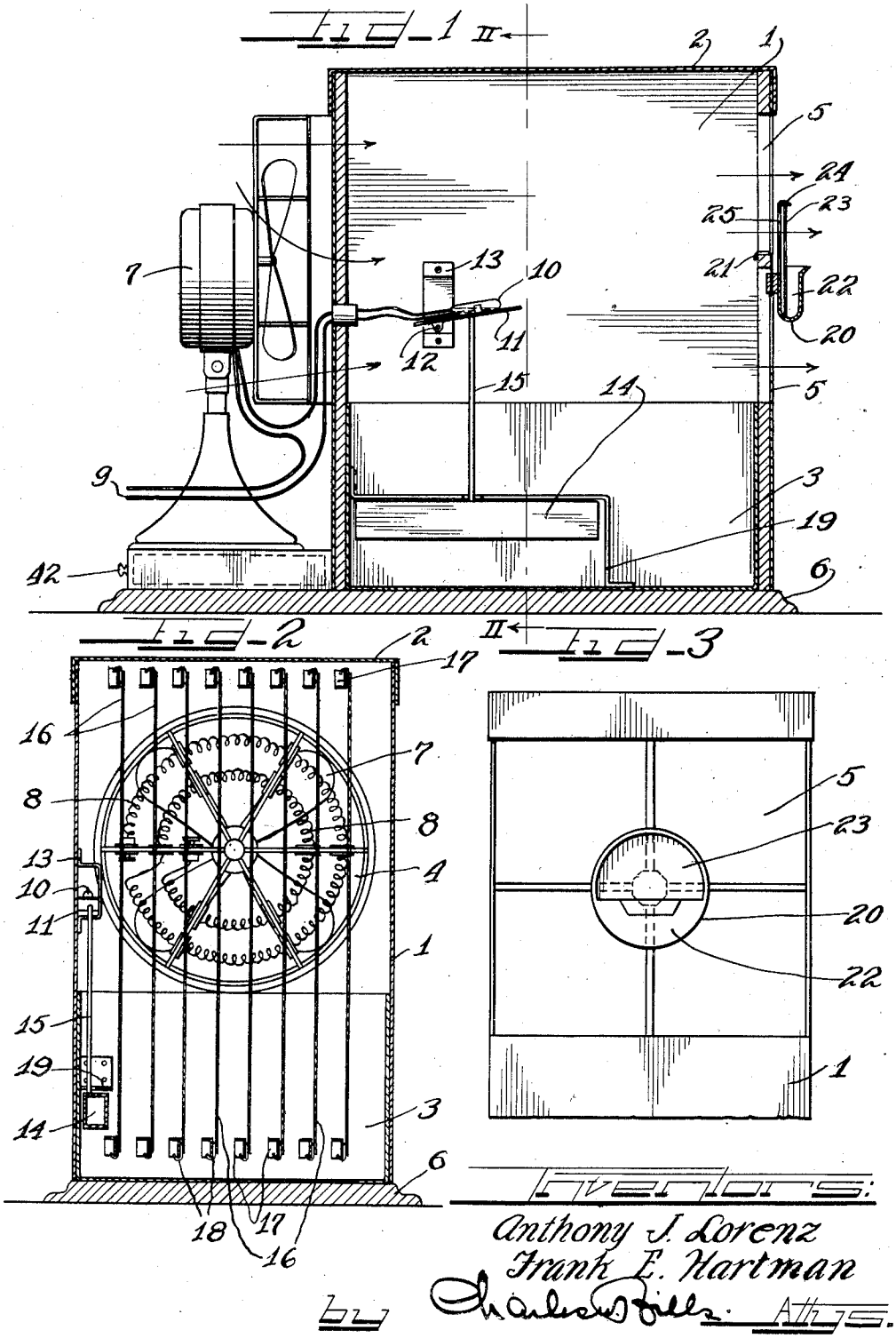
Jan. 10, 1933. A. J. LORENZ ET AL 1,893,954

HUMIDIFIER

Filed Feb. 24, 1931 2 Sheets-Sheet 1



Inventors:

Anthony J. Lorenz

Frank E. Hartman

by Charles Bills. Attys.

Jan. 10, 1933. A. J. LORENZ ET AL 1,893,954

HUMIDIFIER

Filed Feb. 24, 1931 2 Sheets-Sheet 2

Fig. 4

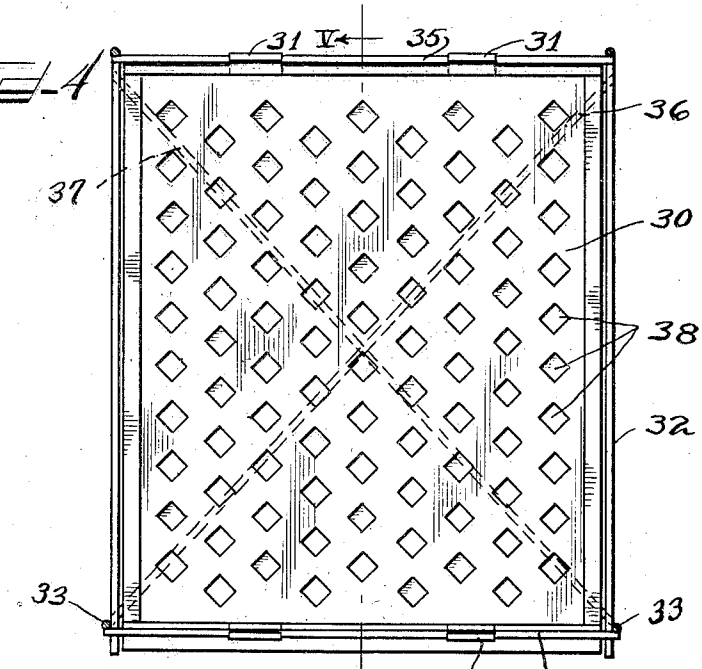


Fig. 5

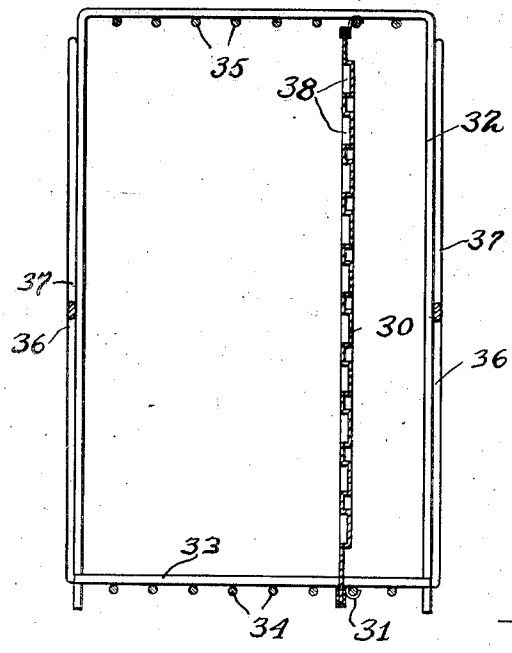
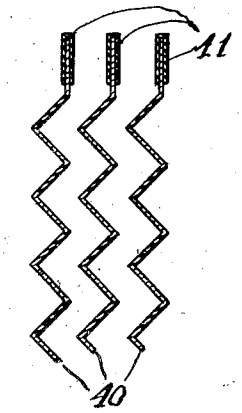


Fig. 6



Inventors

Anthony J. Lorenz

Frank E. Hartman

by Charles W. Fills Attys

Patented Jan. 10, 1933 1,893,954

UNITED STATES PATENT OFFICE

ANTHONY J. LORENZ AND FRANK E. HARTMAN, OF CHICAGO, ILLINOIS, ASSIGNORS, BY DIRECT AND MESNE ASSIGNMENTS, TO BIOLOGICAL ENGINEERING LABORATORIES, OF CHICAGO, ILLINOIS, A CORPORATION OF ILLINOIS

HUMIDIFIER

Application filed February 24, 1931. Serial No. 517,714.

This invention relates to a method of and apparatus for adding moisture to the air. More particularly, this invention relates to a portable humidifier adapted to be used in residences, offices, stores, and the like.

Heretofore, the market has afforded only relatively expensive humidifiers designed primarily for humidification of large rooms and apartment buildings. Small residences, individual offices, and store space have been practically without relatively inexpensive means of obtaining the advantages of properly humidified air.

It is therefore an object of this invention to produce a humidifier for small residences and individual office or store space at a reasonable cost.

It is a further object of this invention to produce a portable humidifier apparatus.

It is a further object of this invention to provide automatic means in a humidifier to throw the humidifying apparatus out of power when the water supply necessary for efficient humidification requires replenishing.

It is a further important object of this invention to provide air preheating means in a humidifying apparatus to cause maximum absorption of moisture by the heated air in passing through the apparatus, thereby avoiding the relatively more expensive method now in use of heating the water to be evaporated.

It is still a further object of this invention to provide means in a humidifier apparatus whereby conditioned air from said apparatus may be aromatized.

A special object of this invention is to provide a small, portable, efficient device for delivering moist air into display or storing spaces to preserve or freshen the material stored therein.

Other and further important objects of this invention will be apparent from the disclosures in the specification and accompanying drawings.

This invention (in a preferred form) is illustrated in the drawings and hereinafter more fully described.

On the drawings:

Figure 1 is a longitudinal sectional view of a humidifier apparatus embodying our invention, with parts in elevation.

Figure 2 is a cross sectional view taken substantially along the line II—II of Figure 1.

Figure 3 is a fragmentary and elevational view of the moist air delivery opening showing the positioning of the aromatizer.

Figure 4 is an elevational view of a preferred form of capillary sheet mounted in a removable support.

Figure 5 is a sectional view taken substantially along the lines V—V of Figure 4, showing a preferred form of support for the capillary material.

Figure 6 is a sectional view of an alternative form of capillary sheets.

As shown on the drawings:

In Figures 1, 2 and 3, the reference numeral 1 indicates the housing of the humidifier, which is provided with a removable top 2 and a reservoir 3 for containing water. The humidifier box or housing 1 is equipped with an intake opening 4 (Figure 2) in the upper half of the box and an outlet 5 in the end of the box opposite the inlet 4. The box 1 is mounted upon a base 6 projecting beyond the side of the housing containing the intake opening. A motor driven fan 7 is mounted upon the extended portion of the base 6 positioned so that the fan blades are directly opposite the opening 4. Heating coils 8 (Figure 2) are positioned directly in front of the fan blades. Any source of heat may be used, preferably that obtained by passing an electric current through a resistance wire, as shown in Figure 2.

The fan 7 and heating coil 8 are energized in parallel by an electric current through wires 9. A mercoid switch 10 is interposed in series in the fan circuit. The mercoid 10 is mounted upon a cradle 11 which is pivoted freely from the side of the box 1 through a pivot 12 secured in the box wall by means of a bracket 13. A float 14 in an open sided housing 19 is positioned in the water reservoir 3. Said float 14 is rigidly attached to the cradle 11 by means of a rod 15.

Sheets of absorbent material 16 (Figure 2) are supported in the box 1 from brackets 17

positioned at spaced intervals at the top and bottom of the box. The sheets are suspended from these brackets 17 parallel to the flow of air through the box 1 by means of hooks 18 secured to the sheets.

As best shown in Figures 1 and 3, an aromatizer or dispenser 20 is detachably mounted in the center of the moist air outlet 5 by means of hooks 21. Said aromatizer consists of a reservoir 22 containing a perfume, deodorant, or other aromatic substance. A wick or sheet of absorbent material 23 is partially immersed in the reservoir 22 and held in the top of the dispenser 20 by an outwardly projecting rim 24. The back portion of the reservoir 22 extends above the reservoir liquid line and is equipped with an opening forming a passageway 25 so that the capillary material 23 is exposed to air passing from the humidifier. In this way a maximum surface for the evaporation of the aromatic substances contained in the reservoir 22 is exposed to the issuing air streams.

In Figures 4 and 5, the reference numeral 30 indicates a preferred form of capillary, absorbent sheet material mounted on a rack 32 by means of brackets 31. The rack, as best shown in Figure 5, consists of a wire frame 32 having the form of an inverted U. A bar 33 is rigidly attached across the open end of the U. The rack is composed of two end members 32 having cross members 35 attached to the top part of the end frame and cross members 34 rigidly attached to the bottom bar or rod 33. To add rigidity to the rack, transverse members 36 and 37 are firmly attached to the sides of the end frame. Each sheet 30 is mounted into the rack by means of hooks 31 secured to the ends of the sheet. To prevent excessive stress on the sheet, its vertical ends, or all of its edges, may be taped with any strong, flexible material such as a strip of thin sheet zinc and the hooks 31 may be secured to said strip.

Sheet 30 contains waffle-like depressions 38 to provide additional surface for contact with air passing through the humidifier. The rack 32 fully equipped with sheets 30 mounted on each of the bars 34 and 35 in spaced parallel position may be lowered into the humidifier box as an entire unit. As the passage of air through the box is parallel to the surface of the sheet, the corrugated surface presented by sheets 30 affords ample contact surface for the air, permitting maximum absorption of moisture.

In Figure 6 the reference numeral 40 indicates an alternative form of sheet whereby the material is crimped to present a baffle-like surface to the flow of air through the humidifier box. The ends of the sheet are mounted in tapes 41 to add rigidity to the sheet. The tape 41 may be any adhesive tape or if desired a flexible metal may be used. In some instances it may be preferable to mount the sheet in a rigid frame.

The operation of the humidifier is substantially as follows. The lead wires 9 are connected to a source of electrical current (not shown). The reservoir of the humidifier box is filled with water until the float positioned in the box rises and causes the mercoid switch mounted on a cradle attached to the float to tip and the mercury in the mercoid to make contact with both terminals, thereby completing the electrical circuit and starting the fan in operation. The heating coils positioned directly in front of the fan may be also thrown into operation, if desired. Air from the room or from any source is drawn through the motor-driven fan 7 into the humidifier box.

A series of panels or sheets of any suitable capillary material such as filter or blotting paper, vegetable or animal fiber, porous ceramic ware or any material that will serve as a wick for elevating water throughout its entire exposed surface are mounted in spaced parallel position to the flow of air through the humidifier box with their lower ends immersed in the water contained in the water reservoir of the box. The heated air from the fan contacts the exposed surfaces of the sheet and thus becomes saturated or partially saturated with water vapor.

The capillary material sheets may be mounted on brackets rigidly attached in the humidifier box in spaced parallel position to the flow of air through the box as shown in Figure 2, or the sheets may be mounted on a removable rack as shown in Figures 4 and 5.

The moistened air upon reaching the opening 5 contacts the exposed part of the aromatizer wick positioned in the opening 5. The aromatizer is a detachable unit and may be removed from the opening at will. Its purpose is to neutralize odoriferous conditions in the space being humidified, such as may be produced by tobacco smoke or odors arising from merchandise or like substances in storerooms and store spaces. The aromatizer consists of a reservoir having a wick or sheet of capillary material immersed in the reservoir, which may contain perfume, deodorants or any medicating substance. Part of the air from the humidifier passes through and around the saturated wick and thus absorbs the volatilized deodorant liquid.

The purpose of heating the air passing through the fan is to materially increase the capacity of the air to absorb moisture from the moistened sheet in passing through the humidifier box. We have found that it is far more efficient to heat the air than to heat the water in the reservoir, since by our method practically all of the energy is utilized effectively to the desired end. Only the moisture in the exposed surfaces of the sheets need be heated by our method. When heat

is applied to water in a reservoir as in present practice, losses occur through radiation from the water remaining in the reservoir, thus making available for evaporation only a small fraction of the total amount of heat applied to the water. It is to be understood, however, that the heater is to be used where the maximum possible evaporation from the humidifier is desired, but it is not the purpose of this invention to limit the device disclosed herein to the use of this heater.

As can be readily seen from the manner of mounting an automatically operated mercoid switch, when water in the reservoir of the humidifier box reaches a level such that only a small portion of the capillary sheets are immersed in the water, the mercoid assumes a horizontal position and the mercury in the switch no longer contacts with both electrical terminals. The fan is then thrown out of power and automatically stops.

The float housing in the reservoir holds the float deeply immersed so that the water level in the reservoir must recede considerably before the float can lower and allow the mercoid to break the electrical circuit.

If desired, the intake and outlet openings of the humidifier box may be equipped with any screen or grating material to present a pleasing appearance.

The apparatus may be designed to permit a drawer 42 to be positioned under the fan along the baseboard thereof for storing additional capillary sheets.

We are aware that many changes may be made and numerous details of construction may be varied through a wide range without departing from the principles of this invention, and we, therefore, do not purpose limiting the patent granted hereon otherwise than is necessitated by the prior art.

We claim as our invention:

1. A portable humidifier comprising a fan, a water reservoir, capillary material panels extending from said reservoir, a housing for said panels and heating means interposed between the fan and the capillary material panels to supply heat to the air streams created by the fan and thereby increase the moisture absorbing capacity of said air before said air reaches said capillary panels.

2. A humidifier comprising a fan, a water reservoir, capillary material panels extending from said reservoir and exposing part of their surface to air streams created by the fan, a housing for covering said capillary panels, heating means interposed between the fan and the capillary material panels, and means for dispensing aromatic materials into the air stream issuing from said housing.

3. A humidifier containing a fan, a water reservoir, float means therein controlling the operation of said fan, capillary material sheets immersed in said reservoir and extending from said reservoir in spaced parallel relation to expose their surfaces to air streams created by the fan, a removable rack for supporting said sheets and a housing enclosing said rack and sheets.

4. A portable humidifier consisting of a fan, a water reservoir, a float housing having the top thereof substantially below the top of the reservoir, a float positioned in said float housing, a mercoid switch operable by said float to automatically throw said fan out of power when the amount of water in the reservoir is insufficient for proper humidification, reinforced capillary material sheets immersed in said reservoir and extending therefrom in spaced relation parallel with and exposed to the streams of air from said fan, a housing provided with air ingress and egress openings enclosing said sheets, supporting means for the sheets in said housing, an aromatizer positioned in the air egress opening of said housing and a heating coil interposed between said fan and sheets.

5. A removable humidifier rack supporting capillary material panels, comprising inverted flattened U-end members, top cross members in spaced parallel relation supported by said inverted U-members, a member rigidly affixed across the open portion of each U-member spaced from the extremities of said U to allow the extending portions of said U to act as legs for the rack, bottom cross members in spaced parallel relation diametrically opposite said top, cross members supported by the member rigidly affixed across the open portion of each U-member and transverse crossed members rigidly affixed on the sides of said U-member to add rigidity to the rack.

6. A capillary material panel for a humidifier comprising a capillary material sheet containing waffle-like deformations and means reinforcing the edges of said sheet.

In testimony whereof, we have hereunto subscribed our names at Chicago, Cook County, Illinois.

ANTHONY J. LORENZ.
FRANK E. HARTMAN.