

[54] POWER HUMIDIFIER

[76] Inventor: Charles M. McDuffee, 16 W. State St., North Aurora, Ill. 60542

[22] Filed: Sept. 1, 1972

[21] Appl. No.: 285,615

Related U.S. Application Data

[63] Continuation of Ser. No. 40,133, May 25, 1970, abandoned.

[52] U.S. Cl. 261/138, 55/233, 55/258, 261/26, 261/106, 261/138

[51] Int. Cl. F28b 1/02

[58] Field of Search 55/233, 258, DIG. 4; 261/26, 30, 96-98, 106, 142, 138

[56] References Cited

UNITED STATES PATENTS

2,022,523 11/1935 Roessler 261/DIG. 4
2,282,373 5/1942 Minkler et al. 261/138 X

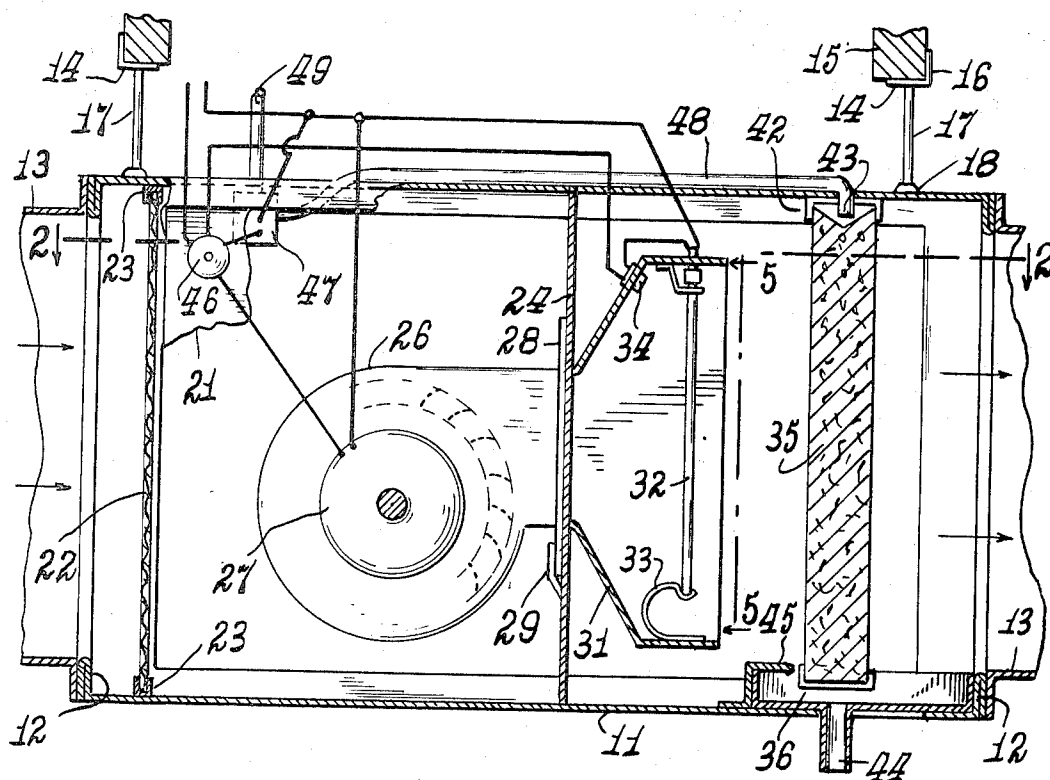
2,327,242 8/1943 Bokom 261/97 X
2,588,736 3/1952 Lipton 261/97 X
3,179,386 4/1965 Liebmann 261/96 X

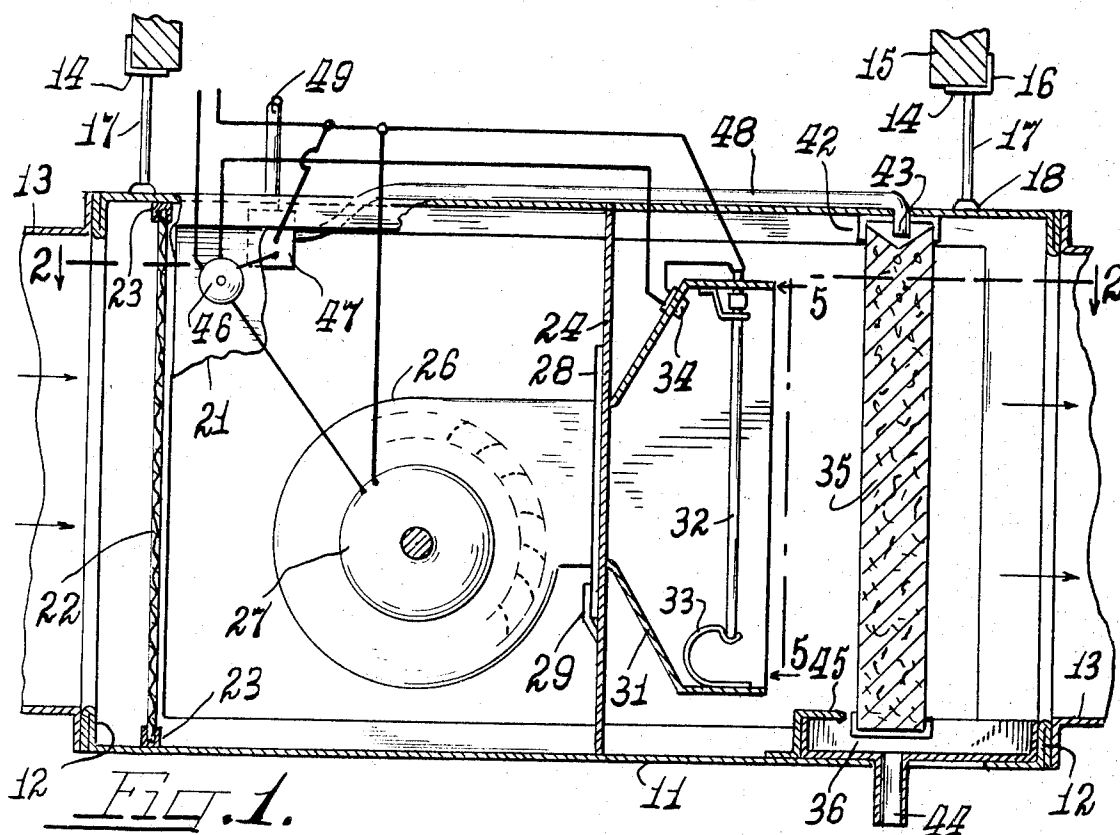
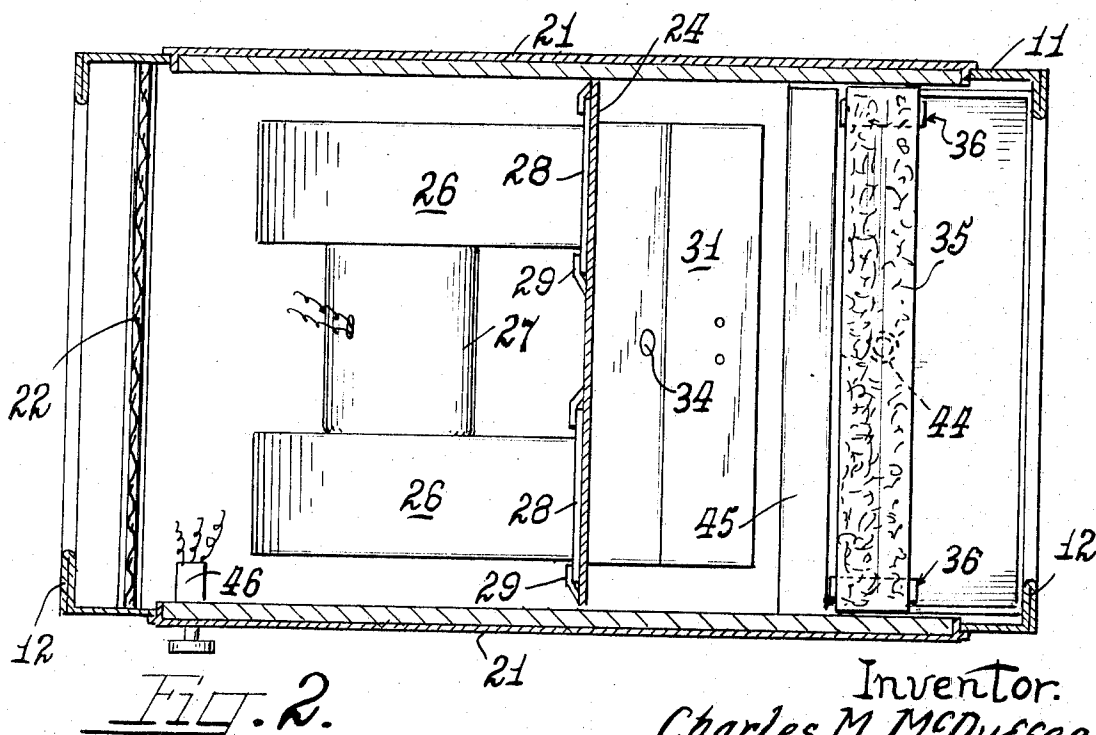
Primary Examiner—Robert L. Lindsay, Jr.
Attorney, Agent, or Firm—Elmer L. Zwickel

[57] ABSTRACT

A power humidifier for permanent installation in a duct-defined path of air flow comprised of a housing having inlet and outlet ends and having therein, in the following sequence, a filter at the air inlet end, blower fans and a calrod heater arranged to heat air after it leaves the blowers and prior to its entrance into and through an air-pervious evaporator pad over and through which cold water is continuously flowed, for humidifying the stream of air passing therethrough. The side edges of the evaporator pad are spaced from the side walls of the housing to allow a minimum quantity of air to by-pass the evaporator pad.

6 Claims, 6 Drawing Figures





Inventor.
Charles M. McDuffee
Elmer L. Jewickel
Attys.

FIG. 3.

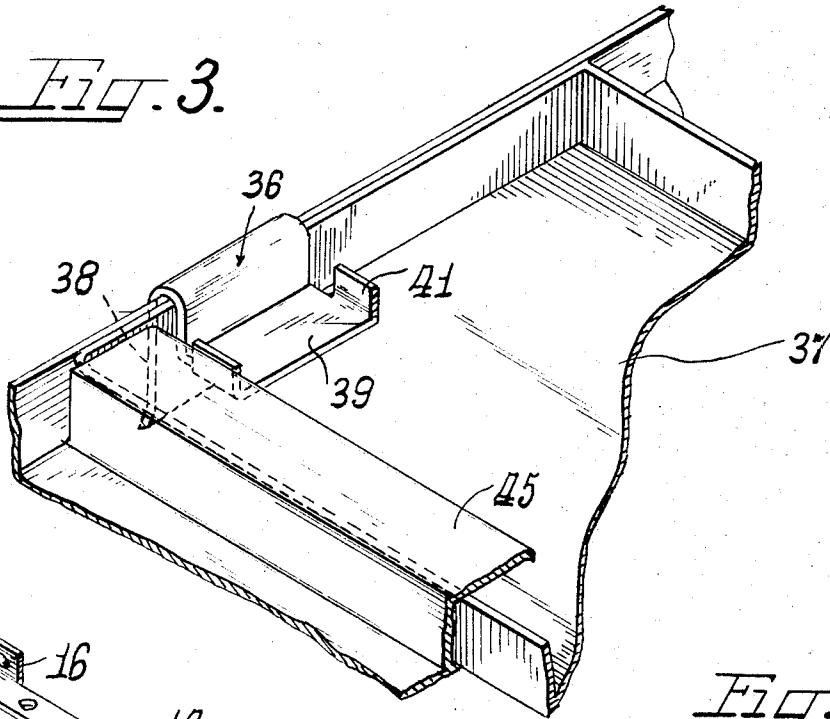
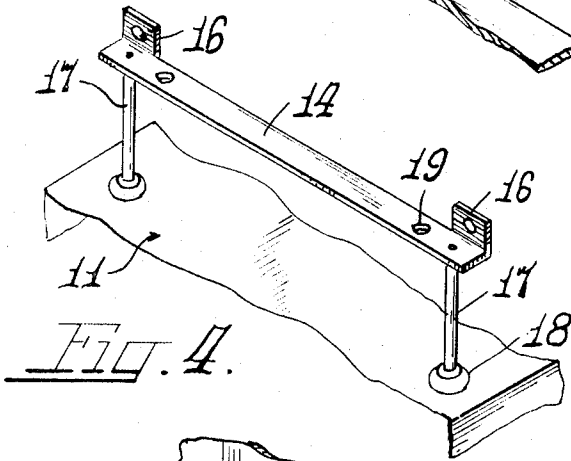


FIG. 4.

FIG. 5.

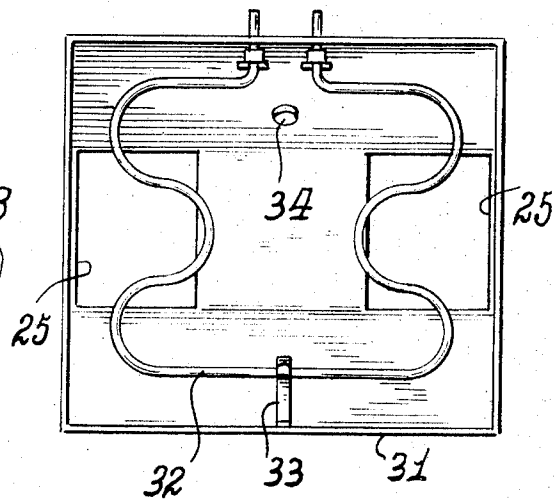
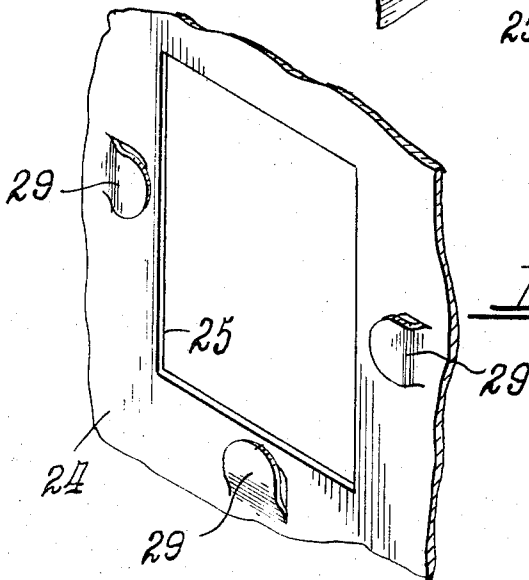


FIG. 6.

Inventor.
Charles M. McDuffee
Elmer L. Quichel
 Attys.

POWER HUMIDIFIER

This application is a continuation of my copending application Ser. No. 40,133, filed May 25, 1970 and now abandoned.

The invention pertains to a power humidifier unit designed for permanent installation in a duct-defined path of air flow. The unit comprises a horizontally elongated housing open at both ends for connection with air ducts. The housing contains at its inlet end a filter and, arranged inwardly of the filter, are a pair of blower fans having in common a heat chamber at their exhaust side so as to direct a mass of heated air into and through a moisture laden evaporator pad located at the discharge end of the housing and having its side edges spaced from the side walls of the housing to permit a limited quantity of air to by-pass the evaporator pad. The pad is supplied with a controlled amount of cold water so as to be moist at all times of use. Water, in excess of that evaporated into the air atream passes on to a drain pan for discharge from the unit. The cold water, in addition to supplying humidifying moisture to the air stream, prevents the formation of scale on the evaporator pad, thus increasing its useful life.

In prior known devices access to the interior of the housing enclosing the various components has been difficult to attain and the components are secured in place in a manner to resist removal for replacement, repair or cleaning. Also, some such devices are known to incorporate an axial fan arranged in the path of heated air thus the motor tends to overheat. In the present structure the blowers are squirrel-cage types and they are located upstream from the heat chamber with the result that the blower motor is always tempered by the flow of unheated air thereover. Further, the present structure entails an arrangement of components mounted for easy access so as to be easily and quickly removed for replacement, cleaning or repair. This includes the drain pan which may be withdrawn from the housing easily and quickly for purposes of cleaning.

It is therefore an object of the invention to provide a power humidifier of the character referred to.

Another object is to provide a humidifier housing with easily removable side panels to afford ready access to the interior thereof.

Another object is to provide a novel mounting for a tandem type blower fan unit.

Another object is to provide a novel heat chamber upstream from the blower fans.

Another object is to provide novel hanger means for a permanently installed power humidifier.

Another object is to provide common means to retain a drain pan in place and to support an evaporator pad thereover.

Another object is to mount the evaporator pad in such manner that its side edges are spaced a short distance from the housing side walls to allow a quantity of air to by-pass the evaporator pad.

Another object is to provide a humidifier of the character referred to which is not expensive or difficult to manufacture or maintain serviceable, and which is very efficient in use.

Other objects and advantages of the invention will become apparent with reference to the following description and accompanying drawings. In the drawings:

FIG. 1 is a longitudinal vertical sectional view of the humidifier, installed, showing parts in elevation.

FIG. 2 is a horizontal sectional view taken substantially on line 2—2 of FIG. 1.

FIG. 3 is a fragmentary perspective view of the drain pan, showing a mounting clip in place.

FIG. 4 is a perspective view of one of the hangers.

FIG. 5 is an end view of the heat chamber, taken substantially on line 5—5 of FIG. 1.

FIG. 6 is a fragmentary perspective view of the partition wall showing the blower mounting lugs.

Referring to the exemplary disclosure of the power humidifier shown in the accompanying drawings, and particularly to FIGS. 1 and 2, the humidifier components are enclosed in a substantially rectangular housing 11 open at both ends. These ends are flanged, as at 12, to mount the flanged end of ducts 13 thereto. The humidifier is intended for permanent installation and to this end it preferably carries a pair of hangers 14 (FIG. 4) which are constructed to bridge ceiling joists or be extended parallel thereto. As shown in FIG. 1, the hangers are arranged parallel to joists 15 and are secured to said joists as by having their flanges 16 secured thereto by nails or screws. The hangers 14 are connected to the housing 11 by suspension rods 17 that are resiliently attached to the housing, cushions 18 being provided for this purpose. When the hangers 14 are disposed to bridge the joists, securing elements (nails or screws) are extended through holes 19 therein.

The housing 11 has removable heat insulated side panels 21 substantially co-extensive with the entire length and width thereof. Thus, upon removal of either panel the entire interior of the housing, and the components therein, are exposed for service or replacement. At the air inlet end, or return side, of the housing there is arranged an air filter 22 having its top and bottom edges seated in channels 23 so as to be readily removable for cleaning or replacement. Arranged in the housing inwardly of filter 22, is a vertical partition 24 having a pair of rectangular openings 25 (one shown in FIG. 6).

The partition 24 is adapted to mount a pair of tandem blower fans 26 having a common motor 27 mounted firmly between them. These fans are squirrel-cage fans so as to assure maximum silent air flow therethrough. As best shown in FIGS. 1 and 2, these tandem fans are mounted in housing 11 in advance of partition 24, each fan having an external flange 28 on its discharge spout. To mount the fans the partition is formed with offset lugs 29, three disposed around each opening 25. These lugs receive the external flanges 28 so as to removably mount the blower fan assembly in place over the partition openings. Thus, it will be noted that the fans discharge air entering through the air filter 22 through the partition openings 25.

Mounted firmly on the other or downstream side of partition 24 and surrounding both partition openings 25 is a perimeter wall structure defining a heat chamber 31 which is in direct flow communication with the partition openings 25. The heat chamber contains a heater, such as the calrod 32 shown in FIGS. 1 and 5. Preferably, the calrod has its upper terminals detachably anchored to the upper wall of the heat chamber and its lower end secured by a spring clip 33 so as to be easily removable should removal be required. A limit switch 34, mounted in the heat chamber and connected to the electric circuit for the calrod, controls

operation of the calrod so as to maintain a predetermined temperature. In the present instance, the limit switch is set at a pre-determined temperature of about 180° F. and its function will be described presently.

Heated air leaving the heat chamber is directed against and through an evaporator pad 35. This pad is supported at its lower edge on a pair of clips 36 that also function to retain a drain pan 37 in place beneath the pad. As best shown in FIG. 3, the clips 36 (one shown) each comprise a clip portion 38 that embraces an end wall of the pan 37 and a flange on the housing side normally closed by side panels 21. The clip has a flat portion 39 having upstanding side wings 41 that underlies and embraces the lower margin of the evaporator pad 35 so as to prevent its displacement. The upper margin of the evaporator pad is seated in an inverted channel 42. It should be noted at this time that the top edge of pad 35 is V-shaped so as to define a trough for receiving water from a water discharge outlet 43. The water trickles down through the pad and any excess is received in the drain pan 37 and discharged through a drain outlet 44. In order to prevent water flow other than into the pan, a drain flange 45, carried by the housing bottom wall, overlies the lead edge of the drain pan 37.

Also included in the assembly is a humidistat 46, and a solenoid valve 47, the latter being connected by line 48 with the water discharge outlet 43. The solenoid is, or course, connected with a source of water supply through a line 49.

It is important to note that the side edges of the evaporator pad are spaced slightly from the walls of the housing. This allows a restricted amount of warm air to by-pass the evaporator pad side edges so as to temper the cold air passing through the pad and make for a more comfortable room air temperature and also to minimize back pressure.

In operation, when the pre-set humidistat 46 calls for humidification, the solenoid valve 47 opens to deliver water to the evaporator pad 35. At the same time the blower fans 26 are operated to draw air into the housing and discharge it through the heat chamber and evaporator pad. Should the heat in the heat chamber reach about 180° F., the heater 32 is shut off through activation of the limit switch 34. At a predetermined temperature differential of about 5° F., the unit is re-activated so as to maintain a substantially constant temperature thus insuring a faster high rate of evaporation at the pad. Because excess water drains through the evaporator pad and is removed through drain 44, the system is kept free of mineral build-up in the pad. Thus, as the air is being humidified, the sensing element of the humidistat 46 becomes satisfied and the whole unit is shut down.

Although a preferred embodiment of the invention has been described, in considerable detail, it will be understood that the description thereof is intended to be illustrative rather than restrictive, as details of the

structure may be modified or changed without departing from the spirit or scope of the invention. Accordingly, it is not desired to be restricted to the exact construction described.

I claim:

1. A power humidifier for permanent installation in a duct-defined path of air flow comprising, in combination, a horizontally elongated housing having an air inlet opening in one end and an air outlet opening in its other end and being provided with duct-connecting means extending about said openings, air filter means mounted adjacent said inlet end for filtering entering air, a vertical partition in said housing disposed downstream from said air filter means and having an air-flow opening therein, motor-driven blower means mounted on said partition and to the side thereof facing said filter means, air heating means mounted on the other side of said partition and in the path of air moving through said opening therein, a vertically positioned self-contained evaporator pad in said housing intermediate said heating means and said air outlet opening, water supply means delivering water to said evaporator pad for gravity flow therethrough, and means for collecting water draining from said evaporator pad, the width dimension of said evaporator pad being such that its side edges are spaced a small distance inwardly from the housing side walls to define vertically elongated passages, whereby a restricted quantity of air heated by the heating means is allowed to by-pass said evaporator pad and thereupon to commingle with the air of the air stream moving through the evaporator pad.

2. A power humidifier according to claim 1, wherein said vertical partition is provided with dual air-flow openings and said blower means includes two tandemly arranged blowers operating to force air drawn into the housing through said partition openings, and wherein heat-chamber means extending in direct air-flow communication with said dual openings is affixed to said other side of the vertical partition and said air-heating means is removably mounted in said heat chamber.

3. A power humidifier according to claim 1, wherein the partition is formed with offset lugs removably engageable by the fan housing.

4. A power humidifier according to claim 1, wherein the air heating means includes means defining a chamber attached to the partition and an electric heater mounted in said chamber.

5. A power humidifier according to claim 4, wherein the electric heater is removably mounted in said defining means.

6. A power humidifier according to claim 1, wherein said water collecting means includes a drain pan removably supported below the evaporator pad, removable clips supporting said pan on the housing side walls, said clips also supporting said evaporator pad in place with its side edges spaced inwardly from the housing side walls as aforesaid.

* * * * *