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[54] HUMIDIFIER
4 Claims, 4 Drawing Figs.

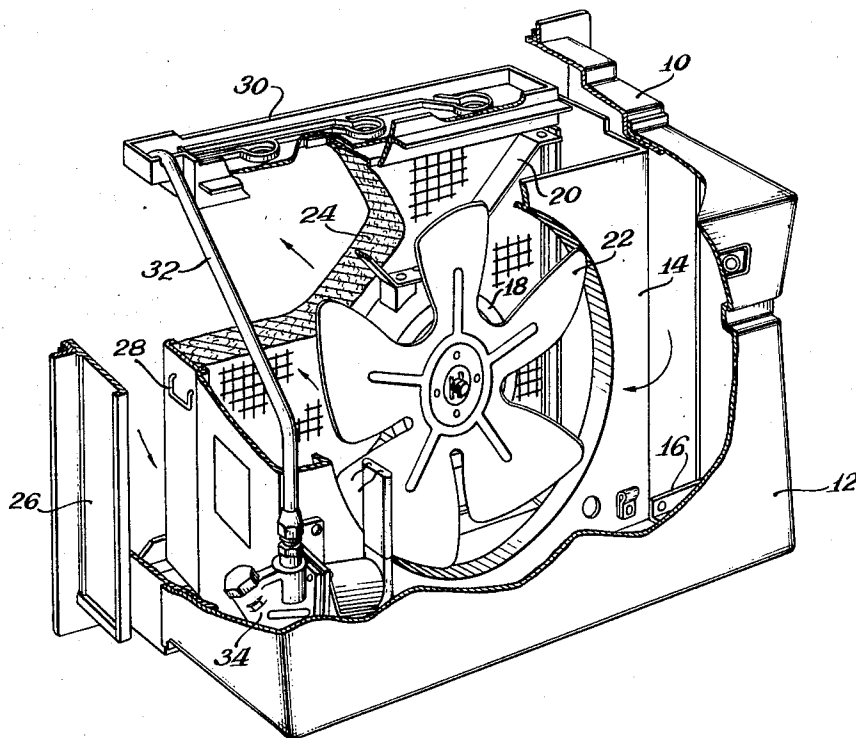
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ABSTRACT: In a humidifier with a motor-powered fan driving an airstream through a saturated water pad to humidify the air, the improvement of a water distribution pan for providing a uniform, metered flow of water to the water pad. The water distribution pan includes a number of apertures in the bottom with a channel leading from each aperture to a reservoir at one end of the pan. The reservoir is defined by the sidewalls of the pan and a dam in the pan between the sidewalls. Water spills over the dam, flows through the channels and drains out through the apertures. Ridges are provided around the apertures on both sides of the pan bottom to insure uniform distribution of the water.



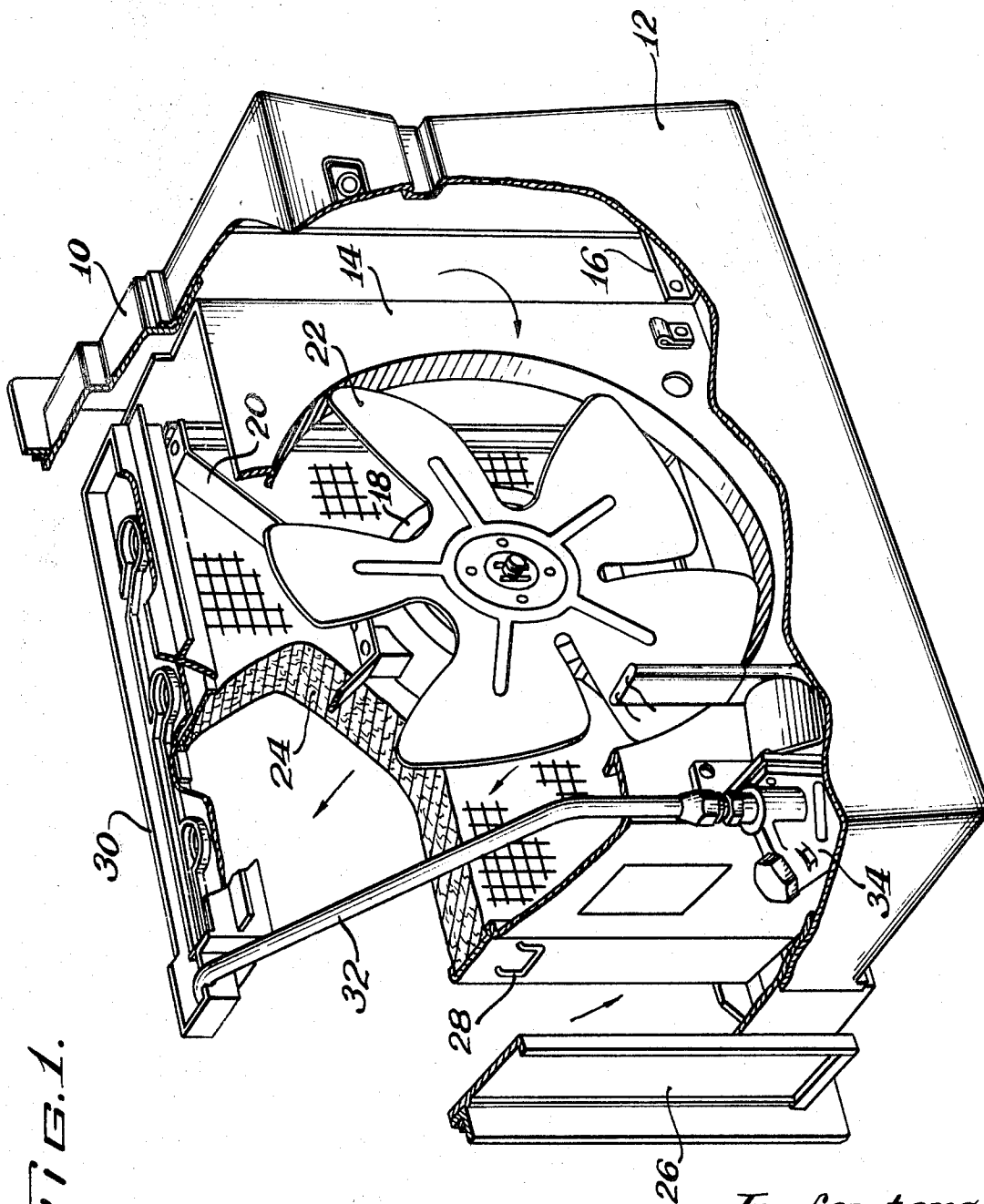


FIG. 1.

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FIG. 2.

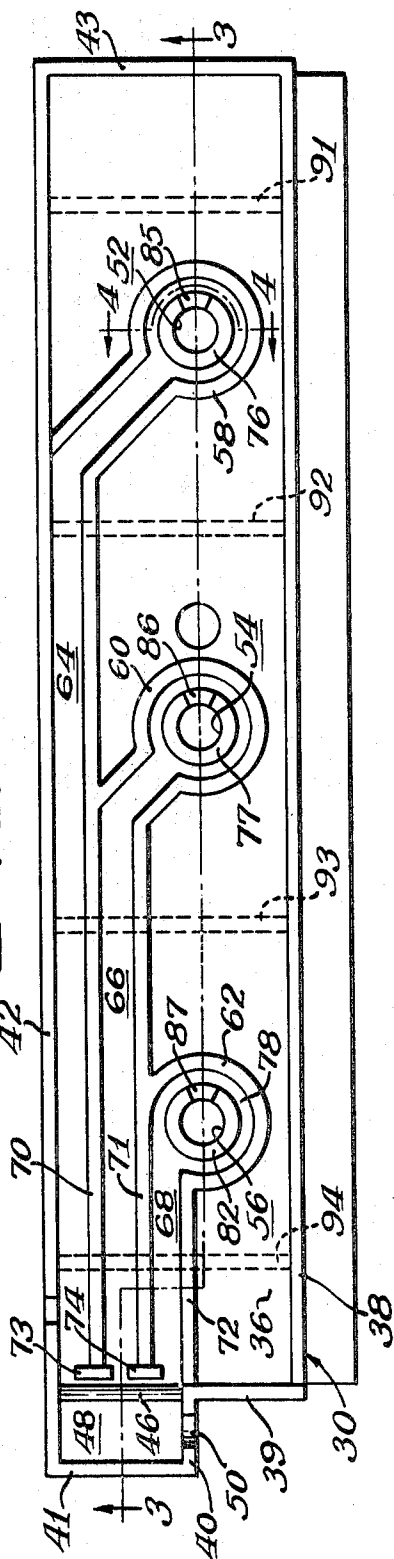
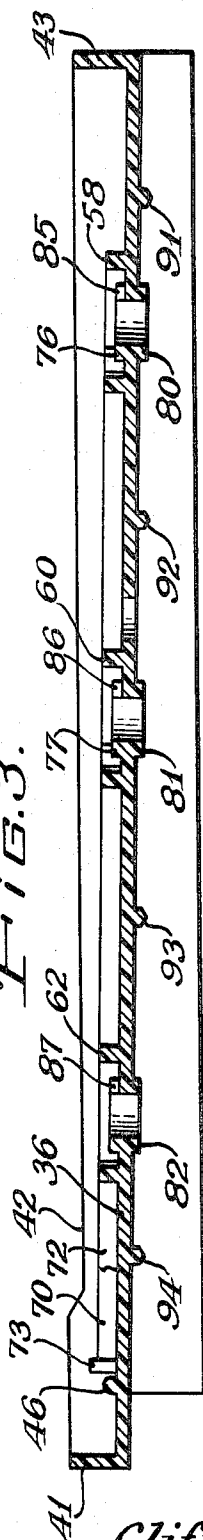
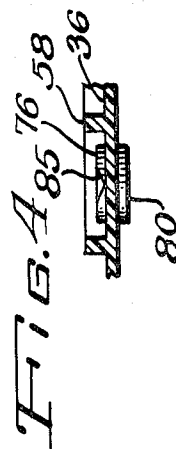


FIG. 3.



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HUMIDIFIER

BACKGROUND OF THE INVENTION

This invention relates to the improvement of a water distribution pan for a humidifier of the type having an air flow directed through a water-saturated pad.

Health authorities have long recognized the advisability of maintaining the indoor relative humidity between 30 and 45 percent. The problem of maintaining such a relative humidity is especially difficult during the winter months when the air is uniformly quite dry. In an effort to provide a healthful and proper amount of moisture in the air, humidifiers of various types and designs are used. In type of humidifier a motor-powered fan drives furnace heated air through a saturated water pad. Such a humidifier may be positioned in an existing warm air duct to properly humidify heated air flowing therethrough.

To promote the efficient operation of this type of humidifier, the water should be evenly distributed in the water pad, and the water pad should be saturated by a proper amount of water. The water distribution pan of the present invention provides a novel and useful manner in which to accomplish these objectives.

SUMMARY OF THE INVENTION

In a principal aspect the present invention of the improvement of a water distribution pan for a humidifier provides more efficient, more effective and more even distribution of water to a water pad positioned under the pan transverse to the flow of air being humidified. The improved water distribution pan includes a plurality of uniformly spaced apertures in the pan bottom through which water passes onto the water pad. A channel leads from each of the apertures to a reservoir at one end of the pan. The reservoir is formed from the sidewalls of the pan and a dam which extends between the sidewalls. Water flows into the reservoir and spills over the dam into the channels. In this manner the water is evenly divided and passes uniformly to each of the apertures.

It is thus an object of this invention to provide an improved water distribution pan that more uniformly distributes water on a water pad in a blower-powered humidifier.

Another object of the present invention is to provide an improved humidifier water distribution pan that provides maximum amount of efficiency for a minimum cost.

Still another object of the present invention is to provide a means for evenly distributing water through the water pad of a blower-powered humidifier regardless of small variations in the positioning or mounting of the humidifier.

These and other objects, advantages and features of the present invention will be more fully set forth in the detailed description which follows.

BRIEF DESCRIPTION OF THE DRAWINGS

In the detailed description which follows, reference will be made to the drawings comprised of the following FIGS.

FIG. 1 is a perspective view of a typical blower-powered humidifier including the improvement of the present invention;

FIG. 2 is a top plan view of the improvement of the water distribution pan of the present invention;

FIG. 3 is a side cross-sectional view of the pan taken substantially along the line 3-3 in FIG. 2; and

FIG. 4 is a partial cross-sectional view of an aperture taken substantially along the line 4-4 in FIG. 2.

DESCRIPTION OF THE PREFERRED EMBODIMENT

FIG. 1 illustrates, in a perspective view, a typical blower-powered humidifier of the type that would utilize the present invention. The components which comprise the humidifier are mounted on an outside frame 10 which is adapted to mate with a cover 12 to provide an airtight assembly for the remaining components of the humidifier. An inside frame 14 is positioned by means of brackets, such as at 16, in a fixed relation

within the outside frame 10. This provides a substantially annular space between the outside and inside frames 10 and 14 through which air may be drawn prior to humidification.

An electric motor 18 is suitably mounted on the inside frame 14 by means of braces, such as at 20, to drive a fan 22 in the opening provided in the inside frame 14. A water pad 24 is mounted in suitable channels provided by the inside frame 14 so that the water pad 24 is transverse to the airflow directed by the fan 22. The water pad 24 is tightly sealed within the inside frame 14. It may be slidably removed for replacement or the like by removing sliding cover 26 and pulling on handle 28 to withdraw water pad 24 from the frame 14. Another sliding cover corresponding to cover 26 is positioned on the opposite side of the humidifier so that the water pad 24 may be withdrawn from either side of the humidifier.

Affixed by suitable fastening means such as biased side members to the top of the inside frame directly over the water pad 24 is the improvement of the present invention; namely, the water distribution pan 30. Water is provided to the pan 30 through the conduit 32. The supply of water is controlled by the valve 34 which in turn has a connection to an external supply of water (not shown).

In operation the humidifier is attached to the side of a plenum or duct and warm dry air is drawn by the fan 22, through the annular space provided between the frames 10 and 14 and then out through the water pad 24. The humidified air is finally directed back into the plenum or air duct. The air pathway is indicated by the arrows in FIG. 1.

The improvement of the invention is the water distribution pan 30 which is more fully illustrated by FIGS. 2, 3 and 4. As can be seen by reference to these figures, the pan includes a bottom 36 and sidewalls 38 through 43. At one end of the pan 30 the sidewalls 40, 41 and 42 and a dam 46 which extends between sidewalls 42 and 40 define a reservoir 48. An indentation 50 in sidewall 40 is provided for the conduit 32 which provides a water supply for the reservoir 48.

Defined in a substantially ordered pattern along the bottom 36 of the pan 30 are three apertures 52, 54 and 56. The apertures 52, 54 and 56 extend entirely through the bottom 36 and provide a path of distribution for water onto the water pad 24. Each aperture 52, 54 and 56 is circumferentially surrounded by an outer wall as at 58, 60 and 62, respectively, spaced a small distance from the aperture 52, 54 or 56. The outer walls 58, 60 and 62 encircle the respective apertures and continue as parallel walls to form channels 64, 66 and 68 respectively. The channels 64, 66 and 68 lead from the respective apertures 52, 54 and 56 to the reservoir 48. Thus outside wall 42 and inside walls 70, 71 and 72 combine in pairs to form the three channels 64, 66 and 68.

While walls 42 and 72 are continuous and meet with the sidewalls of the reservoir 48, the remaining walls 70 and 71 are discontinuous and terminate at a point short of the dam 46 of the reservoir 48. Walls 70 and 71 terminate with water dividers 73 and 74 respectively. Dividers 73 and 74 are short wall segments, perpendicular to walls 70 and 71, respectively, which restrict the entrance to channels 64, 66 and 68. This particular construction of the water dividers 73 and 74 promotes an even distribution of the water spilling over the dam 46 regardless of small tilts or inclinations of the entire humidifier device or the pan 30. The water dividers 73 and 74 are parallel to the dam 46 and are spaced a small distance from the dam 46 to also insure that water will flow into all three channels 64, 66 and 68 regardless of slight inclinations in the pan.

Referring again to the construction of the aperture 52, 54 and 56, circumferential ridges 76, 77 and 78, respectively, are included on the inside, bottom 36 of the pan 30. Each of the inside ridges 76, 77 and 78 include a notch as at 85 in FIGS. 3 and 4 for aperture 52, and notches 86 and 87 for apertures 54 and 56 respectively. The notches 85, 86 and 87 extend from the top of the ridges 76, 77 and 78 respectively to the inside of the bottom 36 of pan 30. Because of cohesive forces between the water and inside ridges 76, 77 and 78, it is necessary for

the water to fill the channels to a depth approximately equal to the height of the ridges 76, 77 or 78 before the water will flow through the notches 85, 86 or 87 and out through the respective apertures 52, 54 or 56. This feature promotes an even distribution of water on the water pad 24.

Circumferential ridges 80, 81 and 82 are also included on the outside, bottom 36 of pan 30 for apertures 52, 54 and 56 respectively. The outside ridges 80, 81 and 82 insure that water which passes through the respective openings 52, 54 and 56 will drop onto the water pad 24. Without the special ridges 80, 81 and 82 drops of water would merely collect and run along the bottom of the pan before dropping off onto the water pad 24. The ridges 80, 81 and 82 prevent the water from running along the underside of the pan and insure quick, even distribution of water on the water pad. Transverse ribs 90-94 may be added to the underside of pan 30 to provide added protection against water clinging to the bottom of the pan and being carried toward the ends by random air currents.

It will be noted that the bottom 36 is inclined downwardly in the direction of desired waterflow in the distribution pan 30. Thus, the channels 64, 66 and 68 in combination with the ridges 80, 81 and 82 and the other parts of the pan 30 described above, insure that water will be evenly divided and flow in the direction of incline of the bottom 36, yet will not go through apertures 52, 54 and 56 to run along the bottom 36 of the pan in the direction of incline. Rather the waterdrops directly onto the pad 24.

Therefore, the combination of reservoir, channels, apertures and ridges insures a waterflow onto the water pad at the proper places, at a constant rate of flow and with uniform distribution. In contrast, water in prior art devices would flow at uneven rates onto different parts of the water pad, and would run along the bottom of the pan and down the sides of the water pad or onto other parts of the frame to disrupt the efficiency of the humidifier. The present invention eliminates these problems in an inexpensive and efficient manner.

While in the foregoing there has been set forth a detailed description of the preferred embodiment, it is to be understood that all those embodiments obvious to persons skilled in the art and all those embodiments equivalent to the claimed subject matter are to be included within the scope of the appended claims.

We claim:

1. In a humidifier of the type including a frame, a motor-powered blower attached to said frame for drawing an airflow through said humidifier over a water pad mounted transverse

to the path of said airflow, the improvement of water distribution means disposed above said pad for providing a uniformly distributed flow of water to said pad, said distribution means comprising a pan having a bottom, first and second ends and sidewalls, with said bottom being inclined at an angle with respect to the horizontal such that said bottom is higher at said first end than at said second end; a water reservoir positioned at said first end of said pan, said reservoir adapted to be connected to a source of water to provide a constant water supply in said reservoir, said reservoir being defined by the sidewalls of said pan, and a dam extending between said sidewalls over which water in said reservoir spills to flow to the remaining portion of said pan, said pan also including a plurality of apertures which are disposed at regularly spaced intervals in said bottom in said remaining portion of said pan and which pass through the bottom of said pan so as to permit water to flow through said apertures and onto said pad; means defining a plurality of water channels in said pan, each of said means which defines a water channel extending from each of said apertures to adjacent said dam, each of said means defining said water channels including a circumferential wall section which encircles said aperture to which it extends and which is spaced from said aperture; and wall means positioned about each of said apertures for preventing flow through said aperture until the portion of the water channels means between said wall means and the said circumferential wall section is filled with water to a depth equal to the height of the wall means.

2. The improvement of claim 1 wherein each of said channels terminates at a point short of said dam, said channel termination points including water dividers defining means including wall segments positioned to promote even distribution of said water in each channel.

3. The improvement of claim 1 wherein said wall means includes a circumferential ridge surrounding said apertures on both sides of said bottom, each of those ridges positioned on the inside of said pan including at least one notch through said ridge; and those ridges surrounding said apertures on the outside of said pan assist in causing the water flowing through said apertures to drop directly onto said pad and in preventing the water flowing through said apertures from running along the underside of said pan.

4. The improvement of claim 2 wherein said means including wall segments are positioned perpendicular to said means defining said water channels.

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