Oct. 11, 1966

J. F. HIRTZ

3,278,175

HUMIDIFIER PAD

Filed Sept. 4, 1963

Fig. 1.

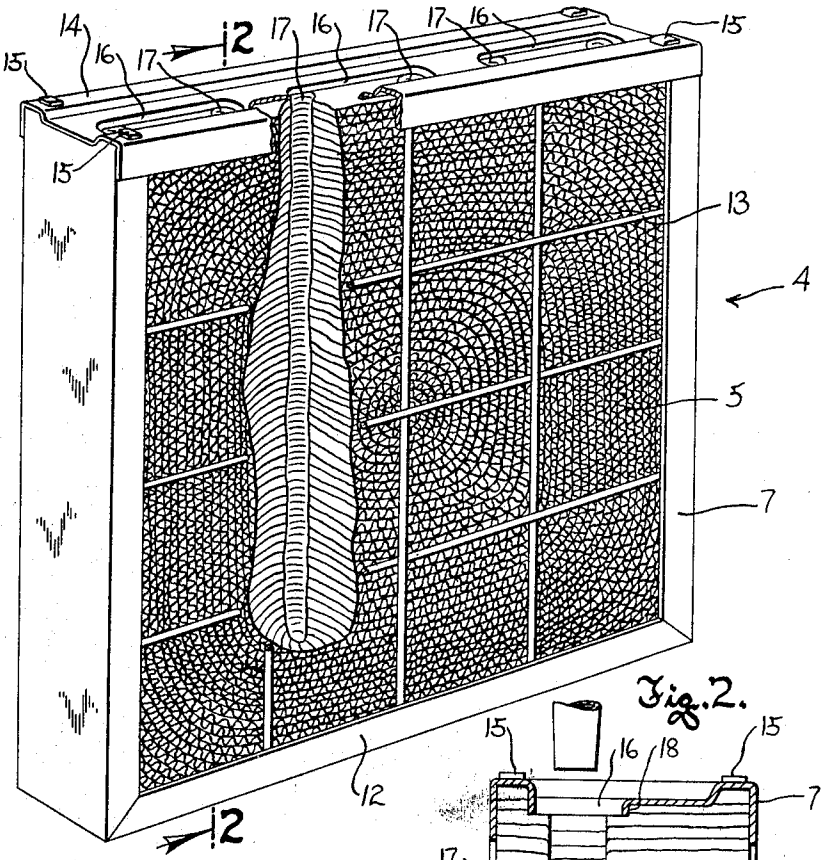


Fig. 2.

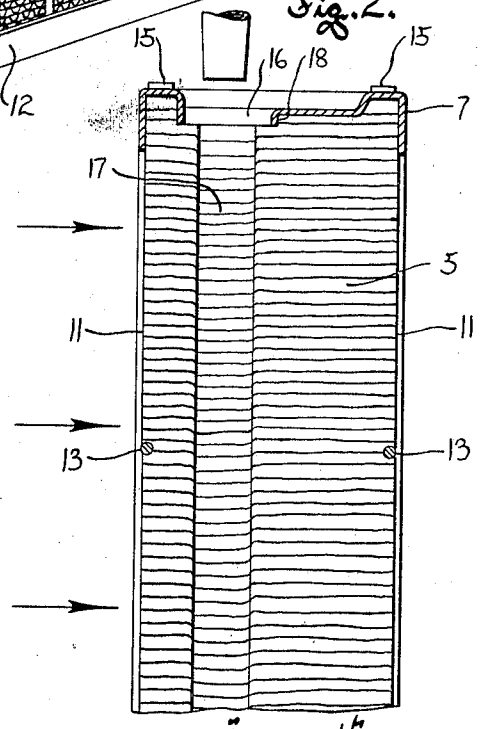
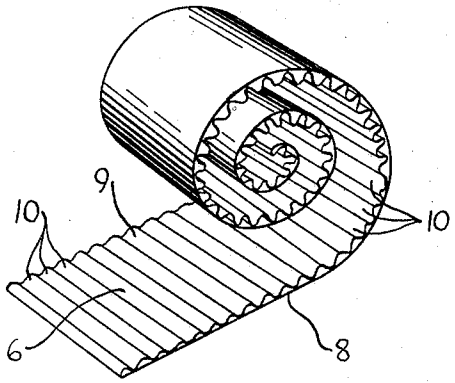


Fig. 3.



Inventor
John F. Hirtz
By Dudley Jones
Attorneys

United States Patent Office 3,278,175 Patented Oct. 11, 1966

3,278,175
HUMIDIFIER PAD

John F. Hirtz, Watertown, Wis., assignor to Syncromatic Corporation, Watertown, Wis., a corporation of Wisconsin

Filed Sept. 4, 1963, Ser. No. 306,577
4 Claims. (Cl. 261—99)

This invention relates to humidifier pads or evaporators of the type comprising a filler or body of more or less bibulous material through which air can be circulated and into which water can be introduced for evaporation into the air to humidify the same.

The general object of this invention is to provide a humidifier pad which can be made very easily and inexpensively in any of wide range of sizes, which has an unusually high capacity for evaporation of water, and which does not tend to become clogged or otherwise rendered ineffective by the minerals that are commonly present in water and which inevitably remain on a humidifier pad as a residue when water is evaporated therefrom.

A more specific object of this invention is to provide a humidifier pad of the character described having a filler or body of inexpensive material and which provides for very fast and uniform distribution of water through the filler so as to promote rapid evaporation of such water into air being circulated through the pad.

It is also an object of this invention to provide a humidifier pad of the character described having an inexpensive filler that affords an unusally large area of surface at which air being circulated through the filler can be exposed to water for evaporation of the latter, but which nevertheless offers very low resistance to movement of air therethrough.

It is a further object of this invention to provide a humidifier pad of the character described which utilizes the force of gravity, capillary attraction, and air flow through the pad to assure very rapid and complete dispersion of water through the body of the pad.

With the above and other objects in view which will appear as the description proceeds, this invention resides in a novel construction, combination and arrangement of parts substantially as hereinafter described and more particularly defined by the appended claims, it being understood that such changes in the precise embodiment of the hereindisclosed invention may be made as come within the scope of the claims.

The accompanying drawing illustrates one complete example of the physical embodiment of the invention constructed according to the best mode so far devised for the practical application of the principles thereof, and in which:

FIGURE 1 is a perspective view of a humidifier pad embodying the principles of this invention with a portion cut away to illustrate interior construction;

FIGURE 2 is a fragmentary vertical cross sectional view through the humidifier pad of this invention, taken on the plane of the line 2—2 in FIGURE 1; and

FIGURE 3 is a fragmentary perspective view of a small section of the corrugated strip material of which the filler is comprised.

Referring now to the accompanying drawing, the numeral 4 designates generally the humidifier pad of this invention, which comprises a filler or body 5 consisting of a spirally wound strip 6 of single-faced corrugated paper-like material and a frame 7 that surrounds the filler at its edges and prevents the spiral of corrugated filler material from unwinding.

The filler material is preferably made of two sheets 8 and 9 of asbestos paper or the like, one sheet 8 being substantially flat and the other sheet 9 being sinuously bent into alternate ridges and grooves to provide the corrugations. The two sheets are of course bonded or fused together at the peaks of the corrugations in the sheet 9, as by means of a silicate of soda cement, so as to maintain the corrugated form thereof. The strip 6 may be cut from a substantially larger body of such single-faced corrugated material and has its length transverse to the ridges and grooves of the corrugations so that it can be easily rolled into a tight spiral, with the ridges and grooves extending parallel to the spiral axis, and preferably with the flat sheet 8 of the strip outermost.

Rolled as just described, the strip 6 provides a filler having opposite flat faces 11, defined by the longitudinal edges of the strip, and having numerous small air passages, defined by the corrugations, extending through it from one of its faces to the other.

The strip is held against uncoiling by means of the rectangular frame 7, which can be formed of channel-shaped pieces of light gage metal. As shown, the frame is made in two parts, one of which is a U-shaped element 12 that embraces three sides of the pad. The remaining side of the frame comprises a straight length 14 of metal channel that overlies the fourth side of the pad. Integral lugs 15 on the free ends of the legs of the U-shaped element 12 extend through slits in the straight member 14, near the opposite ends of the latter, and are clinched over to secure the frame elements together.

The corrugations of the spiral permit the filler to be compressed edgewise to a certain extent, to convert the filler from its normal substantially circular shape to a rectangular shape which conforms to the frame; and some degree of such compressive deformation of the filler is desirable to reduce the size of the air passages defined by the corrugations, accommodate a greater amount of filler material within the frame, and thus increase the surface area of the pad over which water and air are exposed to one another.

To prevent the convolutions of the filler from being axially displaced relative to one another, and to afford a degree of protection to the filler, a suitable screening 13 overlies each flat face 11 of the filler and is held in place by the frame. The screening 13 may be formed of wire rods (as shown), coarse mesh wire cloth, expanded metal foil, or the like, can be held in place by having its marginal edge portions flatwise underlying the flanges of the channel shaped frame.

It is intended that the humidifier pad of this invention be used with its flat face 13 substantially upright, and with air circulated therethrough horizontally, as indicated by arrows in FIGURE 2.

Water is introduced into the filler, to be evaporated into the air circulated therethrough, by means of openings 16 in the top member 14 of the frame and bores 17 which extend downwardly in the filler from said openings. In this case the top frame member is shown as having three openings 16 each elongated lengthwise of the frame member 14 so as to embrace the mouths of two bores 17 in the filler, and each somewhat wider than the bores. The upper frame member has its marginal edge portion around each opening 16 bent downwardly, to provide a small flange 18 which snugly edgewise engages the underlying material of the outermost filler convolution. Each flange 18 thus cooperates with the exposed surface of the filler therebeneath to provide a shallow distributing trough by which water can be conducted to the two bores 17 in the filler that have their mouths embraced by the flange 18.

The several bores 17 extend downwardly in the filler to below its horizontal center line, and can readily be formed with a drill. When the pad is mounted in a

humidfying machine, water can be dripped or trickled into the bores **17**, by way of the trough-like openings **16**, from any suitable delivery means. Since the surfaces of the bores **17** are defined by the corrugated strip material of the filler, water flowing down each bore tends to be diverted away from the same by the successive layers of corrugated strip material that is encounters and tends to flow along the convolutions of the filler. Due to the spiral arrangement of the filler, it will be apparent that a combination of gravity flow and capillary action tends to carry the water uniformly through the entire filler, to be exposed to air circulated therethrough. In addition, the air circulated through the pad is also relied upon to help in effecting uniform distribution of water through the filler, and to this end the bores **17** are located closer to the upstream face **11** of the filler, so that air moving through the filler will tend to carry water toward the downstream face.

Since the corrugations of the filler material define air channels that extend straight through the pad from face to face thereof, air is not compelled to flow through a tortuous path and therefore it encounters relatively little flow resistance from the pad of this invention. By the same token the numerous and well defined air passages through the filler are not readily clogged by mineral residues from evaporated water, and the low cost of the pad of this invention encourages replacement when mineral residues finally reduce efficiency of the pad.

From the foregoing description taken with the accompanying drawing it will be apparent that this invention provides a very inexpensive but highly efficient humidifier pad, wherein a combination of gravity flow, capillary action and air motion is relied upon to provide rapid and uniform dispersion of water through the pad.

What is claimed as my invention is:

1. A humidifier pad through which air can be circulated to be humidified, characterized by:

(A) a filler comprising an elongated strip of corrugated paper-like material having the ridges and grooves of its corrugations extending transversely to its length, said strip being rolled into a substantially tight spiral so as to provide

(1) opposite faces on the filler defined by opposite longitudinal edges of the strip and

(2) air passages extending from one to the other of said faces and defined by the ridges and grooves of the corrugations;

(B) a substantially rigid frame surrounding the filler at the edges thereof to hold the strip spirally rolled; and

(C) said pad having a plurality of water distribution passages extending a substantial distance into the filler from one edge thereof and opening through the frame at said edge of the filler, so that when the pad is disposed with said faces upright and said edge of the frame uppermost, water can be introduced into each of said passages and can be carried laterally away from the passage by the convolutions of the strip to be thus distributed uniformly through the entire filler for exposure to air circulated therethrough.

2. The humidifier pad of claim **1**, further characterized by the fact that said water distribution passages are parallel to said faces of the filler and are nearer one face of the filler than the other, so that movement of air through the filler from the second designated face to the first mentioned face further contributes to uniform distribution of water through the filler.

3. A humidifier pad having a filler which comprises a strip of corrugated paper-like material wound into a substantially tight spiral roll about a horizontal axis so that the longitudinal edges of the strip define opposite upright faces of the filler and the corrugations provide small horizontal air passages through the filler that extend from one to the other of said faces, said humidifier pad being characterized by: the filler having a plurality of bores therein which extend downwardly a substantial distance into the filler from the top thereof, substantially parallel to said faces, and which are spaced from one another across the width of the pad, by which bores water can be introduced into the interior of the filler for flow along the convolutions of the filler, to be thus distributed uniformly through the filler for evaporation by air circulated through said air passages.

4. In a humidifier pad:

(A) a filler which comprises an elongated strip of single-faced corrugated paper-like material having the ridges and grooves of its corrugations extending transversely to its length, said strip being wound into a substantially tight spiral to provide the filler with opposite upright faces defined by edge portions of the strip and with numerous horizontal air passages defined by the corrugations;

(B) a rectangular frame surrounding the filler at its edges and preventing the strip from unrolling and radially compressing portions of the filler;

(C) the top of the frame having lengthwise elongated openings therein, and the marginal edge portion of the frame around each of said openings being bent downwardly to engage the filler surface therebeneath and cooperate therewith in defining a shallow water distribution trough; and

(D) the filler having a plurality of bores opening from each of said troughs and extending downwardly in the filler therefrom, from each of which bores water can be laterally diverted by the convolutions of the strip to be rapidly and uniformly dispersed through the filler by gravity and capillary action.

References Cited by the Examiner

UNITED STATES PATENTS

1,682,546	8/1928	Bangert	261—97
2,386,826	10/1945	Wallach et al.	261—102 X
2,634,112	4/1953	Snow	261—97 X
2,637,540	5/1953	Rowe	261—94
2,791,408	5/1957	Lewis.	
2,809,818	10/1957	Munters	261—103 X
3,065,956	11/1962	Meek	261—29
3,193,259	7/1965	Liebmann	261—106 X

HARRY B. THORNTON, *Primary Examiner.*

T. R. MILES, *Assistant Examiner.*