Aug. 16, 1966 W. H. WENTLING ETAL 3,266,481

HUMIDIFIER

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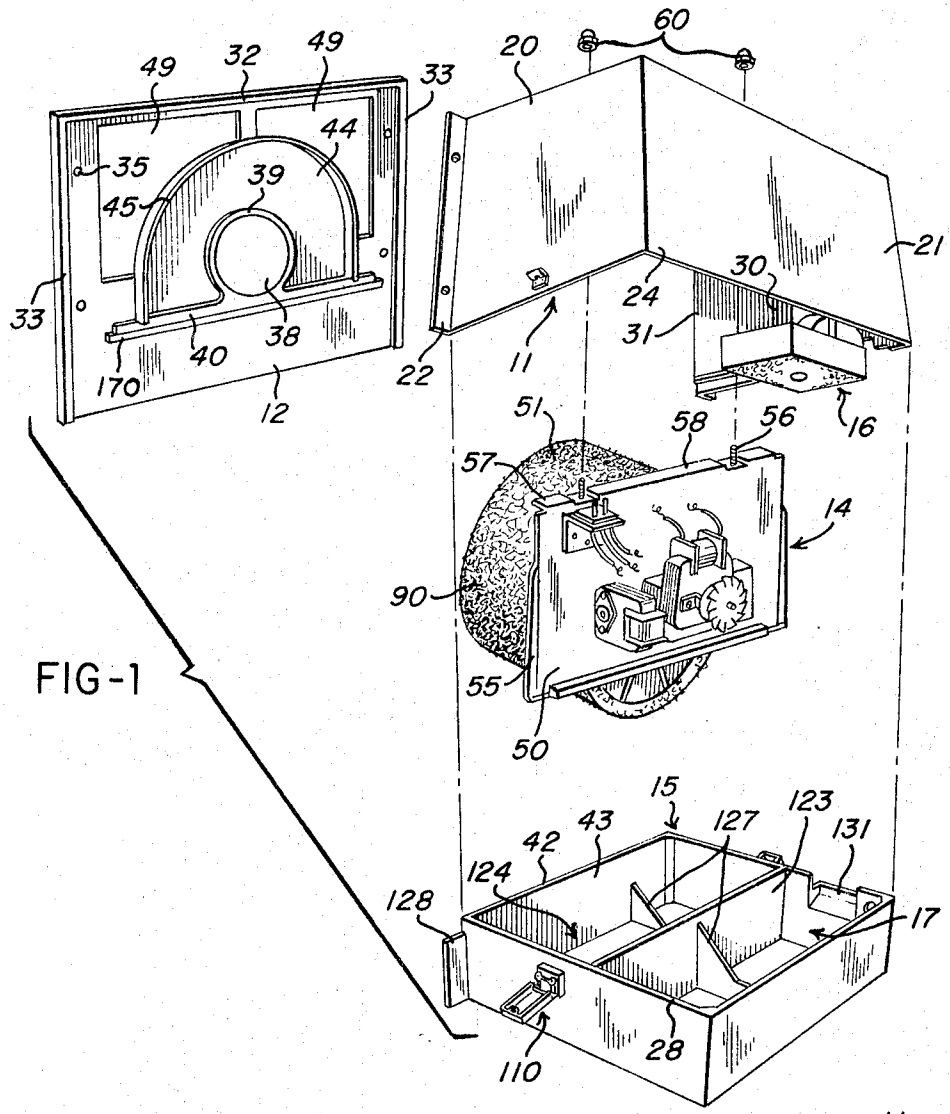


FIG-1

FIG-3

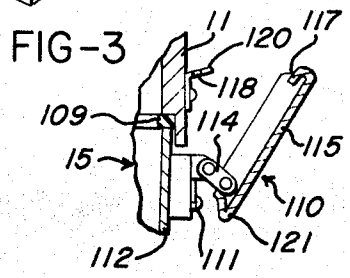
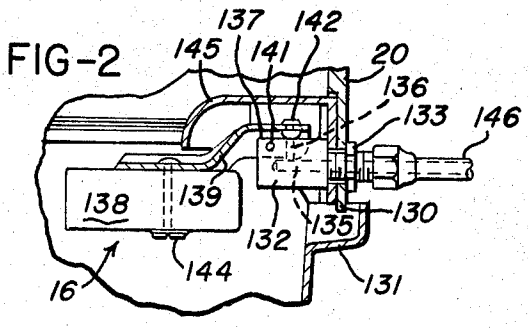


FIG-2



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Aug. 16, 1966 W. H. WENTLING ETAL 3,266,481

HUMIDIFIER

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FIG-4

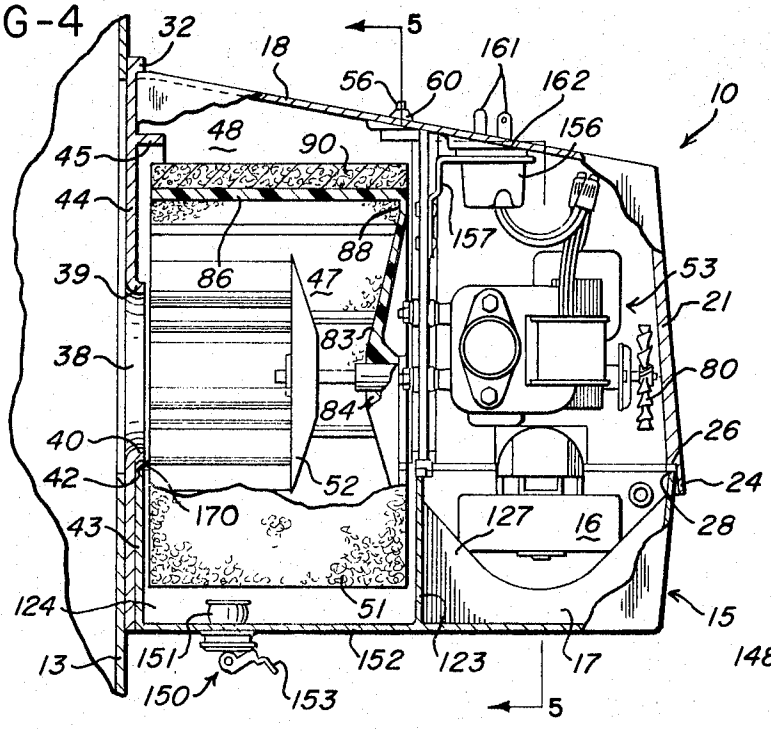


FIG-5

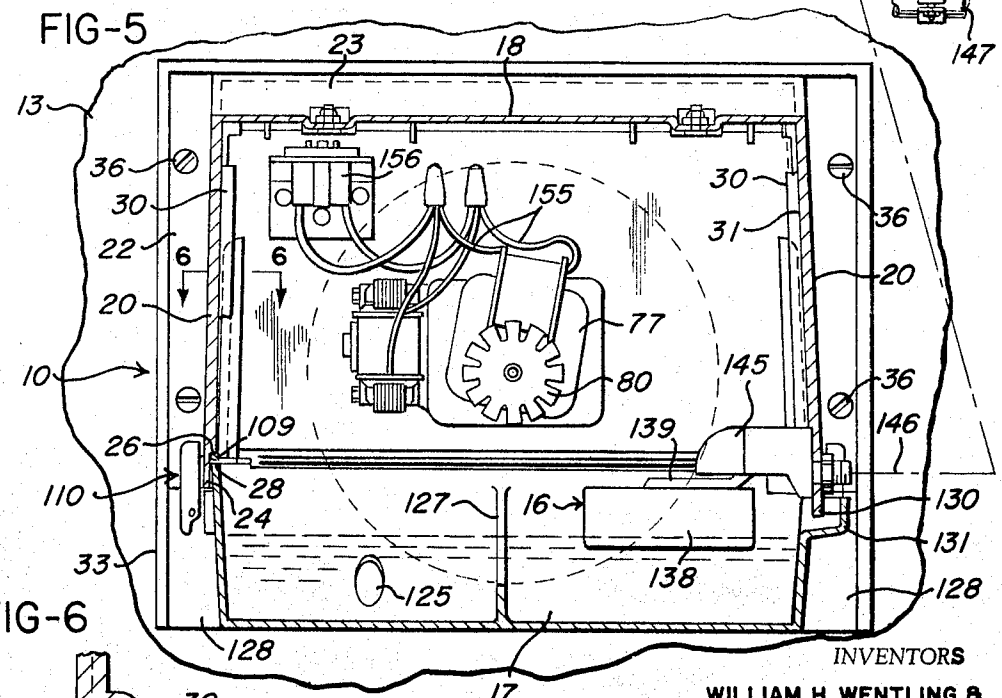
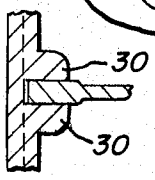


FIG-6



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HUMIDIFIER

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FIG-7

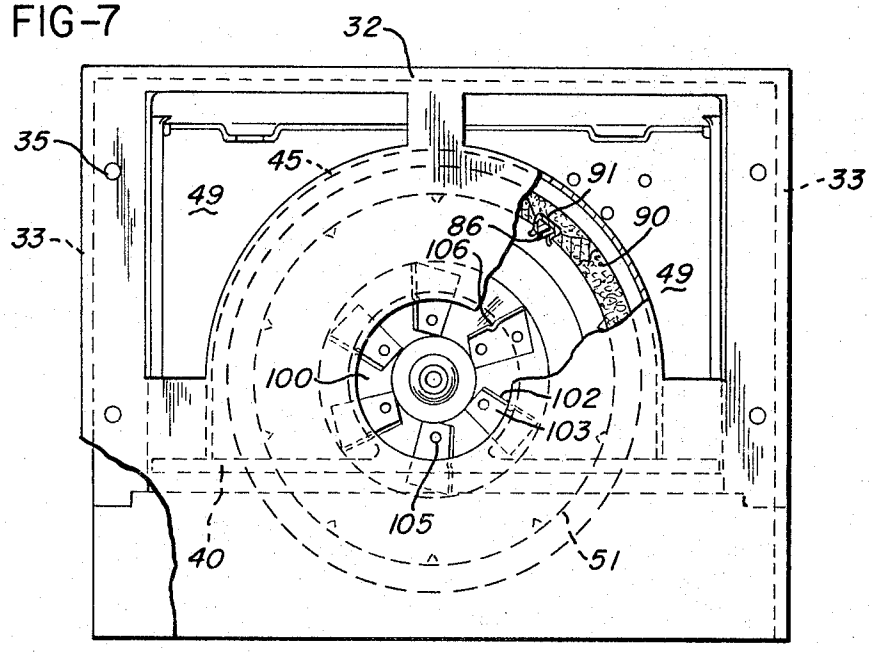


FIG-8

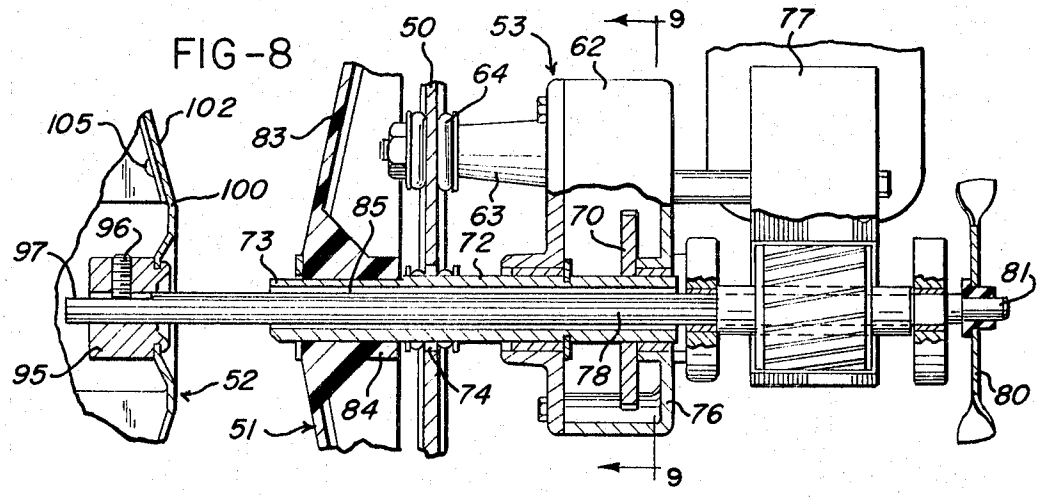
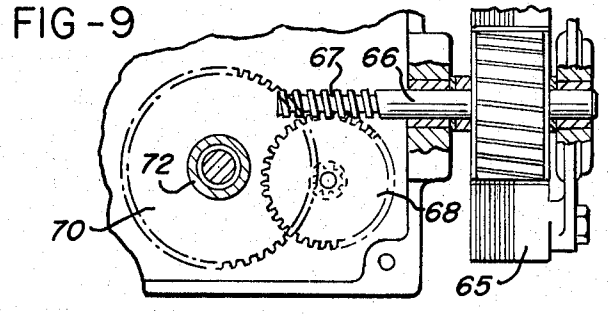


FIG-9



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3,266,481

HUMIDIFIER

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Filed Aug. 18, 1965, Ser. No. 480,569
11 Claims. (Cl. 126—113)

This invention relates to apparatus for adding moisture to air, and particularly to a humidifier adapted to be mounted in conjunction with the domestic warm air heating system or the like. More particularly, this invention relates to improvements in compact power operated humidifiers of the type disclosed in the patent to Wentling et al. No. 3,149,626, granted September 22, 1964, and assigned to the assignee of this application.

In many present day hot air furnaces, the interior space therein is quite limited since the design utilizes every square inch of space in order to reduce the space requirement for the furnace. Thus it is frequently impossible to utilize a humidifier of any type which must extend partially or entirely into the furnace. Even when sufficient space is available to provide for installation of such a humidifier, the air flow is obstructed which materially decreases the efficiency of the furnace.

It is accordingly an important object of this invention to provide a humidifier of the general type in the aforesaid Wentling et al. patent which is mounted entirely on the outside surface of the furnace and which does not reduce the efficiency or rate of air flow in the furnace or duct.

Another object of this invention is to provide a humidifier of the aforesaid type which consumes a minimum of space so that it can be used in conjunction with modern furnaces where the space requirements, both interior and exterior of the furnace or duct, are quite limited and further to provide a humidifier of the aforesaid type wherein a mounting plate is utilized to secure the unit to the wall of the furnace and to separate the inlet from the outlet of the humidifier.

A further object of this invention is to provide a humidifier which can be easily installed, assembled and disassembled without detaching the water line, and further to provide a humidifier wherein the reservoir and the media assembly can be removed for change as required to maintain efficient operation of the humidifier.

In the drawings:

FIG. 1 is an exploded view of the humidifier showing the various components thereof and the manner in which they can be separated;

FIG. 2 is an enlarged sectional view of the float assembly;

FIG. 3 is another enlarged sectional view taken through the releasable clasp which secure the reservoir pan to the main housing;

FIG. 4 is a vertical section view taken essentially through the center of the humidifier;

FIG. 5 is a sectional view taken along the line 5—5 of FIG. 4;

FIG. 6 is another sectional view taken along the line 6—6 of FIG. 5;

FIG. 7 is an end view of the humidifier viewed from left to right of FIG. 4;

FIG. 8 is a sectional view taken vertically through the driving mechanism for the humidifier; and

FIG. 9 is a sectional view taken along the lines 9—9 of FIG. 8.

Referring to the drawings wherein a preferred embodiment of the invention is shown, FIG. 1 illustrates the various components of the humidifier 10 which include a main housing 11 adapted to be secured to the mounting plate 12 on an exterior wall 13 (FIG. 4) of a furnace.

The term furnace includes all air conveying or heating devices on which a humidifier 10 can be mounted for increasing the moisture content of such air. The removable media assembly 14 is releasably secured in the main housing 11 and the reservoir pan 15 is similarly secured to the main housing. As will be seen, the float assembly 16 is secured in the main housing 11 and cooperates with the float chamber 17 in a reservoir pan 15 to regulate the level of water in the pan.

The main housing 11 includes a top wall 18 having the integral side and rear walls 20 and 21 formed integral with the outwardly extending flanges 22 and 23 projecting from the forward edge of the top and side walls 18 and 20. The lower edge portions 24 of the side and rear walls 20 and 21 have a reduced thickness to form the interior shoulder 26 which seats the upper edges 28 of the reservoir pan 15, as seen in FIG. 5. The main housing 11 also has a pair of spaced parallel ribs 30 extending vertically on the inside surface 31 of each of the side walls 20 for receiving the media assembly 14 as will be further described.

The mounting plate 12 is preferably constructed of plastic material and, as shown in FIGS. 1 and 7, is rectangular in design and has the outwardly extending projections 32 and 33 on the top and both sides thereof for adding rigidity to the plate 12 as well as to facilitate attachment thereto of the main housing 11 and reservoir pan 15. A pair of openings 35 are provided adjacent the projections 33 for receiving the screws 36 (FIG. 5) which extend through the side flanges 22 on the main housing and into the sheet metal wall 13 of the furnace.

The inlet opening 38 is provided in the central portion of the mounting plate 12 with the enlarged raised flange 39 formed around this opening for added rigidity and increasing the efficiency of air flow to the media assembly. A projection 40 is provided horizontally across the bottom of the opening 38 and substantially the entire width of the mounting plate 12 for engaging the top edge 42 of the front wall 43 of the reservoir pan 15 when the humidifier 10 is assembled. An inverted U-shaped wall 44 extends around the opening 38 and an inwardly extending flange 45 is provided around the periphery of this wall for preventing recirculation around the media assembly 14 which separates the air inelt chamber 47 from the air outlet chamber 48 (see FIG. 4). A pair of outlet openings 49 are provided in opposite upper corners of the plate 12 for returning the air to the furnace after it has passed through the media assembly.

The media assembly 14 includes the flat vertical mounting partition 50, the media drum 51, the fan 52, as well as the motor assembly 53 (FIG. 8). The partition 50 is relatively thin and the opposite side edges 55 thereof are received in the groove formed between the vertical ribs 30 on the side walls 20 of the main housing 11. The partition 50 is secured in place to the top wall 18 by the bolts 56 which extend through the flange 57 on the top edge 58 of the partition 50 and into suitable openings in the top wall 18 of the housing 11 to be received in the nuts 60. By disconnecting these nuts, the entire media assembly 14 may be removed from the main housing 11 without detaching the latter from the mounting plate 12 or from the furnace.

The drive assembly 53 includes a gear box 62 rigidly secured to the partition 50 by the stud members 63 which have the resilient bushing 64 thereon, as shown in FIG. 8, to reduce the vibrations and noise which are transferred to the partition 50. A small motor 65 is mounted on the side of the gearbox 62, as shown in FIG. 5, with its drive shaft 66 having the worm gear 67 on the end thereof extending into the gearbox 62 to drive the gears 68 and 70. The gear 70 is rigidly connected to the tubu-

lar drive shaft 72 which is mounted for rotation in the gearbox and has its forward end 73 extending through the opening 74 in the partition 50 to the opposite side thereof to support the media drum 51. Mounted on the rear side 76 of the gearbox 62 is a second small electrical motor 77 whose elongated drive shaft 78 extends coaxially through the hollow shaft 72 and beyond the end 73 of the shaft 72 to support the fan 52. Another fan 80 may be mounted on the opposite end 81 of the shaft 78 for cooling the motor 77 in a conventional manner.

The media drum 51 which is mounted on the end 73 of the shaft 72 for rotation therewith includes the annular back plate 83 (FIG. 4) having the hub portion 84 thereon to receive the shaft 72, and a suitable flat surface 85 is provided on this shaft so that angular movement between the hub 84 and the shaft 72 is prevented. A plurality of cantilevered fingers 86 extend horizontally from the outer peripheral edge 88 of the back plate 83 to support the resilient media sleeve 90.

The media sleeve 90 is preferably open cell polyurethane foam which has numerous irregularly spaced pores or passages therethrough, e.g., a porosity of eight to thirteen pores per lineal inch. This characteristic provides relatively large effective surface area to become wetted when the belt is submerged in water. Another advantage of this material is that the total space consumed by the belt is much less than that of other materials capable of providing the amount of surface area, and the particular porosity is dependent upon the thickness, length, and width of the material, as well as the rate of air flow therethrough. It is important that the material not be absorbent since it is not desired to completely saturate the sleeve 90 but only to wet the surface area thereof.

This polyurethane foam material is composed of uniformly distributed interconnecting strands which form a three-dimensional structure of openings or pores, without a covering membrane or surface of the type often found in foam rubber materials. The random arrangement of the pores eliminates straight channels through this material so that air flowing therethrough passes around the individual strands thus creating maximum contact therewith with minimum of air resistance. Also the flow through the material is uniform throughout so that there is maximum flow therethrough. While the pores are not precisely the same size, they are predominately within a range of similar sizes so that the air flowing therethrough is uniform throughout the surface on which water is deposited for maximum efficiency of the humidifier. This material is disclosed and claimed in the copending application of Martin et al., Serial No. 258,338, filed February 13, 1963, and assigned to the assignee of this invention, and it should be understood that other materials may be used without departing from the scope of this invention. One or more of the U-shaped clamps 91, as shown in FIG. 7, are inserted through the resilient sleeve 90 and around a portion of the fingers 86 to prevent the sleeve from slipping circumferentially or radially on the media wheel 51.

The fan 52 is secured to the end of the elongated shaft 78 and includes a hub 95 whose set screw 96 engages the flat surfaces 97 on the end of the shaft 78. The back plate 100 of the fan is secured to the hub 95, and is slightly concave with a plurality of radially extending flat blades 102 extending from the flanges 103 rigidly secured to the back plate 100 by conventional rivets 105 or the like. The axial ribs 106 of each of these blades adds rigidity thereto and the blades lie in a plane disposed at an angle to a radial plane through the center of the fan so that maximum air flow is produced thereby. The outer diameter of this blower wheel is somewhat less than the inner diameter of the media drum 51, as clearly shown in FIG. 7 so that both can rotate without interference.

The reservoir pan 15 is rectangular in shape and is adapted to be releasably secured to the bottom of the main housing 11. As indicated above, the upper peripheral edges 28 of this pan are received against the shoulders 26 of the main housing with the resilient seal 109 therebetween being compressed with the clasps 110 which are used to secure the reservoir pan 15 in place. Each of these clasps 110 (FIG. 3) includes a base bracket 111 secured to the wall 112 of the reservoir pan 15 and having the pivot link 114 secured thereto. The clamp member 115 is secured to the opposite end of the link 114, and the upper portion of the clamp has a downwardly extending lip 117 which is adapted to engage the opening 118 in the bracket 120 on the main housing 11. The clasp 110 is released by merely pulling the bottom portion 121 thereof outwardly away from the wall 112, which then permits upward movement thereof so that the lip 117 disengages the opening 118 in the bracket 120.

The clasps 110 can be resecured by reversing the above operation, and it is to be understood that other forms of manually releasable clasps can be used to connect the main housing 11 and reservoir pan 15 together without departing from the scope of the invention. The main housing 11, the mounting plate 12, the pan 15, and the partition 50 are preferably made of molded fiberglass plastic which can be precisely shaped to provide the highly efficient housing design, as well as the necessary rigidity for the housing and can be easily cleaned of the mineral deposits which occur in a humidifier.

The reservoir pan 15 has a central partition 123 therein which separates the reservoir 124 from the float chamber 17. An opening 125 (FIG. 5) in the partition 123 interconnects the reservoir and float chambers 124 and 17, and the vertical ribs 127 add rigidity to the pan 15. The horizontal ears 128 extend from the front wall 43 of this reservoir pan 15 to engage the raised projections 33 on the mounting plate 12 so that the reservoir pan 15 can be easily and properly aligned with the main housing 11 when the two are being secured together.

The float assembly 16 is secured to the downwardly extending flange 130 on the side wall 20 of the main housing 11, and this flange cooperates with the outwardly extending portion 131 on the reservoir pan 15. The float assembly 16 includes a valve body 132 (see FIG. 2) secured to the flange 130 by the nut 133 and has a longitudinal passageway 135 therein terminating at one end by an orifice 136 on the top side 137 of the valve body 132. The Styrofoam float 138 is secured at the end of the arm 139 which is pivotally secured on the valve body 132 by the pin 141 so that movement of the arm 139 forces the valve member 142 into and out of engagement with the orifice 136 to control the flow of water therefrom. The pin 144 extends through the Styrofoam float 138 and secures it to the arm 139, and a cover member 145 is provided above the orifice 136 and valve member 142 so that any spraying of water is confined to the float chamber 17. The line 146 connects the valve body 132 to the water pipe 147 (FIGS. 2 and 5), and the saddle valve 148 permits the line 146 to be manually shut off from the pipe 147.

When the water level in the float chamber 17 changes, the buoyancy of the float 138 causes it to rise or fall thereby changing the position of the arm 139 which, in turn, moves the valve member 142 with respect to orifice 136 to open or close this orifice. The level of the water is thereby regulated to the desired depth within the float chamber 17, and consequently within the reservoir 124 since the opening 125 in the partition 123 interconnects the float chamber 17 and reservoir 124.

A removable expansion plug 150 is provided in the opening 151 in the bottom wall 152 of the reservoir pan 15 (FIG. 4) so that the water from this reservoir may be easily drained therefrom prior to removal of the pan 15, to drain periodically the reservoir, or to connect a purge pump thereto to remove water therefrom at a preset rate to prevent the precipitation of dissolved minerals in the pan. The plug 150 is conventional in design wherein pivotal movement of the lever 153 causes the outer diameter thereof to expand or contract.

The electrical wires 155 leading to the motors 65 and

77 are connected to the male type socket 156 which is mounted on the bracket 157 secured to the vertical partition 50. The connector members 161 of this socket extend through a suitable opening 162 in the top wall 18 of the main housing 11 so that, when the vertical partition 50 is removed from the main housing 11, the motors 65 and 77 and their electrical wires are similarly removed after a female electrical connector (not shown) is detached from the humidifier 10.

An important feature of the invention resides in the manner in which the humidifier 10 is easily and quickly assembled and disassembled for installation, cleaning or replacement of the media sleeve 90. To disassemble, it is merely necessary to detach the reservoir pan 15 by releasing the manual clasps 110 and lower the pan 15 from the main housing 11. Since the float assembly 16 is secured in the main housing 11, it is only necessary to terminate the flow of water through the line 146 by turning off the saddle valve 148 prior to removal of the pan 15.

The female electrical connector (not shown) is then detached from the male connectors 156, and the two nuts 60 removed from the end of the screws 56. The partition 50 then can be easily lowered from the main housing 11 with the media wheel 51, the fan 52, and the drive motors 65 and 77 still mounted thereto. To remove the sleeve 90 from the drum 51, the clamps 91 are removed from the fingers 86 and the sleeve 90 is slipped axially from the drum 51 for cleaning or replacement as required. At the same time, any mineral deposits which have collected on any portion of the other component of the media assembly 14 or in the reservoir pan 15 can be removed easily therefrom since they do not adhere rigidly to the plastic material.

To reassemble the humidifier 10, the partition 50 is placed in the main housing 11 with the side edges 55 thereof in the groove defined between the projections 30 on the opposite side walls 20. This allows the partition 50 to be accurately positioned so that the screws 56 project through the openings in the top wall 18 thereof to enable the nuts 60 to be quickly replaced. The reservoir pan 15 is then positioned by using the ears 128 between the side edges 33 of the mounting plate 12, and then moved upwardly until the upper edges 42 thereof engage the resilient seal 170 on the shoulders 40 formed near the bottom edges of the main housing 11. Then the clasps 110 are resecured, and this causes the seal 109 to be compressed between the shoulder 26 and the upper edges 28 of the reservoir pan 15 in a fluid tight manner. The female electrical connector is then reattached and the saddle valve 148 turned on so that the float assembly 16 automatically refills the float chamber 17 and the reservoir 124.

The motors 65 and 77 are usually wired for operation with the blower motor of the associated furnace so that these motors operate with the furnace and when the humidistat has closed the circuit to the humidifier motors 65 and 77. The media wheel 51 is rotated by its motor 65 at a relatively slow speed with the lower portion submerged in the reservoir, as shown in FIG. 4, wherein the individual strands of sleeve 90 are wetted. The motor 77 rotates the fan 52 simultaneously with the media wheel 51, although at a higher speed, and the fan draws air through the venturi shaped inlet opening 38 in the mounting plate 12 and then forces it radially through the sleeve 90 on the media wheel 51 into the outlet space 48. From this space the air is returned to the furnace through the openings 50, and the inwardly extending flange 45 adjacent these openings substantially prohibits recirculation of air around the open end of the media wheel 51.

For preferred operation, the rate of air flow through the pores in the sleeve 90, the size of the pores in the sleeve 90, and the rate of movement of the media wheel 51 are carefully correlated so that substantially all of the strands of the sleeve 90 remain wet at all times. As a result, only a portion of the water which wets the sleeve material is evaporated therefrom so that the deposits on the sleeve 90 caused by evaporation are reduced to a minimum. The evaporation thus merely concentrates the remaining water on the individual strands with dissolved minerals, and these solutions are subsequently removed when the sleeve 90 reenters the reservoir 124 wherein the highly concentrated solutions are rinsed from the sleeve. This action gradually concentrates the dissolved minerals in solution in the reservoir 124 and eventually precipitation will occur if the water therein is not drained.

The invention has thus provided an improved humidifier adapted for mounting on a hot air furnace or associated duct which is easily installed, and which can be quickly disassembled for cleaning by the average home owner. The humidifier is compact in size and mounts entirely on the outside of the furnace or duct, and the mounting plate serves the dual purpose of supporting the humidifier and separating the inlet and outlet openings.

While the form of apparatus herein described constitutes a preferred embodiment of the invention, it is to be understood that the invention is not limited to this precise form of apparatus, and that changes may be made therein without departing from the scope of the invention which is defined in the appended claims.

What is claimed is:

1. A humidifier of the character described adapted to be mounted over an opening in a vertical wall of a furnace or duct comprising, a mounting plate secured to the wall around the opening, a housing secured to said mounting plate and having top and side walls with an open bottom, a vertical partition releasably secured to said housing and being disposed in spaced relation with and generally parallel to said mounting plate, a highly porous evaporator drum mounted on said vertical partition and having an open end adjacent said mounting plate, means defining a central opening in said mounting plate for flow of air into the interior of said evaporator drum, means defining an outlet in said mounting plate disposed radially outwardly of said drum and communicating with the space between said drum and said main housing, removable reservoir pan means secured to said bottom of said main housing for wetting said drum, and air moving means for moving air through said inlet opening and said drum and then through said outlet to increase the moisture content of the air by evaporating water from the surfaces of said highly porous drum.

2. A humidifier of the character described adapted to be mounted over an opening in a vertical wall of a furnace or duct comprising, a mounting plate secured to the wall around the opening, a housing secured to said mounting plate and having top and side walls with an open bottom, a vertical partition releasably secured to said housing and being disposed in spaced relation with and generally parallel to said mounting plate, said partition cooperating with said mounting plate and said housing to define a humidification chamber, a highly porous evaporator drum mounted on said vertical partition and having an open end disposed closely adjacent said mounting plate, said evaporator drum separating said humidification chamber into an inlet portion interior of said drum and an outlet portion between said drum and said housing, means defining a central opening in said mounting plate for flow of air into said inlet portion of said humidification chamber, means defining at least one outlet opening in said mounting plate disposed radially outwardly of said drum and communicating with said outlet portion of said humidification chamber, removable reservoir pan means secured to said bottom of said main housing for wetting said drum, and air moving means mounted in said inlet portion of said humidification chamber for moving air through said inlet opening and said drum and then through said outlet to increase the moisture content of the air by evaporating water from the surfaces of said highly porous drum.

3. A humidifier of the character described adapted to

be mounted over an opening in a vertical wall of a furnace or duct comprising, a housing secured to said mounting plate over the opening and having top and side walls with an open bottom, a vertical partition releasably secured to said housing and being disposed in spaced relation with and generally parallel to said mounting plate, said partition cooperating with said housing to define a humidification chamber between said partition and the opening, a highly porous evaporator drum mounted on said vertical partition and having an open end disposed closely adjacent said mounting plate, said evaporator drum separating said humidification chamber into an inlet portion interior of said drum and an outlet portion between said drum and said housing, means defining a central opening in said housing for flow of air into said inlet portion of said humidification chamber, means defining at least one outlet opening in said housing disposed radially outwardly of said drum and communicating with said outlet portion of said humidification chamber, removable reservoir pan means secured to said bottom of said main housing for wetting said drum, and air moving means mounted in said inlet portion of said humidification chamber for moving air through said inlet opening and said drum and then through said outlet to increase the moisture content of the air by evaporating water from the surfaces of said highly porous drum.

4. A humidifier of the character described adapted to be mounted over an opening in a vertical wall of a furnace or duct comprising, housing means including a mounting plate adapted to be secured to the wall around the opening, said housing means having top and side walls with an open bottom, a vertical partition releasably secured to said housing means and being disposed in spaced relation with and generally parallel to said mounting plate, said partition cooperating with said mounting plate and said housing to define a humidification chamber, a highly porous evaporator drum mounted on said vertical partition with its axis perpendicular to the wall and having an open end disposed closely adjacent said mounting plate, said evaporator drum separating said humidification chamber into an inlet portion interior of said drum and an outlet portion between said drum and said housing, means defining a central opening in said mounting plate for flow of air into said inlet portion of said humidification chamber, means defining at least one outlet opening in said mounting plate disposed radially outwardly of said drum and communicating with said outlet portion of said humidification chamber, removable pan means releasably secured to said open bottom of said housing means, means for wetting said drum, and air moving means mounted in said inlet portion of said humidification chamber for moving air through said inlet opening and said drum and then through said outlet to increase the moisture content of the air by evaporating water from the surfaces of said highly porous drum.

5. A humidifier of the character described adapted to be mounted over an opening in a vertical wall of a furnace or duct comprising, housing means having a mounting plate adapted to be secured to the wall around the opening, said housing means having top and side walls, a vertical partition releasably secured to said housing and being disposed in spaced relation with and generally parallel to said mounting plate and being removable from said housing means by movement in a vertical plane, said partition cooperating with said mounting plate and said housing to define a humidification chamber, highly porous evaporator means mounted on said vertical partition and having an inlet end disposed closely adjacent said mounting plate, said evaporator means separating said humidification chamber into an inlet portion interior of said evaporator means and an outlet portion between said evaporator means and said housing, means defining a central opening in said mounting plate for flow of air into said inlet portion of said humidification chamber, means defining at least one outlet opening in said mounting plate disposed outwardly of said evaporator means and communicating with said outlet portion of said humidification chamber, means for wetting said evaporator means, and air moving means mounted on said removable partition for moving air through said inlet opening and said evaporator means and then through said outlet to increase the moisture content of the air by evaporating water from the surfaces of said highly porous evaporator means, said evaporator means and said air moving means being removable with said vertical partition from said housing means for cleaning.

6. A humidifier as defined in claim 5 wherein guide means are provided in said housing means for receiving and aligning said partition with respect to said housing to position quickly and easily said evaporator means and air moving means with respect to said inlet opening.

7. A humidifier as defined in claim 5 wherein said air moving means is mounted in said inlet portion of said chamber and a pair of drive motors are mounted on the opposite side of said vertical partition with their drive shaft extending through said partition to provide the sole support and drive for said evaporator means and said air moving means.

8. A humidifier of the character described adapted to be mounted over an opening in a vertical wall of a furnace or duct comprising, a mounting plate secured to the wall around the opening, a housing secured to said mounting plate and having top and side walls with an open bottom, a vertical partition releasably secured to said housing and being disposed in spaced relation with and generally parallel to said mounting plate, said partition cooperating with said mounting plate and said housing to define a humidification chamber, a highly porous evaporator drum mounted on said vertical partition and having an open end disposed closely adjacent said mounting plate, said evaporator drum separating said humidification chamber into an inlet portion interior of said drum and an outlet portion between said drum and said housing, means defining a central opening in said mounting plate for flow of air into said inlet portion of said humidification chamber, means defining at least one outlet opening in said mounting plate disposed radially outwardly of said drum and communicating with said outlet portion of said humidification chamber, an inwardly extending flange on said mounting plate radially outwardly of said evaporator drum for blocking the recirculation of air from said outlet portion to said inlet portion of said humidification chamber, removable reservoir pan means secured to said bottom of said main housing for wetting said drum providing for removal of said vertical partition when said pan is removed from said main housing, and air moving means mounted in said inlet portion of said humidification chamber for moving air through said inlet opening and said drum and then through said outlet to increase the moisture content of the air by evaporating water from the surfaces of said highly porous drum.

9. A humidifier as defined in claim 8 wherein said inwardly extending flange is disposed above and on both sides of the inlet end of said evaporator drum and said outlet opening is disposed between said flange and the outer edges of said mounting plate.

10. A humidifier of the character described adapted to be mounted over an opening in a vertical wall of a furnace or duct comprising, a separate mounting plate secured to the wall around the opening for adding rigidity to the wall and for defining inlet and outlet openings to the humidifier, a housing secured to said mounting plate and having top and side walls with an open bottom, a generally vertical partition releasably secured in said housing, said partition cooperating with said mounting plate and said housing to define a humidification chamber, highly porous evaporator means mounted on said partition, said evaporator means separating said humidification chamber into an inlet portion interior of said evaporator

means and an outlet portion between said evaporator means and said housing, said inlet portion of said humidification chamber adapted to receive air from said inlet opening, said outlet opening in said mounting plate communicating with said outlet portion of said humidification chamber, removable reservoir pan means secured to said bottom of said main housing for wetting said evaporator means, and air moving means mounted in said housing for moving air through said inlet opening and said evaporator means and then through said outlet opening to increase the moisture content of the air by evaporating water from the surfaces of said evaporator means.

11. A humidifier of the character described adapted to be mounted over an opening in a vertical wall of a furnace or duct comprising, a separate mounting plate secured to the wall around the opening for adding rigidity to the wall and for defining first and second openings to the humidifier, a housing secured to said mounting plate and having top and side walls, a vertical partition in said housing, said partition cooperating with said housing to

define a humdification chamber, highly porous evaporator means mounted on said partition, said evaporator means separating said humidification chamber into a first portion interior of said evaporator means and a second portion between said evaporator means and said housing for wetting said evaporator means, and air moving means associated with said housing for moving air through said first opening and said evaporator means and then through said second opening to increase the moisture content of the air by evaporating water from the surfaces of said evaporator means.

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JAMES W. WESTHAVER, *Primary Examiner.*