

Oct. 15, 1968

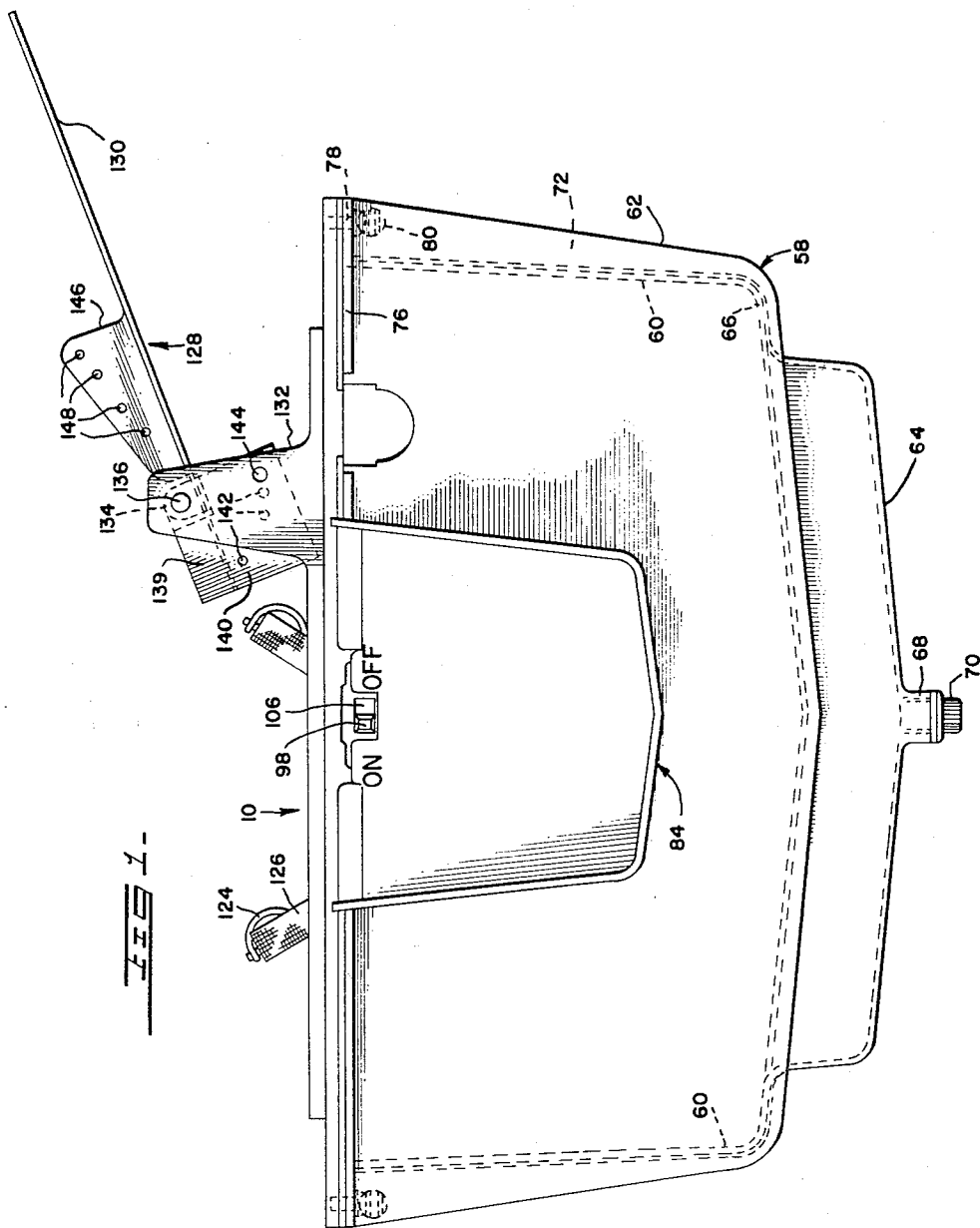
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HUMIDIFYING APPARATUS

Filed May 15, 1964

5 Sheets-Sheet 1



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5 Sheets-Sheet 2

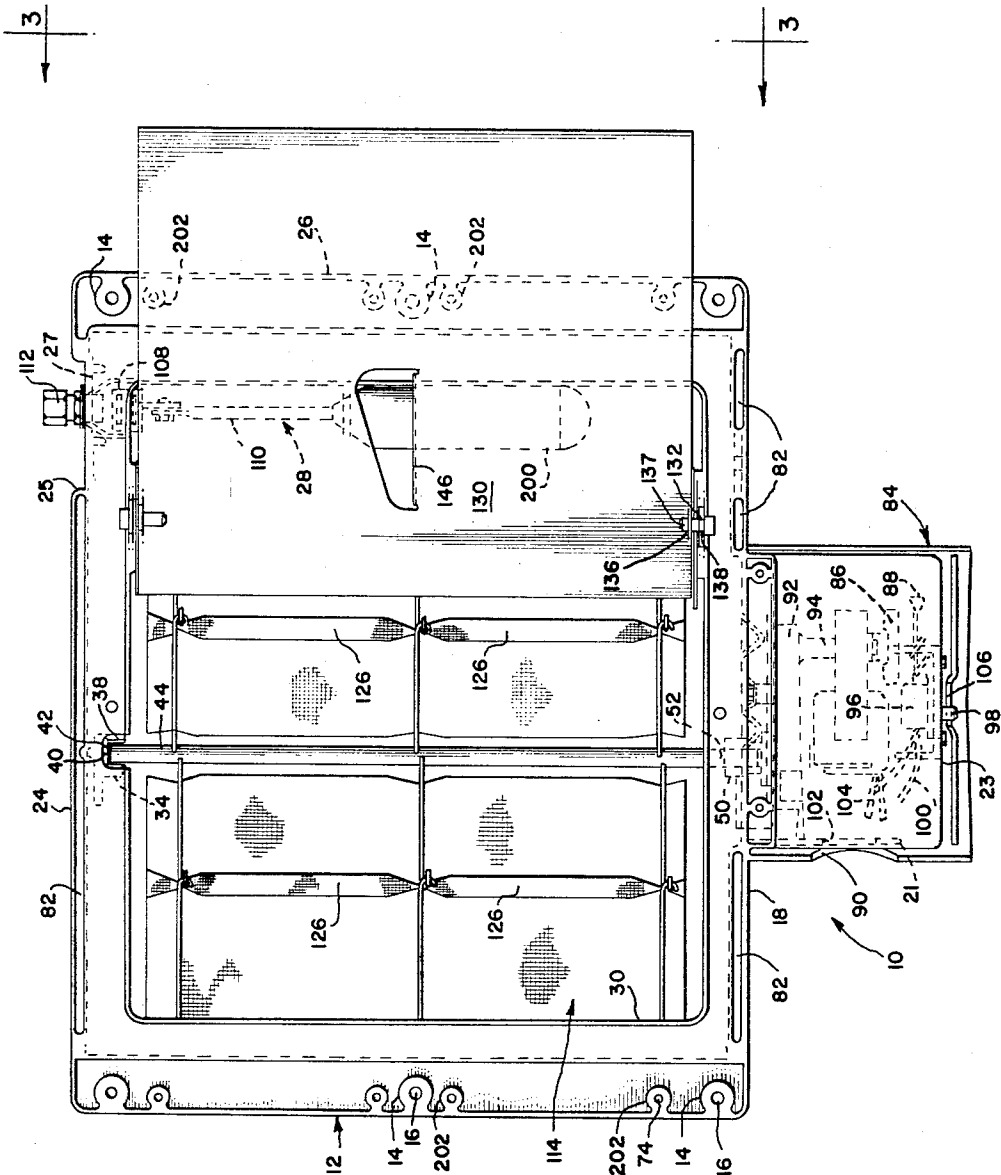


FIG. 2-

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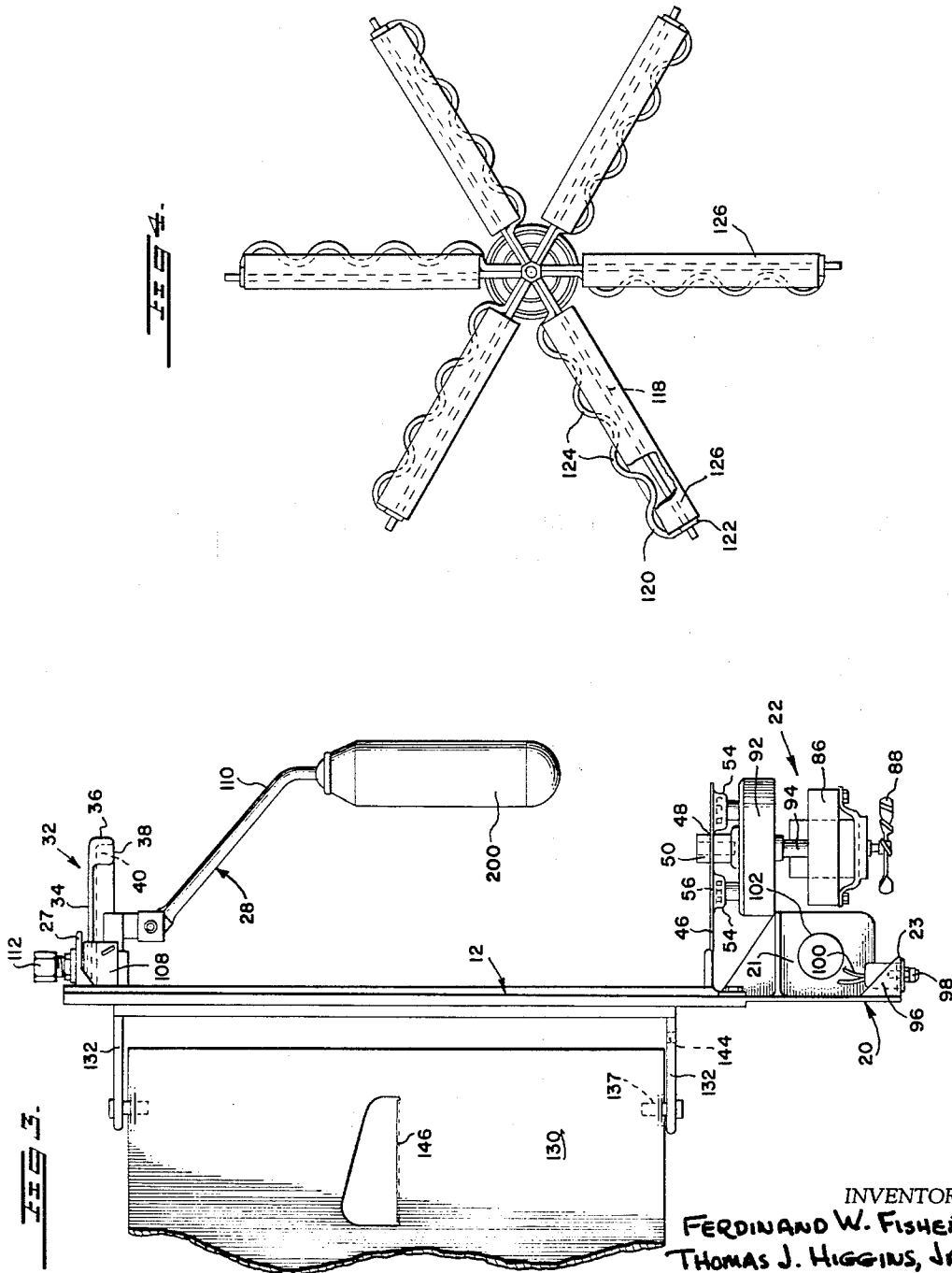
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HUMIDIFYING APPARATUS

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5 Sheets-Sheet 3



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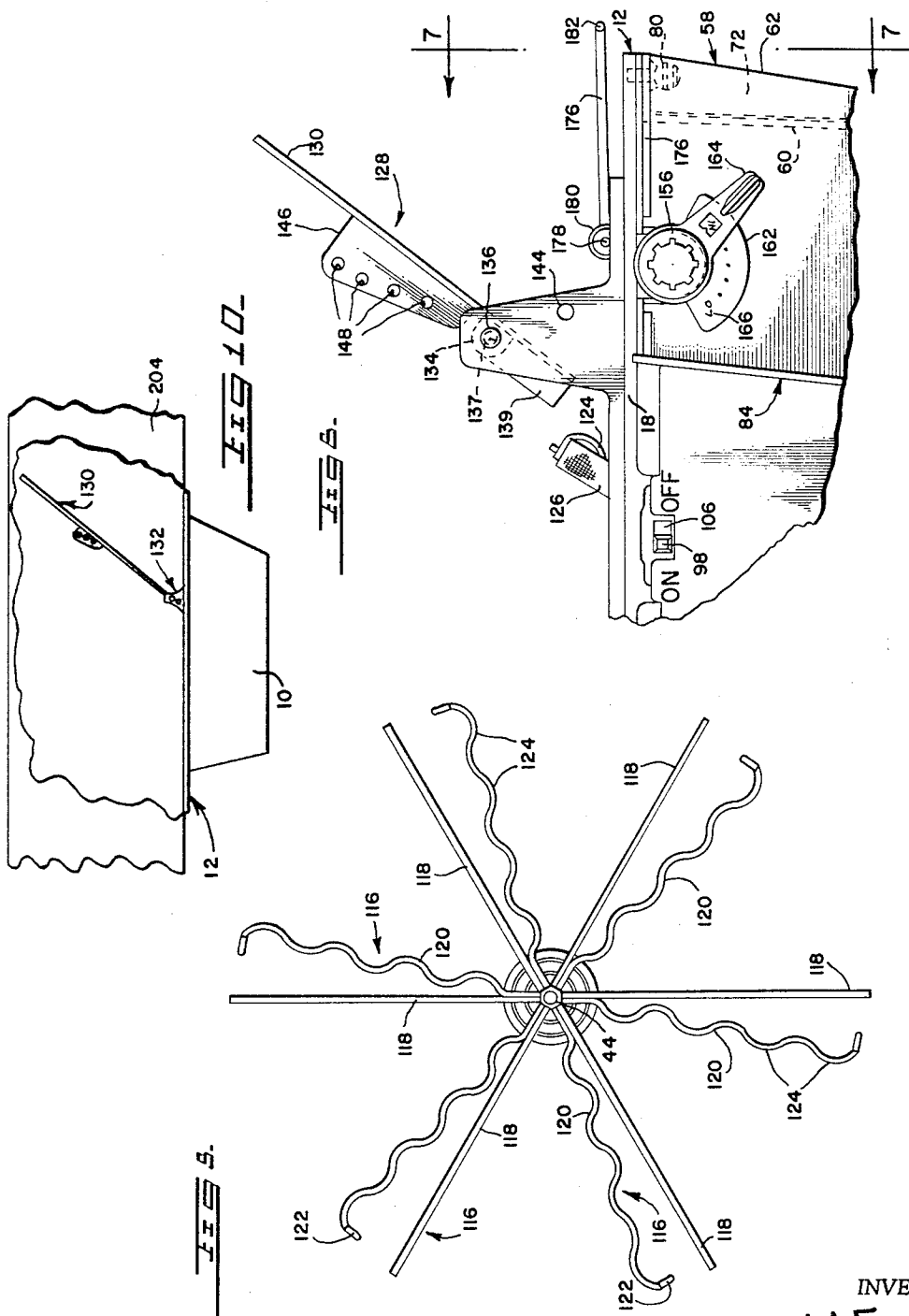
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HUMIDIFYING APPARATUS

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5 Sheets-Sheet 4



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3,405,919

HUMIDIFYING APPARATUS

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4 Claims. (Cl. 261—64)

ABSTRACT OF THE DISCLOSURE

A humidifying apparatus adapted for mounting in the plenum or warm air duct of a furnace heating system. The humidifying apparatus being characterized by an adjustable air flow directing member protruding into the plenum or air duct for directing a portion of the warm air flow through the humidifying apparatus.

The present invention pertains, generally, to air conditioning apparatus.

More particularly, this invention relates to air conditioning apparatus comprising a humidifier particularly adapted to be disposed in structural operative association with the furnace of a warm air heating system to unusually efficiently disseminate desirable quantities of moisture into the heated air delivered by the said furnace.

Accordingly, it is a primary object of the present invention to provide air conditioning apparatus comprising a humidifier particularly adapted to be disposed in structural operative association with the plenum or air distributing duct of the furnace of a warm air heating system, said humidifier being so constituted and arranged as to unusually efficiently automatically disseminate desirable quantities of moisture into the circulating air of the plenum.

It is a further primary object of this invention to provide air conditioning apparatus comprising a humidifier particularly adapted to be disposed in structural operative association with the plenum or air distributing duct of the furnace of a warm air heating system, said humidifier being so constituted and arranged as to be capable of selective partially dependent multiple adjustments, enabling said humidifier to be structurally operative with various size plenums and variably determinative of the quantity of circulating air to be conditioned, and being further so constituted and arranged as to unusually efficiently automatically disseminate desirable quantities of moisture into the said circulating air.

Still further, it is a primary object of the present invention to provide air conditioning apparatus comprising a humidifier particularly adapted to be disposed in structural operative association with the plenum or air distributing duct of the furnace of a warm air heating system, said humidifier comprising, in turn, adjustable means for predetermining the quantity of and for defining the direction of the circulating air to be conditioned, said means being capable of initial selective partially dependent adjustments to structurally operatively associate said humidifier with respect to plenums of various dimensional extents, and said humidifier being so constituted and arranged as to unusually efficiently automatically disseminate desirable quantities of moisture into the said circulating air.

Still further, it is a primary object of the present invention to provide air conditioning apparatus comprising a humidifier particularly adapted to be disposed in structural operative association with the plenum or air distributing duct of the furnace of a warm air heating system, said humidifier comprising, in turn, adjustable means for varying the quantity of and for defining the direction of the circulating air to be conditioned, said means being

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capable of initial selective partially dependent adjustments to structurally operatively associate said humidifier with respect to plenums of various dimensional extents, and said humidifier being so constituted and arranged as to unusually efficiently automatically disseminate desirable quantities of moisture into the said circulating air.

Yet another primary object of this invention is to provide air conditioning apparatus comprising a humidifier particularly adapted to be disposed in structural operative association with the plenum or air distributing duct of the furnace of a warm air heating system, said humidifier comprising, in turn, easily replaceable rotatable moisture disseminating means particularly adapted to disseminate desirable quantities of moisture into the circulating air of the plenum, said humidifier, further, being so constituted and arranged as to be capable of selective partially dependent multiple adjustments, enabling said humidifier to be structurally operatively positioned relative to plenums of various dimensional extents, and variably determinative of the quantity of circulating air to be conditioned.

A still further primary object of this invention is to provide air conditioning apparatus comprising a humidifier particularly adapted to be disposed in structural operative association with the plenum or air distributing duct of the furnace of a warm air heating system, said humidifier comprising, in turn, rotatable moisture disseminating means particularly adapted to disseminate desirable quantities of moisture into the circulating air of the plenum, said disseminating means comprising, in turn, at least one and as much as a plurality of moisture receiving paddles of generally foraminous nature disposed in removably fixed structurally operative association with a plurality of clamping means or clamps, enabling the paddles to be readily and easily replaced, said humidifier, further, being so constituted and arranged as to be capable of selective partially dependent multiple adjustments, enabling said humidifier to be structurally operative with plenums of various dimensional extents, and variably determinative of the quantity and the direction of said circulating air.

It is still another primary object of the present invention to provide air conditioning apparatus comprising a humidifier particularly adapted to be disposed in structural operative association with the plenum or air distributing duct of the furnace of a warm air heating system, said humidifier being so constituted and arranged as to be capable of selective partially dependent multiple adjustments, enabling the same to be structurally operative relative to plenums of various dimensional extents, and to be variably determinative of the quantity and direction of the circulating air to be conditioned, and being further so constituted and arranged as to unusually efficiently automatically disseminate desirable quantities of moisture into the said circulating air, said humidifier, further, being comprised of unitary readily removable assemblies rendering each and every one of the component parts thereof easily accessible for repair and replacement.

Another primary object of this invention is to provide air conditioning apparatus comprising a humidifier particularly adapted to be disposed in structural operative association with the plenum or air distributing duct of the furnace of a warm air heating system, said humidifier being so constituted and arranged as to be capable of selective partially dependent multiple adjustments, enabling the same to be structurally operative relative to plenums of various dimensional extents, and to be variably determinative of the quantity and direction of the circulating air to be conditioned, and being further so constituted and arranged as to unusually efficiently automatically disseminate desirable quantities of moisture

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into the said circulating air, said humidifier, further, being comprised of unitary readily removeable assemblies rendering each and every one of the component parts thereof easily accessible for repair and replacement, and comprising, further, liquid level control means for automatically maintaining a desired quantity of liquid within the said humidifier for dissemination of moisture derived therefrom into the said circulating air.

Other objects and important features of the invention will be apparent from a study of the specification following taken with the drawings, which together show, illustrate, describe and disclose a preferred embodiment or modification of the invention and what is now considered to be the best mode of practicing the principles thereof. Other embodiments or modifications may be suggested to those having the benefit of the teachings herein, and such other embodiments or modifications are intended to be reserved especially as they fall within the scope and spirit of the subjoined claims.

In the drawing:

FIGURE 1 is an elevational view of an air conditioning apparatus constructed according to the principles of the present invention, illustrating further, partially in phantom, one embodiment of certain adjustable component parts for directing and determining the quantity of circulating air to be disseminated with moisture, and for structurally operatively associating the said apparatus with various size plenums or air distributing ducts;

FIGURE 2 is a detailed plan view of the air conditioning apparatus illustrated in FIGURE 1, showing certain component parts in phantom;

FIGURE 3 is a cross-sectional view taken along the line 3—3 of FIGURE 2, with certain component parts shown in phantom;

FIGURE 4 is an elevational view of certain of the component parts of the replaceable rotatable moisture disseminating means of the apparatus of FIGURES 1 to 3;

FIGURE 5 is an elevational view similar to FIGURE 4, but illustrating, further, moisture receiving paddles in supported structural operative association with the component parts of the latter figure;

FIGURE 6 is an enlarged detailed elevational view illustrating another embodiment of certain adjustable component parts for directing and determining the quantity of circulating air to be disseminated with moisture, and for structurally operatively associating the said apparatus with various size plenums or air distributing ducts;

FIGURE 7 is a cross-sectional view taken along the line 7—7 of FIGURE 6, but rotated through an angle of 90° out of the plane of the drawing;

FIGURE 8 is a detailed elevation view of certain of the component parts of the embodiment illustrated in FIGURES 6 and 7;

FIGURE 9 is a front view of the shaft and linkage elements shown in FIGURE 8; and

FIGURE 10 is a schematic view showing the relationship of the humidifier of the present case to an air duct or plenum.

Referring now to the drawing, and particularly to FIGURES 1 through 5, there is illustrated therein an air conditioning apparatus, constructed in accordance with the principles of the present invention, comprising a humidifier 10. The humidifier 10 is particularly adapted to be structurally operatively associated with various size plenums or air distributing ducts of the furnace of a warm air heating system, to unusually efficiently disseminate moisture into the air circulating therethrough.

The humidifier 10 comprises a means for mounting the same in structural operative association with a plenum (not shown), which mounting means comprises, in turn, a mounting plate or frame 12, fabricated of any suitable material, and in any suitable manner. The frame 12, which is of generally rectangular configuration, is provided with any suitable plurality of generally inwardly extending

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mounting lugs 14, having apertures 16 extending therethrough, enabling the frame to be fixedly structurally operatively associated with the plenum 204, by suitable fasteners (not shown).

One side 18 of the frame 12 is provided with a substantially rectangularly configured cover plate 20, extending generally outwardly therefrom. The cover plate, which is integrally structurally associated with or connected to the frame 12, comprises, in turn, an integral generally vertically downwardly extending side plate 21, and an integral generally vertically downwardly extending frontally disposed switch plate 23. The purpose of the cover plate 20, comprising the downwardly extending plates 21 and 23, will be described more fully hereinafter.

The opposite side 24 of the frame 12 is provided with a generally inwardly extending recess disposed towards one end 26 thereof. A mounting extension 27 is integrally structurally operatively associated with or connected to the frame 12 at and within the recess, and extends generally vertically downwardly therefrom, enabling a liquid level control means 28, to be described more fully hereinafter, to be structurally operatively associated therewith.

An aperture 30 is disposed generally centrally of the frame 12 and extends therethrough. A journalling wall 32 is integrally structurally associated with the frame 12 and extends generally vertically downwardly therefrom substantially at the periphery of the aperture 30. The wall 32 comprises a longitudinally dimensionally extensive wall 34, turned back upon itself at the lower end 36 thereof, to present a brief generally vertically upwardly extending wall 38. There is accordingly provided a recess 40 within which one end 42 of a shaft 44 is particularly adapted to be journaled.

A mounting and journalling wall 46 is integrally structurally associated with the frame 12, and extends generally vertically downwardly therefrom substantially at the periphery of the aperture 30, but at an opposite side thereof relative to the side from which the wall 32 extends. The wall is provided with an aperture 48 through which the tubular output shaft 50 of the power means 22 is particularly adapted to extend. Another end 52 of the shaft 44 is particularly adapted to be non-rotatably mutually cooperatively engaged within the shaft 50, and to this end the latter may be of internal hexagonal configuration, and the former of external hexagonal configuration. Of course, any suitable manner of non-rotatably mutually cooperatively engaging the shafts 44 and 50 with respect to one another may be invoked.

The wall 46 is further provided with a plurality of cups 54, enabling the power means 22, to be more fully described hereinafter, as pointed out above, to be mounted in fixed structural operative association with the mounting and journalling wall 46. To this end, conventional fasteners 56 are particularly adapted to be disposed within the cups 54, and to extend through apertures (not shown) extending therethrough.

The humidifier 10 comprises, further, reservoir means 58, particularly adapted to contain a liquid which, in turn, is particularly adapted to be unusually efficiently disseminated into the warm air circulating within the plenum 204 with which the humidifier is fixedly structurally operatively associated. The reservoir means, or casing, or container 58 comprises a plurality of end walls 60, a plurality of side walls 62, and a bottom wall 64. The bottom wall is stepped or counterbored, to present a shelf 66, and is tapered generally inwardly and centrally thereof towards a drain opening 68. A removeable drain plug 70 is provided, so that the reservoir means, or casing, or container 58 can be emptied of liquid when desirable. The longitudinal dimensional extent or length of the side walls 62 is greater than the same distance between the end walls 60. There is presented, therefore, and the casing or container 58 comprises, a recess 72 disposed outwardly of the end walls 60 and between the side walls 62.

The casing 58 is particularly adapted to be fixedly

structurally operatively associated with or connected to the frame 12. To this end, and in addition to the mounting lugs 14, the frame 12 is provided with mounting lugs 202, extending generally inwardly thereof, and having apertures 74 extending therethrough. Additionally, the casing 58 is provided with a lip 76 extending outwardly thereof, and extending completely peripherally thereabout, which lip is particularly adapted to underlie the frame 12. The lip 76 is provided with apertures 78, aligned with the apertures 74, extending through that portion thereof disposed within the recess 72. Connecting pins 80 of any suitable type and configuration extend through the vertically aligned apertures 74 and 78 to removably and yet fixedly connect or structurally operatively associate the reservoir means or casing 58 to and with the frame 12.

Suitable sealing means 82 is disposed between the frame 12 and the reservoir means 58 to preclude leakage therefrom, in a manner considered readily apparent to those skilled in the art. The sealing means may comprise an integral unitary gasket, fabricated of any suitable material and in any suitable manner, which gasket may extend completely peripherally about and between the reservoir means and the frame, or there may be provided a plurality of aligned spaced individual gaskets positioned to extend substantially completely about the periphery of and between the reservoir means and the frame.

A housing 84, integrally structurally associated with or connected to the reservoir means 58, extends outwardly therefrom in underlying relationship with respect to the cover plate 20. The housing is particularly adapted to have disposed therewithin the power means 22. The power means may be of any suitable type and construction for performing the function of rotating the output shaft 50 thereof at a constant rotational velocity. Preferably, the power means comprises a suitable motor 86 having a fan 88 for drawing cool air into the housing and about the motor for cooling the latter. To this end, the housing 84 is provided with an aperture 90. Additionally, the power means 22 comprises a suitable transmission 92 for rotating the output shaft 50 at a constant rotational velocity less than that of the output shaft 94 of the motor 86. The power means 22 is fixedly positioned relative to the frame 12 by fixedly positioning the transmission 92 upon the mounting wall 46. This is accomplished by means of the fasteners 56.

The power means 22 comprises further a suitable on-off switch 96 having a manual actuator 98, which switch is fixedly positioned upon the switch plate 23. Suitable electrical connectors 100 extend from the switch 96, and are particularly adapted to extend outwardly of the housing 84, through an aperture 102 extending through the side plate 21, of the cover plate 20 and through the aperture 90 extending through the housing 84. In a similar manner, suitable wiring 104 extends outwardly of the housing 84 from the motor 86 of the power means 22, and is particularly adapted to be connected to a suitable circuit presenting a source of electricity (not shown), along with the wiring 100.

The housing 84 is provided with another aperture 106, through which the actuator 98 of the switch 96 is particularly adapted to extend. The front of the housing, through which the actuator extends, and outwardly thereof, may be provided with suitable "on" and "off" indicia, as illustrated in the drawings, to present a clear visual indication of the direction in which the actuator must be moved to place the humidifier 10 in operation, as well as to inactivate the same.

As pointed out above, an automatic liquid level control means 28 is structurally operatively associated with the frame 12 by means of the mounting extension 27. The control means 28 may be of any suitable type and construction, and comprises a float 200, fabricated of any suitable material, such as glass, which float is particularly adapted to actuate a valve 108. A valve actuating arm 110 extends between the float 200 and the valve 108, causing

actuation of the latter to and from flow and non-flow positions, in a manner considered readily apparent. An inlet 112 for liquid, such as water, is structurally operatively associated with the valve 108, from without and through the mounting extension 27, presenting a constant supply of liquid to the housing 84. As the level of the liquid within the housing 84, and thus the humidifier 10, decreases, the float 200 descends, enabling the actuating arm 110 to move the valve 108 to a flow position. When the desired level is reached, the float 200 ascends, enabling the actuating arm 110 to move the valve 108 to a non-flow position, precluding any further supply of liquid to the housing. There is automatically maintained, therefore, a constant level of liquid within the reservoir means 58.

As pointed out above, the shaft 44 is particularly adapted to be rotatably moved by the output shaft 50 of the power means 22. The shaft 44 comprises a component part of a moisture disseminating means 114, which is particularly adapted to unusually efficiently automatically disseminate liquid, such as water, from the reservoir means 58 into the warm air circulating through the plenum 204 with which the humidifier is fixedly structurally operatively associated. The moisture disseminating means 114 comprises, in addition to the shaft 44, a plurality of clamping means 116 disposed annularly about the shaft and along the longitudinal dimensional extent or length thereof. The clamping means, or clamps 116 comprise a linear bar 118, and a bar 120 of irregular or curvilinear configuration. The bars 118 and 120 are fixedly structurally operatively associated with or connected to the shaft 44 and, in addition, are fabricated of a material presenting a suitable degree of inherent resiliency. Moreover, in connecting the bars 118 and 120 to the shaft 44, and as a result of such inherent resiliency they are so connected that they are normally disposed in separate relationship with respect to one another, as illustrated in the drawing.

One end of each of the bars 120 is turned back upon itself to present a hook 122. The hooked end 122 of each of the bars 120 is particularly adapted to be disposed about a corresponding end of each of the bars 118. Thus, while the bars 118 and 120 have a normal position, in which they are inherently resiliently disposed in separate relationship with respect to one another, as described above, they have, in addition, an operative position in which they are selectively disposed in a clamped relationship with respect to one another.

As pointed out above, each of the bars 120 is of curvilinear or irregular configuration. This is defined by fabricating the bars 120 with a plurality of loops 124 extending generally completely of the longitudinal dimension extent or length thereof. It is to be understood that the height of each loop or undulation 124, that is, the dimensional extent between the root and the crest thereof, is chosen to dispose the root of each loop substantially in alignment with one another and substantially adjacent the bar 118 when the bars are disposed in operative position relative to one another, as particularly illustrated in the drawings.

The moisture disseminating means comprises, further, a plurality of longitudinally dimensionally extensive generally rectangular moisture receiving paddles 126, which paddles are of substantially the same transverse dimensional extent or width as the length of the clamping bars 118 and 120. The paddles 126 may be fabricated of any suitable material, and preferably are fabricated of a resilient foraminous material, enabling the paddles to receive adequate quantities of the liquid contained within the reservoir means 58. Additionally, the paddles are particularly adapted to be removeably fixedly disposed between and supported by the clamping bars 118 and 120, this being easily accomplished merely by positioning the paddles between the bars, and moving the bars to an operative or clamping position, in which the hooked end 122 of the bar 120 is disposed about the corresponding end of the bar 118. By fabricating the paddles of a resilient material, the

loops 124 of the clamping bar 120, and particularly the root thereof, can extend there into and supporting maintain them in their removeably fixed position relative thereto.

The humidifier 10 comprises, still further, adjustable means 128 for predetermining the quantity of and for defining the direction, through the humidifier, of the circulating air to be conditioned. The adjustable means 128 comprises a baffle plate 130 of substantial longitudinal as well as transverse dimensional extent. A plurality of mounting projections 132, of generally trapezoidal configuration, are integrally structurally associated with or connected to the frame 12, and extend generally vertically upwardly therefrom. The baffle plate 130 has a plurality of mounting lugs 134 extending generally vertically upwardly therefrom, which mounting lugs are provided with an aperture 136 extending therethrough. The apertures 136 are particularly adapted to be disposed in generally horizontal alignment with apertures 138 extending through the projections 132, enabling the baffle plate 130 to be pivotally structurally operatively associated with the humidifier 10. This may be easily accomplished by means of suitable shafts 137 extending through each pair of apertures 136 and 138.

A pair of connecting plates 139 are integrally structurally associated with or connected to the baffle plate 130, and extend generally upwardly therefrom. The plates 139 are positioned substantially adjacent the lugs 134, and are each of them particularly adapted to suspendingly support an adjusting plate 140 of generally L-shaped configuration. The plates 140 may be connected to the plates 139 in any suitable manner, as by welding, and extend generally vertically downwardly therefrom. A plurality of apertures 142 extend through each of the plates 140, and define an arc thereupon for angularly adjusting the plate 130 relative to the frame 12. Each aperture is particularly adapted to be disposed in generally horizontal alignment with an aperture 144 extending through the projection 132, and the plate 140 fixed in position by a suitable fastener (not shown). In this manner, the angular adjustment of the baffle plate 130 relative to the frame 12 of the humidifier 10 is capable of a range of adjustments. In turn, the amount of circulating air traversing the interior of the humidifier can be predetermined, as well as the direction of such circulating air. It can be seen therefore that the amount or degree of dissemination of moisture into the circulating air can be predetermined and controlled through a range of adjustments.

It is conceivable that the distance between the frame 12 and the aperture 136 will position the baffle plate 130 too high for the particular plenum 204 with which the humidifier is to be structurally operatively associated. It is within the scope of the present invention to adjust the means 128 for different size plenums. Accordingly, the baffle plate 130 is provided with a positioning plate 146, of generally trapezoidal configuration, having a plurality of apertures 148 extending therethrough and positioned therealong.

Of course, once the baffle plate is properly disposed relative to the frame for the particular plenum 204 with which the humidifier is to be structurally operatively associated, and any desired quantity of circulating air less than a maximum can be conditioned merely by disposing the proper aperture 142 in horizontal alignment with the aperture 144.

In accordance with the above construction, there are provided multiple adjustments, one for the size of the plenum with which the humidifier 10 is to be structurally operatively associated, and another for the quantity as well as the direction of circulating air to be conditioned. Each adjustment is an initial one, that is, the adjustments are made before the humidifier 10 is connected to the plenum. Thus, the adjustment for the size of the plenum is predetermined, as is the adjustment for the quantity and the direction of circulating air to be conditioned. In addition,

each adjustment is partially dependent on the other since, as pointed out above, to obtain maximum conditioning of circulated air, the adjustment for quantity is made subsequent to the adjustment for the size of the plenum. The adjustable means 128, therefore, performs the functions of predetermining the quantity of and defining the direction of the circulating air to be conditioned, as well as predetermining the size of the plenum to which the humidifier is to be connected, each of these functions being performed or accomplished by initial adjustments that are selective and partially dependent upon one another.

Referring now to FIGURES 6 through 9, wherein like reference characters indicate like parts, a modification of the adjustable means 128 is illustrated therein. In the modification described above, it is pointed out that the adjustments for the size of the plenum and for the quantity and direction of the circulating air to be conditioned are initial adjustments, that is, adjustments made before the humidifier 10 is connected to the plenum. The size of the plenum with which the humidifier is associated, and the quantity and direction of the circulating air to be conditioned are, therefore, predetermined. In the embodiment of the adjustable means 128 illustrated in FIGURES 6 through 9, the adjustment for the size of the plenum is accomplished in the same way, and, accordingly, is an initial adjustment. The adjustment for the quantity and the direction of circulating air to be conditioned, however, can be made subsequent to predetermining the size of and the adjustment for the plenum (not shown), and the installation of the humidifier 10 with respect thereto, and even during the operation thereof.

To this end, the frame 12 is provided with a generally vertically downwardly extending shaft supporting plate 150, depending from the side 18 thereof. An aperture 152 extends therethrough, enabling a rotatable operating shaft 154 to be rotatably disposed therewithin and extending therethrough. The shaft 154 extends completely of the transverse dimensional extent or width of the frame and, though not shown, is suitably supported at the other side 24 thereof. An operating knob 156, of any suitable configuration, is fixedly positioned upon a threaded end 157 of the shaft 154, and is particularly adapted to be disposed outwardly of the supporting plate 150 and a corresponding one of the side walls 62 of the reservoir means 58, as particularly illustrated in FIGURE 6. The operating shaft, while being rotatably disposed, is precluded from shifting transversely of the humidifier 10 by a suitable washer 158, disposed interiorly of the plate 150 and thereagainst. The washer is maintained in position by suitable projections 160 extending generally radially outwardly of the shaft 154.

A suitable indicia plate 162 is positioned upon the reservoir means 58, exteriorly thereof. An indicator 164, which may be integral with the knob 156, or a separate element suitably fixedly structurally associated therewith or connected thereto, extends from the knob, and is particularly adapted to cooperate with the indicia plate 162 for indicating the acute angular disposition of the baffle plate 130 relative to the frame 12, and, accordingly, to the quantity of the circulating air that will be conditioned. To this end, the indicia plate 162 has suitable indicia 166 positioned thereupon, as particularly illustrated in the drawings.

A motion translation plate 168, having an aperture 170, is particularly adapted to be fixedly positioned upon the shaft 154, in any suitable manner, as by means of suitable welding 172. Another aperture 174 extends through the plate 168, in which aperture one leg 178 of a generally U-shaped operating rod 176 is particularly adapted to be disposed. Suitable fastening means 180 is disposed on both sides of the plate 168 at the aperture 174, and about the leg 178 of the rod 176 for non-rotatably structurally operatively associating the rod 176 with the plate. The other leg 182 of the rod 176 is particularly adapted to engage one of the apertures 148 in the positioning plate 146,

which of said apertures 148 is engaged by leg 182 of rod 176 will be dependent on the initial adjustment of the baffle plate 130 with respect to the plenum 204.

Accordingly, it can be seen that rotatable motions of the operating shaft 154 are particularly adapted to be translated to arcuate motions or movements of the operating rod 176, by means of the motion translating plate 168. Since the leg 182 engages the positioning plate 145, rotation of the shaft 154 will vary the acute angular disposition of the baffle plate 130 relative to the frame 12. Thus, while the adjustment for the plenum 204 is an initial adjustment, and must be made before installation of the humidifier with respect thereto, adjustment for the quantity of circulating air to be conditioned can be made subsequent to the adjustment for the size of the plenum, and even during the operation of the humidifier.

However, even though the adjustment for the quantity of air to be conditioned can be made even during operation of the humidifier 10, each adjustment is still partially dependent on the other, for the reasons described above.

In operation, an initial determination is made of the size of the plenum with which the humidifier is to be structurally operatively associated. Whether the humidifier comprises the adjustable means 128 of FIGURES 1-5 inclusive, or FIGURES 6-9 inclusive, an initial adjustment for the size of the plenum or air duct is made.

In the case of FIGURES 6-9 inclusive, the initial adjustment is made by disposing the baffle plate 130 a predetermined distance from the frame 12 by disposing the apertures 136 in alignment with the apertures 138 and positioning the shafts 137 therethrough, the same as is done in the humidifier of FIGURES 1-5 of the operating rod 176 in the proper aperture 148.

In the instance of the adjustable means 128 illustrated in FIGURES 1 through 5 inclusive, an adjustment is then made for the direction and quantity of circulating air to be conditioned, which is made merely by disposing a particular and predetermined one of the apertures 142 in horizontal alignment with the apertures 144, whether it is desired to condition a maximum quantity of circulating air, or some quantity less than a maximum. Each adjustment, in the instance of this adjusting means 128, is, as pointed out above, an initial adjustment that is partially dependent one upon the other.

In the instance of the adjusting means 128 illustrated in FIGURES 6 through 9 inclusive, once the adjustment for the size of the plenum has been made, the humidifier 10 is disposed in structural operation associated therewith, as by means of suitable fasteners (not shown) disposed within and extending through the apertures 16 of the mounting lugs 14. Once installed, the humidifier 10 can be manually adjusted for the direction and quantity of circulating air to be conditioned, by rotating the operating knob 156 which, in turn, rotates the operating shaft 154 and, through the linkage means, comprising the said shaft and the plate 168, varies the acute angular disposition of the baffle plate 130 relative to the frame 12. Again, the adjustment for the size of the plenum, and the adjustment for the direction and quantity of air to be conditioned, are dependent one upon the other, since, as the baffle plate 130 is disposed closer to the frame 12, as required by the size of the plenum, the acute angular disposition of the baffle plate relative to the frame must approach zero, especially when it is desired to condition a minimum amount of air. As pointed out above, any quantity of air can be conditioned, and in the instance of this embodiment of the adjusting means, the adjustment therefore can be accomplished even during the operation of the humidifier 10.

Subsequent to installation of the humidifier relative to the plenum, the manual actuator 98 of the switch 96 is moved to an "on" position, as suitably indicated by the indicia disposed on the front of the housing 84. The power means 22 is thus actuated, causing the continuous rotation of the moisture disseminating means 114. As this

means rotates, each of the moisture receiving paddles 126 enters the liquid contained within the reservoir means 58, enabling the said paddles to receive or accept adequate quantities thereof. Each paddle 126 is more than adequately supported by the clamping means, or clamps 116, especially since a plurality of such clamps, namely three, supports each paddle 126 upon the moisture disseminating means 114. In addition, since each paddle extends substantially completely of the transverse dimensional extent of the reservoir means 58, it can be seen that the said paddles present a substantial surface area particularly adapted to be wetted by the liquid contained therewith.

The humidifier 10 is particularly adapted for use with the furnace of a warm air heating system, as pointed out above, through which the flow of circulating air is a forced flow. A portion of this forced flow of circulating air is directed generally into the reservoir means, the particular direction and quantity of circulating air being determined in the manner set forth above. The heated circulated air is contacted by the moisture disseminating means 114, as a result of which contact, a desirable quantity of the liquid is evaporated and disseminated into the said circulated air. The air thence is reintroduced into the balance of the circulating air, as a result of which reintroduction, the said balance of air is unusually efficiently automatically moisture conditioned with desirable quantities thereof.

It is to be noted that, during the operation of the humidifier 10, the particular position of the power means 22 with respect to the frame 12 and the reservoir means 58 precludes direct contact of the heated circulating air therewith. In addition, provision of the fan 88 performs the function of cooling the motor 86 by drawing atmospheric air into the housing 84 through the aperture 90.

It is particularly to be understood that the various component parts of the humidifier 10 generally comprise unitary readily removable assemblies, enabling the facile removal therefrom for purposes of easily accomplishing repair and/or replacement of such assemblies, and the component parts thereof. Thus, the reservoir means 58 is readily removed from the frame 12 by removing the connecting pins 80 from the generally vertically aligned apertures 74 and 78. Once the reservoir means has been thus removed, it can be seen that the power means 22, the control means 28, and the moisture disseminating means 114 is readily accessible for purposes of repair and/or replacement.

Thus, if it is desired to replace any one or more of the paddles 126, the hooked end 122 of the bars 120 of the plurality of clamping means or clamps 116 fixedly supporting such paddles is released from about the bar 118, this being particularly facilitated by the inherent resiliency of at least the bar 118. The paddle 126 is thence easily removed, and a new one substituted therefor, the procedure for accomplishing this being merely the reverse of removing the paddle from its clamps 116.

In addition, any repair and/or replacement of any of the component parts of the power means 22 is easily accomplished, since such component parts are rendered accessible by the removal of the reservoir means 58.

Still further, any repair and/or replacement of any of the component parts of the liquid level control means 28 is easily accomplished, since, as pointed out above, the component parts thereof are rendered accessible by the removal of the reservoir means 58. With regard to the control means 28, the same, in a manner pointed out above, performs the function of maintaining the level of the liquid within the reservoir means 58 constant during the operation of the humidifier 10, so that the efficiency thereof is in no way impaired.

The humidifier is inactivated simply by moving the manual actuator 98 of the switch 96 to the "off" position, as adequately indicated by the indicia on the front of the housing 84 of the reservoir means 58.

While the invention has been shown, illustrated, described and disclosed in terms of embodiments or modi-

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fications which it has assumed in practice, the scope of the invention should not be deemed to be limited by the precise embodiments or modifications herein shown, illustrated, described or disclosed, such other embodiments or modifications intended to be reserved especially as they fall within the scope of the claims here appended.

What is claimed is:

1. Apparatus for humidifying air particularly adapted to be operatively associated with a warm air duct of a furnace heating system comprising:

a frame adapted to be mounted on an air duct of a furnace and defining a liquid receptacle;

a motor driven, rotatable liquid receiving member mounted on the frame such that a portion of the member is driven through the liquid receptacle;

a baffle member pivotally mounted on the frame and extending generally upwardly therefrom;

a plate attached to and angularly displaced with respect to the baffle member, having an aperture therethrough at a distance from the pivot of the baffle member; the frame having an aperture therethrough at a distance from the pivot of the baffle member allowing alignment of the apertures; and

means for insertion into the aligned apertures to fix the attitude of the baffle member.

2. The humidifying apparatus of claim 1 further comprising:

the frame having a plurality of apertures therethrough on a radius from the pivot of the baffle member for alignment with the aperture in the plate;

whereby the baffle member is capable of being positioned in a plurality of attitudes.

3. Apparatus for humidifying air particularly adapted to be operatively associated with a warm air duct of a furnace heating system comprising:

a frame adapted to be mounted on an air duct of a furnace and defining a liquid receptacle;

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a motor driven liquid receiving member rotatably mounted on the frame such that a portion of the member is driven through the liquid receptacle;

a baffle member mounted on the frame and extending generally upwardly therefrom;

a plate, attached to and angularly displaced with respect to the baffle member, having an aperture therethrough;

a rod having one end adapted for insertion in the aperture in the plate; and

an eccentric motion translating member rotatably mounted on the frame and having an aperture therethrough to receive the other end of the rod; whereby, a driving connection exists between the baffle member and the motion translating member and rotation of the motion translating member causes a change in the pivotal attitude of the baffle member.

4. The humidifying apparatus of claim 3 wherein the motion translating member further comprises:

a shaft rotatably mounted on the frame;

a motion translating plate nonrotatably attached to the shaft and having an aperture therethrough to receive the other end of the rod; and

a knob, operatively associated with the shaft, located exteriorly of the frame.

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