

Jan. 14, 1969

R. I. PRUPIS

3,421,745

SELF-CORRECTING DISPENSING MIXER

Filed June 24, 1966

Sheet 1 of 6

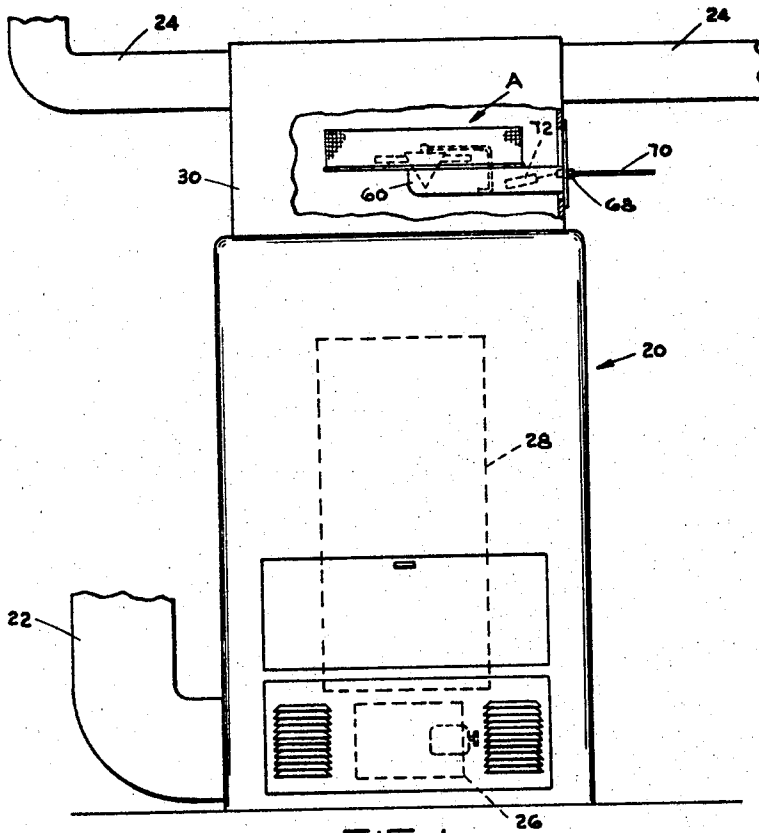


FIG. 1

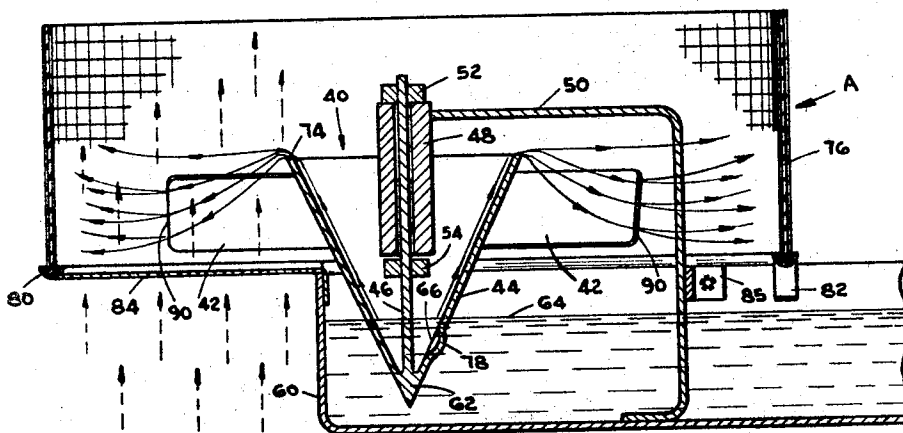


FIG. 2

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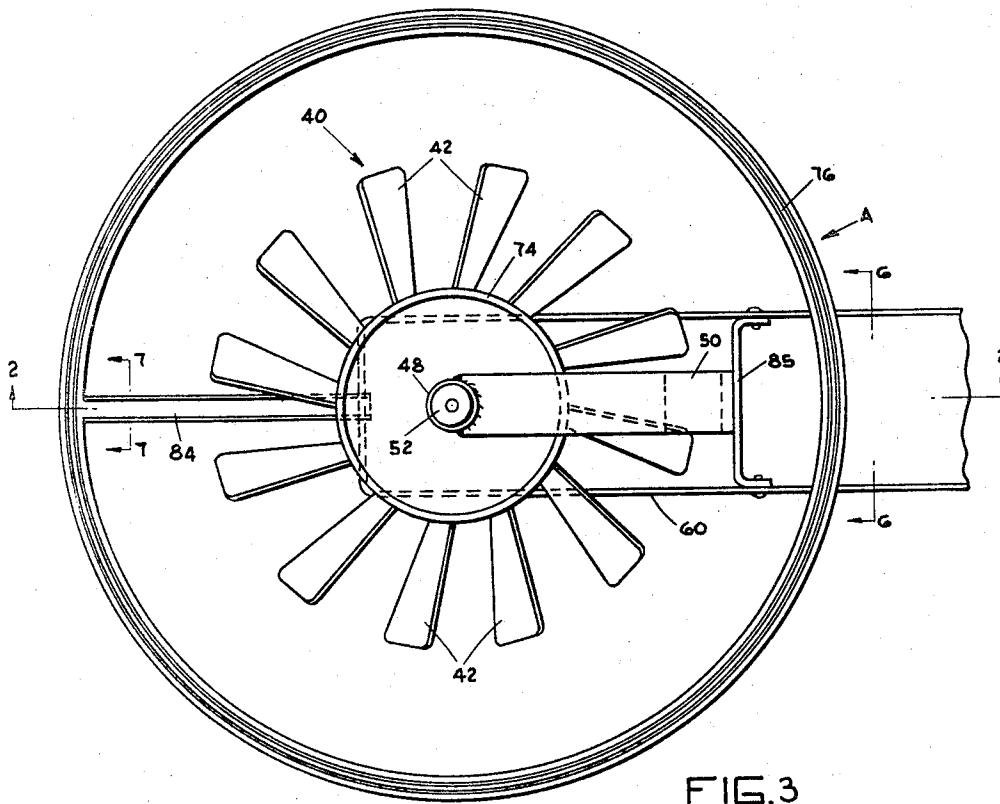


FIG. 3

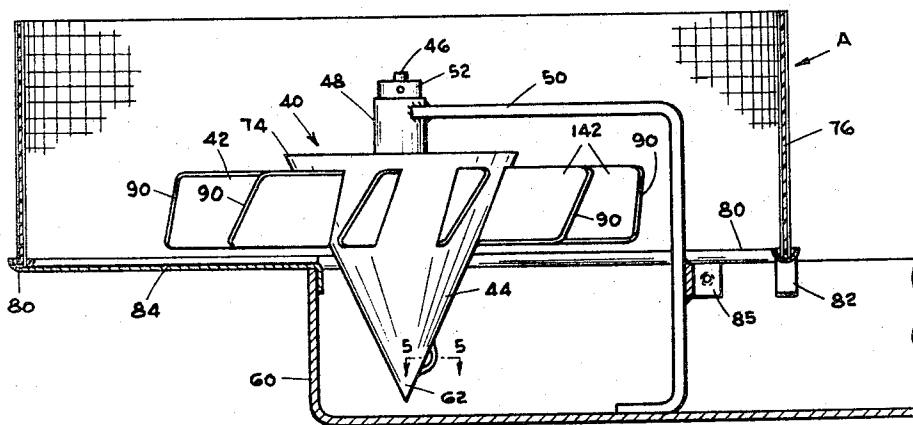


FIG. 4

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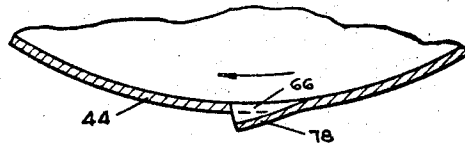


FIG. 5

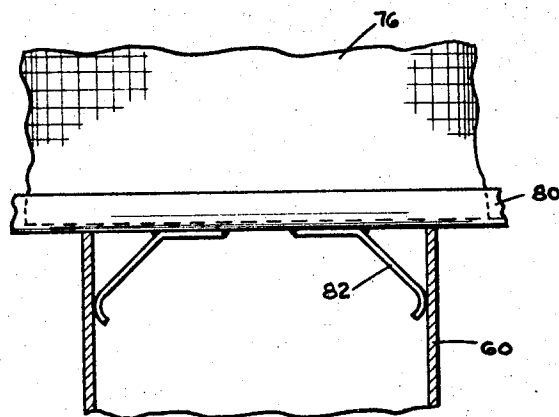


FIG. 6

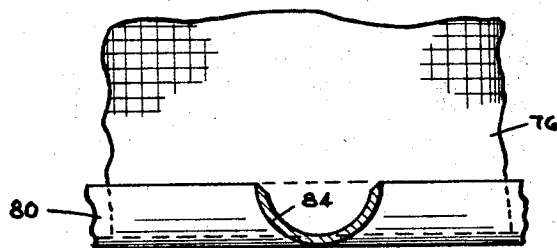


FIG. 7

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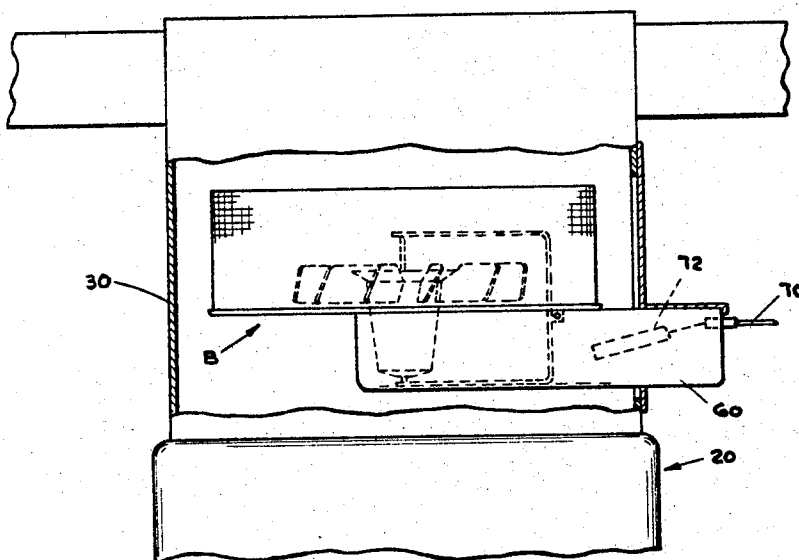


FIG. 8

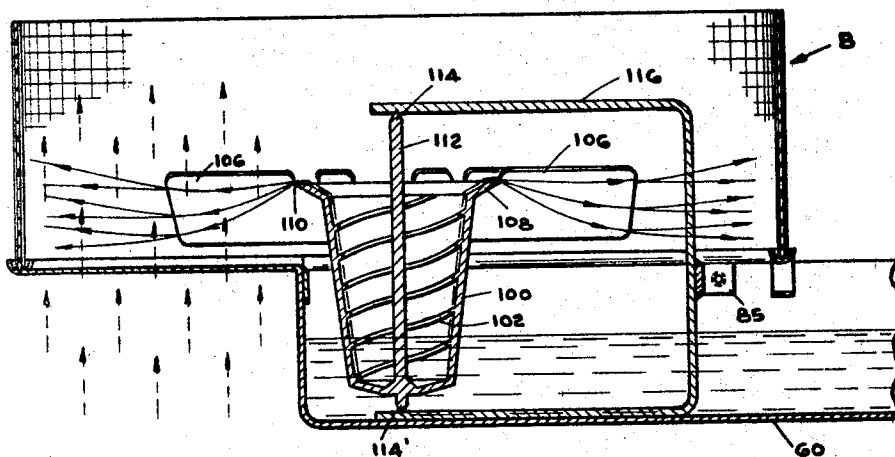


FIG. 9

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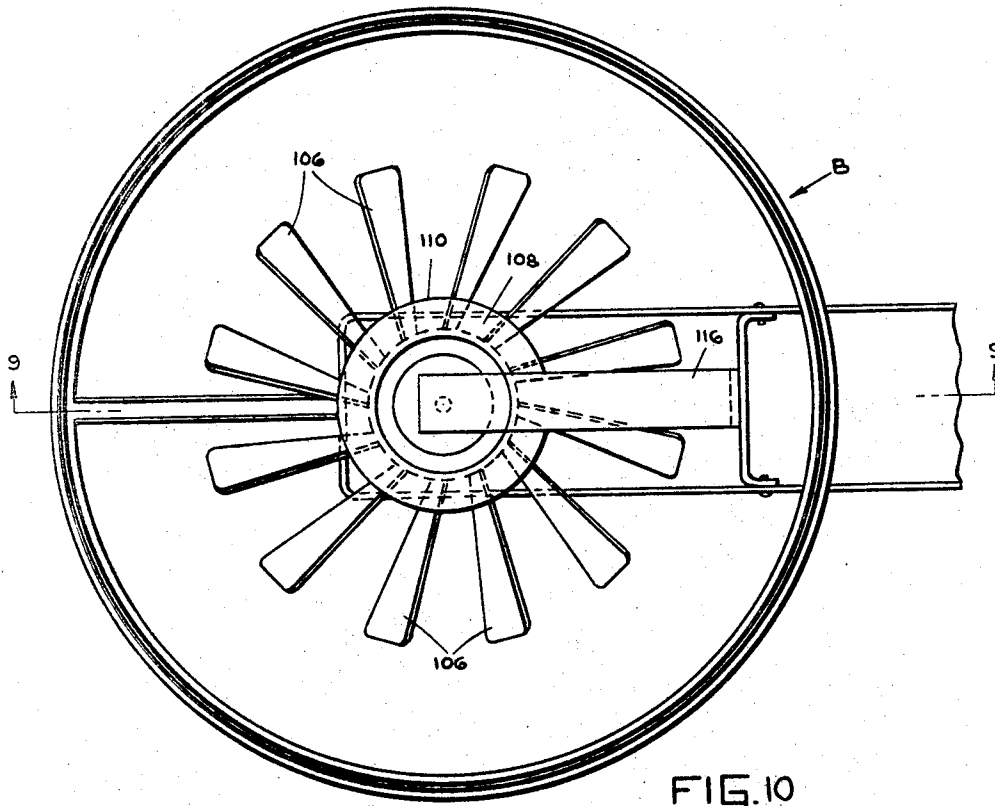


FIG. 10

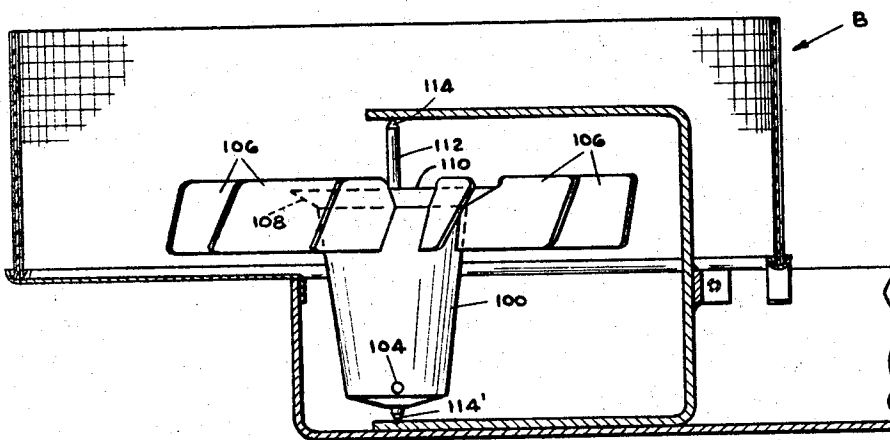


FIG. 11

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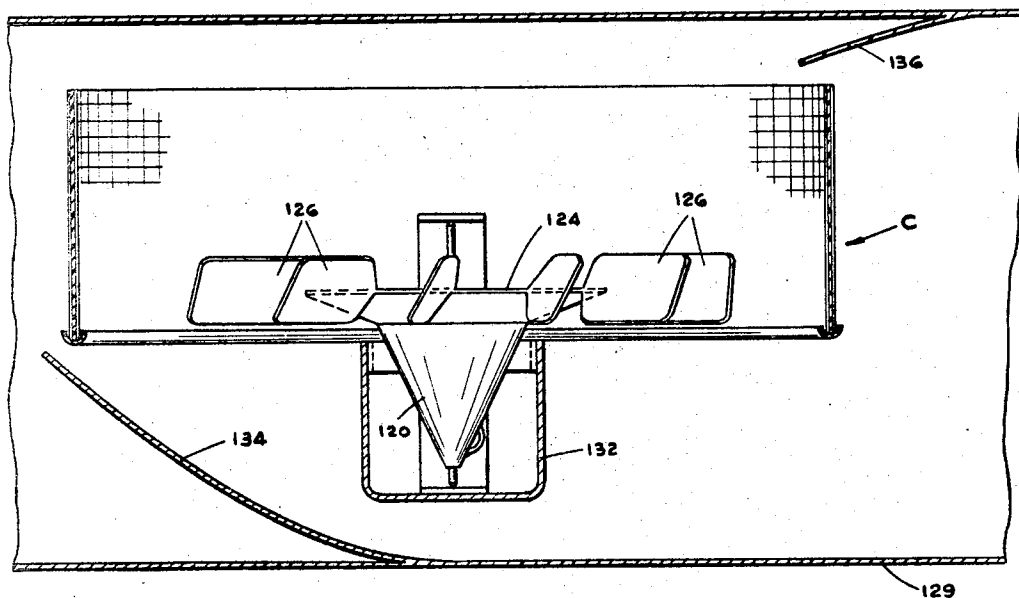


FIG. 12

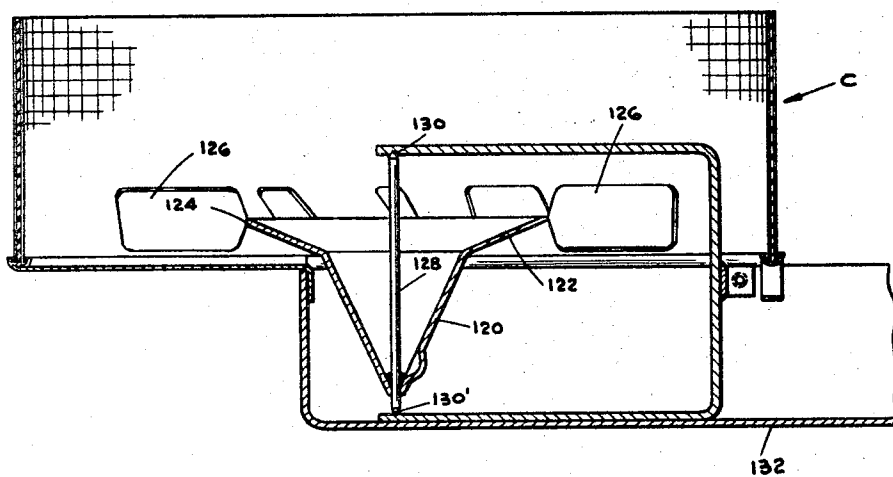


FIG. 13

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U.S. Cl. 261—35

Int. Cl. B05b 3/02

28 Claims

ABSTRACT OF THE DISCLOSURE

A device for mixing or adding a liquid or moisture to a gas, more particularly a humidifier, which employs a hollow member open at the top and having its interior formed to cause a liquid therein to be lifted for discharge at the top upon the rotation of the hollow member. A plurality of blades are mounted on the hollow member near the top thereof. With the hollow member having its lower end positioned in a liquid or water and the blades positioned in a gas or air stream, the action of the stream upon the blades causes rotation of the hollow body, thereby causing the liquid to rise in the hollow body and to be discharged into the stream as a mist. Preferably, the liquid or water mist is discharged in the path of the blades to atomize the liquid.

The invention relates to means and methods for mixing or adding a liquid or moisture to a gas automatically and in a self-regulatory manner. More particularly, the invention is directed to devices for humidifying air in an automatic and self-regulatory manner.

Improvements in forced circulation warm air heating systems have resulted in widespread use of such systems in modern residential construction. This in turn has created a need for more effective, more practical, more reliable, and more economical humidifying devices for increasing the moisture content of the circulated air and for maintaining its relative humidity at a comfortable level. Such devices as now used commercially are usually one or the other of two broad types: the evaporator type which relies on the molecular transfer of the water into the airstream by evaporation, and the atomizer type which sprays the water into the airstream in fine particles or droplets by spray nozzles, centrifugal atomizers or similar devices.

The atomizer type of humidifier is the more effective of the two but atomizer devices have heretofore been relatively complicated and costly because they normally require the use of items such as spray nozzles, high pressure pumps, electrically driven motors and separate controls.

The evaporator type of humidifier includes plates which eventually become clogged with minerals from the water, and the plates must be replaced.

It has been proposed to provide a fan member which is related to a water pan, the fan member having a splash fin extending from its outer periphery and into the water contained in the pan. This form of device which is disclosed in the patent to Geen 2,842,348, July 8, 1958, requires a special form of container for the water whereby air may be projected through a central opening in the water container for access to blades on the fan member to rotate it against the resistance of a vane or splash member extended into the water contained in the pan. This patent also discloses dipping a portion of the fan member in water to act as a splash member. According to the patent, the water in the pan is agitated by the splash member so that the air flowing outwardly of the fan member will vaporize the water to carry water particles into the air stream. It will be apparent that with such arrangements considerable forces are required to impart movement to the splash member to overcome the resistance of the water in which the member is positioned.

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According to the present invention, a humidifying apparatus is provided which utilizes simultaneously both the atomizer and the evaporator methods of humidification, which is inherently automatic in operation, and which has a high order of effectiveness while at the same time being simple and uncomplicated in construction and operation, thereby providing for low cost of manufacture and extremely reliable operation.

A primary object of the invention is to provide an automatic humidifying apparatus which utilizes the kinetic energy of the heating airstream to lift water from a reservoir or sump and then form it into a thin sheet which is thrown centrifugally into the airstream to be humidified.

Other, more specific, objects of the invention are to provide an automatic humidifier for a warm air heating system which:

(a) Operates automatically to initiate the humidifying action at a predetermined time following the commencement of flow of the airstream, thus enabling the humidifying action of the humidifier to be synchronized with the heating action of the furnace;

(b) Acts inherently to increase the amount of water sprayed centrifugally into the airstream with increases in the rate of flow of the airstream;

(c) Provides, without the use of an external power source, for water curtain cleaning of that part of the airstream passing through the humidifier while at the same time humidifying the airstream through combined atomizer-evaporator modes of humidification;

(d) Is self-cleaning when in operation and substantially free of contact with the humidifying water when not in operation, thereby obviating to a large extent problems which would otherwise arise from surface deposits of dirt or other solids and from corrosion;

(e) Utilizes an axial flow type turbine for withdrawing from the airstream the energy utilized to operate the humidifier and a low-torque pump driven by the axial flow turbine for lifting the water from a reservoir and spraying it centrifugally into the airstream, thereby creating minimum interference with the flow of the airstream from the furnace to its point of use; and

(f) Is simple and inexpensive to manufacture and is reliable in operation in that it requires no external power source and no operating controls even though automatic in operation; can be constructed of inexpensive material including moldable plastics and/or aluminum; can be manufactured by simple and inexpensive procedures such as molding or stamping and forming; can be made with very few parts of which only one need be a moving part; and can without change be used either as original equipment, additional equipment, or replacement equipment in conventional warm air heating systems.

Although the primary object of the invention is to provide an improved apparatus for increasing and controlling the relative humidity of the air in a home, office or other building heated by a warm air heating system, for which use the apparatus herein shown and described is specifically designed, it is also an object of the invention to provide such an apparatus, utilizing the basic principles of construction and operation of the embodiments shown and described herein, for other gas-liquid contact purposes where such principles can be utilized to advantage by those skilled in the art.

The above and other objects and advantages of the invention will be apparent from the following detailed description, taken in conjunction with the drawings, which illustrate presently preferred embodiments of the invention as applied to a conventional warm air heating system.

In the drawings:

FIG. 1 is a front elevation of a typical warm air fur-

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nace incorporating a humidifying apparatus constructed in accordance with the present invention;

FIG. 2 is an enlarged, vertical cross-sectional view of the humidifying apparatus of FIG. 1, taken on the line 2—2 in FIG. 3;

FIG. 3 is a top plan view of the humidifying apparatus of FIG. 1;

FIG. 4 is a view similar to FIG. 2, but showing the axial flow turbine-pump of the humidifying apparatus in elevation rather than in cross-section;

FIG. 5 is an enlarged section along the line 5—5 in FIG. 4;

FIG. 6 is a vertical section along the line 6—6 in FIG. 3;

FIG. 7 is a vertical section along the line 7—7 in FIG. 3;

FIG. 8 is a partial broken-away view, partly in elevation and partly in section, of the plenum chamber of FIG. 1 showing installed therein a modification of the humidifying apparatus of FIGS. 1 through 7;

FIG. 9 is an enlarged vertical cross-section of the humidifying apparatus of FIG. 8, this view being taken approximately in the plane of line 9—9 FIG. 10;

FIG. 10 is a top plan view of the air humidifying apparatus shown in FIG. 8;

FIG. 11 is a view similar to FIG. 9 but showing this form of turbine-pump in elevation rather than in section;

FIG. 12 is a view, partly in section and partly in elevation, showing how the humidifying apparatus of the present invention could be installed in a horizontal flow duct or plenum; this figure also showing a further modification of the turbine-pump unit of the humidifying apparatus; and

FIG. 13 is a vertical cross-section of a modified form of the humidifying apparatus of the invention, in which the turbine-pump unit is of the form illustrated in FIG. 12.

Referring to the drawings, the apparatus of the present invention is designed for installation, either as original equipment or as an addition or replacement unit, in a conventional type warm air heating furnace of which a typical example is illustrated at 20 in FIG. 1. Furnace 20 has a return duct 22 for feeding the relatively cold air flowing from the living space of the structure being heated into the furnace where it is heated, humidified, and then sent back to the respective living areas through the heating ducts 24. Forced circulation of the air is provided by a fan or blower unit 26 which may be, for example, a motor driven blower of the centrifugal impeller type. Blower 26 forces the air, in a volume predetermined by proper selection of blower capacity in relation to the heating requirement of the space to be heated, through the furnace chamber surrounding the heat transfer surface 28. A heating source such as an oil or gas flame or electrical resistance units (not shown) is contained within the heat transfer surface 28. The air after being heated by its passage over the heat surfaces 28, which is at an undesirably low relative humidity due to such heating, then flows through the plenum chamber 30 and out to the rooms or other space to be heated through the ducts 24.

The humidifying apparatus of the present invention, indicated generally at A, is incorporated in the system at a point where the air is at low relative humidity above (downstream of) the heating surface 28. Preferably, the humidifying apparatus is inserted into the system in the plenum chamber 30, where it will humidify or re-humidify the main airstream as a whole, as it leaves the heating chamber and prior to its separation into the respective component streams which flow through the various ducts 24 to the individual rooms or spaces to be heated.

It is of course conventional in warm air heating systems of the type shown in FIG. 1 to control the temperature of

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the air in the rooms or other space being heated by controlling either the air circulation blower 26 or the heat source with the heat transfer surfaces 28, or both. For example, the room thermostat may be so connected as to regulate the on-off time of the blower 26 or, in the case where such blower might be set to run continuously, either the on-off time or the temperature of the heat source within heat exchanger 28.

The humidifying apparatus of the present invention is operated by an axial flow turbine driven by the airstream flowing through the furnace. Because it is operated by airflow, which in turn is controlled in accordance with heating requirements at the point or points of use, it provides humidification automatically at times and in amounts which meet the humidification requirements of the system, in either the on-off or the continuous flow mode of system operation referred to above. Neither a separate power source or separate controls are required.

FIGS. 2, 3 and 4 show in detail the construction and arrangement of the axial flow turbine, indicated generally at 40, and its relation to the other components of the humidifier. The turbine 40 is provided with blades or vanes 42 of the radially extending propeller type. The blades are supported by a hollow member 44 closed at the bottom end and open at the top, the member acting as a hub for the blades. In the illustrated and preferred form of the invention, the member 44 is in the shape of a hollow cone. The cone is carried by or mounted on a central shaft 46 rotatably mounted in a bearing 48 fixed as by welding to the supporting bracket 50. Collars 52 and 54 fixed to the shaft 46 respectively above and below the bearing 48 limit axial movement of the turbine shaft without interfering materially with its freedom to rotate in the bearing.

The arrangement is such that the flow of the air from the heating chamber through the plenum chamber 30 to the heating ducts 24 passes at least in part through turbine 40, striking the blades 42 and thus causing the turbine to rotate rapidly.

The cone 44 which serves as the hub for the turbine blades 42 is constructed and arranged to act as a pump for lifting water from a sump or reservoir 60 below the turbine and discharging the water transversely as a thin sheet or spray into the hot dry air of the airstream passing through the turbine. This is accomplished by placing the closed apex end 62 of the cone below the surface 64 of a body of water in sump 60 and by providing an inlet hole 66 in the side wall of the cone near the apex end and below the surface level of the water. Thus, the water will seek the same level 64 inside the cone 44 (passing through hole 66) as it does outside the cone. As shown in FIG. 1, a conventional float operated inlet valve comprising a valve mechanism 68 operated by a float 72 supported by the water in the sump keeps the water at the preselected level 64 by controlling the flow from water supply line 70 into the sump.

When the blades 42 and cone 44 are rotated by the airflow created by blower 26, surface friction between the inside surface of the cone 44 and the water within the cone causes the water to rotate also at a rotational speed which after a brief period approximates the speed of rotation of the cone. Rotation of the body of water within the cone in this manner subjects it to centrifugal force which causes the water to move radially outwardly, and therefore upwardly also because the inside wall surface of the cone diverges upwardly. The water spills over the upper lip 74 of the cone and is thrown centrifugally outward into the airstream passing through the blades 42. As the water is caused to flow outwardly and upwardly along the inside wall of the cone in this manner it thins out and becomes a thin sheet which is discharged transversely over the circular lip 74 at an axial location, in the embodiment of FIGS. 1-4, just above the blades 42. Much of the water so dispersed into the flowing hot air passing through the furnace is immediately absorbed by

the air to increase its relative humidity. Some of the water falls by the action of gravity into the path of the rotating blades which act to break the water into particles or droplets which are incorporated into the airstream and thus increases its relative humidity. The moisture on the blades thus wetted is evaporated into the airstream. Still other particles or droplets are thrown transversely beyond the blades and onto a surrounding circular baffle 76 of water absorbent material such as a porous fiber body of felt or polyurethane which soaks up the water hitting its inside surface and holds or retains it until the water evaporates into the flowing air passing upwardly over both the inner and the outer surfaces of the absorbent cylinder 76. The absorbent baffle 76 may be formed of material which is self-supporting or it may be reinforced and supported by an internal wire mesh structure or similar means.

As the body of water within that part of cone 44 which is submerged in the water in the reservoir is pumped up and over the lip 74 by the rotation of the cone, water is replaced by the water flowing through the opening 66. This action can be facilitated if desired by forming the opening by displacing a portion of the cone wall surface to form a lip or scoop 78, as shown in FIG. 5. When the cone is rotated as shown by the arrow in FIG. 5, impact pressure of the water entering the scoop 78 creates additional pressure drop in the water flowing through the hole 66, and thus increases the pumping effect.

The entire unit is preferably so designed that all water pumped from reservoir 60 and sprayed centrifugally into the airstream will be vaporized or evaporated and carried away by the airstream through feed ducts 24 to the points of use, there to provide the desired percentage of relative humidity. However, under some circumstances it is possible that more water will be pumped from the reservoir and thrown over the lip 74 than can be taken up by the airstream. In such event, the excess water will gradually accumulate in the pores of the absorber 76, until its water holding capacity is reached, after which it will run off (or down) the absorber and collect in a circular trough or gutter 80 underlying and supporting the bottom end of the baffle absorber. The gutter 80 comprises a strip of U-shaped cross-section bent to circular shape supported on sump 60 on one side by a support member 82 extending between the walls of the reservoir 60 as shown in FIGS. 2, 4 and 6. A leader return 84, also of U-shaped cross-section, drains the excess water collecting in gutter 80 into the sump, or reservoir 60, where it can again be picked up by the pumping cone 44 and re-circulated through the atomizing and evaporating portions of the unit. Leader return 84 is positioned opposite support 82 to additionally serve as a support for the opposite side of the gutter and baffle. The bracket 50 providing the support for the axis of rotation of the turbine is secured to a cross member 85 fastened to the side walls of the reservoir 60 as shown in FIGS. 2-4. The bracket 50 extends to and rests on the bottom wall of the reservoir.

The relative locations of the water discharge lip 74, the blades 42, and absorbent baffle 76 enable the humidifying action of the unit to be carried out in different ways as illustrated in FIG. 2. Firstly, the lighter and finer droplets of water thrown from lip 74 will immediately become suspended in the airstream flowing upwardly past the lip and will subsequently vaporize into the air as they are borne along with it through the ducts 24 to the points of use. Secondly, water particles of intermediate weight and fineness will be thrown radially from the discharge lip 74 and as they pass through the air either evaporate to the point where they are of sufficient fineness to become suspended in the airstream or will eventually strike and wet the absorbent baffle 76. The evaporation action is continued, of course, after the water strikes the baffle because the baffle has relatively large surfaces in contact with the airstream flowing thereover, on both its inner and outer sides. Thirdly, the larger and heavier drops

may be pulled downward by gravity at a rate such that they impinge upon the rapidly rotating turbine blades 42 before they reach the absorbent baffle 76. Upon striking the blades 42, the splash will break these heavier particles into components some of which are of a fineness sufficient to become airborne, others of which will be re-thrown into the airstream and pass to baffle 76, and still others of which will wet the turbine blades and either evaporate directly from there into the air flowing through the turbine or pick up additional centrifugal force which will cause it again to be sprayed centrifugally into the airstream, this time from the outer edges 90 of the blades.

It will be apparent that the air which flows through the turbine unit 40 within the annular passage provided by the baffle 76 is being forced through a veritable curtain of water. This subjects the air to a cleaning action because dirt particles borne by the airstream will tend to be entrapped by the heavier water particles or mist and carried to the baffle 76 where they may in part collect. The baffle is readily replaced. In part, the water with the entrained dust is washed down into the gutter and from there to the sump. The water in the sump being relatively quiescent, the dirt particles will settle out and deposit on the bottom for easy periodic cleaning.

During operation, practically all the surfaces of the humidifier unit are bathed in a flowing sheet or curtain of water which has the effect of providing a self-cleaning action for such surfaces. Yet, when the air is not flowing and the turbine is at rest, all the water not actually carried away by the airstream drains back into the sump, out of contact with the moving parts of the unit excepting only the lower end of the cone 44. Thus, corrosion and scum formation on the operating parts is effectively prevented even during long periods of inactivity of the unit.

In the form of the invention illustrated in FIG. 1, the humidifier unit A is of a size for mounting with respect to a sump as ordinarily found in existing heating systems. For increased capacity, the axis of rotation of the humidifier unit is located on the central vertical axis of the furnace, thereby requiring a sump of greater length which may extend in part to the exterior of the furnace as shown in FIG. 8. The diameter of the humidifier unit may therefore be increased. The humidifier unit structure as illustrated in FIGS. 1-7 and of appropriate size may be utilized as original equipment in a system as shown in FIG. 8.

In the modified form of the apparatus shown in FIGS. 8-11, designated B, the pump portion of the device is in the form of a truncated cone 100 provided on its internal surface with a spiral ridge or raised thread 102. As before, an inlet port 104 admits water from the reservoir to the inside of the hollow member. Rapid rotation of such form of hollow member which is closed at the bottom and open at the top, is accomplished by the blades 106 carried thereby. The water is caused to be lifted or pumped, not only by the centrifugal action created by rotation, but also by the screw action afforded by the spiral thread 102. The thread may be raised as shown or formed as a spiralled depression in the wall of the hollow member 100.

In the form of the invention shown in FIGS. 8-11, the spiral 102 terminates at the top of the truncated cone portion, and the wall is flared outwardly to form a more divergent annular disk 108. Water lifted upwardly by the pumping action of the member 100 flows outwardly and upwardly over the disk, and is thinned and centrifugally accelerated as it flows thereover until finally discharged into the airstream from the extreme outer circular edge 110. Thus, in the modification of FIGS. 8-11, both the pumping action and the spraying action of the unit are enhanced.

As will be apparent from the showing of FIGS. 9 and 11, the supporting means for the turbine-pump unit may be a shaft 112 having end pivots 114, 114'. The pivot supporting bracket 116 is generally U-shaped with the arms

of the bracket extending horizontally and supplying bearings for the end pivots 114, 114'.

Also, the blades 106 may be of different configuration as shown, and the discharge lip 110 is located slightly below the plane of the upper edges of the blades. With this form of the invention, the blades act to break up the water delivered in their path to a greater extent.

The embodiment of FIGS. 12 and 13, designated C, combines the described embodiments A and B. A smooth surfaced inverted cone 120 is used but it is provided with an outwardly flared disk 122 for further accelerating the water centrifugally before it is discharged from the circular lip 124 into the airstream passing through the blades 126. As in FIGS. 8-11, a shaft 128 having end pivots 130, 130' is used to rotatably support the unit. The disk 122 may be of increased width as compared to the disk 108 of the embodiment B. Also, the lip 124 is lower with respect to the upper edges of the blades.

The showing of FIG. 12 also serves to illustrate the manner in which the humidifier unit can be installed directly into a duct 129 rather than a plenum chamber as previously shown. In such case, the humidifier unit preferably is installed with its axis of rotation in the vertical position, as before, so that the water in sump 132 will be retained by gravity in its proper position. Airflow through the unit therefore should also be vertical, or at least generally so. This is accomplished by inserting baffles 134, 136 in the horizontal duct 129 to divert the airstream flowing in the duct through the humidifier. Baffle 136 acts to prevent the airflow from by-passing the humidifier. It also cooperates with baffle 134 to guide the airflow first toward the bottom of the duct as it moves toward the humidifying unit and then upwardly to the top of the duct as it moves through the humidifying unit. Thus, the airstream which of course is moving horizontally upstream of the humidifying unit is diverted in the generally vertical direction so as to pass smoothly through the humidifying unit and then reverts to its horizontal movement in the duct downstream of the humidifier.

Although not shown in FIG. 1, air guide baffles could also be provided in this embodiment so as to cause the entire airflow rather than merely a portion thereof to pass through the humidifier. In cases where a high order of humidifying action is required, all the airflow may be directed through the humidifier, for example by a venturi shaped inlet section which would not only cause all the airflow to pass through the humidifier but also would speed up its flow and thus increase the speed of rotation of turbine 40.

Increase (or decrease) in the rate of humidification or the amount of water sprayed per unit of time into the airstream may also be effected in other ways, for example, by raising or lowering the water level in the reservoir, by changing the size of the inlet port which admits water from the reservoir to the inside of the cone pump, or by altering the size or shape of the scoop (FIG. 5) which is provided to increase the water flow through the pump inlet part.

The turbine unit comprising the hollow member closed at the bottom and open at the top, and shaped on its interior to lift water from a sump with which the interior of the hollow body is in communication, together with the blades supported by and extending from the hollow member, may be made in any suitable manner. Preferably, the unit is made as a unitary aluminum casting and provided with a corrosion resistant finish such as by anodizing. Also, the unit may be compression molded of a suitable thermosetting resin or injection molded of a suitable thermoplastic resin composition. The hollow body member and the blades may be separately made of a suitable metal and assembled in any suitable manner.

From the foregoing description of several preferred embodiments of the invention, it will be apparent that a simple and effective device is provided for automatically adding moisture to air in a self-regulatory manner. Blade

means is provided for actuation or rotation by the flow of air. The blade means has water delivery means associated therewith actuated by the blade means to deliver water into the path of the blade means for dispersion into the self-same air which imparts motion to the blades and its associated water delivery means. The blade means has the double function of acting to rotate the device and to break up or atomize water delivered into the path of the rotating blades.

It is believed that the advantages of the invention will be apparent from the foregoing detailed description of several preferred embodiments thereof. It will be apparent to those skilled in the art that various changes and modifications may be made in these embodiments, and other embodiments made, without departing from the spirit or scope of the invention as defined by the following claims.

I claim:

1. A device for dispersing a liquid and mixing the dispersed liquid with a gas comprising a rotatable hollow member open at the top, the interior of the hollow member being formed to cause a liquid therein to be lifted for discharge at the top upon rotation of the hollow member, the lower end of the hollow member being adapted for positioning in a liquid reservoir, inlet means for admitting liquid from a reservoir to the interior of the hollow member, a plurality of blades mounted on and extending substantially radially from the hollow member near the top thereof for rotating the hollow member when the device is positioned in a gas stream.

2. A device as set forth in claim 1, wherein the hollow member is an inverted cone.

3. A device as set forth in claim 1, wherein the hollow member is an inverted truncated cone.

4. A device as set forth in claim 1, wherein the wall of the hollow member is provided with spiral means on its interior surface leading to the top of the hollow member.

5. A device as set forth in claim 1, wherein the top of the hollow member comprises an annular lip.

6. A device as set forth in claim 1, wherein the hollow member is an inverted cone having an annular disk extending from the top edge thereof, the disk being disposed at a greater diverging angle than the divergency provided by the wall of the inverted cone.

7. A device as set forth in claim 1, wherein the top edges of the blades lie in a plane below the plane of the top edge of the hollow member.

8. A device as set forth in claim 1, wherein the top edges of the blades lie in a plane above the plane of the top edge of the hollow member.

9. A device as set forth in claim 1 including a baffle surrounding the assembly of the hollow member and its associated blades.

10. A device as set forth in claim 9 including means associated with the baffle for returning excess liquid to a reservoir.

11. A device as set forth in claim 9, wherein the baffle includes means for absorbing a liquid.

12. A device as set forth in claim 1 including a baffle surrounding the assembly of the hollow member and its associated blades; wherein means is associated with the baffle for returning excess liquid to a reservoir; wherein the baffle includes means for absorbing a liquid; and wherein the hollow member is an inverted substantially cone-shaped member.

13. A humidifying device comprising a rotatably mounted hollow member having a lower end for positioning in a water reservoir and an upper end for positioning in a passage for an airstream to be humidified, the hollow member being open at the top and having its interior formed to direct water for discharge over the top edge of the hollow member when the member is rotated, inlet means for admitting water from the reservoir to the interior at the lower end of the hollow member, and a plurality of blades mounted on and extending substan-

tially radially from the hollow member, said blades when positioned in an airstream acting to rotate the hollow body and to atomize water discharged in their path of rotation by the hollow member.

14. A device as set forth in claim 13, wherein the hollow member is an inverted cone.

15. A device as set forth in claim 13, wherein the hollow member is an inverted truncated cone.

16. A device as set forth in claim 13, wherein the wall of the hollow member is provided with spiral means on its interior surface leading to the top of the hollow member.

17. A device as set forth in claim 13, wherein the top of the hollow member comprises an annular lip.

18. A device as set forth in claim 13, wherein the hollow member is an inverted cone having an annular disk extending from the top edge thereof, the disk being disposed at a greater diverging angle than the divergency provided by the wall of the inverted cone.

19. A device as set forth in claim 13, wherein the top edges of the blades lie in a plane below the plane of the top edge of the hollow member.

20. A device as set forth in claim 13, wherein the top edges of the blades lie in a plane above the plane of the top edge of the hollow member.

21. A device as set forth in claim 13 including a baffle surrounding the assembly of the hollow member and its associated blades.

22. A device as set forth in claim 21 including means associated with the baffle for returning excess liquid to a reservoir.

23. A device as set forth in claim 21, wherein the baffle includes means for absorbing a liquid.

24. A device as set forth in claim 13 including a baffle surrounding the assembly of the hollow member and its associated blades; wherein means is associated with the baffle for returning excess liquid to a reservoir; wherein the baffle includes means for absorbing a liquid; and wherein the hollow member is an inverted substantially cone-shaped member.

25. A humidifying device comprising a water pan having a float operated water inlet valve for maintaining a body of water in said pan at a predetermined water surface level, a bracket attached to said pan for rotatably supporting a shaft on an axis of rotation extending vertically with respect to said water surface level, a hollow

body mounted on said shaft having a lower end provided with a water inlet located below the surface level of the water in said pan and an upper end providing a water outlet located above the top of said pan, an absorbent baffle member surrounding said water outlet and secured by brackets on top of said pan, and blades mounted exteriorly on and extending substantially radially from the hollow body above the top of said pan and within the space bounded by said absorbent baffle member, said blades when positioned in an airstream acting to rotate the hollow body and to atomize water discharged in their path of rotation by the hollow member.

26. A humidifying device as set forth in claim 25, wherein the hollow body is an inverted substantially cone-shaped member.

27. A humidifying device as set forth in claim 26, wherein the member is provided with spiral means on its interior leading to the top of the member.

28. A humidifying device according to claim 25 in which the hollow body is in the shape of an inverted double tapered cone forming a first section for lifting water from the pan to the level of the blades and a second section for spinning the water and moving it radially at increased peripheral speeds prior to throwing it centrifugally into the path of the blades.

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