

April 29, 1969

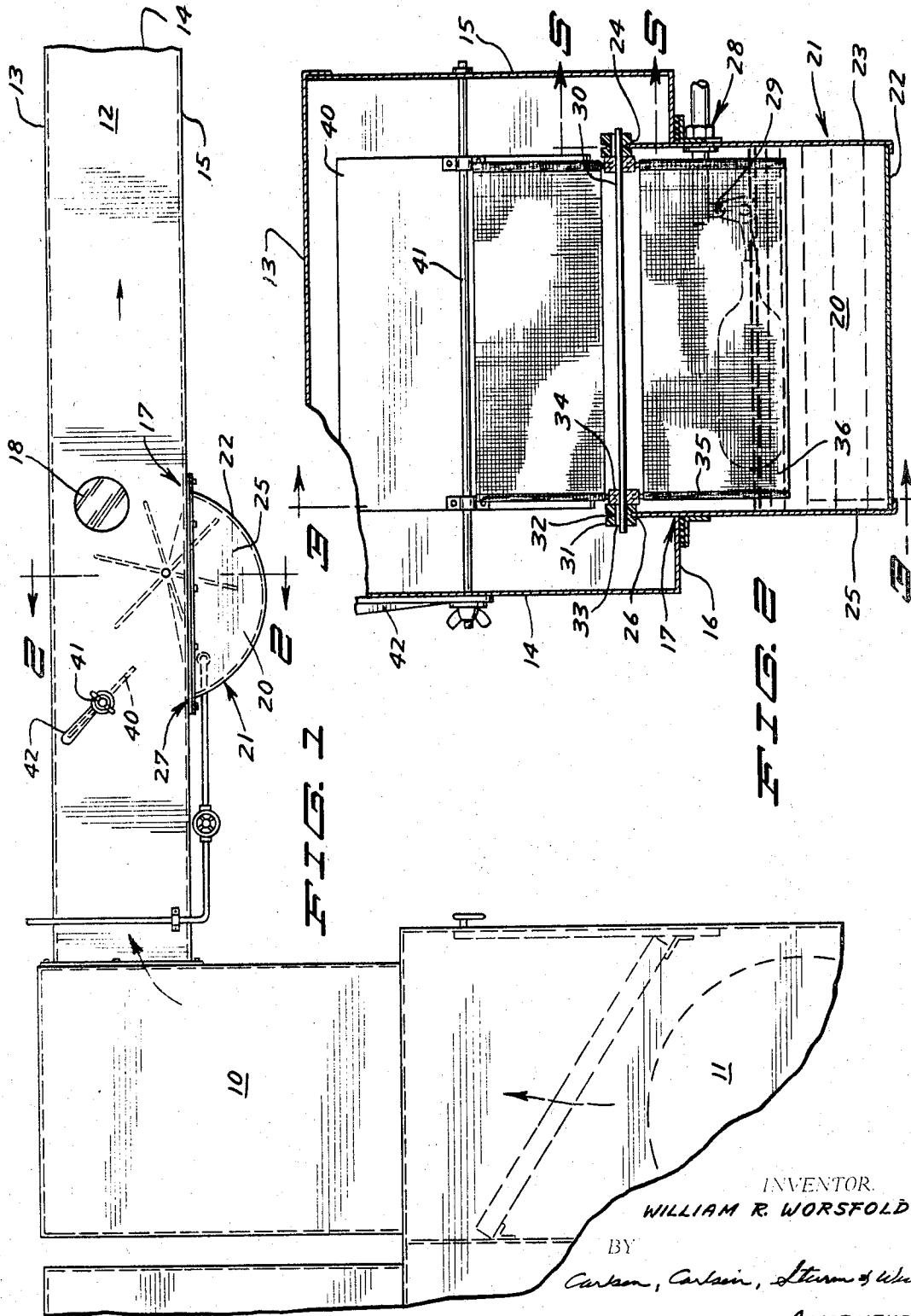
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3,441,256

## HUMIDIFIER

Filed Dec. 12, 1967

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FIG. 3

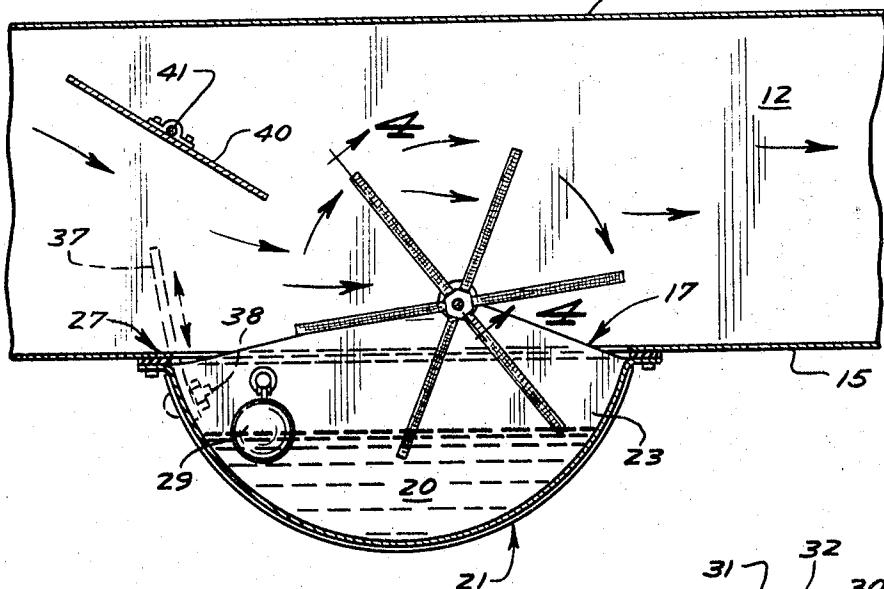


FIG. 4

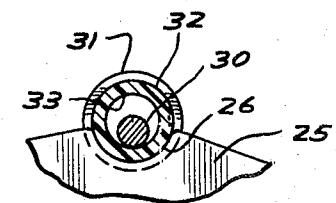
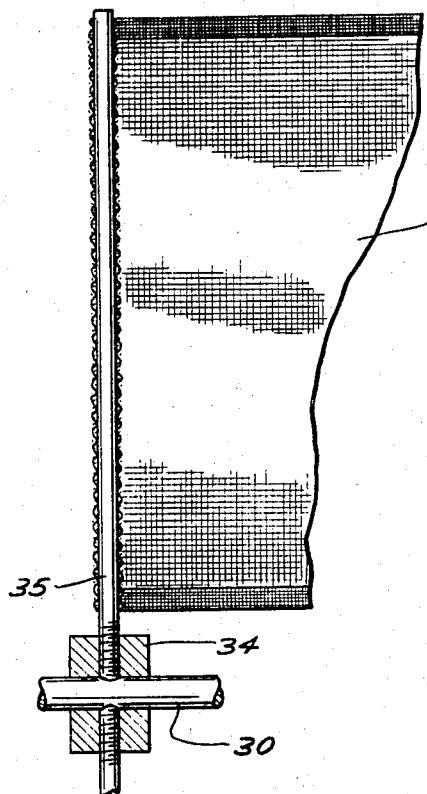


FIG. 5

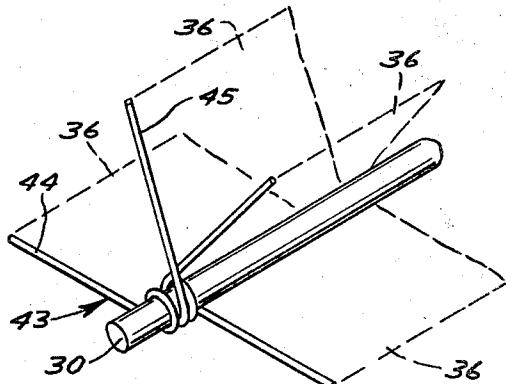


FIG. 6

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HUMIDIFIER

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10 Claims

## ABSTRACT OF THE DISCLOSURE

Humidifying apparatus comprising a gaseous current-driven paddle-wheel like device mounted in notches in upstanding side portions of a reservoir disposed in an opening in the lower surface of a duct, and vane means to control said current adjacent said device.

The prior art with which my invention is concerned includes numerous examples of apparatus for adding moisture to a gaseous medium, such as devices intended to be disposed on or about a forced air heating installation which, in the absence of some means to add moisture to the heated air, are notorious for reducing the relative humidity of the air in an enclosed structure well below that amount required for health purposes or that required for comfort of individuals within the environmental confines of a structure with resultant impaired operational efficiency of the hot air heating plant.

While numerous examples of such apparatus could be here presented, examples of early forms of similar apparatus may be noted in the Ilg patents, Nos. 1,309,737 and 1,846,057, both of which disclose apparatus having a principal use as an air washer. Such apparatus, it will be noted, required that all of the air passing through the apparatus be made to flow through an air washing element which first presented an unduly large restriction to the flow of air through the apparatus and second, required further elements to remove liquid which, for one reason or another, was present in the form of droplets following the air washing phenomena.

As will become apparent in the detailed description below, my invention provides novel and improved apparatus which presents a minimum impediment to the flow of gaseous medium through a duct upon which it is mounted, effects a maximum transfer of moisture to the flow of the gaseous medium therethrough and provides increased efficiency of operation and maintenance through the use of elements which may be easily and inexpensively fabricated and assembled.

It is therefore an object of my invention to provide a novel and improved humidifier for use in adding moisture to the flow of a gaseous medium through a duct.

It is another object of my invention to provide an improved humidifier comprised of a novel combination of elements which may be easily and inexpensively fabricated and assembled.

A still further object of my invention is to provide a novel and improved humidifier which is simple and inexpensive to maintain and operate.

These and other objects of my invention may become apparent from a consideration of the appended specification, claims and drawings in which:

FIG. 1 is a fragmentary side elevational view of a portion of a warm air heating system into which my invention has been incorporated;

FIG. 2 is an enlarged sectional view taken along section line 2—2 on FIG. 1;

FIG. 3 is an enlarged sectional view taken along section line 3—3 on FIG. 2;

FIG. 4 is an enlarged partial sectional view taken along section line 4—4 on FIG. 3;

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FIG. 5 is an enlarged sectional view taken along section line 5—5 on FIG. 2; and

FIG. 6 is an enlarged fragmentary perspective view of a further embodiment of a portion of the apparatus shown in FIGS. 1—5.

Referring now to the drawings, there is shown generally in FIG. 1, a furnace 10 which includes a suitable fan 11 for blowing air from the plenum of the furnace upwardly and outwardly into a suitable duct 12. Duct 12 is shown of generally rectangular cross-section and includes a top portion 13, a pair of side portions 14 and 15 and a generally horizontally disposed bottom portion 16 having an aperture 17 of suitable size for purposes to be described below. Side 14 of duct 12 is also shown including a suitable transparent window 18 for observing the interior thereof in proximity to humidifier 20.

A humidifier 20 is shown operatively disposed over aperture 17 in bottom portion 16 of duct 12. Humidifier 20 includes a fluid reservoir 21 having a generally cylindrically shaped bottom portion 22 and first and second side members 23 and 25, each including a suitable notch 24 and 26 respectively for removably receiving a bearing member 31. Humidifier 20 also includes a front portion 27 which is adapted to be disposed in an upstream direction with respect to the flow of a gaseous fluid through duct 12 as provided by fan 11 on furnace 10. Fluid reservoir 21 is further provided with an inlet 28 to which is connected a suitable valve assembly 29 that is adapted to control the level of fluid within fluid reservoir 21 in a manner well known to those skilled in the art. Inlet 28 may be connected to any suitable source of liquid under pressure.

Humidifier 20 further includes a shaft member 30 that is rotatably journaled at each end in a suitable bearing member 31 which is provided with a peripheral grooved portion 32 that is adapted to be received and removably held in notches 24 and 26 in the sides of fluid reservoir 21. Shaft member 30 also carries a pair of hub members 34, each of which is provided with a plurality of spoke members 35 which are screw threaded thereto and extend radially inwardly thereof into frictional engagement with shaft 30. The hub members 34 and spoke members 35 disposed at either end of shaft 30 are of the same construction and hence have been identified by like reference characters. It may be noted that the spoke members 35 emanating from hub members 34 are in axial alignment so that a suitable screen member 36, or the like, may be removably attached thereto in the manner shown in the drawings or in any other manner that may occur to one skilled in the art upon becoming familiar with the principles of my invention.

It is desirable that the paddle-like screen members be comprised of material that is at least semipermeable to the flow of the gaseous medium therethrough and which will collect and retain a suitable amount of liquid upon rotation through the reservoir 21. It is further anticipated that the illustrated embodiment of the paddle-like screen members 36 may further be modified to utilize, for example, pleated or other configurations which may increase the area from which liquid may be evaporated into the gaseous stream flowing through duct 12.

A means of controlling the flow of gaseous fluid from the inlet end of duct 12 to humidifier 20 is shown comprised of a movable member which extends across the forward edge 27 of fluid reservoir 21 and is shown adjustably disposed and attached through the means of screw and nut 38 which may cooperate with suitable slots (not shown) formed in flow control 37 to allow for upward and downward adjustment.

A further means of flow control of the gaseous medium through duct 12 and with respect to humidifier 20, is

shown comprised of a damper 40 of substantially the same width as the paddle-like members on shaft 30, and includes a laterally extending rod 41 extending through side portions 14 and 15 of duct 12 which is provided at an exterior end with a handle 42 for adjustment about the axis of rod or shaft 41.

In FIG. 6 a further embodiment of apparatus that may be utilized to dispose suitable paddle-like members 36 on shaft 30 is shown comprised of a plurality of substantially V-shaped spring members 43, each of which includes a centrally disposed portion which is in continuous engagement with shaft 30 and a pair of spoke members 44 and 45 emanating therefrom. With the installation of the last named spring members 43 on shaft 30 in a symmetrical manner, uniformly sized paddle-like members 36 may be removably disposed thereon to provide substantially the same structure and operation as described above in connection with FIGS. 2, 3 and 4.

Referring specifically to FIG. 5 of the drawing, it may be noted that the bore 33 of bearing member 31 is substantially larger than the outer diameter of shaft member 30. The relatively smaller size of shaft 30 allows fluid to drain back into fluid reservoir 21, and further tends to prevent the build-up of deposits in and around the bearing and shaft because of the freedom of movement of the shaft 30 within bearing 31.

It is understood that suitable modifications may be made in the structure as disclosed, provided such modifications come within the spirit and scope of the appended claims. Having now therefore fully illustrated and described my invention, what I claim to be new and desire to protect by Letters Patent is:

1. Apparatus of the class above described, comprising in combination:

- (a) a duct for conveying a gaseous fluid under pressure, said duct having a substantially horizontal bottom surface;
- (b) a fluid reservoir disposed in an aperture in the horizontal bottom surface of said duct, said reservoir including upstanding side portions extending longitudinally of said duct, said side portions having opposed notches near the center portions thereof;
- (c) a shaft, removably journaled in the notches in said side portions;
- (d) a plurality of substantially rectangularly shaped paddle members mounted axially of said shaft and extending radially outwardly therefrom, said paddle

members being dimensioned to extend upwardly into said duct; and

(e) means for maintaining fluid in said reservoir at a predetermined level.

5 2. The apparatus of claim 1 in which gaseous fluid deflecting means are disposed upstream of said reservoir, said fluid deflecting means having a lateral width substantially equal to said paddle members.

10 3. The apparatus of claim 2 in which the fluid deflecting means is mounted on the forward edge of the fluid reservoir and extends upwardly into the duct.

4. The apparatus of claim 1 in which the paddle members are removably mounted on radially, outwardly extending spoke members.

15 5. The apparatus of claim 4 in which the spoke members are threadably received in a hub on each end of the shaft, said spokes extending radially inwardly thereof into engagement with said shaft.

6. The apparatus of claim 5 in which the shaft is journaled in tubular bearing members having an annular outwardly opening groove disposed in the notches in the side portions on said reservoir.

20 7. The apparatus of claim 6 in which the bores of the tubular bearing members are substantially larger than the diameter of the shaft.

25 8. The apparatus of claim 4 in which the spoke members are comprised of V-shaped members having a center loop in engagement with the shaft.

9. The apparatus of claim 8 in which the paddle members are comprised of material exhibiting substantial permeability to the flow of gaseous fluid therethrough.

30 10. The apparatus of claim 9 in which the paddle members have a non-planar surface.

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