

June 6, 1933.

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1,912,480

AIR HUMIDIFYING APPARATUS

Filed Sept. 12, 1932

3 Sheets-Sheet 1

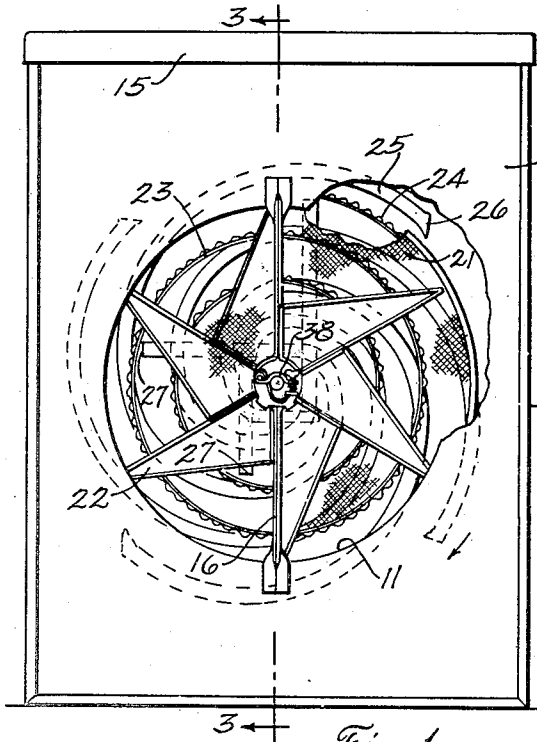


Fig. 1

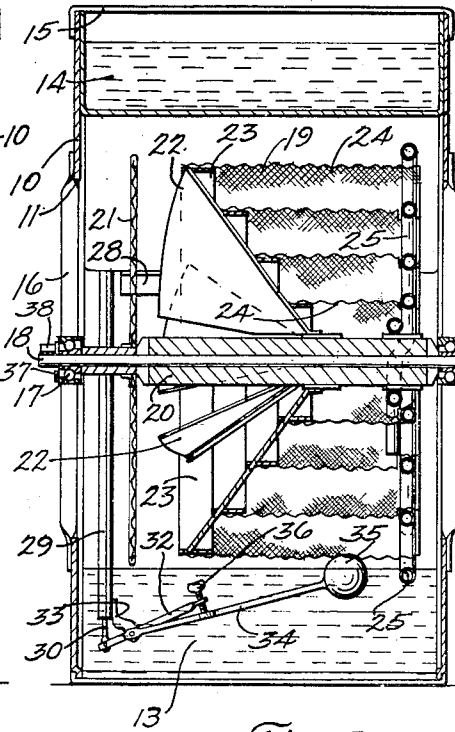


Fig. 3

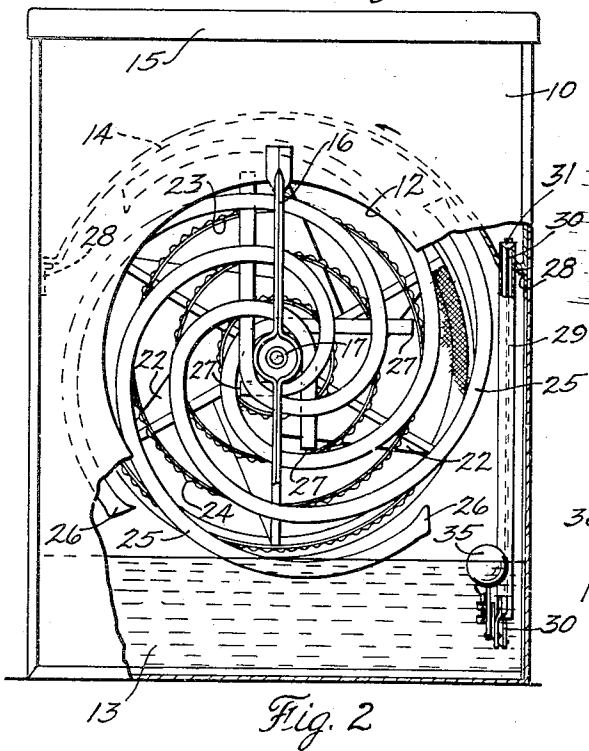


Fig. 2

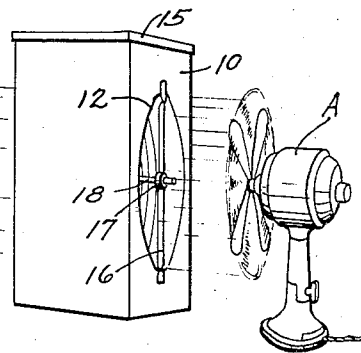


Fig. 4

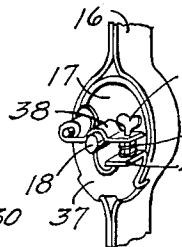


Fig. 5

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3 Sheets-Sheet 2

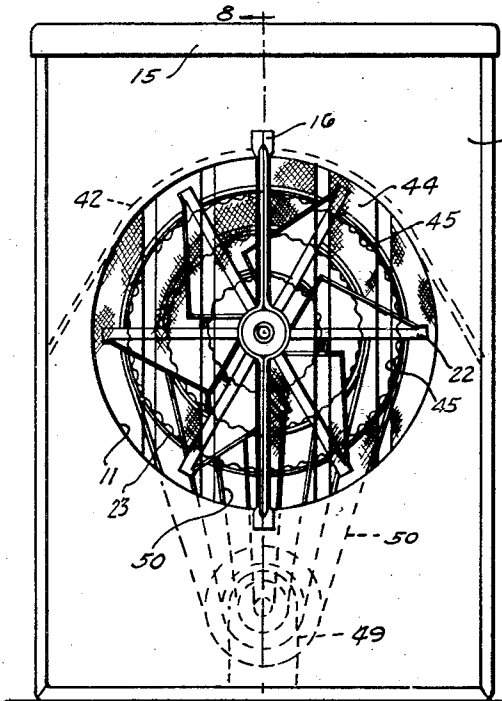


Fig. 6

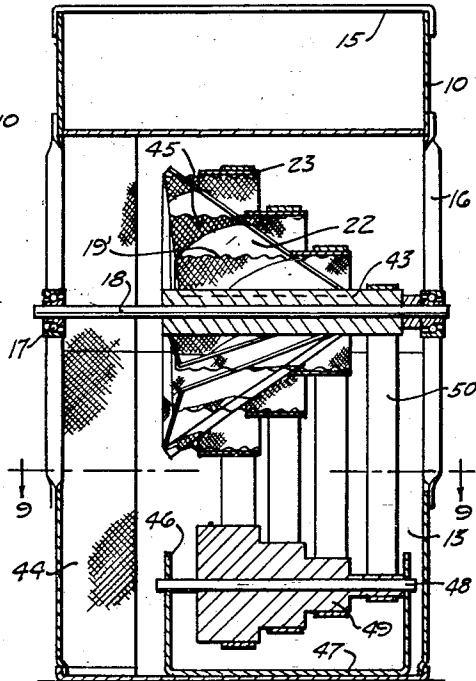


Fig. 8

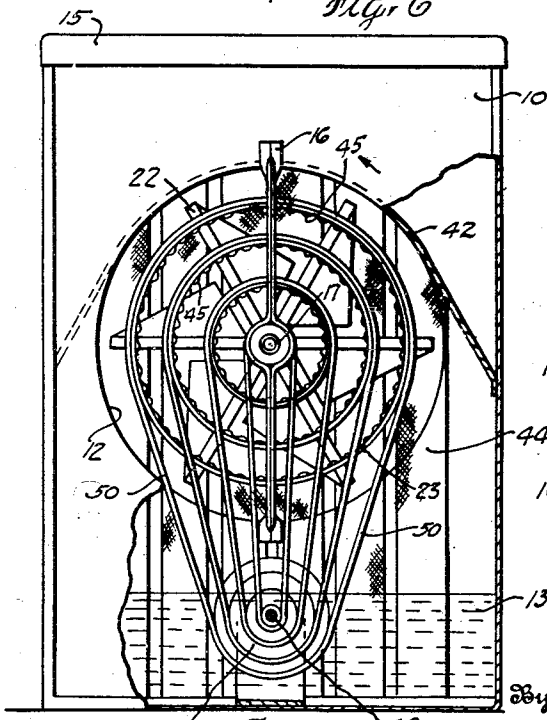


Fig. 7

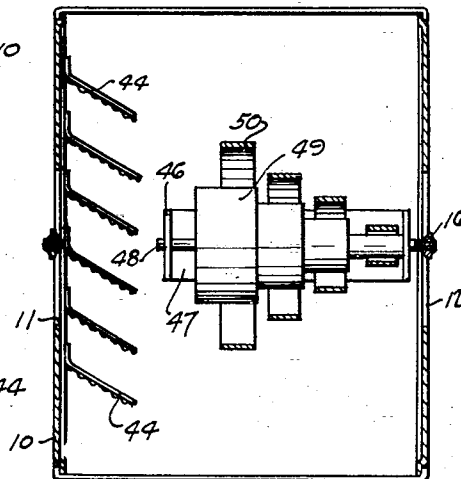


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AIR HUMIDIFYING APPARATUS

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3 Sheets-Sheet 3

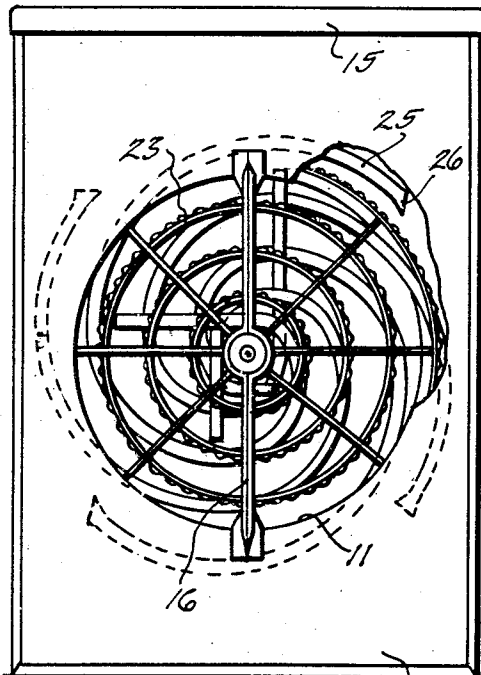


Fig. 10

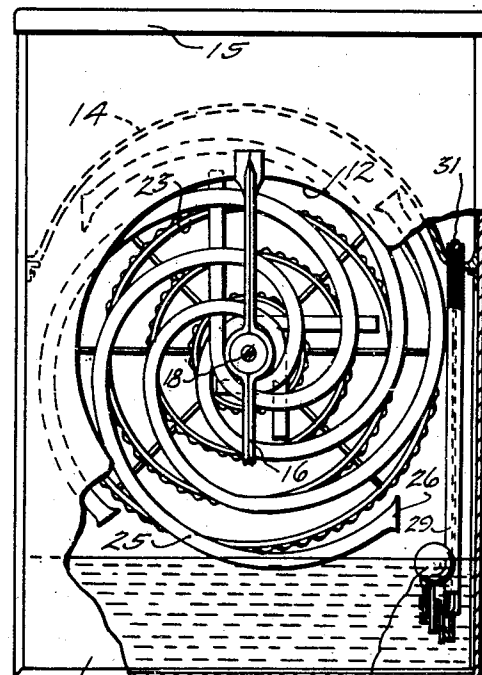


Fig. 11

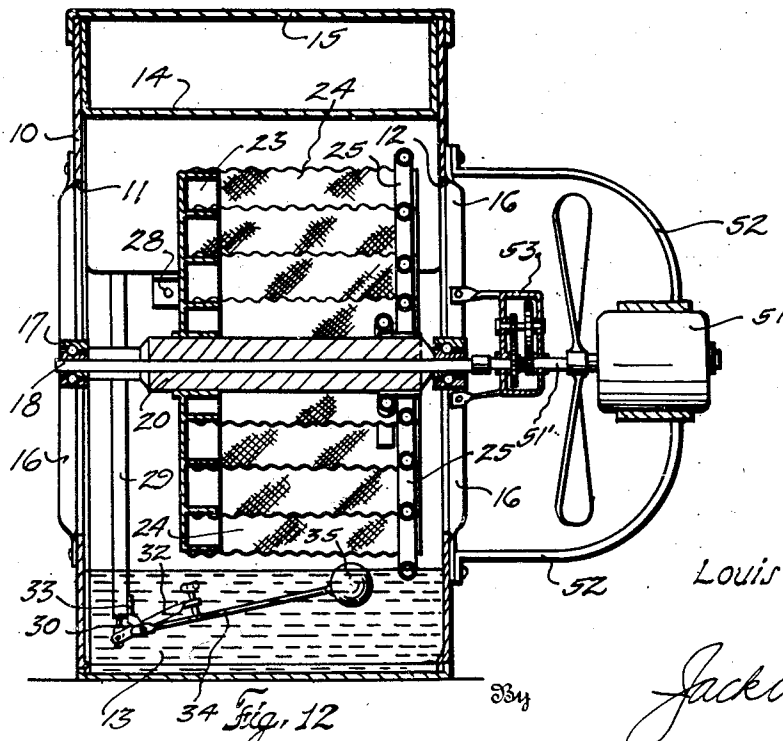


Fig. 12

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UNITED STATES PATENT OFFICE

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AIR HUMIDIFYING APPARATUS

Application filed September 12, 1932. Serial No. 632,729.

This invention relates to new and useful improvements in air humidifying apparatuses.

One object of the invention is to provide an air humidifying or conditioning apparatus adapted to be supported in front of an ordinary electric fan so as to be operated thereby.

A particular object of the invention is to provide an air humidifying apparatus including a rotatable air moistening member having its humidifying elements constantly above the water level, but with its water elevating means constantly immersed in the water, whereby sufficient water will be supplied to the humidifying elements without an excessive supply.

Another object of the invention is to provide a rotating member so arranged as to more effectively moisten the air without unduly splashing the water and without waste of water, whereby economy is practiced.

Still another object of the invention is to provide means for controlling the speed of rotation of the rotatable member.

A construction designed to carry out the invention will be hereinafter described together with other features of the invention.

The invention will be more readily understood from a reading of the following specification and by reference to the accompanying drawings in which an example of the invention is shown, and wherein:

Figure 1 is a front elevation of an apparatus constructed in accordance with the invention,

Figure 2 is a rear view of the same, partly in elevation and partly in section,

Figure 3 is a transverse vertical sectional view taken on the line 3—3 of Figure 1,

Figure 4 is a perspective view showing the device in position in front of an electric fan,

Figure 5 is a detail of the speed regulator,

Figure 6 is a front elevation of a modified form of the invention,

Figure 7 is a rear view of the same, partly in elevation and partly in section,

Figure 8 is a transverse vertical sectional view taken on the line 8—8 of Figure 6,

Figure 9 is a horizontal cross-sectional view taken on the line 9—9 of Figure 8,

Figure 10 is a front elevation of a modified form of the invention,

Figure 11 is a rear view of the same, partly in elevation and partly in section, and

Figure 12 is a transverse vertical sectional view taken on the line 12—12 of Figure 10.

This application is filed as a continuation in part of my co-pending application Serial No. 513,021, filed February 2, 1931.

In the drawings the numeral 10 designates an upright container or housing having a circular front opening 11 and a circular rear opening 12 alined therewith. The lower portion of the housing below the openings constitutes a water compartment 13. A water reservoir 14 is formed in the upper portion of the housing and is closed by a lid 15.

Vertical spiders 16 are fastened to the housing across the openings thereof and have anti-friction bearing members 17 located at the center of said openings. These bearings receive the shaft 18 of a cylindrical air moistening impeller 19. The impeller includes a sleeve 20 (Figures 1 to 5), which terminates short of the front bearing member. A circular screen 21 having a larger diameter than the front opening 11 is fastened on the shaft at the front end of the sleeve so as to prevent drops of water being cast through said opening. A plurality of fan blades 22, triangular in shape, are inclined inwardly and have their inner ends secured to the sleeve. These blades may be of any suitable shape, but they are preferably arranged in a star formation, as is shown in Figure 1.

Stepped concentric metallic rings 23 are suitably fastened to the outer edges of the blades and are of decreasing diameters inwardly so as to be spaced apart. Cylindrical drums or shells 24 are nested concentrically and fastened around the rings. These shells may be made of fine wire fabric or any other pervious material, so that air may freely pass therethrough and contact with moisture deposited thereon.

A constant water level is maintained in the compartment 12 and this is always below

the outermost shell so that the impeller proper is never immersed in the water. Volute tubes 25 are fastened to the rear ends of the shells and around the sleeve 20. Each tube has its outer end 26 flared and extending beyond the outer shell 24 so as to dip into the water in the compartment 13. Each tube has its inner end 27 arranged so as to discharge water onto an adjacent shell and thus as the impeller is revolved in a clockwise direction (Figure 1) its tubes will pick up water and discharge it onto the shells.

The reservoir 14 has its bottom concaved to arch over the impeller and is supported on brackets 28, whereby it is removable. A discharge tube 29 extends from one side of the reservoir down into the compartment 13. A valve stem 30 extends through the tube and has a valve 31 on its upper end within the reservoir for closing said tube. The lower end of the stem is pivoted to a lever 32, which in turn is pivoted on a bracket 33 fastened to the lower end of the tube, as is best shown in Figure 3.

A float arm 34 is also pivoted to said bracket and carries a float 35 at its outer end. A set screw 36 threaded in the end of the lever 32, is rotatably connected with the arm 34. By adjusting the screw the angle of inclination of the float arm is changed and thereby the water level may be varied. It is desirable to maintain a level below the outermost shell 24 but high enough to immerse the entire end 26 of each tube as said end passes through the water. By varying the level of the water, the amount of water supplied to the shells is also varied, as the tubes will pick up more or less water at each immersion, depending upon the water level.

The housing 10 being placed in front of an electric fan A, as is shown in Figure 4, air currents from the fan will enter through the rear opening 12, pass between the shells 24 and strike the blades 22. The blades, owing to their inclination, will be displaced by the air currents, thus causing the impeller 19 to rotate. Upon rotation of the impeller, the tubes 25 will become partially filled with water by reason of their ends 26 dipping into the water in the compartment 13, and as the impeller continues to revolve water will be discharged from the ends 27 onto the rear portions of the shells 24. The air currents passing along the shells will spread the water toward the front and will pass through the water dripping from one shell to the other.

The air currents passing through the impeller will be moistened, whereby the air is humidified, and this moistened or humidified air will be discharged through the screen 21 and the front opening 11. It is pointed out that by keeping the shells out of the water and only supplying water to the rear portions of said shells, the moisture will be more or less dissipated before it is carried

forwardly of the impeller and what excess escapes from the impeller will be arrested by the screen 21. This will not only provide a more efficient and even humidifying, but will conserve the water supply and prevent water being thrown from the housing.

Where the impeller tends to rotate at too high a rate of speed, a regulating device may be applied to the shaft 18. In Figure 5 a supporting plate 37 is attached to the front spider 16 in front of the bearing 17. The plate has a brake arm 38 pivoted thereon and arched over the shaft 18. A set screw 39 passing through the outer end of the arm is threaded into a lug 40 on the plate 37 and a coiled spring 41 surrounds the screw between the arm and the lug. It is obvious that by adjusting the screw, the brake arm is brought into frictional contact with the shaft 18, thus reducing its speed.

In Figures 6 to 9, I have shown a modified form of the invention in which the housing is the same except that the reservoir 14 is omitted and an arched guard sheet 42 is secured in the housing over the impeller. The same shaft 18 and supports are used and a shorter sleeve 43 is employed. Vertical baffles 44 are arranged transversely of the front opening 11 in place of the circular screen 21. The same fan blades are secured to the sleeve 43 with the same stepped concentric metallic rings 23 fastened to the outer edges of the blades. Cylindrical drums or shells 45, shorter than the shells 24, are nested concentrically within the rings and extend about the blades 22.

Upright arms 46 of a support 47 which is mounted in the water compartment 13 receives the shaft 48 of a stepped idler pulley 49. Belts 50 of duck cloth or any suitable pervious or absorbent material, that water will adhere to and be carried thereby, are mounted over the rings 23 and the steps of the idler pulley 49, which is constantly immersed in the water. As the blades 22 are displaced by air currents from the fan A, the impeller 19' will rotate. Upon rotation of the impeller, the belts will absorb and conduct water from the compartment 13 to the rings 23. The air currents passing along the rings and the shells will spread the water over the shells and will pass through the water dripping from one shell to another. The air currents will also pass along the belts. The air passing through the impeller will become moistened and thereby humidified, and be discharged through the baffles 44 and the front opening 11.

It is pointed out that the faster the impeller and the belts are revolved, the more water will adhere to the belts and be carried to the shells, thereby providing a more humid condition of the air. Also, by varying the water level in the compartment 13 so that the idler pulley is only partially immersed in the

water with only one or two of the belts passing through the water, less water will be carried to the shells, thereby providing a drier or less humid condition of the air.

In Figures 10, 11 and 12, I have shown another form of my invention. The housing is constructed the same as is shown in Figures 1 to 4, except that the fan blades 22 are omitted and the metallic rings 23, instead of being in stepped relation, are disposed flush vertically and are rigidly secured to the impeller shaft 18 by radial supports 18'. Instead of using the separate electric fan A, I mount a fan 51 in a suitable bracket 52 on the rear of the housing. The fan shaft 51' is extended forwardly and has connection, through a suitable reduction gearing 53 mounted on the rear spider 16, with the impeller shaft 18.

As the fan 51 rotates to force air currents through the impeller 19, the impeller shaft is rotated by the fan shaft 51' at a lower speed through the reduction gearing 53. Upon rotation of the impeller shaft, the volute tubes 25 will dip into the water in the compartment 13, and the action will be the same as has been hereinbefore explained.

The description which has been given, recites more or less detail of a particular embodiment of the invention, which is set forth as new and useful, however, I desire it understood that the invention is not limited to such exact details of construction, because it is manifest that changes and modifications may be made, within the scope of the appended claims, without departing from the spirit of the invention.

What I claim and desire to secure by Letters Patent, is:

1. In an air humidifying device, a container having water therein, a rotatable humidifying member mounted in the container and including blades inclined toward the center of the member and pervious spreading elements surrounding the axis of said member and extending rearwardly from said blades, and tubular water conductors carried by the members having their outer ends dipping in the water and their inner ends discharging into the spreading elements.

2. In an air humidifying device, a container having water therein, a shaft journaled in the container, concentric rings surrounding the shaft, fan blades attached to the rings and the shaft, concentric pervious spreading cylinders surrounding the shaft and carried by the rings, and means rotated by the shaft for elevating water and discharging it onto the cylinders.

3. A humidifying device as set forth in claim 2, in which the fan blades have their rear edges inclined and the rings engaged therewith, whereby said rings are stepped.

4. In an air humidifying device, a container having water therein, a shaft journaled in the container, concentric rings surrounding the shaft, fan blades attached to the rings and the shaft, concentric pervious spreading cylinders surrounding the shaft and carried by the rings, and means rotated by the shaft for elevating water and discharging it onto the cylinders.

5. In a humidifying device, a container having a water compartment at its bottom and provided with opposite openings above said compartment, a rotatable humidifying member journaled in the container between said openings and including inclined impeller blades and pervious moisture spreading elements extending from said blades, a stepped pulley mounted in the water compartment and moisture carrying belts extending from said pulley to the pervious elements of the rotatable member, said elements being stepped.

6. In an air humidifying device, a container having water therein, a rotatable humidifying member mounted in the container including impeller blades, pervious spreading elements surrounding the axis of said member and rotating with said blades, and tubular water conductors carried by the member having their outer ends dipping in the water and their inner ends discharging into the spreading elements.

7. In an air humidifying device, a container having water therein, a shaft rotatably mounted on a horizontal axis within said container, impeller blades for rotating said shaft, concentric pervious spreading cylinders surrounding the shaft and rotating with said blades, and separate means rotated by said shaft for elevating water and discharging it onto said rotating spreading cylinders.

8. In an air humidifying device, a container having water therein, a shaft journaled on a horizontal axis in the container, impeller blades carried by the shaft, a plurality of rotatable concentric pervious spreading cylinders surrounding said shaft and rotating with said blades, and separate means rotated by the shaft for elevating water and discharging it onto each of the cylinders.

9. In an air humidifying device, a container having water therein, a shaft journaled in the container, concentric rings surrounding the shaft and rotating therewith, impeller blades for rotating said shaft, concentric pervious spreading cylinders surrounding the shaft and carried by the rings, and separate means rotated by the shaft for elevating water and discharging it onto the cylinders.

10. In an air humidifying device, a container having water therein, a shaft journaled in the container, fan blades rotating the shaft, concentric pervious spreading cylinders surrounding the shaft and rotating therewith, and volute tubular water elevators attached to the cylinders.

11. In an air humidifying device, a container having water therein, a rotatable hu-

midifying member mounted in the container and including pervious spreading elements surrounding the axis of said member, tubular water conductors carried by the members having their outer ends dipping in the water and their inner ends discharging into the spreading elements, and means for rotating the humidifying member.

12. In an air humidifying device, a container having water therein, a rotatable shaft journaled in the container, concentric rings surrounding the shaft, concentric pervious spreading cylinders surrounding the shaft and carried by the rings, means rotated by the shaft and dipping into the water in said container for elevating the water and discharging it onto the cylinders, and means for rotating said shaft.

13. In an air humidifying device, a container having water therein, a rotatable humidifying member mounted in the container, pervious spreading elements surrounding the axis of said member and rotating therewith, tubular water conductors carried by the member, having their outer ends dipping in the water and their inner ends discharging into the spreading elements, and means for rotating said humidifying member.

14. In an air humidifying device, a container having water therein, a shaft rotatably mounted on a horizontal axis within said container, concentric pervious spreading cylinders surrounding the shaft and rotating therewith, means for rotating said shaft, and separate means rotated by said shaft and dipping into the water in said container for elevating the water and discharging it onto said rotating spreading cylinders.

15. In an air humidifying device, a container having water therein, a shaft rotatably mounted on a horizontal axis within said container, concentric pervious spreading cylinders disposed flush vertically surrounding the shaft and rotating therewith, separate means rotated by said shaft and dipping into the water in said container for elevating the water and discharging it onto said rotating spreading cylinders, means for rotating said shaft, and means for forcing air currents through said concentric pervious cylinders.

16. In a humidifier, a container having a water compartment in its lower portion and spaced inlet and outlet openings for the passage of air in its upper portion, a pair of stepped pulley units, each horizontally journaled, one of said units being positioned in the path of the air from said inlet to said outlet opening, the other unit being positioned to dip in the water in said compartment, belts connecting the corresponding pulleys of each unit, and means for rotating at least one of said units.

In testimony whereof I affix my signature.
LOUIS D. HOULIS.