

[54] **HUMIDIFIER**

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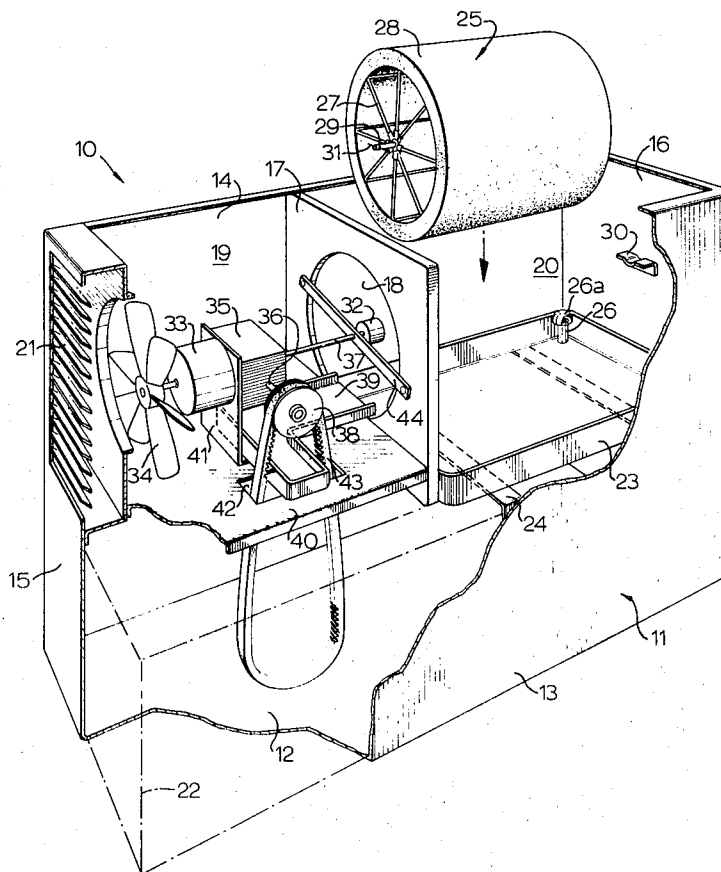
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[57] **ABSTRACT**

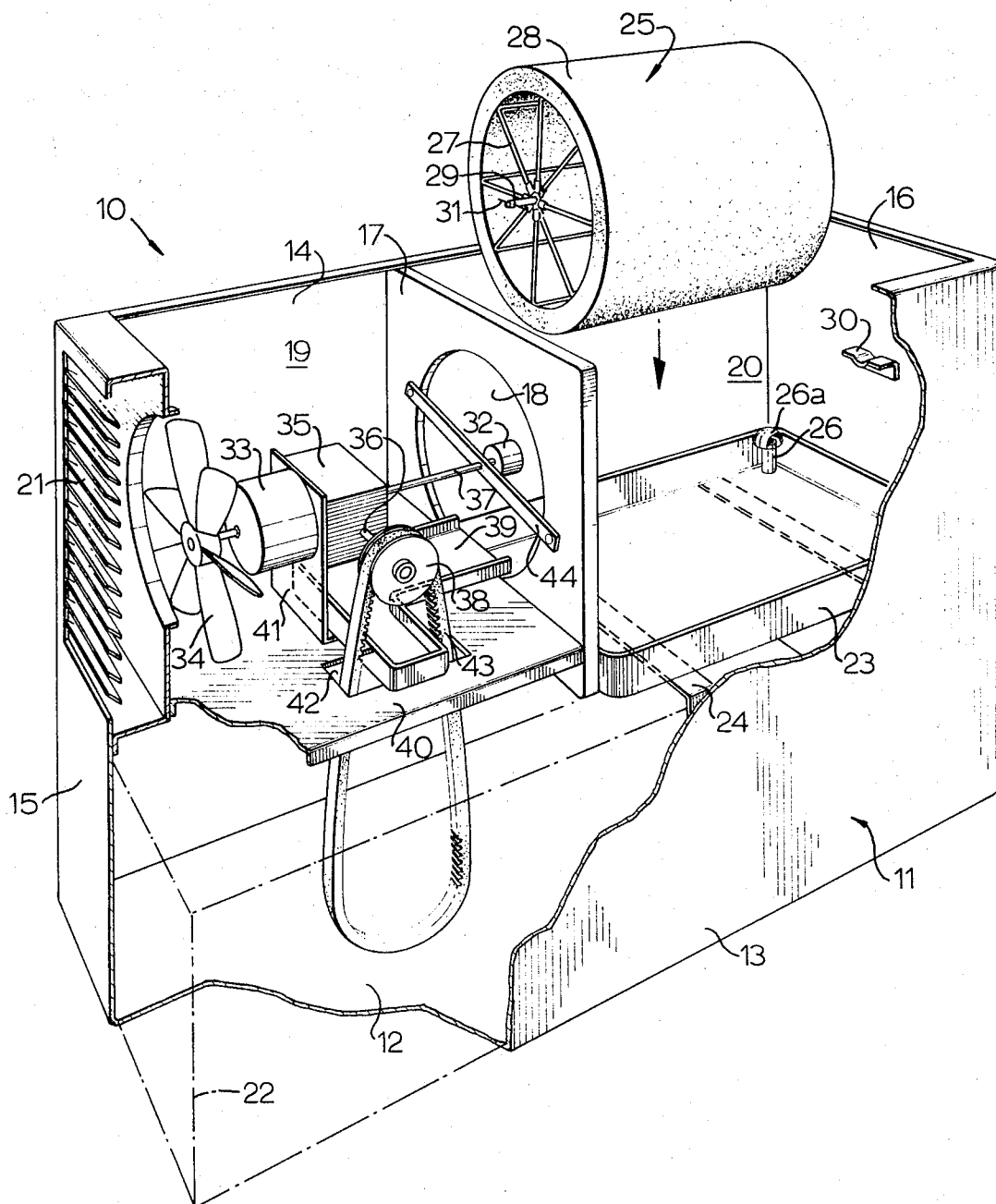
A humidifier having a housing in which are located primary and secondary reservoirs, the latter being readily removable from the housing. Means are provided for transferring water from the primary to the secondary reservoir, and the drum or belt is arranged to move through water in the secondary reservoir.

8 Claims, 1 Drawing Figure



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HUMIDIFIER

This invention relates to humidifiers, particularly to humidifiers of the type that employ a moving web of porous materials as the medium for retaining water to be evaporated by air blown through the web.

Humidifiers of the type that employ a movable web of porous material, such as foamed polyurethane, the web being in the form of a sleeve mounted on a frame to form a drum or being an endless belt trained over a pulley, in any event being movable through a water reservoir to pick up water therefrom, are well known and are in commercial use. Such a humidifier is described in Canadian Pat. No. 858,924 issued Dec. 22, 1970, John Trautman, for example.

One disadvantage of a humidifier of the type shown in the aforesaid patent is that the water reservoir thereof is difficult to clean. This is because the reservoir is constituted by a part of the humidifier housing itself and is not removable. Also it is located at the bottom of the housing. These two factors make it difficult to remove dirt, dust, lime and other mineral deposits that accumulate in the reservoir.

Another disadvantage is that when the reservoir is full, a substantial amount of the porous web is submerged in the water in the reservoir and thus is not available for passage of air therethrough to be humidified. This problem could be solved by raising the web or lowering the water level in the reservoir, but this would necessitate more frequent filling of the reservoir. It also could be solved by the use of an automatic water filling and level control for the reservoir that would keep the water level just sufficient to cover a small percentage of the web. However, these devices are relatively inexpensive to install, unless a water source is readily available and, in many cases, are not desired by the user.

In accordance with this invention there is provided a humidifier that overcomes the foregoing disadvantages. The humidifier has primary and secondary reservoirs, the latter being removable, and means for transferring water from the primary to the secondary reservoir. A web of porous material is arranged to move through the water in the secondary reservoir and also is removable from the housing.

This invention will become more apparent from the following detailed description, taken in conjunction with the drawing, the latter being a perspective view, partly broken away, of a humidifier constituting a preferred embodiment of this invention.

Referring to the drawing, there is shown a humidifier 10 that includes a housing 11 of generally rectangular configuration having a bottom wall 12, side walls 13 and 14 and end walls 15 and 16. A baffle 17 having a circular opening 18 extending therethrough separates the upper part of housing 11 into two compartments 19 and 20. Baffle 17 extends vertically parallel to end walls 15 and 16 and is suitably secured to side walls 13 and 14 as by spot welds. While the top of housing 11 is shown as being open, it is to be understood that a removable, solid panel normally will close the part of the top of the housing to the left of baffle 17, while a removable panel containing louvers normally will cover the part of the top of the housing to the right of baffle 17. A louvered opening 21 through which air to be humidified may be drawn into housing 11 is provided in end wall 15.

The lower part of housing 11 constitutes a primary reservoir having a considerable capacity and a water level when filled that is indicated by dotted line 22. A removable plug (not shown) may be provided in an opening (not shown) in bottom wall 12 to permit the primary reservoir to be drained prior to the storing of the humidifier for the summer.

A secondary reservoir 23 in the form of a shallow pan is located above the primary reservoir and sits on supports 24, only one of which is shown, that are suitably secured to side walls 13 and 14, baffle 17 and end wall 16 as by spot welds. The capacity of secondary reservoir 23 is considerably less than the capacity of the primary reservoir. For example, the latter may have a capacity of 10 gallons and the former a capacity of 2 quarts.

Located within secondary reservoir 23 in a location where it will not interfere with the rotating drum 25 to be described hereinafter is a standpipe 26 that keeps the water level in secondary reservoir 23 just below the level of the upper edge thereof. Any overflow from secondary reservoir 23 via standpipe 26 is directly to the primary reservoir. Standpipe 26 is covered by a hollow hemisphere 26a of larger diameter than the standpipe and that projects just below the upper end of the standpipe and serves to prevent lint etc., from overflowing into the primary reservoir.

Drum 25 also is located in compartment 20 and is positioned above secondary reservoir 23. It consists of a frame 27 and a web 28 of porous material supported on the frame. In the embodiment of the invention illustrated web 28 is an endless belt or sleeve and is annular in configuration. In another embodiment frame 27 could be replaced with a roller and web 28 could be an endless belt trained over and driven by the roller and dipping into water in the secondary reservoir. Web 28 may be fabricated of many different types of material. Foamed polyurethane is commonly used in rotating drum or moving belt type humidifiers as the web material.

Extending from both ends of frame 27 are axles 29, only one of which is shown. The axle not shown is adapted to seat in a bearing 30 suitably secured to end wall 16 as by spot welds. The other axle has a pin 31 secured thereto that extends at right angles to the axle. Pin 31 constitutes one member of a clutch, the other member being shown at 32 and being a cylinder having a slot (not shown) in the end thereof that faces drum 25 and that receives pin 31 when the clutch is engaged.

Drum 25 is supported in compartment 20 with its axis of rotation horizontal and with web 28 just dipping into the water contained in secondary reservoir 23.

Located in compartment 19 are an electric motor 33, a propeller 34 driven directly by the electric motor and positioned adjacent louvered opening 21, a gear reduction unit 35 also driven by motor 33 and having two output shafts 36 and 37, a pulley 38 fastened to shaft 36, a trough 39 having a part thereof located directly under pulley 38 and a supporting framework consisting of a horizontally extending panel 40 disposed under the foregoing components and suitably secured to side walls 13 and 14, end wall 15 and baffle 17 as by spot welds and a motor and gear reduction unit supporting bracket 41 extending vertically upwards from panel 40 and suitably secured thereto as by spot welds.

An opening 42 is provided in panel 40, and through this opening there extends a belt 43 that is trained over

and driven by pulley 38, belt 43 being of sufficient length to extend almost to the bottom of the primary reservoir.

Clutch member 32 is fastened to output shaft 37. The latter extends through an opening in a supporting bracket that is secured to baffle 17 and that spans opening 18.

The controls for the humidifier are not shown and can be conventional. Thus there can be provided a simple on-off switch for motor 33, a speed control for the motor and a humidistat. There also may be provided a water level indicator for indicating the water level in the primary reservoir.

In operation, drum 25 and pulley 38 are driven by motor 33 via gear reduction unit 35 at a much slower speed than directly driven propellor 34. Belt 43 is driven by pulley 38 through the water in the primary reservoir. Belt 43 carries water from the primary reservoir up to pulley 38. The water drops from there into trough 39, from which it flows into secondary reservoir 23.

Drum 25 is driven by motor 33 via gear reduction unit 35, shaft 37 and the clutch composed of members 31 and 32. The web 28 thereof dips into the water in secondary reservoir 23 and becomes water laden. Propellor 34 draws air to be humidified into housing 11 via louvered opening 21 and forces this air through opening 18 and into the centre of drum 25. The end of drum 25 not shown in the drawing preferably is closed, so this air is forced through web 28 and evaporates some of the water held in the web, the humidified air then passing out of housing 11 through the louvered panel (not shown) located over drum 25. To maximize the flow of air through the web, the left hand end of drum 25 should be kept as close as possible to baffle 17.

The speed of pulley 38 is adjusted such that there always will be sufficient water in secondary reservoir 23. On the other hand, because there is a primary reservoir to provide the humidifier with capacity, secondary reservoir 23 need contain only a small amount of water, preferably to a depth not much greater than the thickness of web 28, so that only a small amount of the web is submerged at any time. Thus the efficiency of the humidifier is improved, as compared with a humidifier of the type disclosed in the aforementioned patent, since a greater amount of web material is exposed to the passage of air therethrough than was hitherto the case.

During operation of the humidifier dirt, dust and mineral deposits accumulate on web 28, and much of this finds its way into pan 23 where it settles to the bottom thereof. In prior art humidifiers of the type shown in the aforementioned patent this material has been difficult to remove for reasons previously noted. In a humidifier embodying this invention it can be removed readily simply by removing drum 25 and then lifting pan 23 out of compartment 20 and cleaning the pan.

Another advantage of the humidifier is that because drum 25 does not dip into the primary reservoir, the primary reservoir can be made as deep as desired. Thus, as compared with a humidifier of the type shown in the aforementioned patent and having the same size housing, a humidifier embodying the invention can have a 10 gallon capacity compared to a 6 gallon capacity for the former.

A further advantage of the humidifier described herein is that only one motor is required to drive pro-

pellor 34, rotate drum 25 and transfer water from the primary to the secondary reservoir.

While a preferred embodiment of this invention has been described herein, changes and modifications may be made therein without departing from the spirit and scope of the invention as defined in the appended claims. For example, a pump could be substituted for pulley 38 and belt 43.

What I claim as my invention is:

1. A humidifier comprising a housing, primary and secondary water reservoirs located within said housing, said secondary reservoir comprising a member adapted to contain water, said member being removably located within said housing and readily removable therefrom, said member being located above said primary reservoir, a web of a porous material that is adapted to pick up water, said web being removably located in said housing above said secondary reservoir and being adapted to move through water in and pick up water from said secondary reservoir, a propellor adapted to move air from outside of said housing through said web, means for transferring water from said primary reservoir to said secondary reservoir, and driving means including a single motor for driving said web, said propeller and at least a part of said means for transferring water from said primary reservoir to said secondary reservoir, said part of said means for transferring water from said primary reservoir to said secondary reservoir including a pulley and a belt, said belt being looped over and driven by said pulley and dipping into water in said primary reservoir.

2. A humidifier according to claim 1 wherein said web is a sleeve, said sleeve being supported on a frame and being annular in configuration.

3. A humidifier according to claim 2 wherein said driving means for driving both said web and said means for transferring water from said primary reservoir to said secondary reservoir includes a gear reduction unit and wherein said driving means for driving said web includes a clutch having first and second engageable and disengageable members, said first member being connected to and driven by said gear reduction unit and adapted to drive said second member when engaged therewith, said second member being connected to said frame.

4. A humidifier according to claim 1 wherein said means for transferring water from said primary reservoir to said secondary reservoir includes a trough having a part thereof located below said pulley and extending therefrom to adjacent said secondary reservoir to discharge water carried up from said primary reservoir by said belt and dropped into said part of said trough into said secondary reservoir.

5. A humidifier according to claim 4 wherein said web is a sleeve, said sleeve being supported on a frame and being annular in configuration.

6. A humidifier according to claim 5 wherein said driving means for driving both said web and said means for transferring water from said primary reservoir to said secondary reservoir includes a gear reduction unit and wherein said driving means for driving said web includes a clutch having first and second engageable and disengageable members, said first member being connected to and driven by said gear reduction unit and adapted to drive said second member when engaged therewith, said second member being connected to said frame.

7. A humidifier according to claim 6 wherein said member comprising said secondary reservoir is a shallow pan.

8. A humidifier according to claim 7 wherein the capacity of said primary reservoir is much greater than the capacity of said secondary reservoir.

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