

Aug. 31, 1965

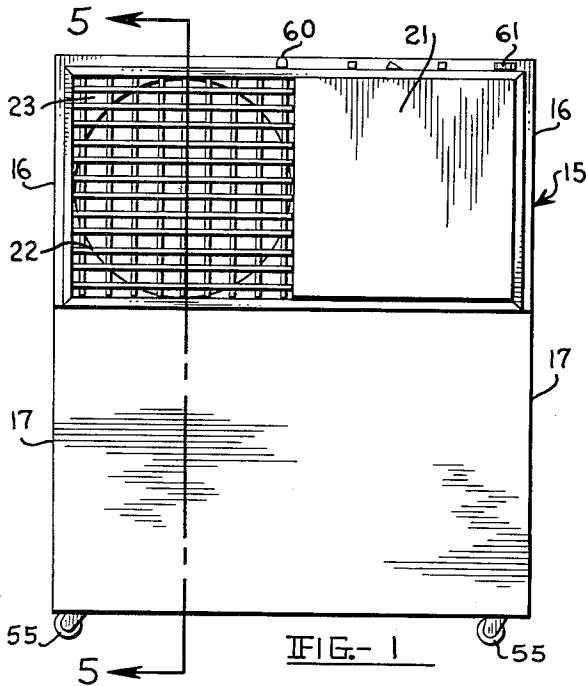
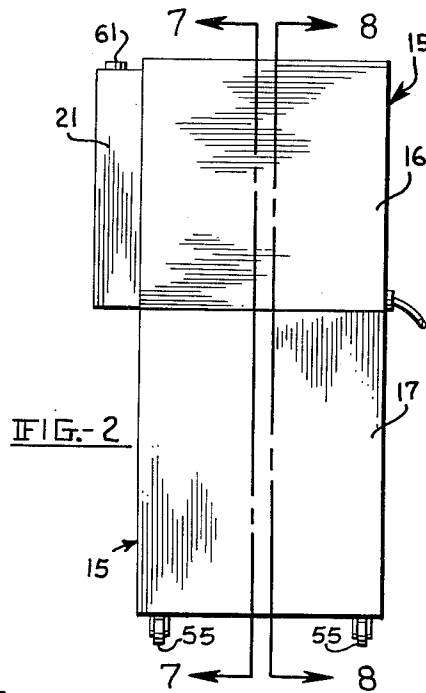
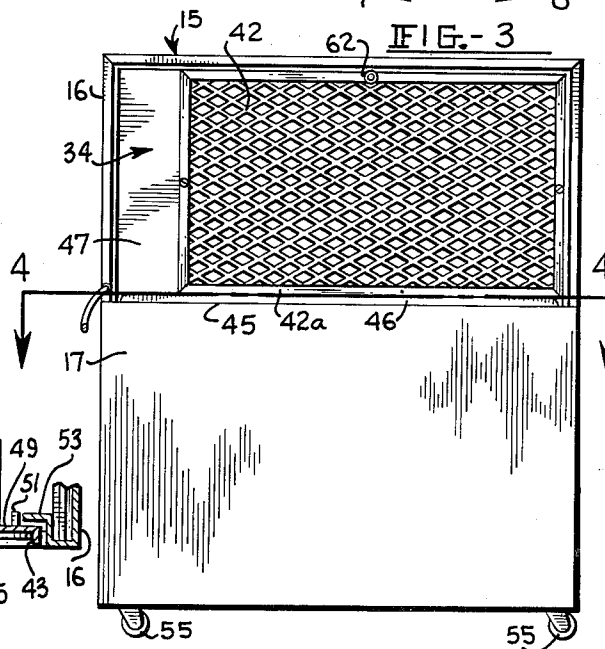
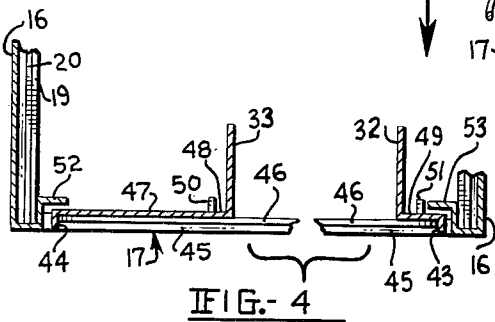
L. E. SPROUSE ETAL

3,203,676

HUMIDIFIER AND COOLER

Filed April 1, 1963

4 Sheets-Sheet 1



INVENTORS
LOWELL E. SPROUSE
EVERETT DEAN WISEMAN

BY *Herbert Q. Reinert*

ATTORNEY

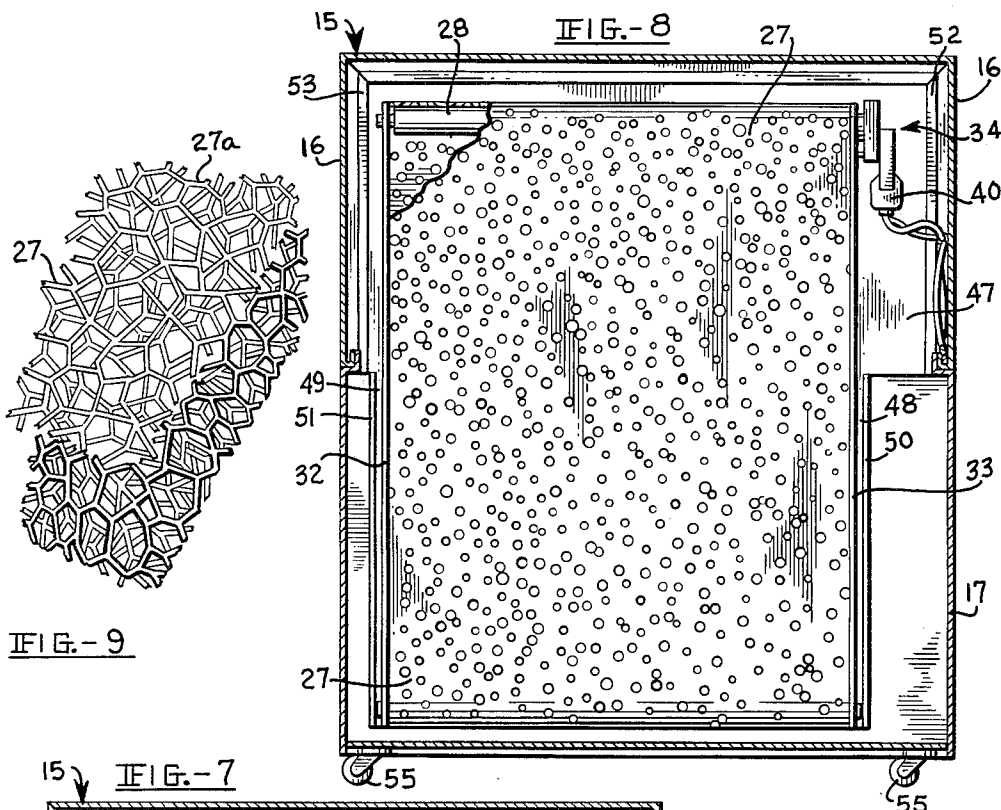
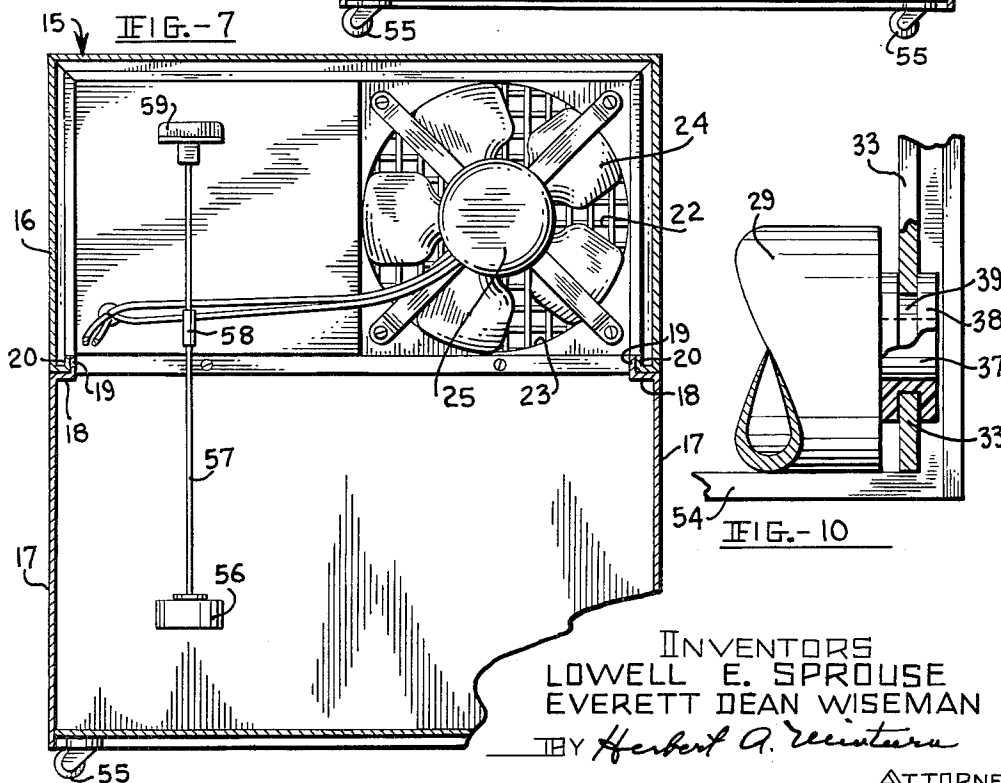
Aug. 31, 1965

L. E. SPROUSE ETAL
HUMIDIFIER AND COOLER

3,203,676

Filed April 1, 1963

4 Sheets-Sheet 3



Aug. 31, 1965

L. E. SPROUSE ET AL

3,203,676

HUMIDIFIER AND COOLER

Filed April 1, 1963

4 Sheets-Sheet 4

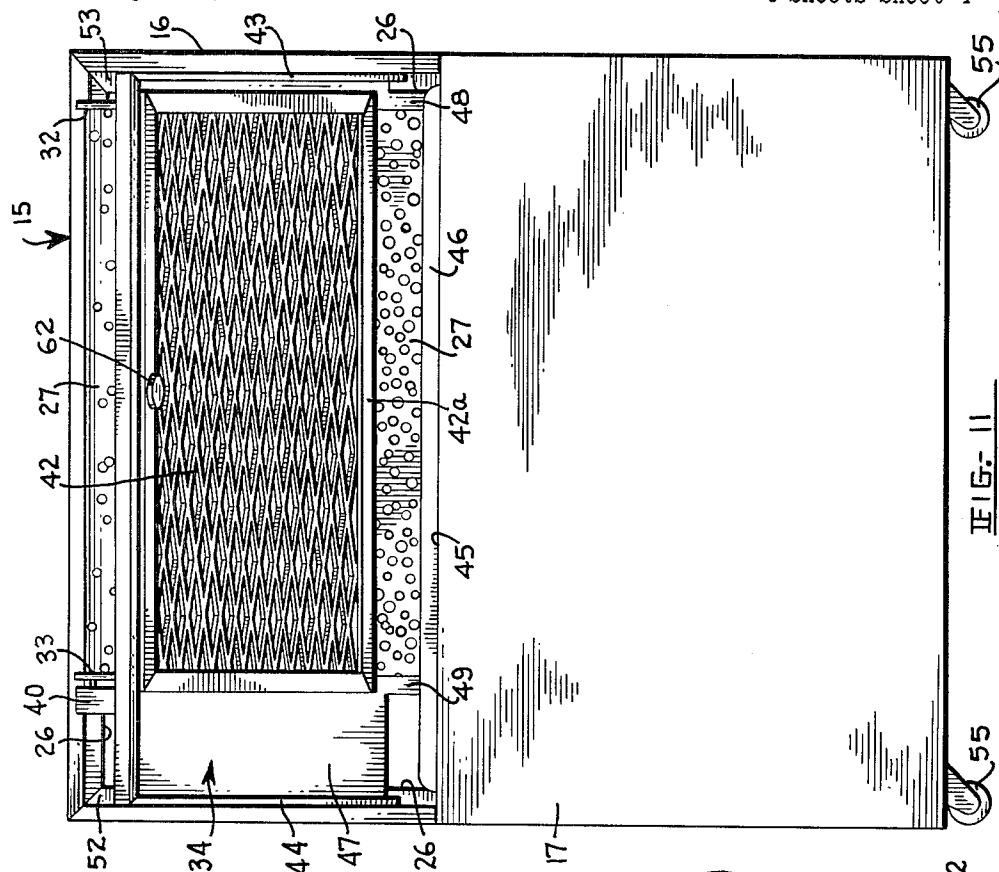


FIG. 11

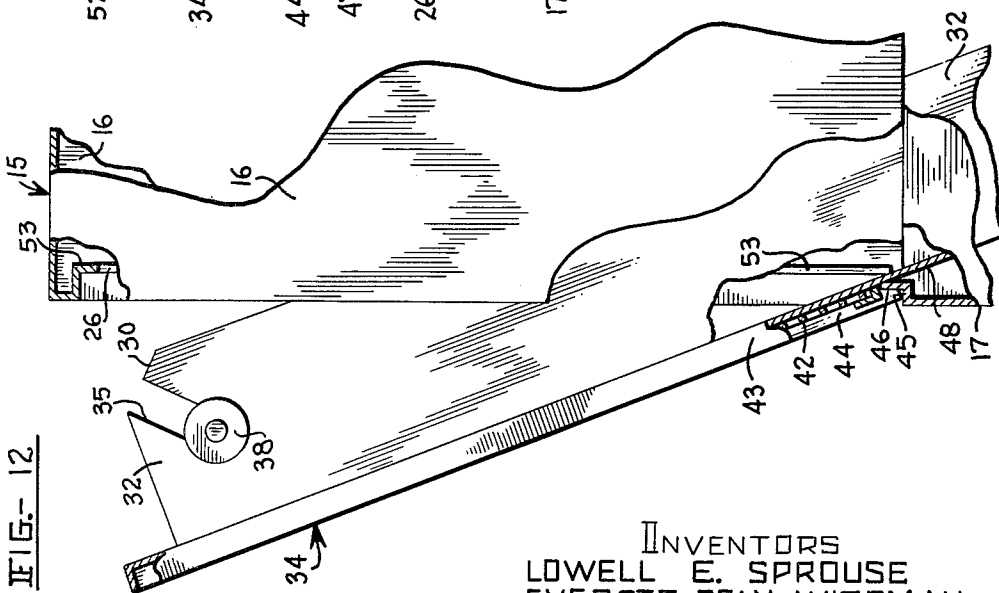


FIG. 12

INVENTORS
LOWELL E. SPROUSE
EVERETT DEAN WISEMAN

BY *Herbert A. Winter*

ATTORNEY

1

3,203,676

HUMIDIFIER AND COOLER

Lowell E. Sprouse and Everett D. Wiseman, Columbus, Ind., assignors to Vernco Corporation, Columbus, Ind., a corporation of Indiana

Filed Apr. 1, 1963, Ser. No. 269,600

11 Claims. (Cl. 261—28)

This invention relates to a device for humidifying an enclosed space by adding moisture thereto and also cooling the space by an evaporative process. The invention is embodied in the present form in a mobile unit which may be pushed from room to room or from position to position in a room as may be desired. The only connection to the device required is that of a supply of electricity. The device employs a tank of water into which dips an endless belt of sponge-like nature and a current of air is directed through the belt when moving to lift water from the tank and cause the current of air passing through the belt to carry moisture therefrom.

A primary object of the invention is to provide a structure of the nature indicated which will be relatively free from liming deposits from the water employed and which will be simple of construction and operation to the end that each unit employing the invention may be manufactured at a relatively low cost and have a very low cost of maintenance.

Further important objects of the invention reside in the particular and peculiar construction of the belt mounting and of the ready access to the belt and other parts from time to time as may be required.

It is known that in the past, evaporative devices have been employed, particularly with textile curtains hanging therein lifting water from a reservoir by capillary action. Such devices readily limed and soon became ineffective. Moreover considerable resistance to passage of air through the curtains was encountered particularly through continued use of the device. The present invention avoids these problems.

These and many other objects and advantages of the invention will become apparent to those versed in the art in the following description of one particular form as now best known to us, and which form is illustrated in the accompanying drawings, in which

FIG. 1 is a view of a device embodying the invention in front elevation;

FIG. 2 is a view in end elevation;

FIG. 3 is a view in rear elevation;

FIG. 4 is a view in transverse section through the rear of the device on the line 4—4 on a slightly enlarged scale;

FIG. 5 is a view in vertical section on the line 5—5 on a greatly enlarged scale, in FIG. 1;

FIG. 6 is a detail of the interconnection between an upper and lower portion of the housing;

FIG. 7 is a vertical longitudinal section on the line 7—7 in FIG. 2 on a slightly enlarged scale;

FIG. 8 is a vertical longitudinal section on the line 8—8 in FIG. 2 on a slightly enlarged scale;

FIG. 9 is a detail on an enlarged scale of a portion of the belt;

FIG. 10 is a detail on an enlarged scale and in partial section of the mounting structure of a belt roller;

FIG. 11 is a view in rear elevation with the belt carrying unit slightly raised and tipped rearwardly, on an enlarged scale; and

FIG. 12 is a view on a still further enlarged scale of the belt carrier shown in fragmentary form and partial section.

A housing generally designated by the numeral 15 is constituted of an upper and a lower section 16 and 17 respectively. The lower section 17 is essentially a water tank open only at the upperside and entirely thereacross.

2

There is an inturned flange 18 which is turned an upwardly extending lip 19 therearound the upperside of the tank or lower portion 17.

The upper section 16 rests by its lower edge on the flange 18 by a foot 20 turned inwardly and thence upwardly. The upper section 16 has a forwardly extending bay 21. Substantially half of this bay 21 is closed across its front side, and the other portion has an opening and a grille 22 extending across this opening designated by the numeral 23. Behind the grille 22 is mounted a fan 24 driven by a motor 25. The motor 25 turns the fan 24 on that direction which will cause a current of air to move outwardly through the grille 22. As indicated in FIG. 5, the fan and its driving motor are located within the upper housing section 16. The rear side of the housing section 16 is open entirely from one side to the other and from the lower to the top side. This opening is designated by the numeral 26.

A belt 27 is endless in nature and is made out of a material which is rubber-like, to be foraminous in the nature of a sponge, only having rather large cells therein and therethrough communicating one with another. As indicated in FIG. 9, a preferred material is a synthetic rubber or a plastic which has been bubbled or blown into a cellular condition, primarily defined by interconnecting strings or threads 27a all interconnecting as best indicated in FIG. 9 so that air may pass through the belt readily, and at the same time the belt will have innumerable individual surfaces on which a film of water may reside as the belt is carried through the water by its lower portion in actual usage.

The belt 27 is trained around a pair of spaced apart rollers 28 and 29 which are carried at upper and lower ends 30 and 31 respectively of flanges 32 and 33.

These flanges 32 and 33 are, in the present form, integral parts turned forwardly from a frame generally designated by the numeral 34. The ends of the flanges 32 and 33 are each provided with diagonally entering slots 35 and 36 respectively, the slot 35 extending diagonally upwardly and forwardly and the slot 36 extending diagonally downwardly and forwardly. Each roller 28 and 29, has a short trunnion 37 revolvably fitting within a bearing 38, preferably made out of plastic and circumferentially grooved to provide the annular slot 39. This bearing 38 in each instance receives opposite sides of the margin of the slot 35 or 36 as the case may be within the groove 39 as a means of retaining the bearing 38 in position longitudinally of the roller. The belt 27 is elastic in nature, so that it may be stretched sufficiently to permit the bearing 38 to be entered in their respective slots 35 and 36 and then have the belt 27 draw those bearings to the inner ends of those slots and thereby retain the bearings in positions to permit the rollers 28 and 29 to turn freely in those bearings.

A motor 40 is fixed to the frame 34 and interconnected to a gear reduction drive to the upper roller 28 as a means for driving the belt 27.

The frame 34 has a rectangular opening through the major portion thereof, this opening being covered by a screen or grid 42. The opening and grid 42 are positioned to one side of the vertical center of the housing 15 as indicated in FIG. 3 in order to permit room for the mounting of the motor 40 on the frame.

This frame 34 is generally inverted U-shaped. At each outer vertical edge there is a rearwardly turned flange 43 and 44 respectively. The lower ends of these flanges 43 and 44 will normally rest on the ledge 45 which extends across the back, top side of the lower housing section 17, FIG. 11. When these flanges 43 and 44 so rest, these is an upturned flange 46 extending from the forward side of the ledge 45 which closes off the space between the bottom of the frame end panel 47 and the underside of the

grid 42 as best indicated in FIG. 3. The frame 34 has a pair of depending legs 48 and 49 which extend downwardly and forwardly of the flange 46 and normally bearing thereagainst. It is from these legs 48 and 49 that the roller carrying and spacing apart flanges 32 and 33 are turned, FIG. 4. There is a short flange 50 turned forwardly from the leg 48 on that side thereof removed from the major flange 32. Likewise there is a flange 51 turned forwardly from the side of the leg 49 which is removed from the flange 33. These flanges 50 and 51 serve as stiffening means. Both legs 48 and 49 normally ride against the lip 46. The housing section 16 has an turned flange 52 extending vertically and downwardly from its top on the front side of the panel 47 to substantially the bottom of the housing section 16. There is also a flange 53 extending downwardly in front of the opposite side of the frame 34 from the top of the section 16 and in front of the rearwardly turned flange 43, FIG. 4. The lower ends of the two legs 48 and 49 are tied together by a transversely extending angle iron 54 which is turned to have one leg thereof normally in abutment with the wall 17a of the lower housing section 17, FIG. 5.

The frame 34 normally rests by the lower ends of the flanges 43 and 44 bearing on the ledge 45, FIGS. 4 and 12, the ends of the lip or flange 46 being cut away for that purpose. It is in this position of the frame 34 that the under edge 42a of the grid frame 42 comes into close proximity with the lip or flange 46. Thus when the frame 34 is inserted through the opening 26, and brought downwardly to have the lower ends of the flanges 43 and 44 rest on the ledge 45, and the frame is then released. It will normally rock from the dash line position, FIG. 5, to the full line position and there remain, particularly by reason of the "off center" support of the frame 34.

The lower housing section 17 is supplied with water to have its upper surface spaced somewhat below the underside of the upper section 16. The exact level of this water is immaterial so long as the lower end of the belt 27 remains immersed and the water does not splash over the juncture between the sections 16 and 17 in the event that the housing 15 is transported from one position to another such as by pushing it on the casters 55 fixed to the underside of the housing section 17. Preferably a float 56 is provided on the end of a rod 57 which is slidingly guided through a bracket 58 to have its upper end operate a switch mechanism generally designated by the box 59, which preferably in turn operates a signal light 60, FIG. 1, on the top of the bay 21. The exact structure of the switch mechanism 59 is not herein shown since such a switch may be obtained commercially on the market and its precise form does not enter per se in the present invention. The device is also of course provided with a suitable control switch operated by a knob 61, FIG. 1, and again the circuit is not herein illustrated since such a circuit would be well known to those versed in the art and in itself does not enter into the invention per se. Also if desired, a humidistat may be incorporated in the circuitry for automatically controlling the operation of the motor 25. Again this device is not illustrated for the same reasons.

In any event, upon the energization of the motor 25, the motor 40 is likewise energized to cause the belt 27 to travel quite slowly around the rollers 28 and 29 to that the lower end of the belt, dipping into the reservoir of water, will be wetted and carry moisture thereby upwardly to come within the path of a current of air which is traveling from the back side of the device through the grid 42, the two flights of the belt 27, and out the grille 22.

Thus it is to be seen that we have provided an exceedingly simple device, yet most unique in the mounting of the belt so that at anytime it may become necessary to replace the belt, or to take it out and clean it, all that needs to be done is to pull the knob or button 62 rearwardly and thence upwardly to remove the belt and its supporting structure from within the housing 15. By

slipping the lower roller 29 downwardly and outwardly to carry the bearings from without the slots 36, and doing the same with the upper roller 28 in reference to the slots 35, the belt 27 may be shifted longitudinally of the rollers and thus become free.

Therefore we do not desire to be limited to that precise construction as embodied in the one particular form illustrated and described herein, since structural changes may obviously be employed without departing from the spirit of the invention, beyond the limitations which may be imposed by the following claims.

We claim:

1. In a humidifying device, the combination with a housing having an upper front opening, a rear upper opening, and a water reservoir in its lower portion; and

a motor driven fan behind said front opening; of a belt-carrying frame;

a pair of belt-carrying rollers; means carried by said frame in vertically spaced apart relation to carry one roller revolubly across an upper portion of said frame and to carry the other roller revolubly across a lower portion of said frame within said reservoir;

motor means driving said one roller; said frame being adapted to be entered into and removed from said housing through said rear opening; an elastic, foraminous belt trained about said rollers; and

frame support means located at the bottom of said housing rear opening and engageable with said frame so that said frame may rock to position said trained belt approximately vertically within said housing, across said rear opening, and carry the lower belt portion into said reservoir;

the upper portion of said belt traversing said opening from adjacent its top and from side to side, and being in the path of a current of air induced by said fan to enter said rear opening, flow through said belt, and out through said front opening.

2. The structure of claim 1, in which said frame support means comprises

a ledge extending across said housing and defining the lower margin of said rear opening; and abutments projecting rearwardly from said frame and resting on said ledge.

3. The structure of claim 2, in which said ledge and said abutments are located above a central zone between the top of said rear opening and the bottom of said reservoir.

4. The structure of claim 2, in which there is an abutment on a lower portion of said frame in the path of a portion of said housing when the frame rocks to position said belt to said approximate vertical position.

5. In a humidifying mechanism having a water reservoir with a lower floor and unit means elevating water from the reservoir, an inverted, generally U-shaped frame positioned therein; and having

an upper transverse member; legs extending downwardly respectively from spaced apart zones of said member; a flange turned forwardly respectively from each of said legs;

each of said flanges having an inner closed end slot entering its upper end portion and extending a distance diagonally downwardly and rearwardly therein; each of said flanges also having an inner closed end slot entering its lower end portion and extending diagonally a distance rearwardly and upwardly therein;

a pair of belt rollers each with a bearing portion on opposite ends; bearings, one each revolubly receiving therein a roller bearing portion;

5

each of said bearings having an annular, external groove therearound;

an elastic, forminous belt carried around said rollers; said rollers being spread apart and stretching said belt to place said bearings across the respective upper and lower slots in the two flanges with the reduced diameter portions of the bearings appearing in the annular grooves received within said slots, the tension set up in the belt positioning the bearings by said reduced diameter portions against the respective ends of the slots, permitting the rollers to be rotated and in turn carry said belt therearound; said belt being positioned between said flanges; and a motor carried by the frame and drivingly connected to the upper roller.

6. The structure of claim 5 in which said belt is an elastic, reticulated, foraminous rubber-like material through which air may be flowed.

7. The structure of claim 5, in which there is a housing receiving said unit means,

said housing having said water reservoir in its lower portion;

said housing having a front opening adjacent its top and a rear opening adjacent its top and extending a distance downwardly to a line across the housing and defining the lower margin of that rear opening; said line being above a central zone immediate the top of the rear opening and said reservoir floor; said unit means being adapted to be entered into and removed from said housing through said rear opening;

bearing means carried by said frame coming into contact with and rocking on extensions from said housing at the outer ends of said line; and the

dimensions of said frame being those wherein said belt, by an upper portion will extend vertically upwardly above said line approximately the full height of said rear opening, and vertically downwardly to

6

position a lower portion of said belt in proximity to said reservoir floor, all following rocking of said unit means by its bearing means on said housing extensions.

8. The structure of claim 7, in which said unit means, bearing means and housing extensions are located on the back side of said frame thereby, under the influence of gravity, inducing said rocking.

9. The structure of claim 7 in which there is means limiting said rocking of said unit means to said vertical position of said belt.

10. The structure of claim 7, in which there is a grid carried across the upper portion of said unit means extending coextensively over said rear opening when the unit means is approximately vertically disposed;

a forwardly turned ledge from the housing on said line; and

a lip turned upwardly from the forward edge portion of the ledge approximately against which lip, a lower edge portion of said grid fits.

11. The structure of claim 10, in which said housing extensions constitute an outer end portion of said ledge; and

said frame bearing means are located on the back side of said frame, and said unit means tend to rock on said bearing means to swing the lower end of the unit means toward the back side of said housing and close said rear opening by said grid.

References Cited by the Examiner

UNITED STATES PATENTS

1,888,001	11/32	Hicks	261—80
2,295,233	9/42	Mosher	261—30
2,637,540	5/53	Rowe	261—94
2,808,899	10/57	Hofstetter	55—354

HARRY B. THORNTON, *Primary Examiner.*