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H. L. FROELICH

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HUMIDIFIER

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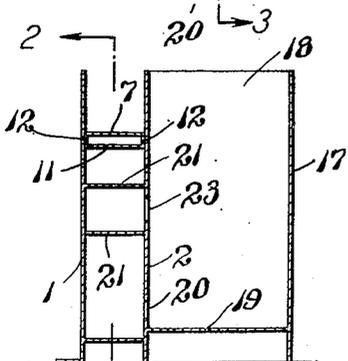
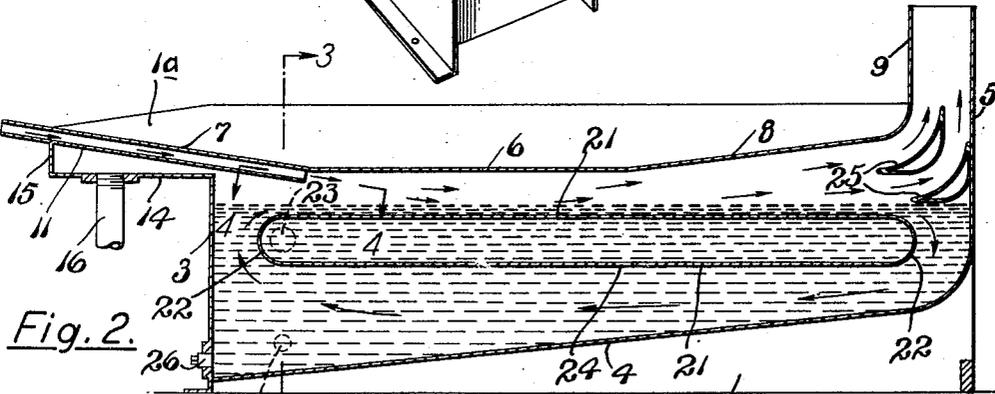
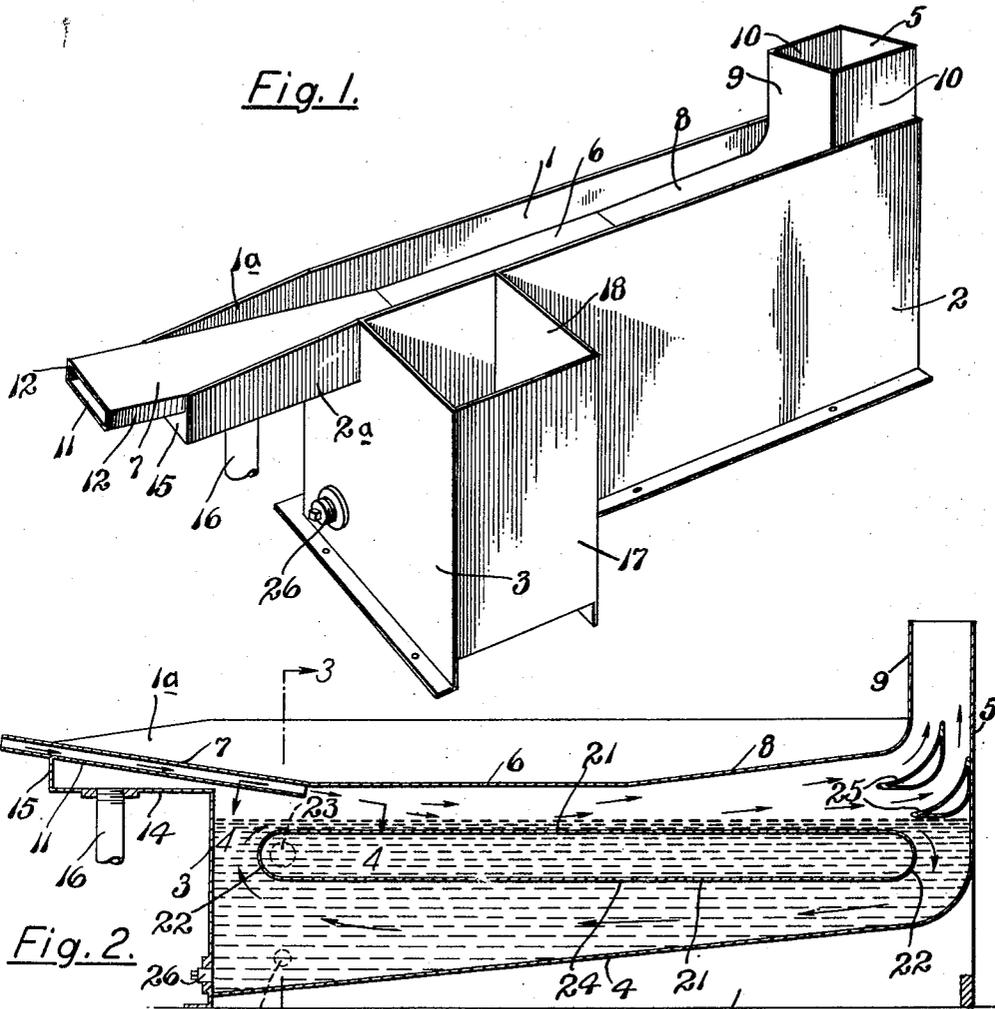
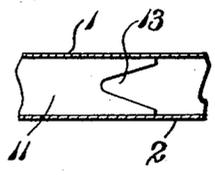


Fig. 4.



Inventor  
Holmes L. Froelich  
By Frank E. Liverance, Jr.  
Attorney

1

2

2,710,178

**HUMIDIFIER**

Holmes L. Froelich, Detroit, Mich.

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This invention relates to humidifiers, and is primarily concerned with a novel structure of humidifier by means of which water vapor is taken from a body of water in a moving current of air and the air with the water vapor therein delivered into a room or other enclosure, or into an air conditioning system which may supply several rooms or enclosures with air. Maintaining the proper amount of water vapor in the air so that the relative humidity is as it should be is a primary object and purpose of the invention and is accomplished in a very practical, economical and exceptionally, effective way by utilizing the humidifier structure which I have invented.

An understanding of the invention may be had from the following description, taken in connection with the accompanying drawing, in which:

Fig. 1 is a perspective view of the humidifier made in accordance with my invention.

Fig. 2 is a longitudinal vertical section therethrough substantially on the plane of line 2—2 of Fig. 3.

Fig. 3 is a transverse vertical section substantially on the plane of line 3—3 of Fig. 2, and

Fig. 4 is a fragmentary generally horizontal section on the plane of line 4—4 of Fig. 2.

The sectional views are taken looking in the directions indicated by the arrows, and like reference characters refer to like parts in the different figures of the drawing.

In the structure shown, two vertical, somewhat elongated generally rectangular plates 1 and 2 are provided being located in spaced parallel vertical planes. At one end an end plate 3 is permanently secured by a soldering, brazing, welding or other equivalent permanent connection. The plate 3 is wider than the distance between the plates 1 and 2 and at one side extends beyond the adjacent side as shown in Fig. 1. A bottom plate 4 lies between the two plates 1 and 2 and is permanently secured in the same manner at one end to the end member 3 and at its longitudinal edges to the plates 1 and 2, extending from the end 3 substantially to the opposite ends of the side plates 1 and 2 and curved in the arc of a circle to extend vertically, as at 5, between the side plates 1 and 2, being permanently soldered or otherwise secured thereto. The bottom 4 inclines downwardly from one end of the humidifier to the other, its lowest end being at its connection to the end plate 3.

Above the bottom 4 and, preferably, a short distance below the upper edges of the side plates 1 and 2, a top unit is provided made of sheet metal like the remainder of the device, having a horizontal middle section 6 and two end sections 7 and 8 connected therewith, each of which inclines upwardly from the ends of the intermediate section 6. The end section 8 extends toward the part 5, is curved upwardly and terminates in a vertical part 9 parallel to and spaced from the end section 5. Sides 10 at right angles to the spaced portions 5 and 9 may be integral with the end section 9 or be formed separately therefrom and soldered or welded thereto and be also welded to the end edges of the part 5, making a vertical conduit at one end of the humidifying device.

Underneath the opposite end section 7 a conduit is provided having a lower side 11 spaced from and parallel to the section 7, and vertical sides 12, the parts being permanently secured together and the length of the conduit being substantially equal to the length of the section 7. The lower side or bottom 11 of the conduit at its inner end preferably is provided with a V-shaped notch 13 (Fig. 4) which may be of substantially the form shown. This conduit and the remainder of the unit connected therewith is located between the side plates 1 and 2 and end sections 1a and 2a thereof as shown in Fig. 1, and is soldered or otherwise equivalently secured at the side edges of the sections 6 and 8 and at the sides 12 of the conduit, thereby making an enclosure having a vertical outlet at one end and an air supplying conduit at the opposite end.

Within such enclosure water is adapted to be supplied which in practice is designed to have an upper level located, substantially as shown in Fig. 2, a short distance below the inner end of the air carrying conduit. An overflow for water if the water level should rise above the desired level is provided underneath the air carrying conduit by a short horizontal plate 14 and a vertical end 15 between the extensions 1a and 2a of the side plates, the upper edge of the end 15 being connected with the underside 11 of the air carrying conduit and the inner edge of the bottom plate 14, being located a short distance below said lower side 11. A waste pipe 16 connected with the bottom 14 is provided to carry away any water overflow.

The end plate 3, at the portion thereof which extends beyond the adjacent side 2, and the side 2 furnish two sides of a water holding supply receptacle. The other two sides are vertical plates 17 and 18 and these together with a horizontal bottom 19 (Fig. 3) provide a receptacle into which water may be entered, the level to be controlled in any conventional manner, as by a float operated valve or the like. Through the side 2 at this receptacle an opening 20 is made for flow of water into the previously described enclosure, the opening 20 being shown above the bottom 4 as in Figs. 2 and 3. The enclosure, therefore, is filled with water to the controlled level of the water in the water receiving receptacle described.

Within the enclosure and below the upper level of the water therein a horizontal transverse core is located having upper and lower parallel spaced horizontal plates 21 integrally connected at their ends by generally semi-circular ends 22. Such ends are spaced inwardly a short distance from the ends 3 and 5. A second opening 23 is made through the plate 2 where it provides a side for the water supply receptacle or tank so that water enters into the hollow core described, and an outlet opening 24 is made in the lower side 21 thereof substantially midway between its ends.

At the lower end of the vertical outlet provided by the parts 5, 9 and 10 direction vanes or baffles 25 may be located, the opposite ends thereof being soldered or otherwise permanently secured to the plates 1 and 2. The parts 21 and 22 of the described core likewise are similarly permanently secured at their edges to the inner sides of the vertical plates 1 and 2. Immediately above the lower end of the inclined bottom 4 an opening in the end 3 is made and a screw plug 26 is used to close the opening. The plug may be removed at times when desired for flushing out the enclosure chamber in which the water is held, to remove any sediment deposit and which will be carried by the water movement and by gravity to the lower end portion of the bottom 4.

In the operation, air is forced by pressure through the air carrying conduit and because of the inclination to the horizontal, the air leaving the inner end of the conduit is directed against the upper surface of the water

3

within the humidifier enclosure. It also spreads laterally, progressively, as it reaches and passes by the notch or recess 13 in the bottom 11 of such conduit. Such water coming forcefully against the upper surface of the water causes turbulence in the water, the breaking up thereof into small drops of different sizes, thus the air becomes laden with water vapor and in some cases in a liquid state in the form of drops. The air is delivered at the vertical outlet, being thence carried to its place of delivery which may be a room or other enclosure or to the air conduit of a building air conditioning system. The baffles at 25 which may be of the form shown or of any other suitable form serve to prevent passage of liquid drops.

It is also apparent that because of the direction of flow of the air under pressure it will cause a movement of the water with which the air engages which will move over the upper side 21 of the described core, thence around one end and underneath and back again to the opposite end of the core as indicated by the arrows of circulation of the water within the humidifying receptacle.

The structure described is readily manufactured of thin metal. It is economical to produce, is safeguarded against overflow, deposited sediment may be removed whenever desirable. The structure is sturdy and of a long life, and in its operation is especially effective.

In the structure described, the opening at 20 is not essential, and may be omitted. Also the open upper end receptacle having vertical sides 17, 18 and parts of the side 2 and end 3 may be supplied with a drainage opening closed by a removable plug, like the plug 26, located immediately above the bottom 19 of such receptacle. The invention is defined in the appended claims and is to be considered comprehensive of all forms of structure coming within their scope.

I claim:

1. Humidifying apparatus comprising a receptacle having spaced vertical elongated sides, ends connecting said sides, a bottom, and a top, said top having a middle section in a generally horizontal plane and two end sections inclining upwardly and away from the middle section at a generally slight angle thereto, an air carrying conduit having one of said end sections as its top, two vertical spaced sides depending therefrom and a bottom spaced from the top and in general parallelism thereto, said air conduit bottom having its inner end substantially directly below the inner end of the inclined end top section above it, said inner end portion of said conduit bottom

4

having a slot therein of greatest width at the inner end of the conduit bottom and progressively decreasing in width away therefrom, and an outlet at the outer end of the other inclined top section comprising generally vertical walls extending above the top of said receptacle.

2. Humidifying apparatus comprising a receptacle having spaced vertical elongated sides, ends connecting said sides, a bottom, and a top, said top having a middle section in a generally horizontal plane and two end sections inclining upwardly and away from the middle section at a generally slight angle thereto, an air carrying conduit having one of said end sections as its top, two vertical spaced sides depending therefrom and a bottom spaced from the top and in general parallelism thereto, and an outlet at the outer end of the other inclined top section comprising generally vertical walls extending above the top of said receptacle, and a hollow member within the receptacle having generally horizontal upper and lower spaced sides and rounded ends connecting said sides located above the bottom of the receptacle, the ends being spaced from the ends of the receptacle and said sides and ends of said member having connection to the sides of said receptacle.

3. A structure as defined in claim 2, said bottom of the receptacle being located in a plane at an acute angle to the horizontal, the lower end of said receptacle bottom being at the same end of the receptacle as the air carrying conduit.

4. A structure as defined in claim 2, and a water supply receptacle having a bottom and vertical walls, one wall being supplied by a side of the first receptacle, and said side having a water passing opening therethrough between the supply receptacle and first receptacle, said side of the first receptacle having a second water passing opening located adjacent one end of said hollow member, and the lower side of said hollow member having a water passing opening therethrough between its ends.

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