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AIR CONDITIONING DEVICE

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Fig. 1.

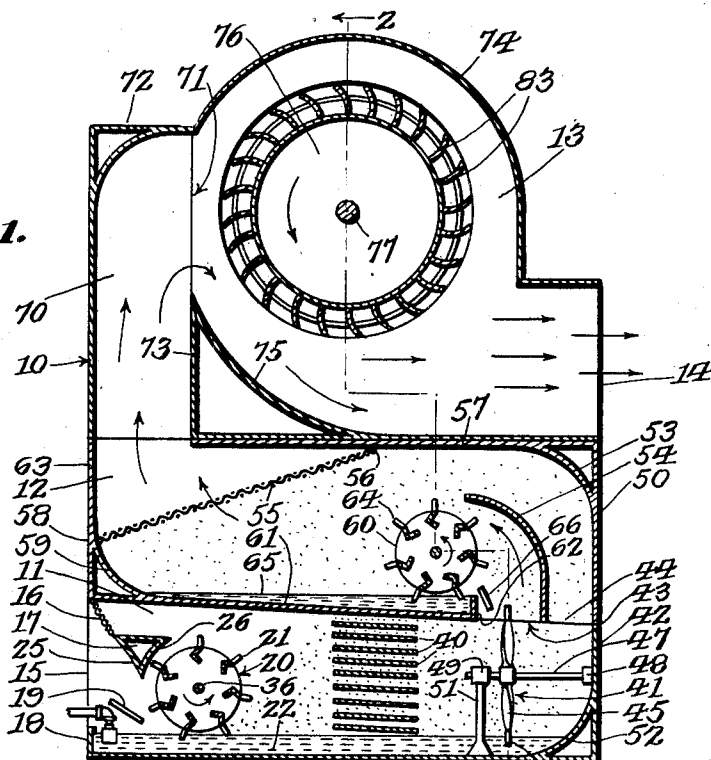


Fig. 2.

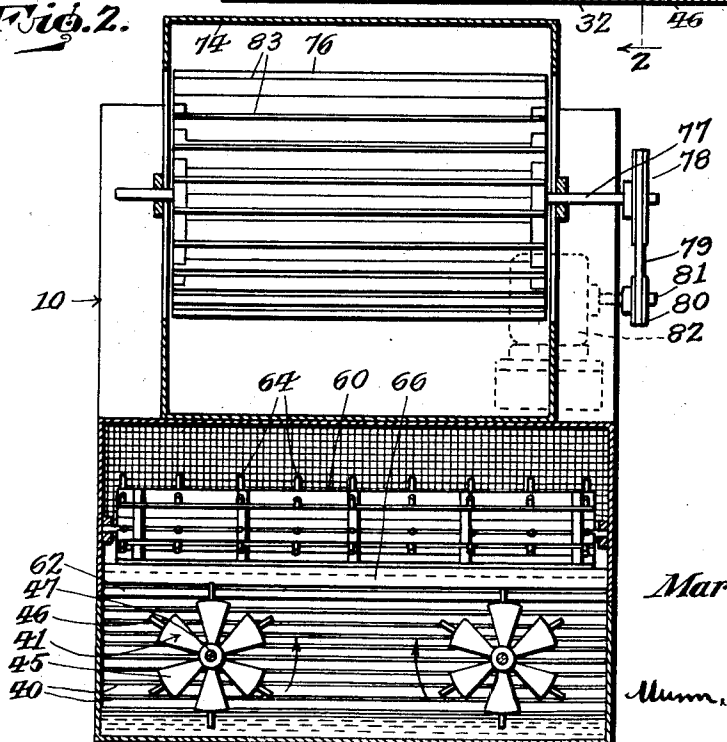
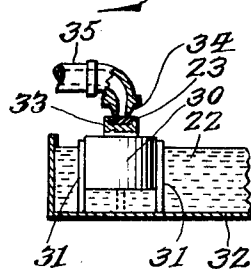


Fig. 3.



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AIR CONDITIONING DEVICE

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11 Claims. (Cl. 261—92)

This invention relates to an air conditioning device.

An object of the invention is the provision of a device into which air is drawn and conditioned by the removal of dust, the addition of moisture and by the lowering of the temperature of the air, the temperature and the amount of moisture added being controlled by rotatable members operated by air passing through the device.

Another object of the invention is the provision of an air conditioning device in which the air is not only cleaned and cooled but a predetermined quantity of moisture is added in several stages, in the first stage the air being cooled and moistened after which a predetermined quantity of the moisture is removed and collected for aiding in a further cooling of the air before it is forced out of the device into a room or space in a building.

A further object of the invention is the provision of a device having a plurality of superimposed chambers through which the air is drawn for removing dust, for adding moisture and for cooling the air while controlling the quantity of moisture which is retained by the air before it is discharged into a room, the moisture which is whipped up in the initial compartment for aiding in cooling the air is partially removed in a second compartment before the air is drawn into a discharging compartment, the moisture which is removed from the air being employed for further cooling of the air before it is released from the device.

This invention will be best understood from a consideration of the following detailed description, in view of the accompanying drawing forming a part of the specification; nevertheless, it is to be understood that the invention is not confined to the disclosure, being susceptible of such changes and modifications as define no material departure from the salient features of the invention as expressed in the appended claims.

In the drawing:

Figure 1 is a vertical section of the air conditioning device constructed in accordance with the principles of my invention.

Figure 2 is a transverse vertical section taken along the line 2—2 of Figure 1.

Figure 3 is a fragmentary vertical section showing a float controlled inlet for supplying water to the air conditioning device.

Referring more particularly to the drawing, 10 designates a housing having a lower compartment 11 into which the air is initially drawn, a superimposed compartment 12 and a third com-

partment 13 from which the cooled air is forced through a discharge opening 14 into a room of a building.

The lower compartment 11 has an inlet opening 15 for air between a screen 16 cooperating with a baffle 17 and a vertically disposed flange 18. This flange is of sufficient height to maintain a predetermined quantity of water in the bottom of the compartment 11.

The baffle 17 cooperates with a baffle 19 for directing air which is drawn into the compartment 11 through the opening 15 upon a rotatable member 20 which has a plurality of angularly disposed vanes 21 running longitudinally of the rotatable member with the ends of the vanes dipping into water 22 normally maintained at a predetermined level in the bottom of the chamber 11 by means of a float controlled valve 23 as shown more clearly in Figure 3.

The baffle 17 has a curved face 25 substantially in alignment with the screen 16 and a second curved face 26 which is in close association with the outer free edges of the moving vanes 21 of the rotatable member 20.

A float 30 is movable vertically within a plurality of vertically disposed guide members 31 secured to the bottom 32 of the chamber 11. The float is provided with a reduced upper end 33 which carries a valve 23 and this valve is adapted to engage a nipple 34 formed at one end of a pipe 35 which is connected with a source of water for maintaining the nipple closed against the discharge of water into the chamber 11 when the float 30 has been elevated sufficiently by a predetermined level of the water in the bottom of the chamber 11. In other words, the float 30 and the valve 23 will always maintain a predetermined level of water in the bottom of the chamber 11 so that when the member 20 is rotated the free ends of the vanes 21 will dip periodically into the water when the member 20 is revolved by the incoming air through the opening 15.

While it is true that the member 20 is revolved by the incoming air impinging on the vanes 21 said member may be revolved at a predetermined speed by a motor, if desired, when said motor is operatively connected to a shaft 36 which supports the rotatable member 20.

A plurality of baffles 40 extend transversely of the chamber 11 between the rotatable member 20 and a fan 41 located adjacent a wall 42 which is opposite the opening 15. The lowermost baffle 40 is located above the level of the water 22 and these baffles are spaced a predetermined distance apart so that they will not retard the flow of air

through the chamber 11 but will provide a large surface area over which the air must pass from the opening 15 to the respective discharge openings 43 and 44. These baffles will be supplied with thin films of water which are thrown toward them by the vanes 21 of the revolving member 20 so that the air must pass between the films of water on the opposite faces of these baffles.

Any number of fans 41 may be located in vertical alinement within the rear end of the chamber 11 and the blades 45 of these fans are so constructed that they may revolve either in a clockwise direction or an anti-clockwise direction. At the end of each blade are radially disposed fingers 46 which dip periodically into the water 22 in the bottom of the chamber 11 so that these fingers will pick up a predetermined quantity of moisture and discharge said moisture through the opening 43 which leads into the chamber 12. Due to the fact that the air which passes between the baffles 40 is carrying a certain amount of moisture and a certain amount of the moisture from the air is collected on the blades 45 of the fans and due to centrifugal force this moisture will run out toward the fingers and will be also discharged into the opening 42. Furthermore, the revolving fans 41 will maintain an atmosphere of moisture at this point so that when some of the air enters the opening or passage 44 in the chamber 12 air will carry further moisture into said chamber.

The fans 41 are carried by shafts 47 mounted in bearings 48 and 49. The bearing 48 is secured to an end wall 50 of the housing 10 while the bearing 49 is carried by a standard 51 secured to the bottom 32 of the housing. These fans are revolved by the air being drawn through the chamber 11. A curved baffle 52 running transversely of the chamber 11 is located in close association with the fans 41 for causing the air to be directed upwardly into the passage 44 in the chamber 12.

The passage 44 is formed by curved baffles 53 and 54. These baffles cause air which enters the passage 44 to be directed onto a screen 55 connected along its upper edge as shown at 56 to the top 57 of the chamber 12. The lower end of the screen is connected at 58 to the upper end of a curved baffle 59 located directly above the opening 15 of the chamber 11 and at the lower forward corner of the chamber 12.

A rotatable member 60 similar to the member 20 is located inwardly of the curved baffle 54 and directly above the inner end of a bottom 61 of the chamber 12 which also forms the top of the chamber 11. A transversely disposed flange 62 is of a predetermined height and connected to the bottom 61 adjacent the passage 43 for retaining a predetermined quantity of water on the bottom 61 which is slightly inclined from the wall 63 of the housing 10 to the flange 62 so that the free edges of the vanes 64 of the rotatable member 60 will dip into the water 65 which has collected on the bottom 61 of the chamber 12.

The curved baffle 54 cooperates with a baffle 66 in the passage 43 for directing a portion of the air which is drawn through the chamber 11 onto the vanes 64 of the rotatable member whereby said member will be revolved at a predetermined speed and this speed will depend upon the suction created in the housing by a means which will be presently explained.

It will be noted that the fingers 46 of the fans 41 project into the passage 43 so that mois-

ture which is centrifugally discharged from these fans will be thrown into the air entering the passage 43 and this moisture will be collected on the bottom 61 of the chamber 12. Naturally when too much water is discharged onto the bottom of the chamber 12 said water will flow over the upper edge of the flange 62 and be collected on the bottom of the chamber 11.

A passage 70 which extends transversely of the housing 10 and adjacent the wall 63 connects the chamber 12 with the chamber 13 through an opening 71. This opening is formed between a top 72 of the passage 70 and the upper edge of a wall 73 which forms part of the passage 70.

The chamber 13 is provided with a curved top 74 and a curved baffle 75 embraces a fan 76 driven by a shaft 77 and this shaft is in turn rotated by a pulley 78, a belt 79 and a pulley 80 secured to a shaft 81 which is directly connected to an electric motor 82. The motor 82 may be driven at varying speeds in accordance with the needs in a well known manner.

The fan 76 is provided with a plurality of spaced curved blades 83 and this fan is driven in the direction indicated by the arrow in Figure 1 for drawing air through the various chambers in the housing 10 and for forcing the air through the opening 14. The speed of the motor 82 is such that it will control the operation of the rotatable members 20 and 60 and likewise the fans 41. Thus, it will be seen that the motor 82 will be driven at a speed to create a sufficient suction in the housing 10 so that the air drawn through said housing will not only operate the members 20, 60 and 41, but the speed of the fan 76 will also in effect control the cooling of the air through the proper supply of moisture to the various elements through which the air must pass or over which the air must pass.

The screen 55 is so positioned within the housing at a proper angle that it will present a large surface area and the air leaving the chamber 12 and all excess moisture carried by the air is returned to the bottom 61 of the chamber by the screen so that when the air is discharged through the opening 14 of the chamber 13 the air will not only be cooled but will be properly humidified for the purpose.

The operation of my device is as follows: The fan 76 is operated at a predetermined speed whereby air will be drawn through the various chambers in the housing 10 after it enters the opening 15 in the chamber 11. The incoming air operates the member 20, the fans 41 and the rotatable member 60.

Rotation of the member 20 will cause the blades 21 to pick up a predetermined quantity of moisture from the bottom of the chamber 11 and this moisture is supplied to the air before it passes between the baffles 40 and these baffles are then supplied with a thin film of moisture so that the air will constantly be coming in contact with these thin films and will thus be cooled.

The fans 41 not only churn up the air before the air enters the passages 43 and 44, but the fingers 46 of these fans will elevate the moisture from the bottom of the chamber 11 onto the revolving blades 64 of the rotatable member 60 so that the bottom of the chamber 12 is constantly supplied with moisture. Since the air must pass through the fans 41 they are further cooled by coming in contact with the thin film of moisture on the blades of the fans.

A predetermined quantity of cooled air with a predetermined quantity of moisture enters the passage 44 and the curved baffles 53 and 54 will direct this air onto the screen 55. As the air passes through this screen any excess moisture from the air is removed and this moisture runs back to the bottom of the chamber 12.

Air which passes through the screen 55 then enters the passage 70 and is forced outwardly through the passage 44 from the chamber 13 by the fan 76.

Since a certain quantity of moisture is always carried by the air into the room from the opening 14 additional water must be supplied to the bottom of the chamber 11. The float controlled valve 23 will admit additional quantities of water to the bottom of the chamber 11 as the water in said chamber is lowered.

I claim:

1. An air conditioning device comprising a housing having an upper and a lower chamber through which air is drawn, means supplying the bottom of the lower chamber with a cooling liquid, the housing having a passage connecting the chambers at the inner ends thereof, means creating a suction in the chambers, means rotated by the air drawn through the lower chamber for spraying the air with the liquid, means throwing some of the liquid through the passage into the upper chamber, means protecting some of the air entering the upper chamber from the thrown liquid and means collecting the liquid precipitated from the air in the upper chamber over which the air passes.

2. An air conditioning device comprising a housing having an upper and a lower chamber through which air is drawn, means supplying the bottom of the lower chamber with a cooling liquid, the housing having a passage connecting the chambers at the inner ends thereof, means creating a suction in the chambers, means rotated by the air drawn through the lower chamber for spraying the air with the liquid, means dividing the air into streams, and means supplying one stream of air with additional moisture as it enters the upper chamber.

3. An air conditioning device comprising a housing having an upper and a lower chamber through which air is drawn, means supplying the bottom of the lower chamber with a cooling liquid, the housing having a passage connecting the chambers at the inner ends thereof, means creating a suction in the chambers, means rotated by the air drawn through the lower chamber for spraying the air with the liquid, a rotary means operated by the air passing through the upper chamber for mixing some of the air and cooling liquid in said chamber, and means diverting the remaining air away from the rotary means.

4. An air conditioning device comprising a housing having an upper and a lower chamber through which air is drawn, means supplying the bottom of the lower chamber with a cooling liquid, the housing having a passage connecting the chambers at the inner ends thereof, means creating a suction in the chambers, means rotated by the air drawn through the lower chamber for spraying the air with the liquid, means throwing some of the liquid through the passage into the upper chamber, means diverting some of the air around the liquid thrown into the upper chamber as said air enters said chamber and means collecting the liquid precipitated from the air in the upper chamber over which the air passes,

and means for removing the greater portion of the moisture before the air leaves the upper chamber.

5. An air conditioning device comprising a housing having an upper and a lower chamber through which air is drawn, means supplying the bottom of the lower chamber with a cooling liquid, the housing having a passage connecting the chambers at the inner ends thereof, means creating a suction in the chambers, means rotated by the air drawn through the lower chamber for spraying the air with the liquid, a rotary means operated by the air passing through the upper chamber for mixing some of the air and cooling liquid in said chamber, means diverting the remaining portion of the air around the rotary means and a screen in the upper chamber for removing the greater portion of the moisture from the air.

6. An air conditioning device comprising a housing having an upper and a lower chamber through which air is drawn, means supplying the bottom of the lower chamber with a cooling liquid, the housing having a passage connecting the chambers at the inner ends thereof, means creating a suction in the chambers, means rotated by the air drawn through the lower chamber for spraying the air with the liquid, a plurality of air operated fans below the passage and provided with fingers dipping into the liquid and throwing the liquid through the passage into the upper chamber, and means collecting the liquid precipitated from the air in the upper chamber over which the air passes.

7. An air conditioning device comprising a housing having an upper and a lower chamber through which air is drawn, means supplying the bottom of the lower chamber with a cooling liquid, the housing having a passage connecting the chambers at the inner ends thereof, means creating a suction in the chambers, means rotated by the air drawn through the lower chamber for spraying the air with the liquid, a plurality of air operated fans below the passage and provided with fingers dipping into the liquid and throwing the liquid through the passage into the upper chamber, and means collecting liquid precipitated from the air in the upper chamber over which the air passes, the housing having a second passage through which air travels from the lower to the upper chamber and at a point beyond the fans so that this air is not charged with moisture from the fans.

8. An air conditioning device comprising a housing having an upper and a lower chamber through which air is drawn, means supplying the bottom of the lower chamber with a cooling liquid, the housing having a passage connecting the chambers at the inner ends thereof, means creating a suction in the chambers, means rotated by the air drawn through the lower chamber for spraying the air with the liquid, a plurality of air operated fans below the passage and with fingers dipping into the liquid and throwing the liquid through the passage into the upper chamber, and means collecting the liquid precipitated from the air in the upper chamber over which the air passes, a plurality of spaced baffles in the lower housing between the rotated means and the fans, films of the liquid being maintained on the baffles by the rotated means.

9. An air conditioning device comprising a housing having an upper and a lower chamber through which air is drawn, means supplying the bottom of the lower chamber with a cooling

liquid, the housing having a passage connecting the chambers at the inner ends thereof, means creating a suction in the chambers, means rotated by the air drawn through the lower chamber for spraying the air with the liquid, means 5 throwing some of the liquid through the passage into the upper chamber, the upper chamber having a bottom inclined downwardly towards the passage, a flange connected to the bottom adjacent the passage for collecting moisture discharged from the air in the upper chamber. 10

10. An air conditioning device comprising a housing having an upper and a lower chamber 15 through which air is drawn, means supplying the bottom of the lower chamber with a cooling liquid, the housing having a passage connecting the chambers at the inner ends thereof, means creating a suction in the chambers, means rotated 20 by the air drawn through the lower chamber for spraying the air with the liquid, a plurality of air operated fans below the passage and provided with fingers dipping into the liquid and throwing the liquid through the passage into 25 the upper chamber, and means collecting liquid precipitated from the air in the upper chamber over which the air passes, the housing having a second passage through which air travels from the lower to the upper chamber and at a point 30 beyond the fans so that this air is not charged with moisture from the fans, a rotary member in the upper chamber having blades contacting the

air passing through said chamber for revolving said members whereby the air entering the chamber is thoroughly mixed with the liquids thrown through the passage.

11. An air conditioning device comprising a 5 housing having an upper and a lower chamber through which air is drawn, means supplying the bottom of the lower chamber with a cooling liquid, the housing having a passage connecting the 10 chambers at the inner ends thereof, means creating a suction in the chambers, means rotated by the air drawn through the lower chamber for spraying the air with the liquid, a plurality of air 15 operated fans below the passage and provided with fingers dipping into the liquid and throwing the liquid through the passage into the upper chamber, and means collecting liquid precipitated 20 from the air in the upper chamber over which the air passes, the housing having a second passage through which air travels from the lower 25 to the upper chamber and at a point beyond the fans so that this air is not charged with moisture from the fans, a rotary member in the upper chamber having blades contacting the air passing 30 through said chamber for revolving said members whereby the air entering the chamber is thoroughly mixed with the liquids thrown through the passage, and means for removing the moisture from the air in the second chamber before said air leaves the chamber.

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