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AIR CONDITIONER

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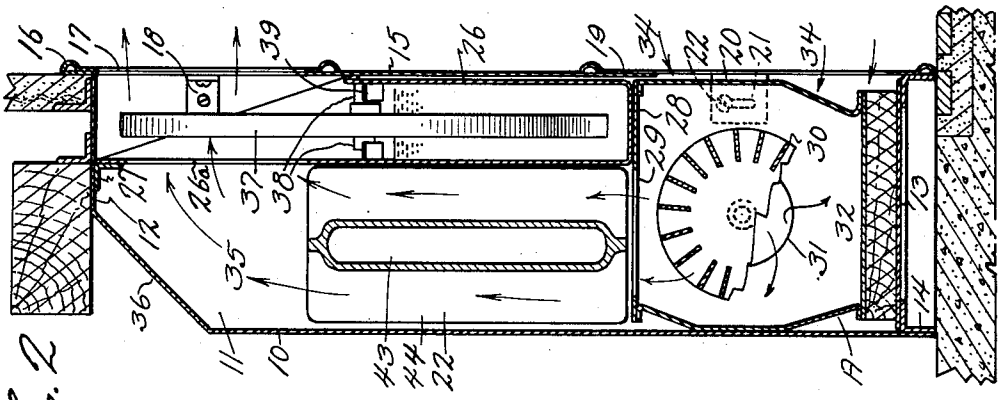

Fig. 2

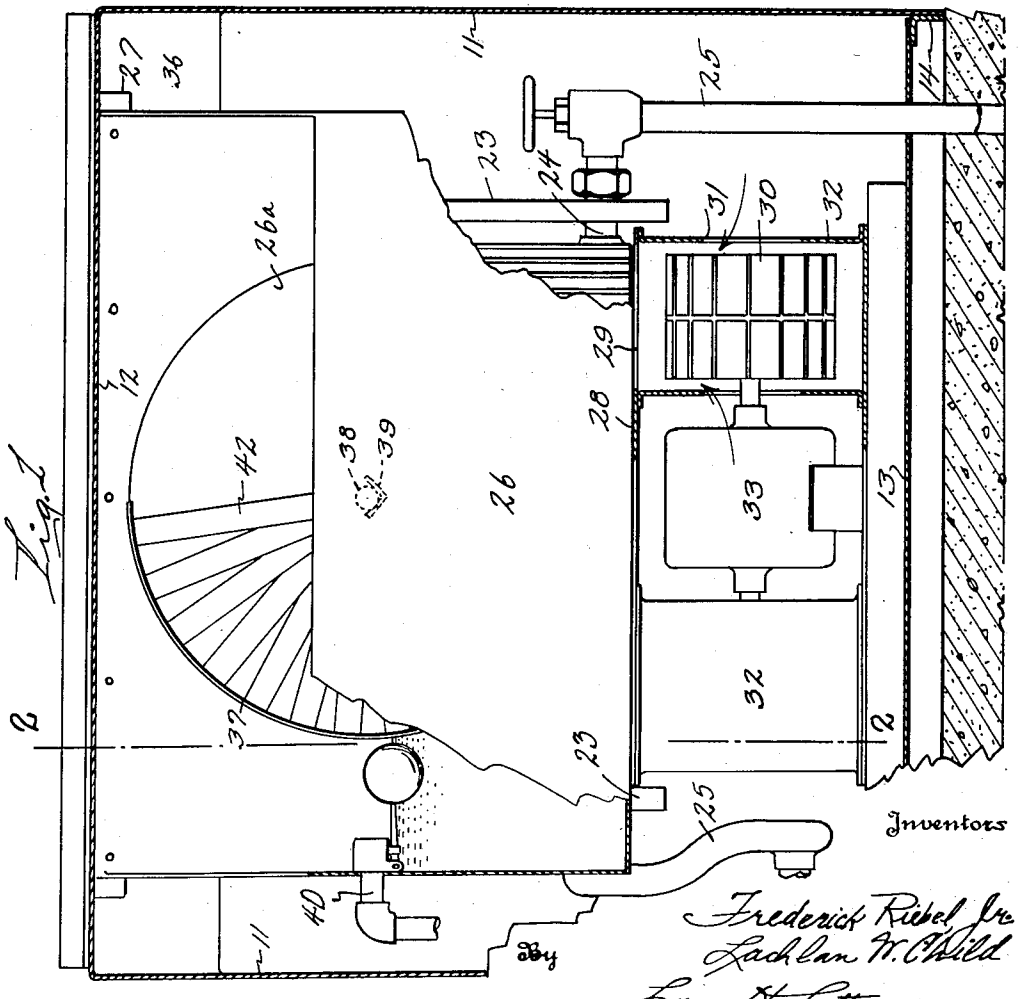

Fig. 1

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AIR CONDITIONER

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17 Claims. (Cl. 257—138)

Our invention relates to air conditioners and has for its object to provide a conditioner for dwelling houses, offices, etc., which may be built into a wall of a room to be conditioned.

An object of our invention is to provide, in combination, a heating element, a water reservoir, a humidifying device operating in conjunction with said water reservoir to carry moisture into the path of air passing through the conditioner, and a means for creating a forced circulation of air therethrough to first absorb heat from the heating element and thence to absorb moisture from the humidifying device, all arranged in a compact casing which may be contained within a cavity in an ordinary wall without projecting substantially beyond the surface of the wall.

Another object of our invention is to provide a conditioner of this type in combination with means for maintaining a constant water supply for the humidifying device.

A further object of the invention is to provide a conditioner of this type with means for adapting it to the wall cavity so as to conceal the edges thereof.

Another object is to provide a conditioner of this type in which the heating element is so arranged that it will not only heat the column of air moving through the device prior to contact with the humidifying mechanism, but will also pre-heat the water in the reservoir so as to facilitate humidifying in the moving column of air.

With these and other objects in view our invention consists in the combination and construction and arrangement of the various parts thereof, whereby the objects contemplated are attained, as more fully set forth in the accompanying specifications, pointed out in our claims, and illustrated in the accompanying drawing, in which:

Fig. 1 is a front elevation of a conditioner embodying our invention, parts being broken away to better illustrate the construction, and

Fig. 2 is a vertical sectional view on the line 2—2 of Fig. 1.

The casing of the conditioner has the rear wall 10, the end walls 11, the top wall 12, the bottom wall 13, and the base frame 14, and is open in front.

The upper two-thirds of the front opening is covered by a front panel 15 embodying in its upper region a grille 16 having the air passage openings 17.

The panel 15 is secured by means of brackets 18 to the end walls 11.

The opening between the lower edge of the panel 15 and the bottom wall 13 of the cabinet is covered by a lower grille 19 secured by means of brackets 20 to the end walls 11. Slots 21, through which the securing elements 22 extend, allow vertical movement of the brackets 20 relative to the end walls 11.

The heating element 22, preferably of the steam radiator type, occupies the space intermediate the top and bottom of the casing and in the rear region thereof. Brackets 23 secured to the rear wall 10, support the heating element 22 through the medium of the nipples 24 which connect the radiator to the steam conduction pipe 25.

The space between the heating elements 22 and the front panel 15 of the casing is occupied by the water tank 26 which is hung upon a bracket 27 secured to the top wall 12 of the casing and secured to brackets 23.

The space below the heating element 22 and tank 26 is occupied by the blower unit "A" which has a top wall 28 apertured at 29 in registry with the heating element 22 so as to concentrate the delivered air on said heating element. The blower has conventional centrifugal fans 30, which take air in through the openings 31 in the partition walls 32 of the blower casing, and are driven by a motor 33.

Air passes into the conditioner through the lower grille 19 as indicated by the arrows 34, is discharged upwardly through the space between the tank 26 and rear wall 10, contacting with the heating element 22 and receiving heat therefrom, and is thence directed forwardly as indicated by the arrows 35, by the inclined wall portion 36, through the semi-circular opening 26a in the tank 26, and thence discharged through the upper grille openings 17.

A humidifying device, comprising a rotatably mounted wheel shaped carrier 37, is positioned to intercept a major portion of the air as it passes out of the conditioner, and carries water from the reservoir 26 into the path of the air stream. The carrier is journalled in bearings 38 which in turn rest in crotch shaped brackets 39 so that the carrier may be lifted out of the tank if desired. This may be accomplished by removing the front panel 15.

Water is supplied to the reservoir 26 by a water supply pipe 40, and its level is controlled by a float valve 41.

It is to be noted that the carrier is very narrow in depth, and that the reservoir 26 is correspondingly quite narrow from front to rear, leaving ample space for the heating element 22 between it and the rear wall of the casing. The heating ele-

ment and reservoir together occupy all of the space from front to rear of the casing, and are spaced from the bottom to provide just enough room for the blower "A", which occupies substantially all of the space below the two.

The heating element is spaced from the top of the casing to provide ample space for the air current to swing forwardly out through the grille 16, and the carrier extends substantially to the top of the casing so as to intecept a major portion of the forwardly directed air stream.

The heating element transmits heat through the rear wall of the reservoir 26 so as to pre-heat the water in the reservoir. Being in side by side relation with the reservoir, a maximum pre-heating effect is thus obtained.

The carrier will be heated by contact with the water, and as its blades carry films of water into the path of the air current, they will retain these films of water at the temperature of the water within the reservoir.

Thus when the heated current of air coming from the heating element strikes the pre-heated films of water, a maximum vaporizing effect will be secured.

The carrier 37 is rotated by action of the air stream against the inclined blades 42, and the body of water within the reservoir will exert a braking action against the carrier so that a quite slow rotation will be produced. The blower being remote from the carrier, the air stream will have diffused into a substantially uniform column of air by the time it reaches the carrier, no part of which will have sufficient velocity to blow any particles of water from the blades of the carrier. As a consequence, the conditioner is not subject to the objections found in some conditioners, namely, that droplets of water will be sprayed from the conditioner. Humidifying effect is secured by diffusion of the air stream against a multiplicity of carrier blades, and pre-heating of both water and air stream.

By employing the particular type of carrier illustrated, in combination with the narrow reservoir and heating element positioned with its narrowest dimension extending forwardly and rearwardly, the depth of the casing may be made sufficiently small so that the conditioner may be installed in a wall of ordinary thickness. Yet the arrangement is such as to secure maximum compactness, practically all of the space within the casing being utilized.

The radiator 22 comprises a steam conduit 43 positioned extending longitudinally of the casing and radiating fins 44 extending vertically and at right angles to the axis of the conduit.

The reservoir 26 forms together with the rear wall 10 of the casing, a restricted passage to concentrate the air stream from the blower into contact with the fins of the heating element so as to secure a maximum heating effect.

The blower, being of the type embodying two opposed centrifugal fans mounted on the same shaft in alignment with each other, has minimum depth from front to rear in proportion to its capacity, being consequently well suited to the restricted space provided for it.

We claim as our invention:

1. An air conditioner for installation in a wall comprising a casing provided with upper and lower discharge and intake openings in its front wall, a relatively narrow reservoir extending longitudinally of the casing, and occupying the space adjacent the front wall thereof and intermediate the top and bottom thereof, a heating element occupying the space between said reservoir and the rear wall of the casing, and spaced from the top and bottom thereof, a blower occupying the space below the heating element and reservoir and having a discharge mouth positioned directly beneath the heating element, and a relatively thin, wheel shaped carrier mounted within the reservoir for movement in a vertical plane extending longitudinally of the conditioner, said carrier having a portion projecting above the reservoir and above the heating element into the path of air traveling from the heating element to said discharge opening.

2. An air conditioner for installation in a wall comprising a casing of sufficiently shallow depth to be received in a cavity in said wall, and provided with lower and upper intake and discharge openings in its front wall, a grille covering said discharge opening, a water reservoir occupying the space intermediate the top and bottom of the casing just below said discharge opening and adjacent the front wall of the casing, a heating element occupying the space between said reservoir and the rear wall of the casing, and spaced from top and bottom of the casing, a blower occupying the space below said heating element and reservoir and provided with a discharge mouth directly below the heating element, and a relatively thin wheel shaped carrier rotatably mounted in the reservoir in a plane extending longitudinally of the casing, the upper region of said carrier being positioned just behind said discharge opening.

3. An air conditioner comprising a casing provided in its front wall with upper and lower discharge and intake openings respectively, a reservoir occupying the space intermediate the top and bottom of the casing and just behind the front wall thereof, a heating element occupying the space between said reservoir and the rear wall of the casing and spaced from the top and bottom thereof, a blower occupying the space below said heating element and reservoir and provided with a discharge mouth directly below the heating element, and a carrier projecting into said reservoir and across the space just behind said discharge opening, to intercept air passing from the heating element to the discharge opening.

4. An air conditioner comprising a casing provided in its front wall with upper and lower discharge and intake openings respectively, a reservoir occupying the space intermediate the top and bottom of the casing and just behind the front wall thereof, a heating element occupying the space between said reservoir and the rear wall of the casing and spaced from the top and bottom thereof, a blower occupying the space below said heating element and reservoir and provided with a discharge mouth directly below the heating element, and a carrier projecting into said reservoir and across the space just behind said discharge opening, to intercept air passing through the heating element to the discharge opening, said heating element being in close association with the rear wall of the reservoir so as to pre-heat the water therein.

5. In an air conditioner, a casing provided in its front wall with upper and lower discharge and intake openings respectively, a water reservoir in the casing, spaced from top and bottom thereof and extending longitudinally, a heating element between said reservoir and the rear wall of the casing, and positioned in close association with the rear wall of the reservoir so as to pre-heat the water therein, a blower positioned in the space within the casing below said heating element

and reservoir and provided with a discharge mouth adapted to direct air upwardly through said heating element, and a carrier extending into said reservoir and into the path of the air stream from the heating element to said discharge opening.

6. In an air conditioner, a casing, provided with intake and discharge openings, a water reservoir therein, a heating element positioned in close association with one wall of said reservoir so as to pre-heat the water therein, a blower in the casing arranged to create a current of air through said heating element from the intake to the discharge opening of the casing, and a carrier extending into said reservoir and into the path of the air stream between said heating element and the discharge opening, said carrier being operative to transfer water from said reservoir to the heated portion of said air stream.

7. An air conditioner for installation in a wall of a room comprising an elongated casing, provided with intake and discharge openings, a steam radiator element comprising an elongated steam conduit positioned longitudinally in the casing and radiating fins extending vertically, a water reservoir positioned side by side with said radiator, the two filling the space from front to rear of the casing, a blower positioned in the space below said radiator and reservoir and arranged to create a current of air passing through said radiator, and a carrier extending into said reservoir and also into the path of heated air currents coming from the radiator.

8. An air conditioner for installation in a wall of a room comprising an elongated casing, provided with intake and discharge openings, a steam radiator element comprising an elongated steam conduit and radiating fins extending in the direction of air flow from intake to discharge opening, a water reservoir positioned side by side with said radiator, the two filling the space from front to rear of the casing, a blower arranged to create a current of air passing through said radiator, and a carrier extending into said reservoir and also into the path of heated air currents coming from the radiator.

9. An air conditioner for installation in a wall comprising a casing, a water reservoir therein, a heating element therein, a rotatable carrier extending into said water reservoir and also across the path of air discharged from said heating element, a blower positioned remote from the carrier, a water supply pipe communicating with the reservoir, and a float valve for controlling the discharge of water from said pipe.

10. An air conditioner comprising a casing, a water reservoir therein, a heat transfer element therein, comprising a horizontally extending fluid conduit and thin closely spaced radiating vanes positioned in vertical planes, means for distributing water from said reservoir to the air stream passing through the conditioner, a blower for creating a forced circulation of air through the conditioner and through said heat transfer element, a water supply pipe communicating with the reservoir and a float valve controlling the emission of water from said pipe.

11. An air conditioner comprising a casing, a water reservoir therein, means for distributing water from said reservoir to the air stream passing through the conditioner, an upwardly discharging blower unit in the lower region of the casing, comprising a motor and opposed blowers on opposite ends of the shaft of said motor, the axis of said shaft disposed horizontally and longitudinally of the casing, an elongated heating element positioned above said blower, means to confine the air stream delivered from said blower so that substantially all of it may be caused to pass through said heating element, a water supply pipe communicating with the reservoir, and a float valve for controlling the discharge of water from said pipe.

12. An air conditioner comprising a casing, a water reservoir therein, an upwardly discharging blower unit in the lower region of the casing, an elongated heating element positioned above said blower, means to confine the air stream delivered from said blower so that substantially all of it may be caused to pass through said heating element, means for distributing water from said reservoir to the air stream delivered from said heating element, a water supply pipe communicating with the reservoir, and a float valve for controlling the discharge of water from said pipe.

13. An air conditioner comprising a casing, a water reservoir therein, a heating element therein, a rotatable carrier extending into said water reservoir and also across the path of air discharged from said heating element, a blower positioned remote from the carrier, a water supply pipe communicating with the reservoir, and a float valve for controlling the discharge of water from said pipe.

14. In a humidifier, a casing, a blower therein for producing an air stream therethrough, a carrier comprising a fan with not less than thirty solid metal, pitched blades rotatably mounted therein so that a portion only of said carrier projects into the air stream, means to supply liquid to an opposite region of the carrier, said carrier being remote from the blower whereby the air stream will diffuse into a substantially uniform air column which will not remove droplets of the liquid from the carrier.

15. In a humidifier, a casing, a blower therein for producing an air stream therethrough, a wheel shaped fan bladed carrier journalled therein, means shrouding said carrier so as to direct substantially all of said air stream through a portion only of the carrier and means to supply liquid to the unexposed region of the carrier, an extended air duct being formed in the casing between the exposed portion of the carrier and the blower, to allow the air stream before reaching the carrier to diffuse into a substantially uniform air column that will not remove droplets of the liquid from the carrier and that will rotate the carrier slowly.

16. In a humidifier, a casing, a blower therein for producing an air stream therethrough, a wheel shaped fan bladed carrier journalled therein, means shrouding said carrier so as to direct all of said air stream through a portion only thereof, said means including a partition wall disposed in a plane parallel to and adjacent the carrier, provided with an aperture substantially registering with the periphery of the exposed portion of the carrier, an extended air duct being formed in the casing between the blower and said exposed portion, in which the air stream may diffuse into a substantially uniform air column before reaching the carrier.

17. In a humidifier, a casing, a blower therein for producing an air stream therethrough, a wheel shaped carrier comprising a hub and a large number of narrow solid metal pitched blades projected radially therefrom, said blades when viewed at right angles to the plane of the

carrier, showing spaces between their outer regions, and a tank into which the lower region of the carrier dips, the upper region only of the carrier being interposed in the path of said air stream, an extended air duct being formed in the casing between the exposed portion of the carrier and the blower, to allow the air stream before reaching the carrier to diffuse into a substantially uniform air column that will rotate the carrier slowly and will not remove droplets of water therefrom.

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