Nov. 28, 1933. F. D. PITT 1,936,914

AIR CIRCULATING SYSTEM

Filed Sept. 13, 1930

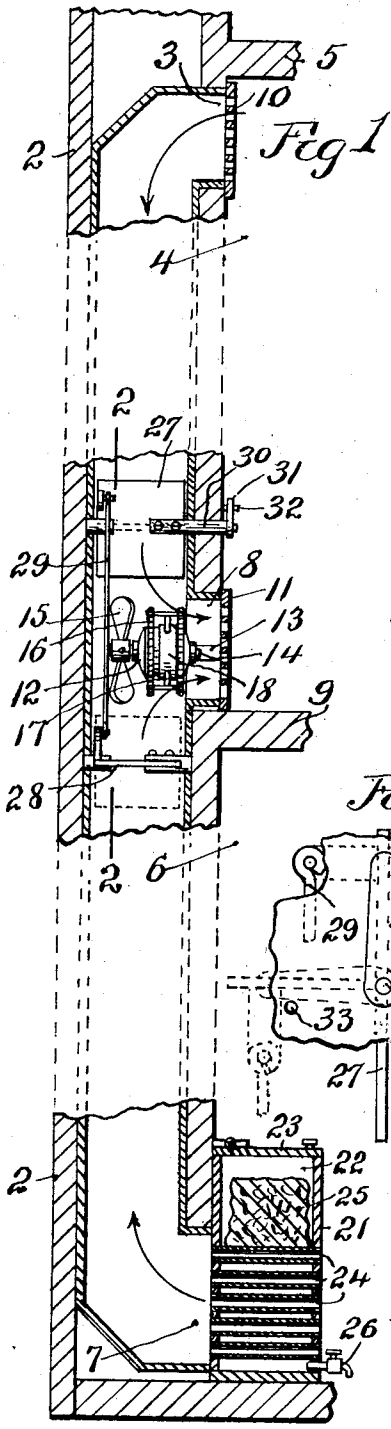


Fig 1

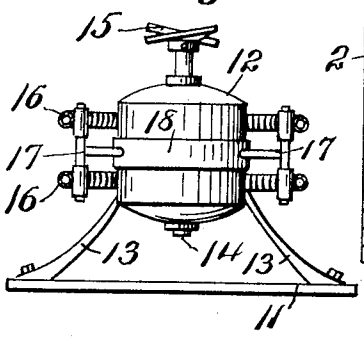


Fig 3

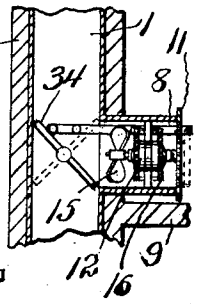


Fig 8

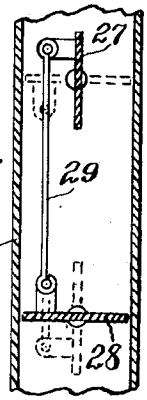


Fig 2

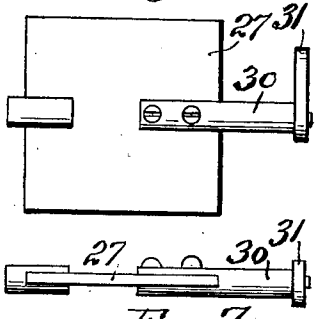


Fig 6

Fig 7

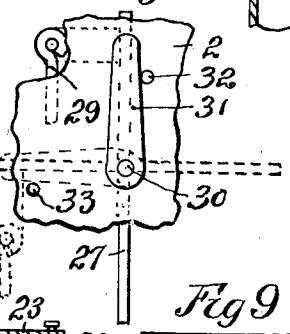


Fig 5

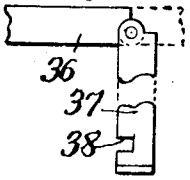


Fig 9

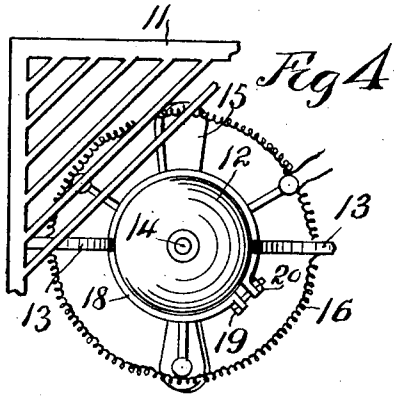


Fig 4

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AIR CIRCULATING SYSTEM

Frederick D. Pitt, Kansas City, Mo.

Application September 13, 1930
Serial No. 481,663

9 Claims. (Cl. 257—8)

My invention relates to improvements in air circulating systems. It relates particularly to a novel air circulating system adapted for the individual heating of a room in cold weather and for cooling the room in warm weather, while effecting a thorough circulation of air through the room, and an even heating or cooling of the different parts of the room.

One of the objects of my invention is to provide a novel air circulating system, which is simple, cheap, easily installed, and not likely to get out of order, which is accessible for cleaning or repairs, and which is economical to operate and is efficient in operation.

My invention provides further novel means by which the air circulated through the room may be heated or cooled, as desired.

The novel features of my invention are hereinafter fully described and claimed.

In the accompanying drawing, which illustrates my invention,

Fig. 1 is a side view, partly in elevation and partly in vertical section, and partly broken away, of the apparatus employed in my improved air circulating system.

Fig. 2 is a section on the line 2—2 of Fig. 1.

Fig. 3 is a top view, partly broken away, of the fan motor shown mounted on the lower grille and the heating element.

Fig. 4 is an enlarged front elevation of the fan motor, heating element, and the lower grille partly broken away.

Fig. 5 is an enlarged front elevation of part of the valve mechanism, shown in Figs. 1 and 2.

Fig. 6 is a side view of the upper valve, shown in Fig. 1.

Fig. 7 is an edge view of the same.

Fig. 8 is a view, partly in side elevation and partly in vertical section of a modification of the valve mechanism.

Fig. 9 is an enlarged side elevation of a portion of the valve operating mechanism shown in Fig. 8.

Similar characters of reference designate similar parts in the different views.

1 designates an air conduit located in a wall 2 and having an upper air inlet 3 communicating with a room 4 adjacent to the ceiling 5 thereof.

The conduit 1 has lower than the inlet 3, and outside the room 4, and preferably communicating with a lower room 6 adjacent to the floor thereof, an inlet 7.

The conduit 1 has an air outlet 8 between the inlets 3 and 7, which discharges into the room 4 adjacent to the floor 9 thereof.

A grille 10 may be provided over the air inlet 3, and a lower grille 11 may be provided over the outlet 8.

For forcing air from the conduit 1 through the outlet 8 into the room 4, any well known suitable means may be employed. In Fig. 1, I have shown an electric motor 12 located in the conduit 1, the motor having two arms 13 which are attached to the inner side of the grille 11, for supporting the motor.

The motor 12 is provided with the usual wire connections, not shown, for providing it with current. To the rear end of its armature shaft 14 is attached a flowing element comprising a fan 15, the blades of which are disposed so as to force air from the conduit 1 through the outlet 8 into the room 4, when the motor is operated.

For heating the air so forced into the room 4, any suitable means may be employed. In the drawing such heating means comprises an electric heating element consisting of two rings 16 of helically arranged resistance wires which encircle and are spaced from the body of the motor 12, and which are supported by radial arms 17 extending from a transversely divided ring 18 mounted on the motor body, the ends of the ring 18 being engaged by a clamping bolt 19 provided with a nut 20, Fig. 4.

By locating the heating element 16 forward of the fan 15, the body of the motor 12 is kept cool.

When it is not desired to heat the room 4, the heating element 16 is not supplied with current.

For cooling the air discharged from the conduit 1 through the outlet 8 into the room 4, any suitable means may be provided. In the drawing, there is shown resting on the floor of the lower room 6 a refrigerating radiator comprising a casing 21 provided with a chamber 22 having a top opening normally closed by a hinged door 23.

Extending horizontally through the chamber 22 in the lower portion thereof is provided air conducting means comprising tubes 24 one set of ends of which communicate with the room 6 and the other set of ends of which discharge into the air inlet 7. A block of ice 25 may be inserted through the top opening of the casing into the chamber 22 and supported upon the upper air conducting tubes 24, as shown in Fig. 1.

The casing 21 may be provided adjacent to its bottom with a draw off faucet 26, by which water resulting from the melting of the ice 25 may be withdrawn, as desired.

For closing communication through the conduit with either the inlet 3 or the inlet 7 and the

outlet 8, while leaving the other inlet in communication with the outlet 8, any suitable means may be employed. In Figs. 1, 2 and 5 there is shown a valve mechanism comprising an upper valve 27 and a lower valve 28 oscillatively mounted in the conduit 1 respectively above and below the air outlet 8. The valves 27 and 28 are disposed at right angles to each other, and are connected with each other by a rod 29. The upper valve 27 has an axial shaft 30 which extends into the room 4 and therein provided with a crank 31.

A pin 32 in the wall 2 limits the movement of the crank 31 in the clockwise direction, and a pin 33 in the wall limits the movement of the crank 31 in the opposite direction.

When the crank 31 is turned to the vertical position, shown in solid lines in Figs. 1 and 5, the valve 27 will be disposed vertically and the valve 28 horizontally. When the crank 31 is turned counter clockwise to the position shown in dotted lines in Fig. 5, the valve 27 will be disposed horizontally and the valve 28 vertically.

When it is desired to heat the room 4, the crank 31 is turned to the vertical position, thus disposing the valve 27 vertically, so as to provide a clear passage of air from the upper part of the room 4 through the upper grille 10, air inlet 3 and conduit 1 to and through the outlet 8. The motor 12 being operated, and the heating element 16 being supplied with electricity, the air discharged into the room 4 by the fan 15 will be heated, and heating the colder air in the lower part of the room 4, will pass upwardly and again enter the conduit through the inlet 3, thus effecting a good circulation of heated air through the room.

In warm weather, when it is not desired to heat the room 4, the heating element 16 is disconnected from its current supply, and the crank 31 is turned to the horizontal position, thus turning the lower valve 28 from the closed horizontal position, to the vertical open position, shown in dotted lines in Fig. 1, the rod 29 causing the upper valve 27 to assume the horizontal closed position, shown in dotted lines in Figs. 1 and 5.

The motor 12 being operated, the fan 15 will cause air to pass through the ice cooled tubes 24 from the room 6 into the conduit 1 through the inlet 7. The air, thus cooled, will be discharged by the fan 15 through the outlet 8 into the room 4.

In the modified valve machanism, shown in Figs. 8 and 9, there is provided in the conduit 1 a single valve 34, which is oscillatably mounted in the conduit 1 directly in the rear of the outlet 8. In the outlet 8 is mounted the electric motor 12, which is supported by arms 13 attached to the grille 11, as in the form shown in Fig. 1. The motor has similarly mounted on it the heating element 16, the operation of the motor, its fan 15 and the heating element being as has been already described.

When the valve 34 is in the position shown in solid lines in Fig. 8, the air will pass downwardly through the conduit 1 and out of the outlet 8 into the room 4, and it will be heated by the element 16, when the latter is charged.

When the valve 34 is turned to the position shown in dotted lines in Fig. 8, the upper inlet 3 will be closed to communication with the outlet 8, while the lower inlet 7 will have communication with the outlet 8. The air will thus be forced upwardly from the inlet 7 by the fan 15, and, if cooled, in the manner described, the cooled air will be discharged through the outlet 8 into the room 4.

For shifting the valve 34 to the two positions shown in solid and dotted lines in Fig. 8, the valve 34 has pivoted to it a link 35, which is pivoted to the inner end of a horizontal bar 36, which in turn is pivoted on a horizontal axis to the inner end of an operating bar 37, which extends through the grille 11. To dispose the valve 34 in the position shown in solid lines in Fig. 8, the operating bar 37 is forced rearwardly. To position the valve 34 in the position shown in dotted lines in Fig. 8, the bar 37 is pulled forwardly, and then swung downwardly, to the position shown in Fig. 9 and in dotted lines in Fig. 8. This disposition of the bar 37 prevents its projecting into the room horizontally.

The bar 37, as shown in Fig. 9, has a notch 38 in its lower edge adapted to receive the grille 11, when the valve 34 is swung to the position, shown in solid lines in Fig. 8. This will hold the valve 34 in such position. When the valve is swung to the dotted position in Fig. 8, and the bar 37 is swung to the depending position, this position of the bar 37 will hold the valve 34 in the adjusted position.

By providing the air conduit 1 at one side only of the room to be heated, the air traveling through the conduit travels a minimum distance from the ceiling to the floor, and thus loses by radiation or conduction in such travel in the conduit a minimum of heat, in addition to requiring but a minimum of parts and a maximum saving in the cost of installation.

Also by reason of such location of the air conduit in one wall only, the air which is cooled and discharged through the conduit into the room, is subjected to a minimum of heating by absorption or conduction in its travel through the conduit into the room.

I do not limit my invention to the structure shown and described, as many modifications, within the scope of the appended claims, may be made, without departing from the spirit of my invention.

What I claim is:—

1. In an air circulating system, an air conduit having an air inlet communicating with a room adjacent to the ceiling thereof, a second air inlet lower than the first and outside the room, and an air outlet between said inlets and discharging into the room adjacent to the floor thereof, means for forcing air from said conduit through said outlet into the room, a heater in said conduit for heating the air before it is so discharged, and means for closing communication through said conduit from either of said inlets to said outlet while leaving the other inlet in communication with said outlet.

2. In an air circulating system, an air conduit having an air inlet communicating with a room adjacent to the ceiling thereof, a second air inlet lower than the first and outside the room, and an air outlet between said inlets and discharging into the room adjacent to the floor thereof, means for forcing air from said conduit through said outlet into the room, means for cooling the air taken in through said lower inlet, and means for closing communication through said conduit from either of said inlets to said outlet while leaving the other inlet in communication with said outlet.

3. In an air circulating system, an air conduit having an air inlet communicating with a room adjacent to the ceiling thereof, a second air inlet

lower than the first and outside the room, and an air outlet between said inlets and discharging into the room adjacent to the floor thereof, means for forcing air from said conduit through said outlet into the room, means for heating the air so discharged, means for cooling the air taken in through one of said inlets, and means for closing communication through said conduit from either of said inlets to said outlet while leaving the other inlet in communication with said outlet.

4. In an air circulating system, an air conduit having an air inlet communicating with a room adjacent to the ceiling thereof, a second air inlet lower than the first and outside the room, and an air outlet between said inlets and discharging into the room adjacent to the floor thereof, means for forcing air from said conduit through said outlet into the room, means for cooling the air taken in through one of said inlets, and means for closing communication through said conduit from either of said inlets to said outlet while leaving the other inlet in communication with said outlet.

5. In an air circulating system, an air conduit having an air inlet communicating with a room adjacent to the ceiling thereof, a second air inlet lower than the first and outside the room, and an air outlet between said inlets and discharging into the room adjacent to the floor thereof, means for forcing air from said conduit through said outlet into the room, a refrigerating radiator having air conducting means discharging into said lower inlet, and means for closing communication through said conduit from either of said inlets to said outlet while leaving the other inlet in communication with said outlet.

6. In an air circulating system, an air conduit having an air inlet communicating with a room adjacent to the celing thereof, a second air inlet lower than the first and outside the room, and an air outlet between said inlets and discharging into the room adjacent to the floor thereof, means for forcing air from said conduit through said outlet into the room, means for heating the air so discharged, a refrigerating radiator having air conducting means discharging into said lower inlet, and means for closing communication through said conduit from either of said inlets to said outlet while leaving the other inlet in communication with said outlet.

7. In an air circulating system, an air conduit having an air inlet communicating with a room adjacent to the ceiling thereof, a second air inlet lower than the first and outside the room, and an air outlet between said inlets and discharging into the room adjacent to the floor thereof, means for forcing air from said conduit through said outlet into said room, means for heating the air so discharged, and means actuated from within said room for closing communication through said conduit from either of said inlets to said outlet while leaving the other inlet in communication with said outlet.

8. In an air circulating system, an air conduit having normally open ends communicating with a room respectively adjacent to the ceiling and the floor thereof, a motor in said conduit, a heating element and a blowing element supported by the motor, the blowing element being operable by the motor for forcing air against said heating element through said conduit, said motor, heating element and blowing element being united to form an integral structure insertable into and removable from said conduit as a unit through one of said open ends.

9. In an air circulating system, an air conduit having normally open ends communicating with a room respectively adjacent to the ceiling and floor thereof, a motor in said conduit, a heating element and a blowing element supported by said motor, the blowing element being operable by said motor for forcing air against said heating element through said conduit, and a grille across one of said open ends and supporting said motor.

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