

Feb. 20, 1940.

C. DEMUTH

2,190,937

AIR CONDITIONING REGISTER

Filed June 8, 1938

2 Sheets-Sheet 1

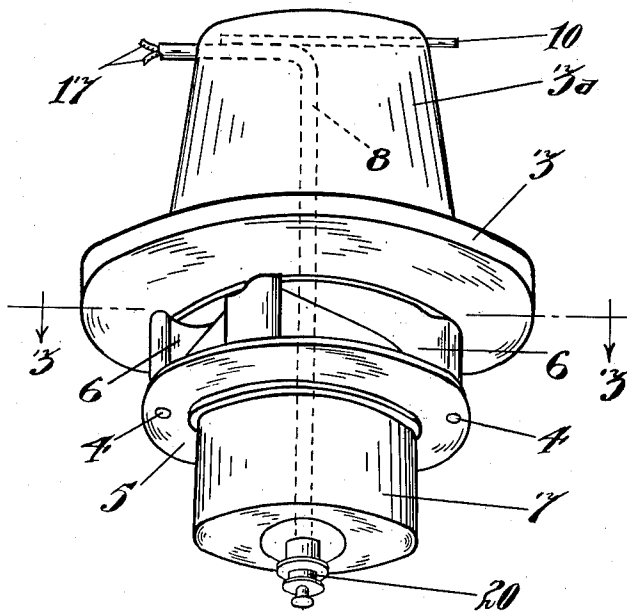


Fig. 1.

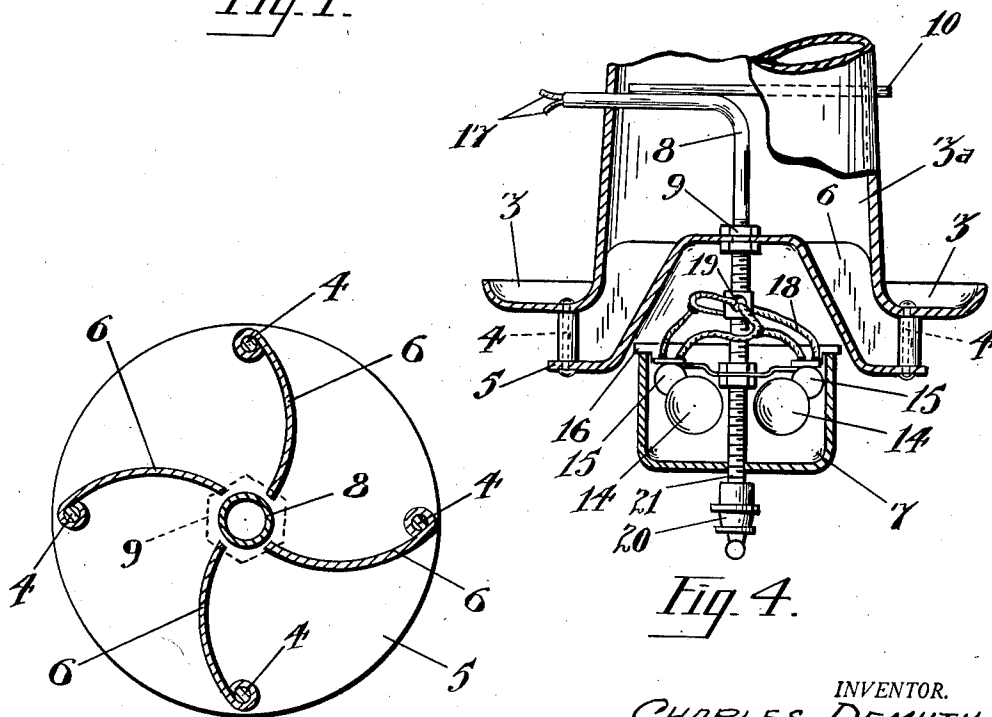


Fig. 4.

Fig. 3.

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Fig. 5.

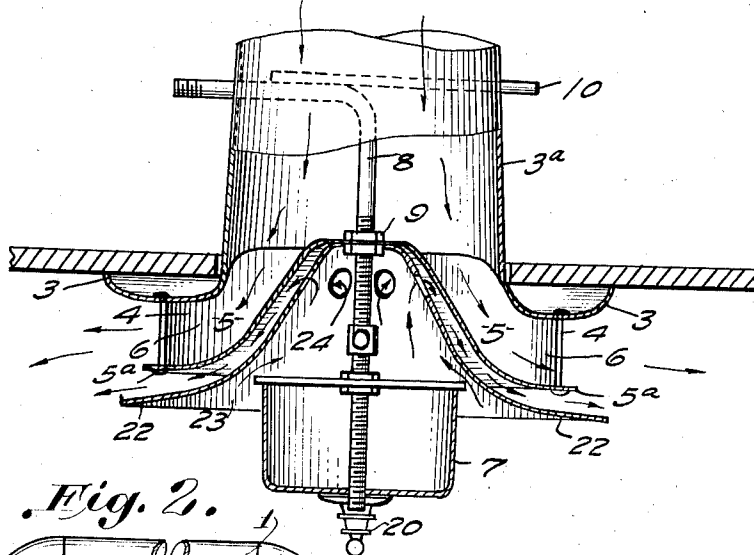
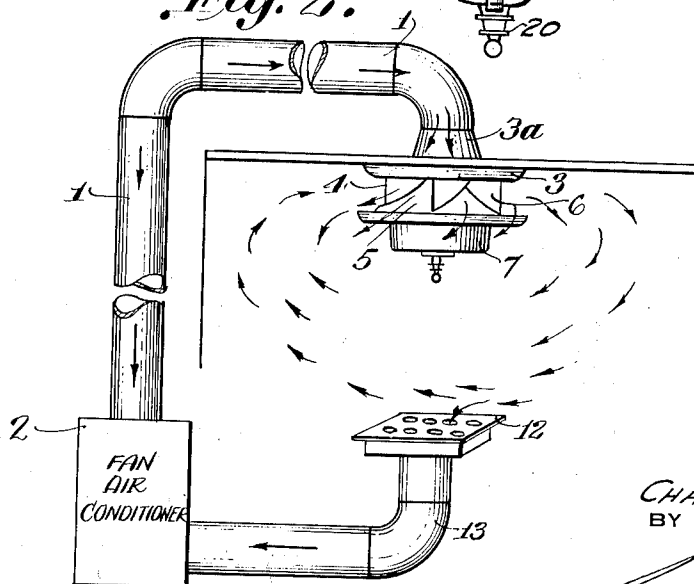


Fig. 2.



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AIR CONDITIONING REGISTER

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4 Claims. (Cl. 98-40)

This invention relates to a register or distributing head for air conditioning or heating, and is especially adapted for mounting in the ceiling of a room, and may be combined with the lighting equipment so as to be concealed and appear as an ornamental lighting fixture. It is preferred to make the device in two forms; one form in which the ventilating device is combined with a lighting fixture and preferably practically hidden from view by the lighting fixture. The ordinary register is not acceptable in many modern buildings, because of the fact that it is far more ornate, and takes up space desirable for other purposes. Furthermore, the ordinary register as used is certain to create a draft in the room. A second form is preferred because it is designed in such a way as to permit an acceleration of the circulating movement of the air. In this alternative form, the air which is immediately surrounding the electric fixture is carried by an injector principle into the main stream of ventilating air and mixed into the stream. It is especially desired to design the device in such a way as to eliminate dead spots in the room and to circulate the air which usually accumulates in corners adjacent the ceiling. In this form, the heat delivered by the electric fixture and the lamps mounted therein, is also circulated back into the general air in the room, and not allowed to accumulate around the fixture. In fact, the heat from the electric lamps aids in accelerating the distribution of the air throughout the room. Furthermore, the circulatory system keeps the lighting fixture cool, which causes the lamps themselves to last much longer than if permitted to run hot, with insufficient ventilation. Obviously, the register may be used either for the introduction of heated air or cool air.

In heating a room, the applicant contemplates the mounting of the register in the ceiling and the supply of heated air to the register, whereupon it flows through the register downward until it enters a suction vent which may be in the form of a perforated grill or grating in the baseboard or actually in the floor of the room. The cool air being heavier than the heated air, drops through the grill in the floor and is returned to the intake side of the fan, whereupon the heated air settles down to uniformly heat the room.

Likewise, in air conditioning a room, particularly in the summer time when it is desired to introduce cool air, the register is mounted in the ceiling and the cool air emitted therefrom falls by gravity downward toward the floor of the room.

Although the return register referred to which

is to be mounted in the floor of the room is desirable, it is not absolutely essential for the operation of the device, as there is usually sufficient leakage of air through the doors and windows of the room to permit of proper circulation, and especially for the escape of enough old air to permit the receiving of new air through the ventilator.

The applicant's device is particularly concerned with the annular shape of his register and its distributing qualities.

Air is usually supplied to the register with a slight pressure which would create a definite draft, and it is the purpose of the applicant's device to distribute this flow of air uniformly and without draft. Aside from the main port through which the air is blown, applicant provides a cone-shaped distributing head directly in the path of the air, which acts to turn the air outward in a direction substantially parallel to the ceiling. Furthermore, the applicant has provided a number of curved vanes in the path of the air during this deflection, which tend to give the air a whirling action which distributes the new air into the room.

Moreover, this whirling action prevents direct drafts which are usually set up with ventilators of this type. Practical tests have shown that the entire air within a room is caused to rotate by this device, which causes a quick and uniform distribution at all times without draft.

A further purpose of the vanes is to create a plurality of definite nozzles which send the air into the extreme corners of the room, preferably at a slight angle below the ceiling. These curved vanes in addition to giving the whirling circulating action, form definite currents of air which are directed principally toward the four corners of the room, adjacent the ceiling. As a rule, these corners are dead spots which accumulate warm and foul air which may stand there for considerable periods of time, unless some actual ventilation occurs to clear them away.

In order to more clearly disclose the invention, reference is made to the accompanying drawings, in which:

Figure 1 is a perspective view of the device.

Figure 2 is a diagrammatic view showing the arrangement of the device in a room in conjunction with a floor type outlet.

Figure 3 is a plan view with the distributing cone removed, showing the arrangement of the curved vanes for causing the rotary circulation.

Figure 4 is a vertical section taken on the center

One of the device, showing the method of supporting the flanges and the deflecting cone.

Figure 5 is a vertical section showing the alternative form of construction of the air conditioning register, in which a secondary circulatory system is established to circulate the air immediately around the lighting fixture.

Similar reference numerals refer to similar parts throughout the drawings.

In the drawings, 1 is a supply duct connected to a circulating fan 2. 3 is a flange fitting forming the base of the device. 4 are support studs mounted in the flange 3. 5 is a deflecting cone mounted on the studs 4. 6 is a curved vane for deflecting the air in a circulatory path. 7 is a lighting dome which may or may not be used with the device.

In order to facilitate the mounting of the register against a flat surface such as a ceiling, the duct work is usually installed in the house before the floor is laid, and the electrical conduit is provided. In the applicant's device, the flange hub 3a is projected through the ceiling, and an electrical conduit 8, which is preferably in the form of a solid pipe, extends downward through the hub 3a, the cone 5, and into the lamp 7. A rod is preferably welded to the electrical conduit 8 and projects horizontally through the hub 3a of the flange 3. This conduit 8, with the hub 3a, is mounted in the ceiling before the floor is laid. The conduit 8 extends downward through the flange 3 and the cone 5, whereupon it is held in position by a lock nut 9. With this type of construction it is obvious that with the conduit 8 and the hub 3a in position, it is only necessary to slip the flange 3 and cone 5 over the end of the conduit and apply the lock nut 9, whereupon the entire fixture is erected.

In Figure 2, the device is shown as it would be mounted in a room, and 12 is a grill mounted in the floor of the room. 13 is a return duct running from the grill back to the circulating fan.

Referring to Figure 4, the sectional view shows a possible arrangement for the electrical equipment for lighting the lamp. One or more electric bulbs 14 are mounted within the lamp dome 7, preferably screwed into sockets 15, which are mounted to the base flange 16 of the lamp. These sockets are wired to the feeder circuit 17 by a fixture wire 18 which connects in parallel and enters hole 19 in the electrical conduit 8. The conduit 8 has a rod 10 attached thereto to provide a support through the hub 3A. The lamp dome is held in position by an ornamental nut 20 which threads onto the end of a threaded nipple 21 forming a continuation of the conduit 8.

Referring to Figure 5, 22 is an auxiliary cone-shaped flange which is mounted adjacent to but spaced from the cone 5. This forms a duct 23. Openings 24 are cut in the upper part of flange 22, which permit air moving around the under side of the flange 22 to pass upward through the openings 24 and outward through the duct 23. When the main current from the blower system travels out through the openings formed by the flange 3 and cone 5 and around the vanes 6, the stream of air flowing over the edge 5A of the cone 5 sweeps past the flange 22 which projects outward beyond the edge 5A of the cone 5. This current of air tends to draw with it the air trapped in the opening 23. This acts on the injector principle, and in pulling the air through the duct 23, also draws additional air from around the lighting fixture and through the

ports 24. These lighting fixtures generally liberate considerable heat, as they are usually large glass domes containing a number of electric lamps. The heated air from the fixture obviously rises to enter the ports 24 in the flange 22, and is swept out with the flow of air from the main duct. This causes the heated air around the fixture to become thoroughly mixed with the air furnished by the blower system. This results in the cooling of the lighting fixture, which aids in lengthening the life of the lamps. This auxiliary injector feature also serves to draw air from the zone immediately under the lighting fixture. This zone would tend to present a dead spot, forming the immediate center of the circulatory action previously referred to. As a matter of fact, with the construction as shown in Figure 5, there is a definite upward motion of the air from this zone immediately under the lighting fixture. This arrangement assures an absolute and complete ventilation of the entire air within the room. Furthermore, this prevents the accumulation of heated foul air in the upper corners of the room. The electrical wiring and lamps have been omitted in this view for the sake of clarity.

In operation, the device being mounted as in Figure 2, and the circulating fan operating, the air is blown through the duct 1 into the flange 3, whereupon it impinges upon the deflecting cone 5 and the curved distributing vanes 6, and is thereby thrown outward into a circulatory path. The vanes 6 are made in such a way as to curve around the studs 4 and to lie closely between the flange 3 and the cone 5. The studs 4 are riveted at their ends to the flange 3 and the cone 5. This holds the vanes 6 in correct position. The air then settles gradually to the floor of the room, whereupon it is drawn off through the grill plate in the floor, and returned to the circulating fan.

When the register is used to distribute cool air in the summer time, the air is supplied through the duct at approximately two hundred to nine hundred cubic feet per minute, or more. The air rushing through the duct impinges upon the cone 5 and is deflected into a circulatory movement by the curved vanes 6. This cool air continues to circulate in a circulatory path as it moves around the room, and this circulatory movement acts as a vortex to lift the warm air which is nearer the floor in the room. This action causes a thorough mixing of the warm air with the cool air, and produces the desired ventilation. It is important to point out that the device is so designed as to project the air outward and away from the ceiling at an angle of approximately ten degrees.

In the winter, when it is desired to operate the device with warm air for heating, the same action takes place, but the warm air in its rotary motion tends to pick up the cool air from the floor, and by this vortex action bring it into a thorough mixture with the warm air being supplied.

In the construction shown in Figure 5, wherein the auxiliary circulation device is used, the operation is exactly the same as previously described, but an extra injector principle has been used instead to form a definite suction for the zone of air immediately under the electric fixture.

Having described the invention, what is claimed as new and is desired to be secured by Letters Patent is:

1. In a distributing register, a flange connection adapted to be attached to an air supply, a

deflecting cone mounted co-axially and spaced from the said flange to form therewith an emitting nozzle, stationary curved deflecting vanes placed within the said nozzle opening and adapted to deflect the air emitted from the nozzle in a circulatory path.

5 2. In a ventilating system for a building, a distributing register comprising a flange connection adapted to be attached to an air supply, a deflecting cone mounted co-axially and spaced
10 from the said flange to form therewith an emitting nozzle, stationary curved deflecting vanes placed within the said nozzle opening and adapted to deflect the air emitted from the nozzle in a circulatory path; means to mount said air
15 register in the ceiling of a compartment, means to supply the register with a flow of air, a return vent mounted in the proximity of the floor of the compartment, and a duct connecting the said return vent to the said supply.

3. In a combination distributing register and lighting fixture, a flange connection adapted to be attached to an air supply, a principal deflecting cone mounted co-axially and spaced from the said flange to form an emitting nozzle, a secondary deflecting cone mounted co-axially with

the principal deflecting cone and spaced therefrom, the edge of the said cone extending beyond the edge of the principal cone to form a tangential injector nozzle, openings in the said secondary cone to permit the suction of air from
5 the space immediately below the said cone into the secondary injector nozzle, and a lighting fixture mounted substantially under the secondary cone.

4. In a distributing register, a flange connection adapted to be attached to an air supply, a principal deflecting cone mounted coaxially and spaced from the said flange to form therewith an emitting nozzle, deflecting vanes placed with-
10 ing said nozzle opening and adapted to deflect the air emitted from the nozzle in a circulatory path, a secondary deflecting cone mounted co-
15 axially with the principal deflecting cone and spaced therefrom, the edge of the said second cone extending beyond the edge of the principal
20 cone to form a tangential injection nozzle, openings in said secondary cone to permit the suction of air from the space immediately below the said cone into the secondary injector nozzle.

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