Nov. 29, 1932. E. L. ANDERSON 1,889,588

UNIT HEATER AND VENTILATOR

Filed June 12, 1930 6 Sheets-Sheet 1

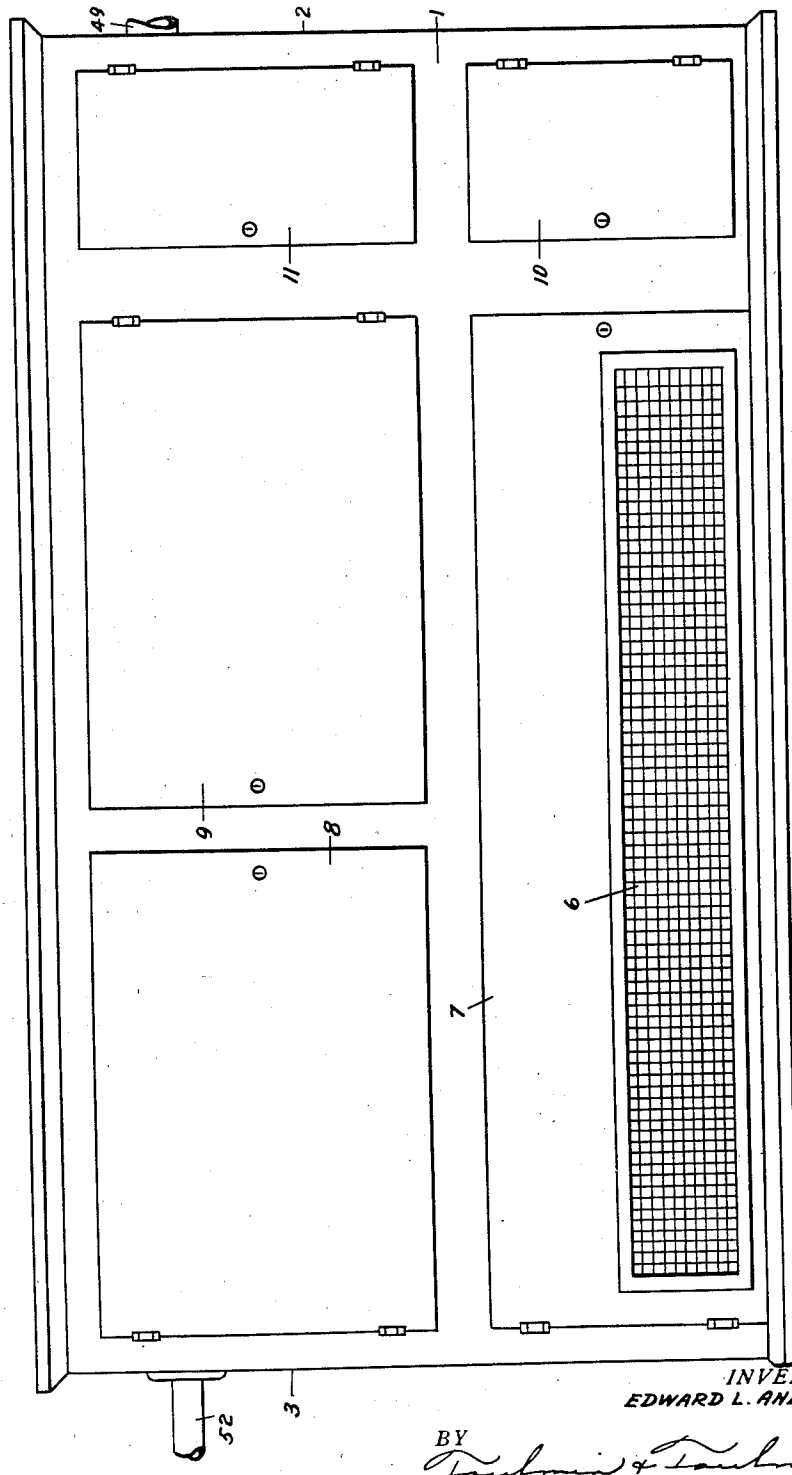


FIG. 1

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UNIT HEATER AND VENTILATOR

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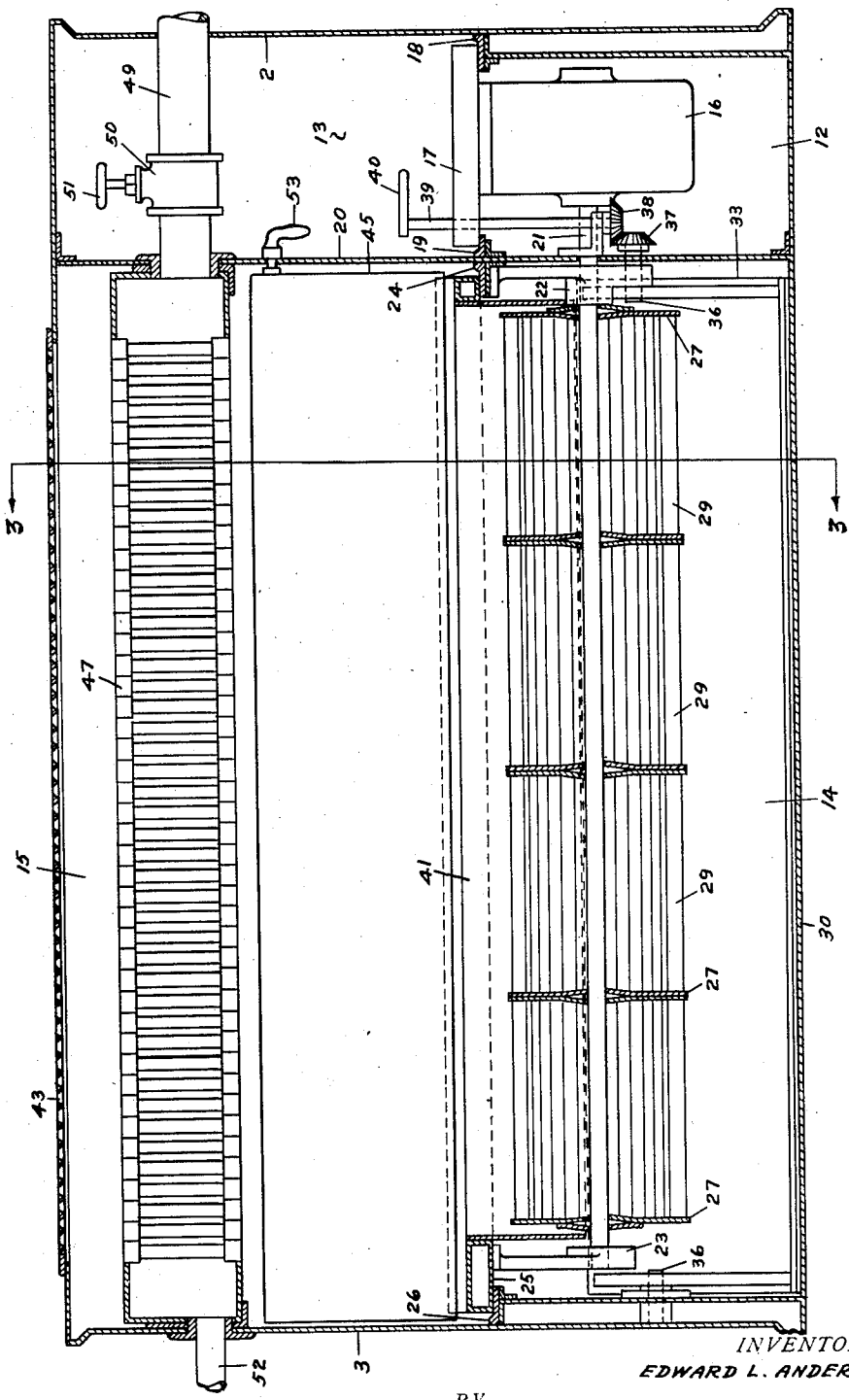


FIG. 2

INVENTOR
EDWARD L. ANDERSON.

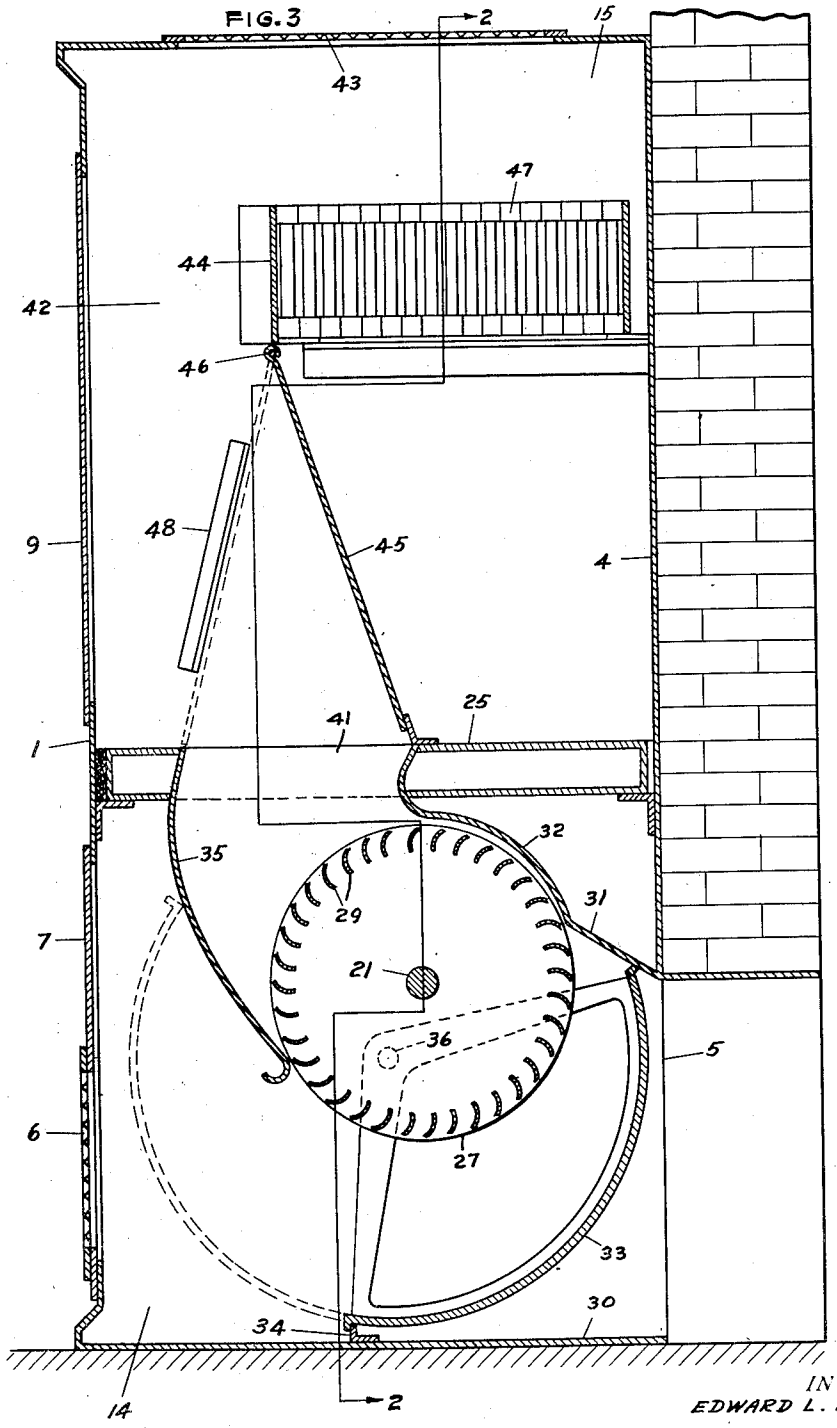
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UNIT HEATER AND VENTILATOR

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FIG. 3



INVENTOR
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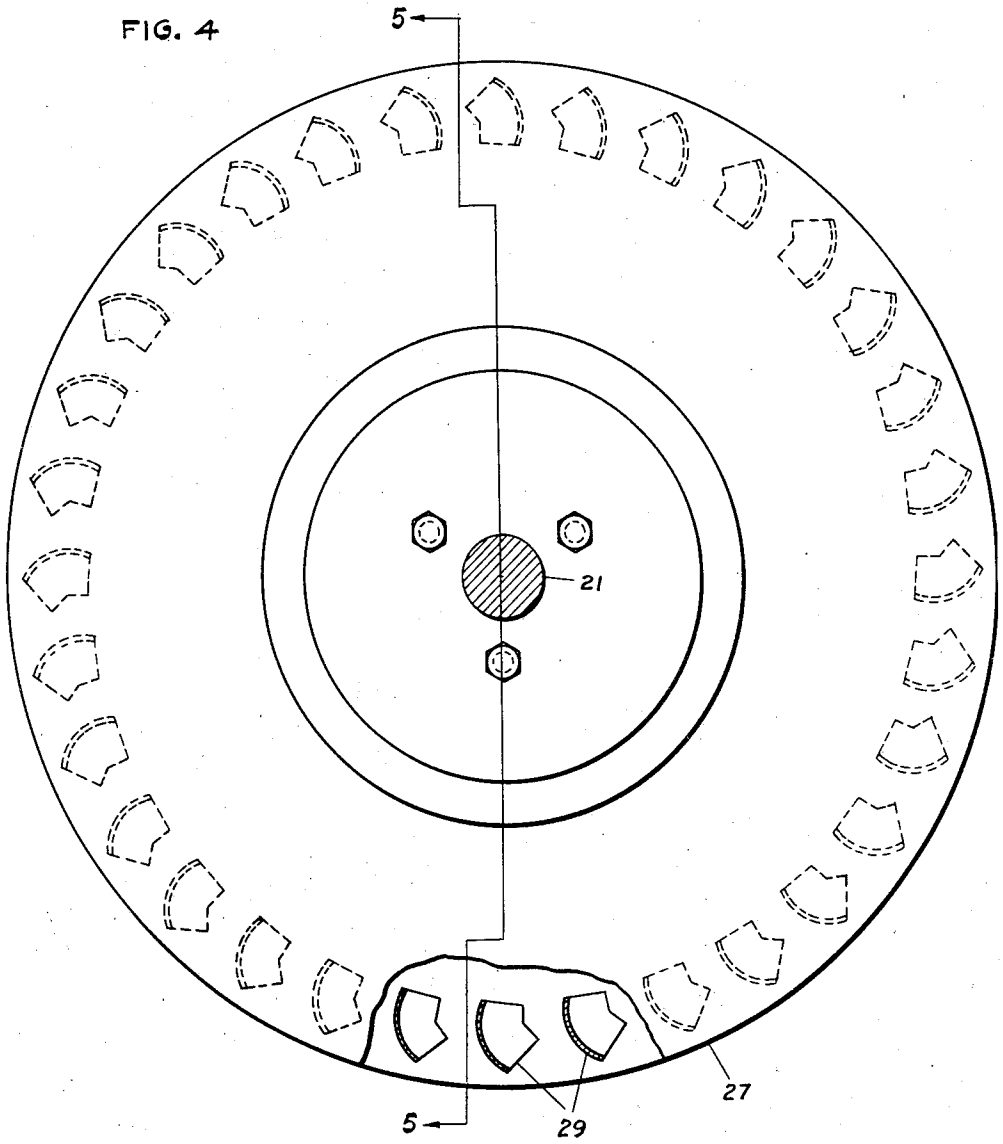
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UNIT HEATER AND VENTILATOR

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FIG. 4



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UNIT HEATER AND VENTILATOR

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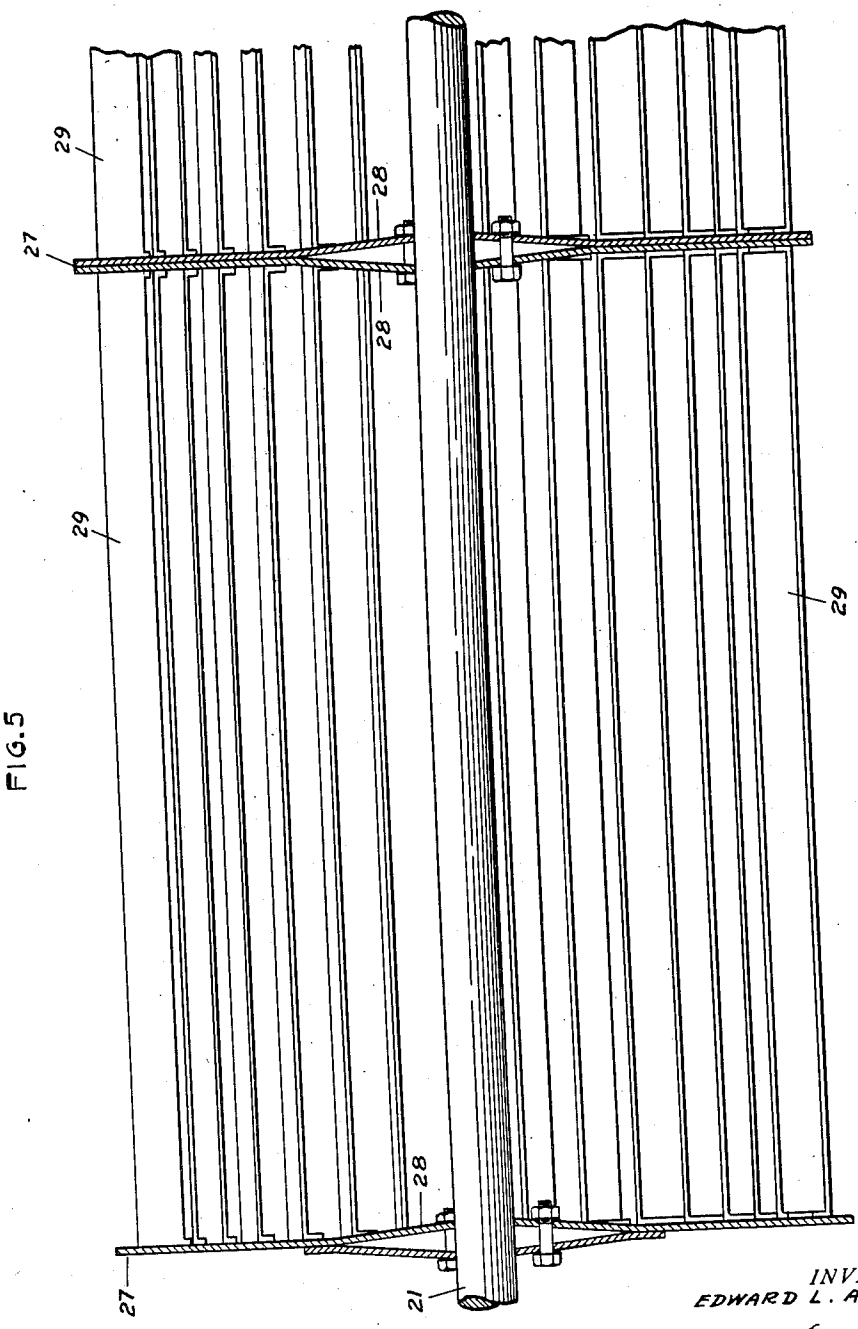


FIG.5

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UNIT HEATER AND VENTILATOR

Filed June 12, 1930 6 Sheets-Sheet 6

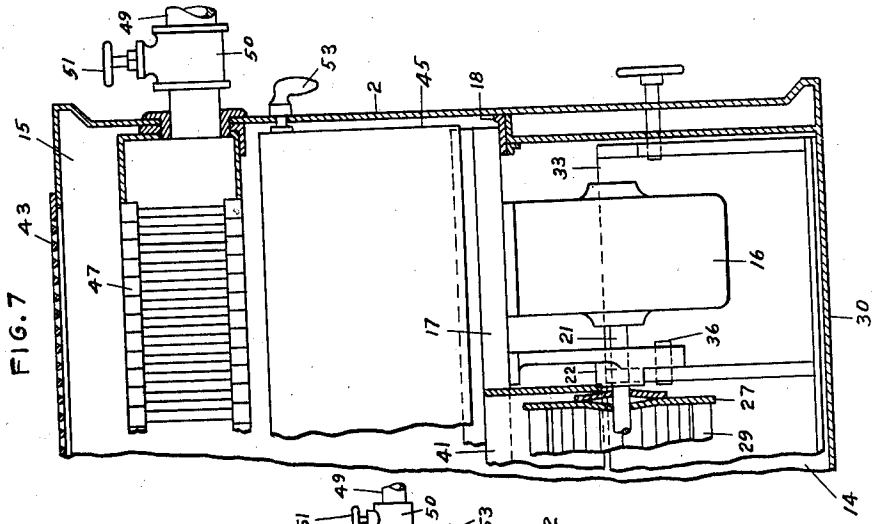


FIG. 7

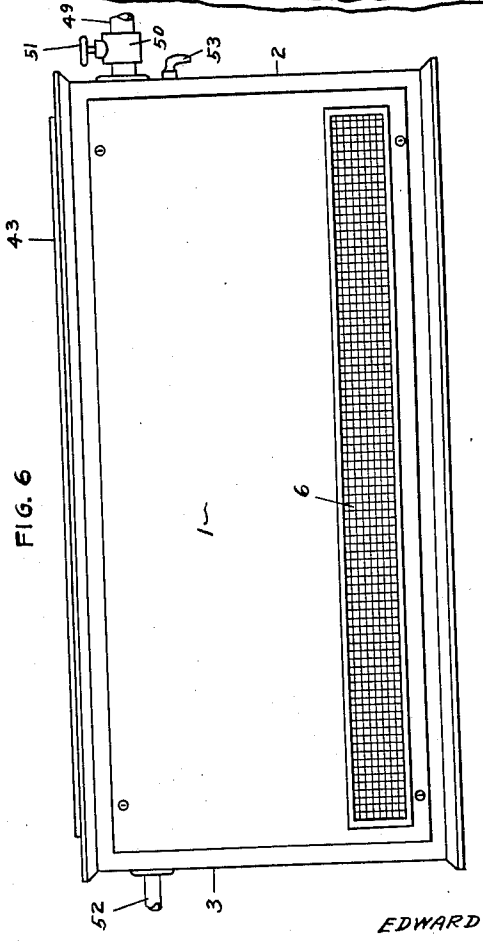


FIG. 6

INVENTOR
EDWARD L. ANDERSON.

BY Fauchman & Fauchman

ATTORNEY

Patented Nov. 29, 1932.

1,889,588

UNITED STATES PATENT OFFICE

EDWARD L. ANDERSON, OF GROSSE ILE, MICHIGAN, ASSIGNOR TO AMERICAN BLOWER CORPORATION, OF DETROIT, MICHIGAN, A CORPORATION OF DELAWARE

UNIT HEATER AND VENTILATOR

Application filed June 12, 1930. Serial No. 460,617.

My invention relates to unit heaters and ventilators.

It is the object of my invention to provide a unit heater and ventilator having a broad narrow air stream for delivery of fresh or heated air or for recirculated air.

It is my object to provide a line flow fan in a unit heater and ventilator in which the axis of the fan extends parallel to the major width of the inlet opening and of the outlet opening and the air enters the side of the fan and makes its exit through the side of the fan.

It is a further object to provide a unit heater and ventilator in which there is a straight line flow in a single plane of all of the air, whether fresh air, cold air, heated air, or recirculated air.

It is a further object to provide such a unit heater and ventilator with a single control damper for inlet air and recirculated air and a single by-pass damper.

It is a further object to provide a unit heater and ventilator with a separate fan compartment, a separate heater compartment, a separate motor compartment and a separate control compartment accessible through independent doors.

Referring to the drawings:

Figure 1 is a front elevation of the unit heater and ventilator casing;

Figure 2 is a section on the line 2—2 of Figure 3;

Figure 3 is a section on the line 3—3 of Figure 2;

Figure 4 is an end elevation of the fan with the axle in section and one side of the fan partially broken away;

Figure 5 is an enlarged section through one portion of the line flow fan;

Figure 6 is a front elevation of the unit with a single door and without the side compartment;

Figure 7 is a section of one end of the unit without the side compartment but with the motor compartment showing the arrangement of the damper and steam controls and method of support of the motor.

Referring to the drawings in detail, 1 is a front wall of the casing having side walls 2 and 3 and a rear wall 4 which has an air inlet opening 5. The front wall has a recirculation air grille 6. The front wall is provided with a fan door 7, a pair of heater compartment doors 8 and 9, a motor compartment door 10 and a control compartment door 11. Interiorly the casing is divided into a motor compartment 12, a control compartment 13, a fan compartment 14 and a heater compartment 15. In the motor compartment is a motor 16 suspended from a motor base 17, on the ledges 18 and 19 which are respectively mounted on the side walls 2 and a partition wall 20.

This motor base serves as a separating partition between the motor compartment 12 and the control compartment 13. The motor 16 has its shaft 21 extended laterally through the partition 20 into the fan compartment 14 where it is supported with the depending brackets 22 and 23 that are respectively mounted on the rail 24 and the partition 25. The partition 25 is supported by the rails 24 and 26.

On this shaft 21 are mounted a series of sections of a line flow fan in which the maximum diameter is many times smaller than the maximum length. The sections are comprised of end plates 27 which are bowed or bulged at their centers at 28 and are attached to the next adjacent plates so as to form a locking engagement with the shaft. Arcuate fan blades as at 29 extend parallel to the major axis of the fan.

This fan is located adjacent the fresh air inlet opening 5. This opening extends from a point approximately opposite to the axle 21 of the fan to the floor. Thus, the distance between the axle 21 and the floor plate 30 is more than twice the diameter of the fan. The air is guided inwardly from the area inlet opening 5 and upwardly by a partition wall 31 which has an arcuate bulge 32 for accommodating the periphery of the fan where the blades 29 are returning from the outlet of the passageway through which air is flowing to the inlet 5 thus screening the blades and reducing back flow and impeding of the air as it moves inwardly and upwardly.

The inlet of the air through the opening

5 is controlled by a quadrant-shaped damper plate 33. This plate engages the partition plate 31 and a shoulder 34 when it is in its recirculating position. When it is in its fresh air position it engages the shoulder 34 and the partition 35 which forms the other side of the air inlet duct opposite to the walls 31 and 32. This damper 33 is controlled by any suitable means and may be operated as a fresh air, recirculated air, or air mixing damper. It is journaled on short axles 36 in the partition 20 and in a part of the side wall 3 of the casing. It is operated through bevel gears 37 and 38 and shaft 39 which terminates in a handle 40 in the control compartment. The damper may be controlled by any suitable means, either by handle or an automatic device.

The partitions 31, 32 and 35 are supported in the transverse partition 25 which has an aperture 41 for receiving the air guided by these partitions 31, 32 and 35. This air may either flow through the by-pass area 42 and thence out the outlet grille 43 to one side of the partition 44 as it is guided by the swinging damper 45 that is hinged at 46 at the bottom of the partition 44; or it may pass over the radiator 47 within the partition 44, in which event the damper 45 will be resting against the stops 48 carried by the side walls of the casing, or a part of the air may be passed through the area 42 and the remainder through the heater 47.

This radiator is provided with an inlet pipe 49 having a control valve 50 operated by the handle 51. The outlet line from the radiator is designated 52. Any form of radiator or control may be employed. In the event automatic controls are utilized there is ample space to accommodate them both for the motor dampers and radiator within the control compartment 13. The damper 45, for instance, is regulated by the handle 53 within the control compartment 13.

The form of casing shown in Figure 6 has a single door and does not have the side compartments in which the motor and the regulating parts are located. In Figure 7 a casing similar to that of Figure 6 is shown, but with the motor compartment partly separated and distinguished from the main fan compartment.

In this form the damper 33 extends the full width of the casing and instead of being adjusted by means of the handle 40, located in compartment 13, it is adjusted by means of a handle 40*a* located on the end of a shaft 36*a*, similar to shaft 36 and in line with the shaft 36, as shown in Figure 7. The shaft 36 and the shaft 36*a* serve as bearings for one end of the damper. In other respects the structural features of these two forms are the same as those found in the other form.

It will be understood that I desire to comprehend within my invention such modifications as may be necessary to adapt it to varying conditions and uses.

Having thus fully described my invention, what I claim as new and desire to secure by Letters Patent, is:

1. In a unit heater and ventilator, a heating element, a casing having an inlet and outlet opening, and a fan having blades extending across the inlet adapted to take air through the inlet opening through the sides of the fan and discharge it through the other side of the fan through the outlet opening without the air deviating from the same plane of movement.

2. In a unit heater and ventilator, a casing having an inlet opening and an outlet opening, a fan having a length many times the diameter thereof, said fan comprising a plurality of arcuate blades, end plates therefor, and means for directing air from the inlet through the side of the fan, and means for directing air to the outlet from the other side of the fan as the air travels therethrough in the same plane, a heater in said casing, and means for controlling the movement of the air either over the heater to one side of it or both over it and to one side of it.

3. In a unit heater and ventilator, a casing having an air inlet opening, a recirculation opening and an exit opening, a fan having its major axis parallel to the major axis of said openings and its length greater than the diameter, means for directing air to the same entrance area of said fan from either the inlet opening or the recirculation opening, means of selecting the air from either the inlet opening or the recirculation opening, means of directing the air from the fan so selected to the outlet opening, and a heater in said casing.

4. In a unit heater and ventilator, a casing having an air inlet opening, a recirculation opening and an exit opening, a fan having its major axis parallel to the major axis of said openings and its length greater than the diameter, means of directing air to the same entrance area of said fan from either the inlet opening or the recirculation opening, means of selecting the air from either the inlet opening or the recirculation opening, means of directing the air from the fan so selected to the outlet opening, a heater in said casing, and means of diverting said air delivered by the fan either over the heater or to one side of it or both.

5. In a unit heater and ventilator, a casing having an inlet opening, a recirculation open and an exit opening, a line flow fan adapted to receive air through one side and discharge it through the other side while the air moves in the same plane, means of selecting whether the air will enter through the inlet opening or through the recirculation

opening, means for controlling the air so selected, a casing adjacent to said fan serving to guide the air to it and from it, and a swinging damper above said casing, a radiator in one side of said casing, a partition separating said radiator from the other side of the casing forming a by-pass passageway whereby said air from the fan may be diverted either over the radiator, around it or both around it and through it.

6. In a unit heater and ventilator, a relatively shallow and long casing, a line flow fan mounted therein, said casing having bottom inlet and recirculation openings and a top outlet opening with the axis of the fan parallel to the major diameters of said openings, means for guiding the air into one side and out of the other side of said fan without changing the plane of movement of the air as it enters from the inlet or recirculation openings and is discharged out of the outlet opening whereby air is delivered in a broad narrow stream from openings of corresponding form, a swinging bypass damper above said fan, a radiator and bypass partion associated therewith whereby air from the fan may be delivered in a straight line flow either over the radiator to one side of it or both before making its exit through the outlet opening.

7. In a unit heater and ventilator, a relatively shallow and long casing, a line flow fan mounted therein, said casing having bottom inlet and recirculation openings and a top outlet opening with the axis of the fan parallel to the major diameters of said openings, means for guiding the air into one side and out of the other side of said fan without changing the plane of movement of the air as it enters from the inlet or recirculation openings and is discharged out of the outlet opening whereby air is delivered in a broad narrow stream from openings of corresponding form, a swinging bypass damper above said fan, a radiator and bypass partition associated therewith whereby air from the fan may be delivered in a straight line flow either over the radiator to one side of it or both before making its exit through the outlet opening, and a mixing chamber between said bypass and radiator on the one hand and the outlet opening on the other.

8. In a unit heater and ventilator, a casing having an inlet opening and an outlet opening, a fan having a length many times the diameter thereof, said fan comprising a plurality of arcuate blades, end plates therefor, and means for directing air from the inlet through the side of the fan, and means for directing air to the outlet from the other side of the fan as the air travels therethrough in the same plane, a heater in said casing, and means for controlling the movement of the air either over the heater to one side of it or both over it and to one side of it, or introducing any part of the air from either inlet.

In testimony whereof, I affix my signature.

EDWARD L. ANDERSON.