

Nov. 23, 1926.

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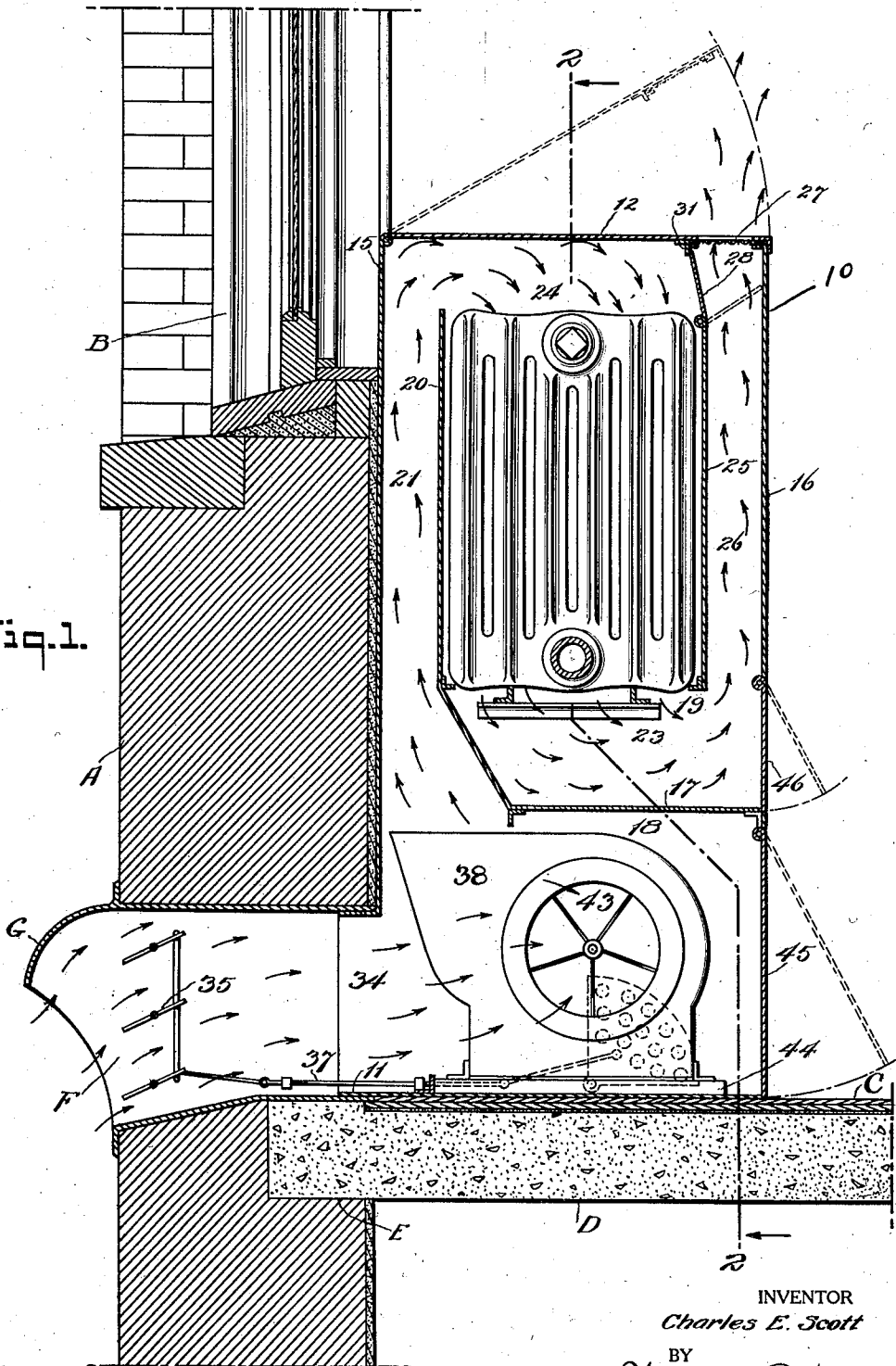
C. E. SCOTT

HEATING AND VENTILATING UNIT

Filed Feb. 23, 1924

3 Sheets-Sheet 1

Fig. 1.



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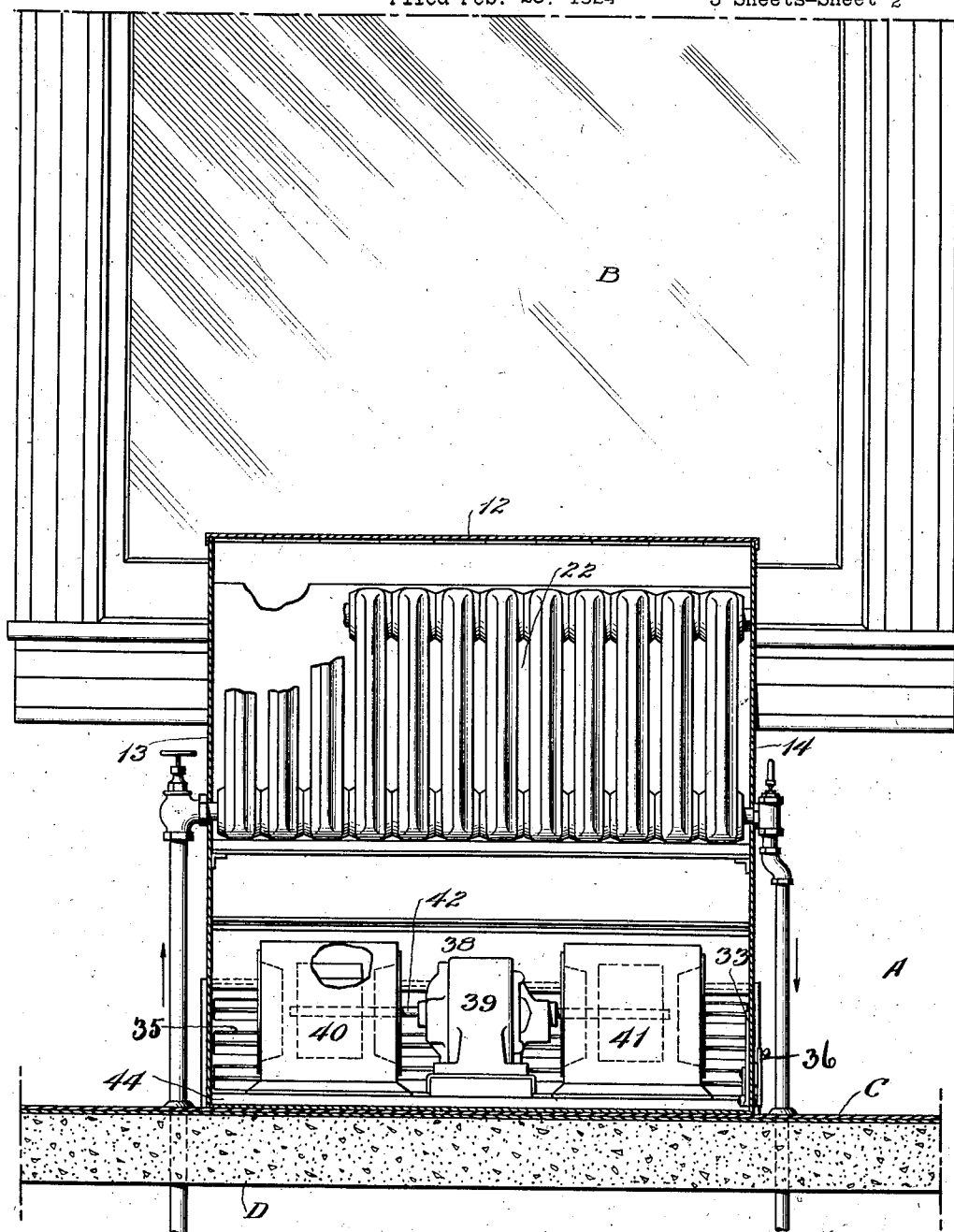


Fig. 2.

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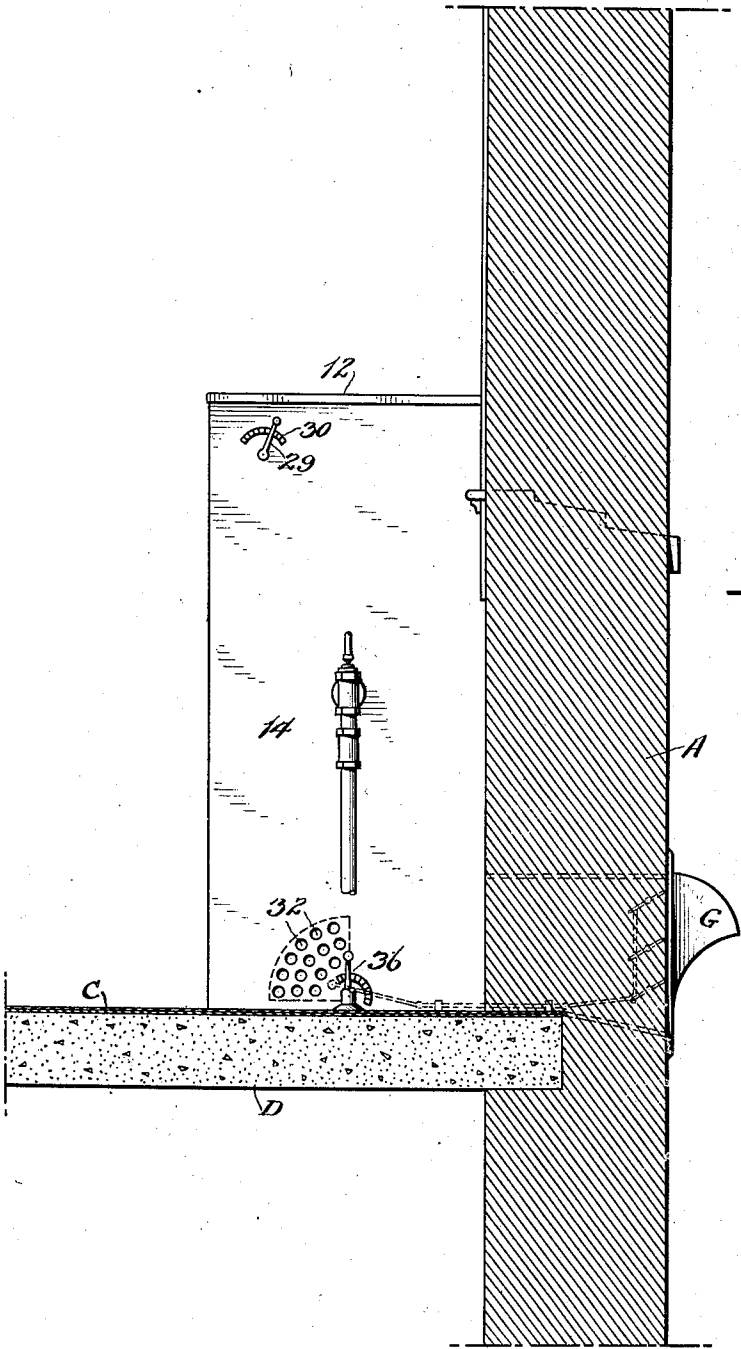


Fig. 3.

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HEATING AND VENTILATING UNIT.

Application filed February 23, 1924. Serial No. 694,796.

The invention relates to a combined heating and ventilating unit of the type which includes a radiator, or other air heating unit; which contains a blower, or other air circulating means, and which receives air from either the outside or from within the room in which the unit is mounted, and drives this air in contact with or through the heating unit to heat the air to any desired temperature before it is discharged into the room.

The primary object of the invention is to provide a simplified form of device of the type outlined, which will increase the efficiency in operation of such units, heat the air passed therethrough economically and insure an even constant temperature in all portions of the space supplied by the unit.

It is a prevailing objection to such devices as now constructed, that they do not economically utilize the available heat energy discharged from the contained radiator. With known forms of such devices much of the heat is lost through radiation to adjoint spaces not desired heated; and through conduction and convection to parts which, like the fan motor and other machine parts, are desired to be kept cool. Further the air flow has not been conducive to an economic heat absorption for the contact of the air with the heating unit is either not sufficiently prolonged to give the desired temperature or, an abnormally large radiator is necessary to give the desired temperature but abnormally large radiators are not economical either in original cost nor in operation. Accordingly, an object of the invention incidental to the desideratum for an economic heating of the air is to provide a construction which will feature the employment of a radiator or other heating unit which will have a relatively small heat dispensing area, but will have an air conducting conduit so disposed relative thereto that the air will have a relatively long heat absorbing association therewith while passing through the several passageways in the device. This phase of the invention is attained by giving the air a preliminary heating and thus having the temperature raised gradually before the air so preheated is brought into direct heating engagement with the radiator for its final heat treatment. Incidentally, the invention features a construction in which substan-

tially all of the available heat is absorbed per unit of time by the air passing through the device during this time and which air additionally acts as a heat insulator for the heating device to prevent heat losses from the device by direct radiation.

Another object of the invention is to provide for a disposition of the air circulating mechanism which will maintain the same in the coldest part of the casing irrespective as to whether it is drawing air in from the outside, or from the inside of the room, and which disposition will render the air-cooled mechanism substantially unaffected by the heat from the contained heating unit.

Another object of the invention is to provide for such a disposition of several compartments within the casing that ready access may be attained for inspection, for cleaning, or for the replacement of contained mechanism, such as the air circulating mechanism.

Incidental to the last named object, the invention features a construction by means of which the air circulating mechanism, which is usually heavy and in need of frequent attention, can be contained on the bottom of the containing casing adjacent the floor to thus minimize tendency to vibration and to facilitate the withdrawal of the heavy mechanism out of the casing on to the floor of the room for convenient access.

Among the other objects of the invention are to provide a selective control for regulating the proportion of fresh air to the recirculated air from the room admitted to the intake of the circulating means, and to control the proportion of relatively cold to heated air discharged from the unit into the room.

Various other objects and advantages of the invention will be in part obvious from an inspection of the accompanying drawings and in part will be more fully set forth in the following particular description of one form of mechanism embodying my invention, and the invention also consists in certain new and novel features of construction and combination of parts hereinafter set forth and claimed.

In the accompanying drawings:—

Figure 1 is a vertical sectional view taken through a preferred embodiment of my invention shown in position abutting against

the wall of a room heated thereby and showing a connection with the external atmosphere;

Figure 2 is a vertical sectional view taken on the broken line 2—2 of Figure 1, looking in the direction indicated by the arrows; and

Figure 3 is a view in side elevation of the device shown in the preceding figures and looking at the same from the right side of Figure 2.

In the following description and in the claims, parts will be identified by specific names for convenience of expression but they are intended to be as generic in their application to similar parts as the art will permit.

In the drawings the unit constituting the subject matter of this disclosure is shown in position with one side, hereinafter referred to as a rear side or wall, engaging against a wall A of the room designed to be heated by the unit. The wall shown is an outside wall to feature the positioning of the unit against a cold wall and at a window shown at B. The unit rests directly on a floor C which in turn is supported by the usual girder structure D thrust into the wall A as shown at E. The wall is shown provided below the window B with an external air inlet F outlined by a metal conduit G which may be considered either as part of the structure of the building or may be part of the unit hereinafter described. In the present disclosure, the conduit G is shown to be part of the building structure in order to facilitate the easy removal of the casing if desired without affecting any part of the building structure.

In the drawings there is shown a radiator casing 10, of rectangular form including a bottom 11, a top 12, end walls 13 and 14, a rear wall 15 and a front wall 16. The rear wall 15 contacts against the wall B and is thus regarded as the cold side of the casing while the opposite or front wall 16 faces inwardly into the room and is regarded hereinafter as the warm or heated side of the casing.

Intermediate its height the casing is provided with a horizontally disposed partition 17 which is coextensive with the length of the casing and extends inwardly from the front wall 16 to a point in spaced relation to the opposite wall 15. This partition divides the interior of the casing into a lower blower containing compartment 18 and an upper radiator containing compartment 19.

Extending upwardly from the inner end of the partition 17 is a vertically extending partition or baffle plate 20 which terminates below the top 12 and coacts with the rear wall 15 to form a cold air conduit 21 at the rear or cold side of the casing.

A heating unit 22, is positioned in the chamber 19, spaced above the partition 17 to form a hot air space 23 below the radiator and between the same and the horizontal partition 17. The radiator is spaced below the top 12 to form a cold air space 24 between the top of the radiator and the top of the casing. From this construction it will be seen that there is formed within the casing and in vertically superposed order, a blower compartment 18, a hot air space 23, a radiator compartment containing the radiator 22, and a cold air space 24, and that the cold air conduit 21 discharges over the top of the partition 20 into the cold air space 24 which is of relatively large conducting capacity. The radiator herein illustrated is a steam radiator of a conventional open frame type is thus suspended in the upper portion of the casing and supported by the end walls 13 and 14. It is obviously within the scope of this disclosure to provide other supports for the radiator where this sheet metal is used to form the casing walls.

A vertically disposed partition 25 outlines the side of the radiator compartment on the side opposite the partition 20; extends parallel to this partition; and parallel to the front wall 16 of the casing to form a vertically extending hot air conduit 26 on the warm side of the casing. This hot air conduit opens at its lower end from the hot air space 23 and discharges at its upper end through a screened air outlet 27 formed in the top 12 of the casing.

The upper portion of the partition 25 which faces the cold air space 24 constitutes a hinged valve 28 pivotally connected at its lower end and movable into or towards its limiting positions by means of a hand lever 29, moving over a locking segment 30 positioned on the outside of the end wall of the casing as shown in Figure 3. In its limiting vertically extending position constituting an extension of the wall 25, as shown in full lines in Fig. 1, the upper, free end of the valve 28 engages against a stop 31 formed on the underside of the top cover 12. When so disposed the valve acts to close direct intercommunication between the cold air space 24 and the outlet 27. In its other limiting position horizontally disposed as shown in dotted lines in Figure 1, the valve closes the upper end of the conduit 26, thus intercepting circulation of air from the cold air space through the compartment 22, hot air space 23, conduit 26, but opening the cold air space 24 to the outside of the casing directly therefrom through the outlet 27.

For the purpose of drawing air in from the part of the room adjacent the floor, the compartment 18 is provided with an internal air inlet 32 (Fig. 3) controlled by a hinged

segmental valve 33 positioned on the inside of the casing as shown in Figure 2.

The rear wall 15 is provided at its lower end with an external air inlet 34 for supplying the blower compartment 18 with fresh cold air from the outside taken in through the conduit G. The inflow through the inlet 34 is controlled by a valve 35 herein shown to be mounted in the conduit G as a fixed structural part of the same.

Preferably the valves 33 and 35 are associated to work simultaneously in order to close one valve while opening the other, and in this way regulate the proportion of cold, fresh, external air admitted through the intake 34 to the recirculated air within the room admitted through the intake 32. Both valves are connected so as to be manipulated from a single control 36 in the form of a lever mounted on the side of the casing within the room and operatively connected to the valves through suitable reach rods 37.

Positioned within the lower compartment 18 is an air circulating unit 38 herein shown to include an electric motor 39 at opposite sides of which are blower fans 40, 41 hereinafter referred to sometimes as a blower. The turning elements of these fans are mounted at opposite ends of the motor armature shaft 42 and in general this mechanism resembles conventional construction.

The blowers are each provided at their exposed ends with an air intake port 43 and have their discharge ports at their upper rear side and disposed to discharge directly into the cold air conduit as indicated by the upwardly pointing arrows to the left of the showing in Figure 1.

The air circulating unit is positioned on a base 44 and this unit is designed so that it may be bodily withdrawn from the compartment 18 through an opening provided in the lower portion of the front wall 16. It is a feature of this disclosure that this heavy air circulating unit is positioned at the bottom, or, in case the bottom is omitted, on the floor so as to minimize any tendency of the motor to set up a vibration of the casing.

Another advantage of positioning the motor and its associated units at the bottom of the casing is that the mechanism may be withdrawn for repair, inspection and substitution simply by drawing the unit out of the casing onto the floor and without necessity of raising and lowering the heavy parts vertically. The front wall of the blower compartment 18 is defined by a drop door 45, which normally closes the compartment, constitutes the lower part of the wall 16, but which is so disposed that when raised past the position shown in dotted lines in Figure 1, ready access is provided to all parts of the blower compartment and the air circulating unit contained therein, of

desired mechanism may be readily withdrawn after which the door will close by its own weight and thus close the casing.

Similarly the portion of the front wall which is opposite the top air space 23 is defined by a similar door 46 which provides access to this space, permitting the cleaning of the same from any dirt deposited, and which will permit the ready insertion into the space of air humidifying and disinfecting apparatus.

In order to permit access to the cold air space and to the radiator the top 12 is preferably formed as a hinged cover and may be opened back against the wall of the room and past the position indicated in dotted lines in Figure 1.

In operation and assuming that the heating unit and the air circulating units are actively disposed and that the several valvular controls are in the positions indicated in full lines in Figure 1, the device is actively supplying fresh heated air to the room. It will be understood that the blower will draw cold air from the external atmosphere through the conduit G, past the open valve 35, through the intake ends 43 of the fans, and discharge the cold air into the conduit 21. The cold air is thus forced under pressure upwardly adjacent the cold wall A and is discharged into the cold air space at the top of the casing. During its passage upwardly through the conduit 21, the air is subjected to an initial preheating by the radiation of heat from the heating unit 22 acting through the thin metallic partition 20. The air thus pre-heated is discharged downwardly through the openings in the frame of the heating unit where it is subjected to a heating action by direct contact with the hot radiator. In this way the air coming into contact with the radiator is at a higher temperature than the air taken in from the outside and this permits the radiator to raise the temperature of the air higher than it could possibly do if the air was not pre-heated before coming in contact with the same. While the time duration of the air contact is less than usual the range of temperature raise starts at a higher temperature and thus the radiator can function more efficiently than with known devices for all parts of the radiator are at substantially the same temperature. As the steam intake end of the radiator is at the bottom it results in the arrangement herein illustrated that the bottom of the radiator has a tendency to be hotter than the top. This therefore results that relatively cold air comes in contact with the upper portion of the radiator which is least heated, and the air is heated gradually and progressively during its passage downwardly through the radiator until it comes in contact with the hottest surfaces adjacent the bottom of the radiator. The hot air is

then discharged into the space 23 at its maximum temperature. As the direction of the air thus heated is reversed on itself in passing up into the hot air conduit 26 it acts to deposit any contained substance on the bottom of the air space. It is a usual practice to place some form of air treating material in this space. As the air passes upward through the hot air conduit 26 it receives some heat by radiation through the partition 25 and at the same time gives some heat to the front wall 16, but this heat discharged through the front wall 16 is of course at no greater temperature than the air in the conduit. The conduit thus acts in effect as a double-walled air containing insulator for the heating unit and thus prevents the heating unit from directly heating the room through the front wall 16. Similarly the air conduit 21 acts as a layer of air insulation between the heating unit and the cold wall 15 of the casing. In this way loss of heat through the wall A of the building is practically eliminated, thus saving in heat losses prevalent in similar devices now known. Any heat passing through the partition 25 is taken up by the cold air and is not lost through the building wall.

Should the valve 28 be moved over into the dotted line position shown in Figure 1 none of the air will pass through the radiator but will pass across the cold air space and will be discharged under pressure directly into the room through the outlet 27. As to whether this is fresh air from the outside or recirculated air from the room will depend upon the positions of the valves 33 and 35.

While I have shown and described, and have pointed out in the annexed claims, certain novel features of my invention, it will be understood that various omissions, substitutions and changes in the form and details of the device illustrated and in its operation may be made by those skilled in the art without departing from the spirit of the invention.

Having thus described my invention, I claim—

1. A rectangular metal casing provided with a bottom, opposite end walls, a rear wall, a front wall and a hinged top, a horizontal partition extending inwardly from the front wall towards the rear wall, an upstanding partition projecting upwardly from the horizontal partition, terminating in spaced relation to the top and co-acting with the rear wall to form a cold air conduit, another vertical partition extending down from the top, terminating above the horizontal partition and co-acting with the front wall to form a hot air conduit, the portion of the top facing the upper end of said hot air conduit being open and providing an air outlet, the portion of the casing below

the horizontal partition constituting a blower compartment, said casing provided with a valve controlled air inlet opening into the same, an air circulating device contained in said blower compartment positioned directly on said bottom and removable as a unit from the casing and a radiator positioned between said vertically extending partitions and in spaced relation to both the horizontal partition and to the top, and supported from the end walls.

2. A radiator casing provided with a horizontally disposed partition dividing the same into an upper radiator compartment and a lower blower compartment, said blower compartment provided adjacent its bottom with an air inlet, air heating means in the upper compartment, air circulating means in the cool lower compartment positioned below the heating means and substantially not heated by the heating means in the upper compartment, said circulating means having its intake open to said air inlet and discharging into the upper compartment at its upper end and means for closing the upper end of said upper compartment whereby the air is caused to be directed downwardly on to said air heating means.

3. In a device of the class described, the combination of a pair of vertically extending conduits, an open frame radiator positioned between the conduits and adapted to heat the air by radiation as it is passed through both of said conduits and also adapted to heat the air by direct contact with its frame as the air is passed through one of the conduits discharging at its upper end into the space above the radiator and the other conduit having its hot air intake end open to the space below the radiator, and a blower discharging into the lower end of the first named conduit, and an imperforated partition separating the blower from the radiator.

4. In a device of the class described, the combination of a radiator casing, a blower in the lower part of the casing, a heating device positioned above the blower, partitions for separating the blower from the heating device, said partitions coacting to form a cold air conduit for directing the discharge from the sub-positioned blower down on to the top of the heating device and across its entire upper end and a hot air conduit for discharging the heated air from the bottom of the heating device and for delivering the hot air from the upper end of said conduit.

5. A radiator casing provided with a horizontal partition dividing the same into an upper radiator and hot air space compartment and a lower blower compartment, a vertically extending partition defining one side of the upper compartment and co-acting with the adjacent side of the casing for

forming a cold air conduit between the top of the lower compartment and the top of the upper compartment, and by-passing the radiator compartment across its top, the lower part of the upper space constituting a hot air space and another vertically extending partition with its lower edge terminating in spaced relation to the horizontal partition forming the opposite side of the upper compartment and co-acting with its adjacent side of the casing to form a hot air conduit leading upwardly from the hot air space at the bottom of the upper compartment.

6. A radiator casing provided with means within the same forming in superposed order a blower compartment, a hot air space, a radiator compartment and a cold air space, and said casing containing a conduit placing the blower compartment in fluid communication with the cold air space and with another conduit discharging from the hot air space, said cold air space, said radiator compartment and said hot air space being in sequential fluid communication, the top of said casing constituting a cover adapted to be moved into open position to provide direct access to the cold air space and to said conduits.

7. In a device of the class described, the combination of a casing including an upper chamber, a radiator positioned therein below the top to provide a cold air space above the radiator, said casing provided with a hot air conduit at one side of the radiator having its intake end open to the space below the radiator and discharging through an air outlet in the top of the casing, a single valve having two limiting positions. in one position opening the cold air space directly to the air outlet while closing the hot air conduit, in the other position opening the hot air conduit to the air outlet while closing communication between the cold air space and the air outlet and thus permitting the air in the cold air space to pass downwardly past the radiator and said casing including a blower compartment below the radiator chamber and discharging into the cold air space.

8. In a device of the class described, the combination of a radiator casing provided with partitions forming a blower compartment, a radiator compartment above the blower compartment and conduits leading from the blower compartment to the top of the radiator compartment and from the bottom of the radiator compartment out through the upper portion of the casing and valvular control means at the top of the radiator casing for by-passing all of the cold air from the blower compartment around the radiator compartment.

9. In a device of the class described, the combination of a pair of vertically extending conduits, an open frame radiator posi-

tioned between the conduits and adapted to heat the air by radiation as it is passed through both of said conduits and also adapted to heat the air by direct contact with its frame as the air is passed there- through, one of the conduits discharging at its upper end into the space above the radiator and the other conduit having its hot air intake end open to the space below the radiator, and a blower discharging into the lower end of the first named conduit and a valve at the upper end of said other conduit for controlling the air flow through the radiator.

10. A radiator casing provided with means within the same forming in superposed order a blower compartment, a hot air space, a radiator compartment and a cold air space, and said casing containing a conduit placing the blower compartment in fluid communication with the cold air space and with another conduit discharging from the hot air space, said cold air space, said radiator compartment and said hot air space being in sequential fluid communication, said blower compartment provided with a cold air intake, the casing provided with an air discharging outlet, and control means for selectively opening either or both the cold air space or/and the last named conduit to said outlet.

11. A radiator casing provided with means within the same forming in superposed order a blower compartment, a hot air space, a radiator compartment and a cold air space, and said casing containing a conduit placing the blower compartment in fluid communication with the cold air space and with another conduit discharging from the hot air space, said cold air space, said radiator compartment and said hot air space being in sequential fluid communication, said blower compartment provided adjacent the bottom of the casing with two air inlets, one adapted to draw air in from the outside of the house and the other adapted to draw air in from the space adjacent the floor of the room in which the casing is mounted, and valvular means for closing one of the inlets while the other is open.

12. A radiator casing provided with means within the same forming in superposed order a blower compartment, a hot air space, a radiator compartment and a cold air space, and said casing containing a conduit placing the blower compartment in fluid communication with the cold air space and with another conduit discharging from the hot air space, said cold air space, said radiator compartment and said hot air space being in sequential fluid communication, said blower compartment and said hot air space being each provided with means for permitting access to the respective compartments.

13. In a device of the class described, the combination of a radiator casing provided

with air intake ports at its lower end and
with a discharge port at its upper end and
otherwise closed, air heating means and air
circulating means housed within the casing
5 in superposed order, said casing provided
with a conduit for conducting the discharge
upwardly from the circulating means past
one side of the heating means to give the air
an initial preheating before it is discharged
10 downwardly into contact with the heating

means and said conduit being of inverted L
shape with a part thereof leading horizon-
tally from said preliminary heating part to
discharge the air into direct heat absorbing
contact with the heating means. 15

Signed at New York, in the county of
New York and State of New York, this 30th
day of January, A. D. 1924.

CHARLES E. SCOTT.