

Jan. 7, 1941.

M. F. COTES ET AL

2,228,201

AIR CIRCULATOR

Filed Aug. 28, 1939

4 Sheets-Sheet 1

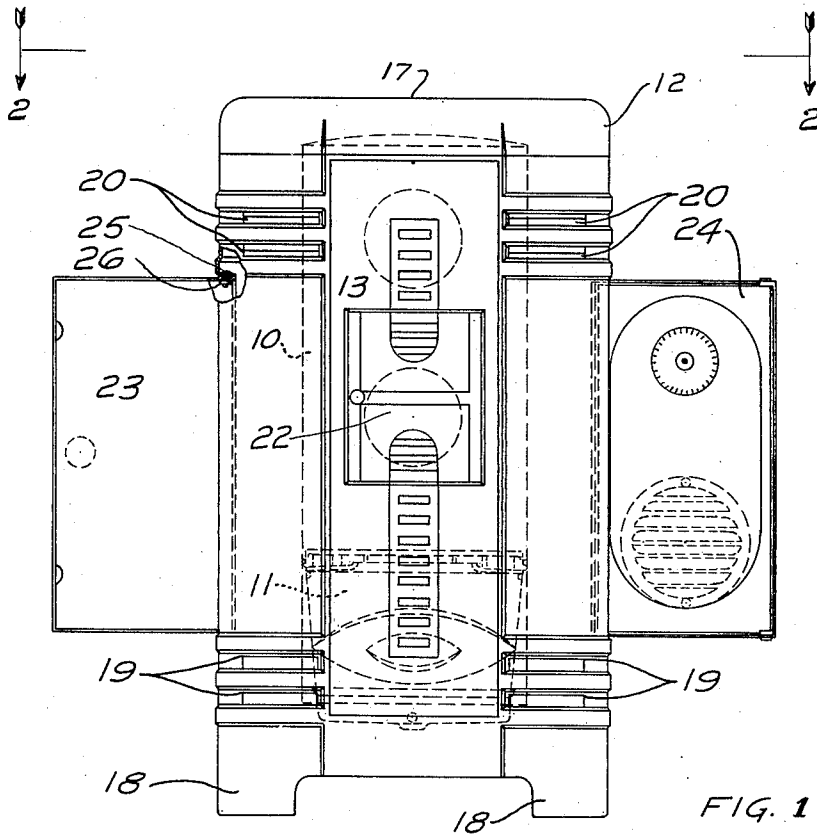


FIG. 1

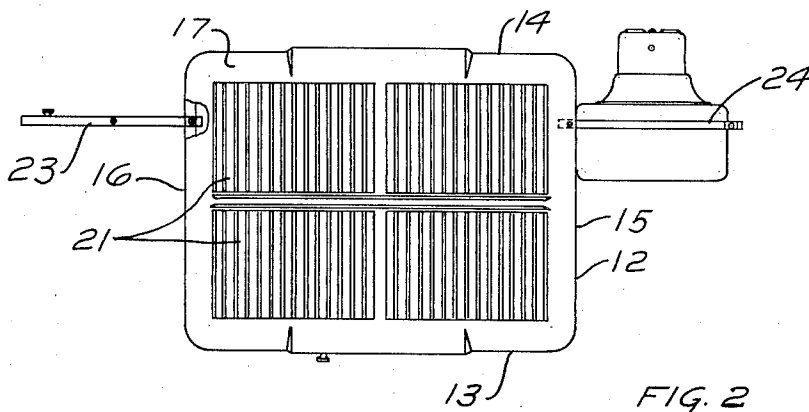


FIG. 2

INVENTOR.
MERVIN F. COTES
and
BY JOHN W. MILLER
Carroll R. Taber
ATTORNEY

Jan. 7, 1941.

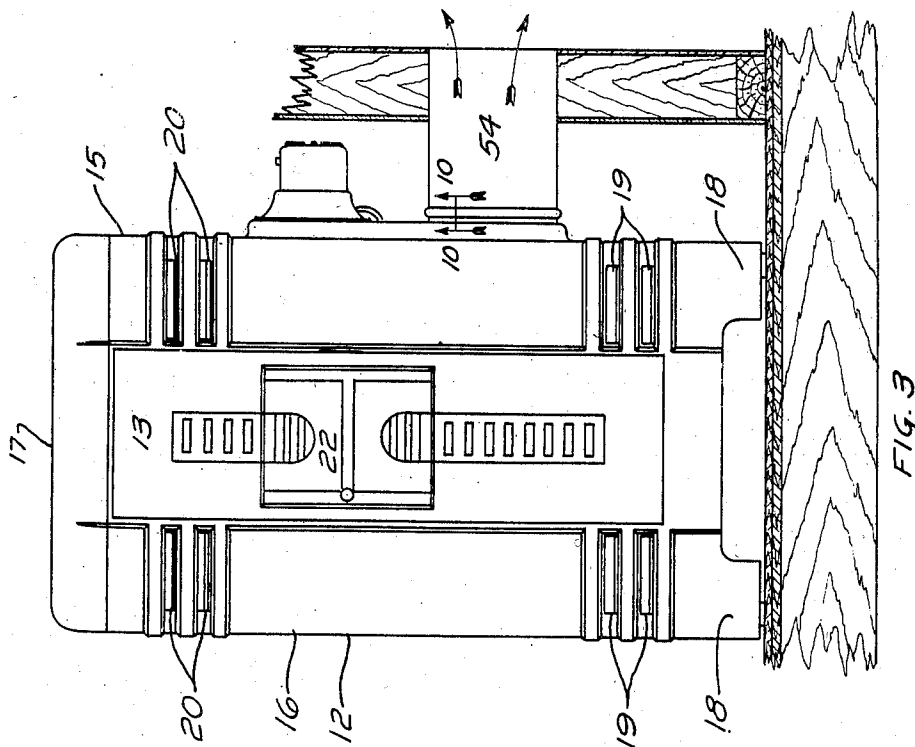
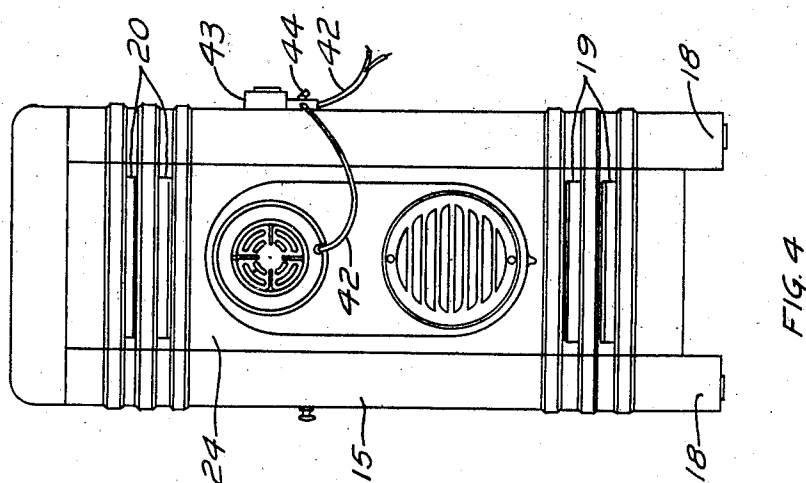
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4 Sheets-Sheet 2



INVENTOR.
MERVIN F. COTES
BY JOHN W. MILLER
C and R. Taber
ATTORNEY.

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4 Sheets-Sheet 3

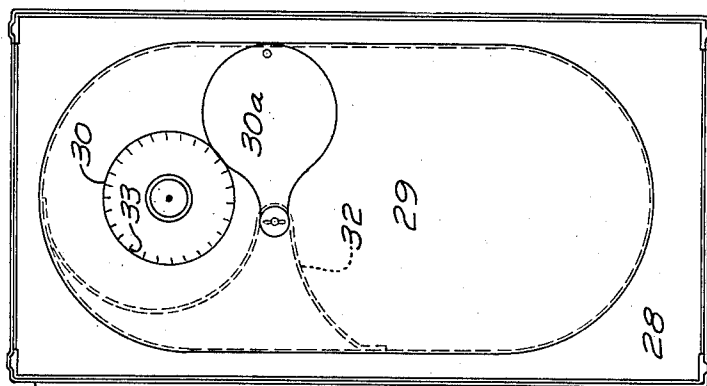


FIG. 6

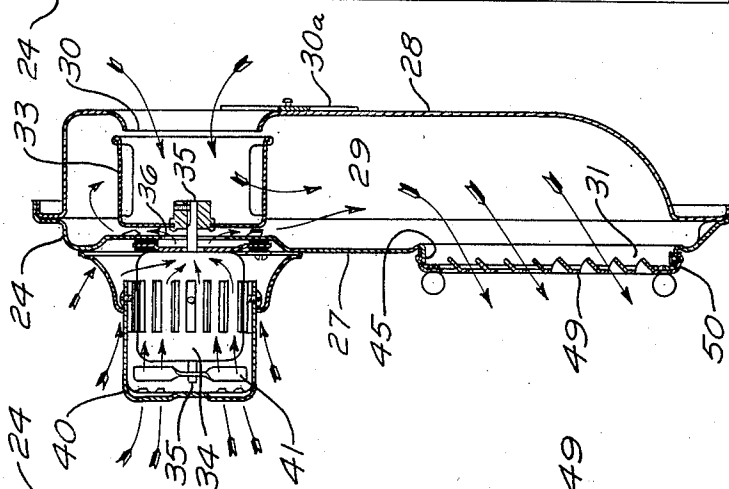


FIG. 7

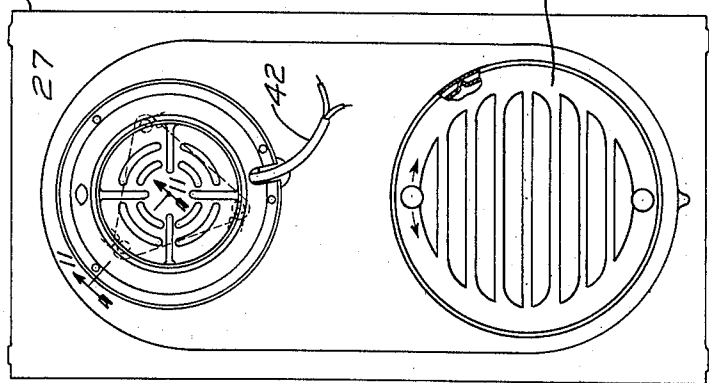


FIG. 5

INVENTOR.
MERVIN F. COTES
and
JOHN W. MILLER
BY *Carroll R. Taper*
ATTORNEY.

Jan. 7, 1941.

M. F. COTES ET AL

2,228,201

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4 Sheets-Sheet 4

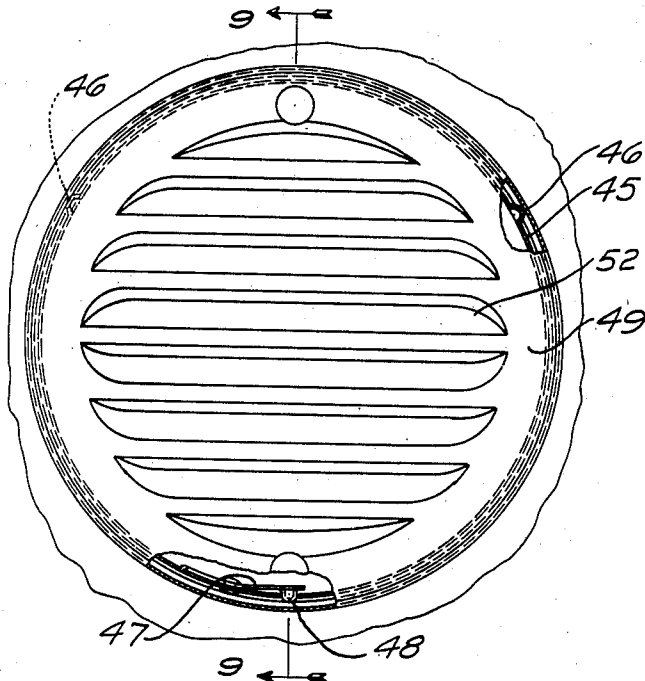


FIG. 8

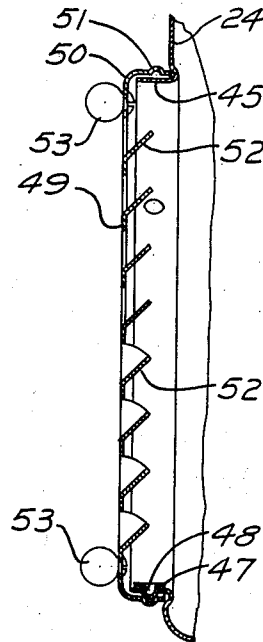


FIG. 9

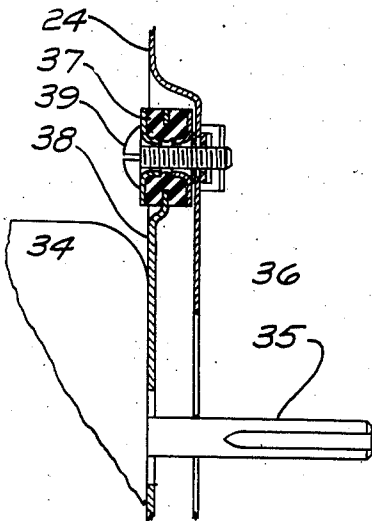


FIG. 11

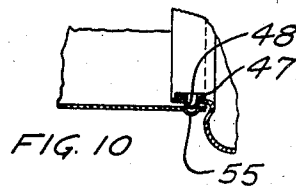


FIG. 10

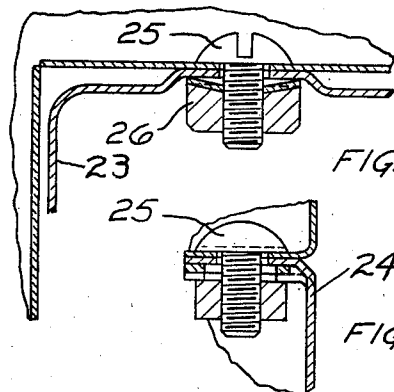


FIG. 12

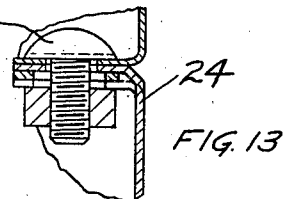


FIG. 13

INVENTOR.
MERVIN F. COTES
and
BY JOHN W. MILLER
Carrick R. Taber
ATTORNEY.

UNITED STATES PATENT OFFICE

2,228,201

AIR CIRCULATOR

Mervin F. Cotes and John W. Miller, Lansing,
Mich., assignors to Moter Wheel Corporation,
Lansing, Mich., a corporation of Michigan

Application August 28, 1939, Serial No. 292,178

16 Claims. (Cl. 230—117)

This invention relates to casings for circulating heaters and more particularly to an air circulating unit in the form of a panel structure adapted to form a removable portion of the wall of such a casing.

The present application is a continuation in part of our earlier application Serial No. 249,482 filed January 5, 1939.

The principal object of the present invention is to provide a compact unitary air circulating structure so constructed that it may be substituted for a removable wall section or the conventional door of a circulating space heater or similar cabinet structure.

Another object of the invention is the provision of an air circulating cabinet having a plurality of interchangeable doors, one of which constitutes a unitary air circulating structure.

Other objects more or less incidental and ancillary to the foregoing will become apparent upon reading the following description taken in connection with the accompanying drawings, wherein—

Figure 1 is a front view of a circulating heater equipped with a pair of doors, one of which constitutes a unitary air circulating structure;

Figure 2 is a top plan view of the heater shown in Figure 1;

Figure 3 is a front view in elevation of the heater shown in Figure 1 illustrating one of the uses to which the unitary air circulating structure may be put;

Figure 4 is a side view in elevation of the heater shown in the preceding figures illustrating the arrangement of a thermostatic control for the air circulating structure;

Figure 5 is an enlarged front view of the door constituting the unitary air circulating structure which is best shown in Figures 1 and 2;

Figure 6 is a rear view of the unitary air circulating structure shown in Figure 5;

Figure 7 is a sectional view taken on substantially the line 7—7 of Figure 5;

Figure 8 is a fragmentary front view of the structure shown in Figure 5;

Figure 9 is a sectional view taken on the line 9—9 of Figure 8;

Figure 10 is a sectional view taken on substantially the line 10—10 of Figure 3;

Figure 11 is an enlarged fragmentary view of the structure shown in Figure 7; and

Figures 12 and 13 are sectional views illustrating the manner in which the cabinet doors shown in Figures 1 and 2 are pivotally connected to the cabinet.

Except for the door construction and the appurtenances thereof which will be described presently, the circulating heater shown in Figures 1 to 4 is of conventional form. It consists of a heat chamber assembly shown in dotted lines in Figure 1 made up of a combustion chamber 10 and an oil burner 11 enclosed within an outer casing 12. The outer casing 12 includes a front wall 13, a back wall 14, side walls 15 and 16, and a top wall 17. The cabinet is supported upon four legs 18 so that air may enter the space between the casing 12 and the combustion chamber assembly under the vertical walls of the casing. The front and side walls are provided with a plurality of air inlet louvers 19 adjacent the bottom thereof and with a plurality of air outlet louvers 20 adjacent the top thereof. The top wall is provided with a grille 21 for the discharge of heated air.

The front wall 13 is provided with a door 22 which affords access to the combustion chamber for igniting the burner and the like. The side walls 15 and 16 are provided with a pair of identical door openings defined by laterally extending flanges integral with the respective side walls.

A door 23 is pivotally mounted in the opening in the side wall 16 and a door 24 in the form of a unitary air circulating structure is pivotally mounted in the door opening in side wall 15. Doors 24 and 23 are interchangeable. They are each mounted as best shown in Figures 1, 2, 12 and 13 by means of cooperating bolts and nuts 25 and 26. Each of the doors 23 and 24 is provided with a flange about its perimeter having bolt receiving openings formed in the top and bottom thereof. In door 23 the bolt receiving openings are formed only in the top and the bottom adjacent the rear side of the door. Of course, door 23 can be reversely mounted by reversing the top and the bottom. In door 24 the openings are formed in the top and the bottom flange adjacent both lateral edges whereby the door may be hinged either at the front or the rear. Door 24 may, of course, if desired by permanently secured in the door opening as by bolts or the like.

Doors 23 and 24 are identical to the extent that they each comprise a rectangular front panel of a suitable size to fill either of the door openings in the side walls 15 and 16. There the identity ceases. Door 24, as previously mentioned, constitutes in itself a unitary air circulating structure, the details of the construction of which are shown in Figures 6, 7 and 8.

Door 24 is made up of a front panel 27 and a rear panel or housing 28, the two being secured to each other to form an elongated air duct 29 having an inlet opening 30 at one end thereof on one side of the door and an outlet opening 31 at the other end thereof on the other side of the door. A partition 32 of curved configuration is formed within the air duct 29 for a purpose which will appear presently.

A fan or blower 33 of the axial intake radial discharge type is positioned within the duct 29 adjacent the inlet opening 30 whereby upon rotation, air is drawn into the fan 33 through the opening 30 and discharged through the air duct 29 toward the outlet opening 31, the fan 33 and partition 32 being coordinated in a conventional manner to effect this result. In order to control the volume of air circulated by the fan, there is provided a closure 30a pivoted to panel 28 so that the size of opening 30 may be regulated as desired. The fan 33 is supported and driven by a fan motor 34, the fan being secured to the shaft 35 of the motor.

The motor 34 is mounted upon the front side of the panel 27, the panel being provided with an opening 36 through which the motor shaft 35 extends. The motor 34 is secured to the panel 27 as best shown in Figure 11 through means of a resilient mounting consisting of a rubber block 37 secured to the motor plate 38. The rubber block in turn is secured to the panel 27 by screws 39.

The motor 34 is enclosed within a housing 40 perforated to provide for the admission thereof of cooling air. Within the housing at the opposite end of the motor from the fan 33 there is mounted upon an extension of the motor shaft 35 an auxiliary fan 41 utilized for cooling the motor 34. The fan 41 is adapted to draw cooling air into the housing 40 and direct it over and about the motor 34 and its bearings and through the opening 36 in panel 27 where it is picked up by the fan 33 and discharged through the air duct 29 (see arrows in Fig. 7).

The size of the opening 36 and the spacing of the fan 33 from the panel 27 must be such as to permit air to pass through opening 36 and between fan 33 and panel 27.

The motor 34 is preferably a conventional type of electric motor supplied with current through a connection 42. If desired, it may be of the variable speed type in order to regulate the volume of air circulated by the fan 33. In that case, the closure 30a for opening 30 need not be employed.

In Figure 4 there is shown associated with the electric line 42 a thermostat 43 and a manual switch 44 whereby the fan motor may be controlled either automatically (by the thermostat) or manually (by the switch). While the thermostat 43 is shown as mounted on the rear wall 14 of the cabinet, it will be readily understood that it could be mounted on any other wall including the door 24 or remote from the heater.

In any case, the thermostat should be arranged whereby its temperature responsive element is under the influence of the temperature within the casing 12, or within the space to be heated.

The outlet opening 31 in the air duct 29 is defined by an annular flange 45, preferably made integral with the front panel 27. As best shown in Figures 8 and 9, the flange is formed with two radially outwardly extending projections 46 and with a spring latch 47, including a projection 48 adapted to extend through an opening in the

flange 45. By this arrangement an air directing grille 49 is rotatably and detachably connected to the flange 45.

The grille 49 is provided with an annular flange or collar 50 having formed therein a circumferential groove 51 adapted to receive the stationary projections 46 and the resilient projection 48 carried by the flange 45. The groove 51 of grille 49 is first fitted over the stationary projections 46 and then sprung over the resilient projection 48 to detachably connect the grille to the flange 45.

The grille is provided with a plurality of stationary air directing vanes 52 which may preferably be formed by slotting the face of the grille and bending the vanes away from the plane thereof. On its front face the grille is provided with a pair of handle knobs 53 by means of which the grille may be rotated to any desired position whereby to direct the air discharged through the outlet opening 31 in any desired direction.

The arrangement just described for detachably connecting the grille 49 to the flange 45 surrounding the outlet opening 31 also lends itself for the attachment thereto of other forms of air directing conduits. As shown in Figure 3 there is connected with the flange 45 an air conducting conduit 54 by means of which heated air from the space heater may be conducted to a separate room from that in which the space heater is located. For that purpose the conduit 54 is preferably provided with an annular groove 55 adjacent the end thereof to adapt it for detachable connection with the flange 45 in the same manner as the grille 49 is attached thereto. This feature of the conduit 54 is shown in Figure 10.

From the foregoing it will be apparent that the present invention provides a novel and extremely useful form of unitary air circulating structure which may be used with a circulating heater interchangeably with the conventional form of radiant door commonly employed with such heaters. Likewise, it may be installed in place of a removable wall section. Some of the more important advantages of this structure are illustrated. For example, the door 24 constituting the air circulating unit may be operated in its closed position as shown in Figure 4 or in an open position, as shown in Figures 1 and 2. Moreover, the door 24 may be hinged at either its front or rear edges. Consequently, the heated air from the circulating heater may be directed toward any desired portion of the room in which the heater is installed.

Of course, it will be understood that regardless of the operation of the circulating unit comprising the door 24, the circulating heater continues to function as a natural air circulating device, the cool air being drawn into the space between the casing 12 and the combustion chamber assembly beneath the side walls of the casing and through the inlet openings 19, and being discharged therefrom through the outlet openings 20 and top grille 21. Consequently, when arranged as shown in Figure 3, the circulating heater is adapted to heat not only the room in which it is installed, but also the room in which the conduit 54 terminates.

By reason of the particular construction of the air circulating unit constituting the door 24, i. e., the relative positions of the inlet and outlet openings, the air discharged from the outlet 31 during the operation of the heater is warmer

than it would be if it were withdrawn directly from the cabinet at the level of the outlet opening 31.

One of the outstanding advantages of the present invention which deserves mention is the fact that the unitary air circulating structure which comprises the door 24 may be utilized to circulate cooling air in the summer time, as well as heated air in the winter time. In this connection, the flexibility of the mounting of the door, either with the hinges at the front or rear, and the adjustability of grille 49 are features of especial value.

Since the door 24 constitutes a self-contained air circulating unit, it will be readily apparent that it is not limited to being used with an air circulating heater in the manner herein described, but may be used independently as an air circulating unit; or with any form of air conditioning structure including a cabinet, providing there is an opening of suitable size to receive this unit.

As previously mentioned, door 24 may be secured in the door opening by bolts and the like instead of hinges. Therefore, it is not strictly speaking a door at all but rather a removable panel section adapted to form a part of the casing wall and is so designated in some of the appended claims.

The scope of the invention is indicated in the appended claims.

We claim:

1. A casing for a circulating heater comprising a plurality of walls, one of said walls being formed to provide an opening spaced from the perimeter of said wall, and a separate panel section removably secured to the casing in position to close said opening, said panel having a substantially planular marginal portion and including an air tube having an inlet opening at one end thereof communicating with the interior of the casing and an outlet opening at the other end communicating with the exterior of the casing, said air tube forming an elongated passageway for the discharge of air from the casing which passageway extends generally in the same direction as the plane of the casing wall with which it is associated.

2. A casing as defined in claim 1 which also includes a fan mounted within the air tube for expediting the circulation of air therethrough, and a motor for operating the fan.

3. A casing as defined in claim 1 which also includes a fan mounted within the air tube adjacent the inlet opening thereof for expediting the circulation of air therethrough, and a motor for operating the fan.

4. A casing as defined in claim 1 wherein the inlet opening of the air tube is located in the upper portion of the casing and the outlet opening from the air tube is located in the lower portion of the casing.

5. A casing as defined in claim 1 wherein the air tube in its entirety is located in spaced relation to the perimeter of the separate panel.

6. A casing as defined in claim 1 which also includes a fan mounted within the air tube for expediting the circulation of air therethrough, and a motor for operating the fan, the motor being located exteriorly of the air tube and being exposed to the atmosphere exteriorly of the casing.

7. A casing for a circulating heater comprising a plurality of walls, one of said walls being composed of substantially a single thickness of metal

and including a flange located in spaced relation to its perimeter which extends at substantially right angles to the plane of the wall and defines an outlet zone, and a separate panel section provided with a flange about its perimeter which cooperates with said first mentioned flange to locate the panel section in position on said wall to cover said outlet zone, said panel section including an air tube having an inlet opening at one end thereof communicating with the interior of the casing and an outlet opening at the other end communicating with the exterior of the casing, said air tube forming an elongated passageway for the discharge of air from the casing which passageway extends generally in the same direction as the plane of the casing wall with which it is associated.

8. A casing as defined in claim 7 wherein the air tube in its entirety is spaced from the perimeter of the separate panel.

9. A casing as defined in claim 7 which also includes a fan mounted within the air tube for expediting the circulation of air therethrough, and a motor for operating the fan.

10. A casing as defined in claim 7 which also includes a fan mounted within the air tube adjacent the inlet opening thereof for expediting the circulation of air therethrough, and a motor for operation the fan.

11. A casing as defined in claim 7 which also includes a fan mounted in the air tube for expediting the circulation of air therethrough, and a motor for operating the fan, the motor being located exteriorly of the air tube and being exposed to the atmosphere exteriorly of the casing.

12. A casing for a circulating heater comprising a top wall having an air outlet opening therein, a plurality of side walls formed to provide an air inlet opening adjacent the bottom of the casing, one of said side walls including an opening therein located in spaced relation to its edges, a separate panel section removably installed in said opening, said panel section being formed to provide an air passageway having an inlet opening at one end thereof communicating with the interior of the casing and an outlet opening at the other end thereof communicating with the exterior of the casing, and fan means disposed within said air passageway for discharging air from the casing therethrough, said air passageway being constructed and arranged with respect to the panel section and the remainder of the casing whereby air is discharged from the casing therethrough only when the fan means is operating and whereby air may be discharged from the outlet opening in the top wall irrespective of whether or not the fan means is operating.

13. An air circulating unit of the character described comprising a panel-like structure formed to provide an elongated air duct having an inlet opening at the upper end thereof on one side of the panel and an outlet opening at the lower end thereof on the other side of the panel, said air duct extending generally in the direction of the plane of the panel structure and being located substantially entirely in spaced relation to the perimeter of the panel structure, a fan located within the air duct, and a motor for operating the fan, the motor being located on the outside of the air duct.

14. An air circulating unit as defined in claim 13 wherein the fan is of the axial intake radial discharge type and is located adjacent the inlet opening to the air duct.

15. An air circulating unit as defined in claim 75

13 which also includes an adjustable grille mounted in the outlet opening of the air duct to control the direction of the air discharged therefrom.

- 5 16. An air circulating unit as defined in claim 13 wherein the fan is located adjacent the inlet

opening and wherein an adjustable grille is mounted in the outlet opening to vary the direction of the air discharged from the air duct.

MERVIN F. COTES.
JOHN W. MILLER.