

Oct. 14, 1952

G. C. MITACEK ET AL

2,613,663

SPACE HEATER AND AIR CIRCULATING ACCESSORY THEREFOR

Filed Jan. 23, 1950

2 SHEETS—SHEET 1

Fig. 1.

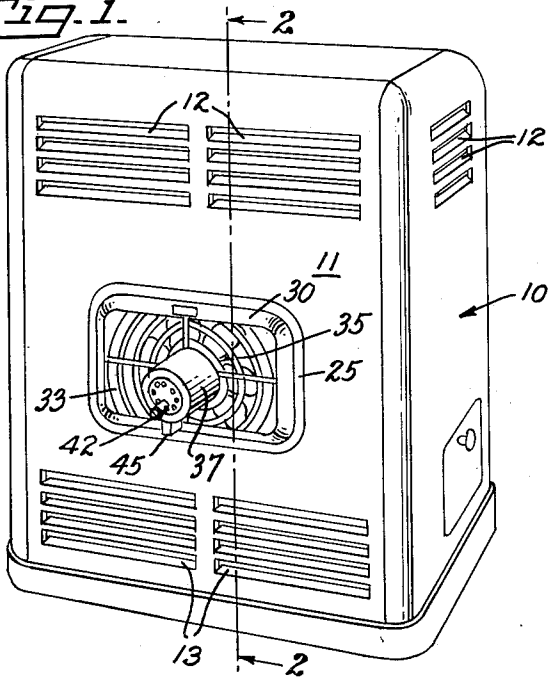


Fig. 3.

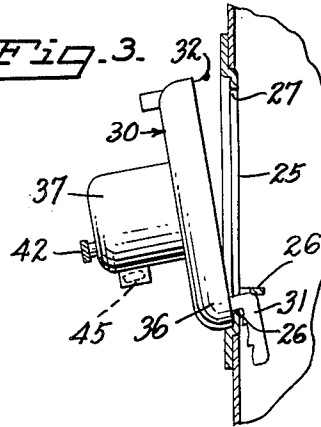


Fig. 4.

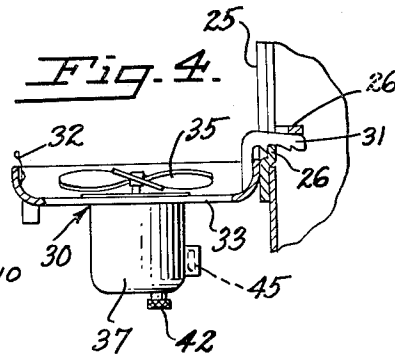


Fig. 2.

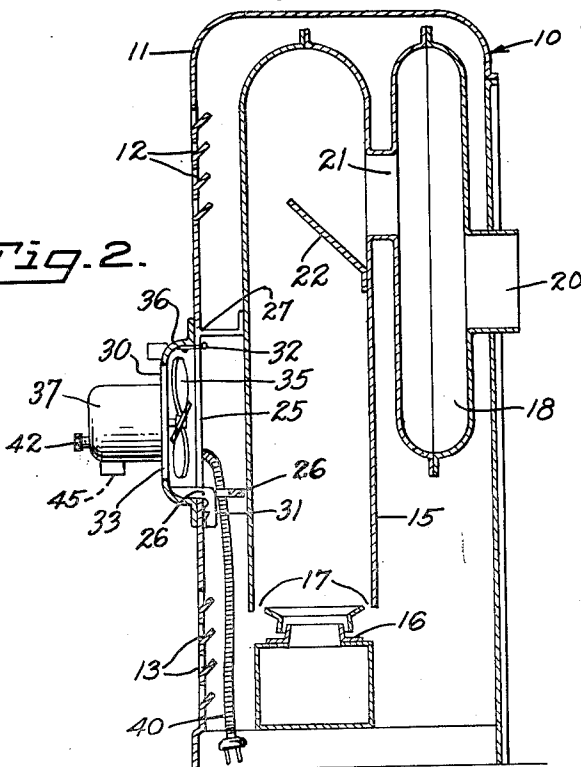
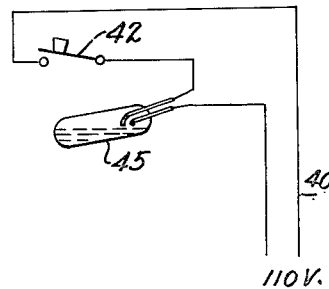


Fig. 5.



INVENTORS
GEORGE C. MITACEK
CHARLES T. HAMMONS
BY
A. Drehan Rees
ATTORNEY

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2 SHEETS—SHEET 2

Fig. 6.

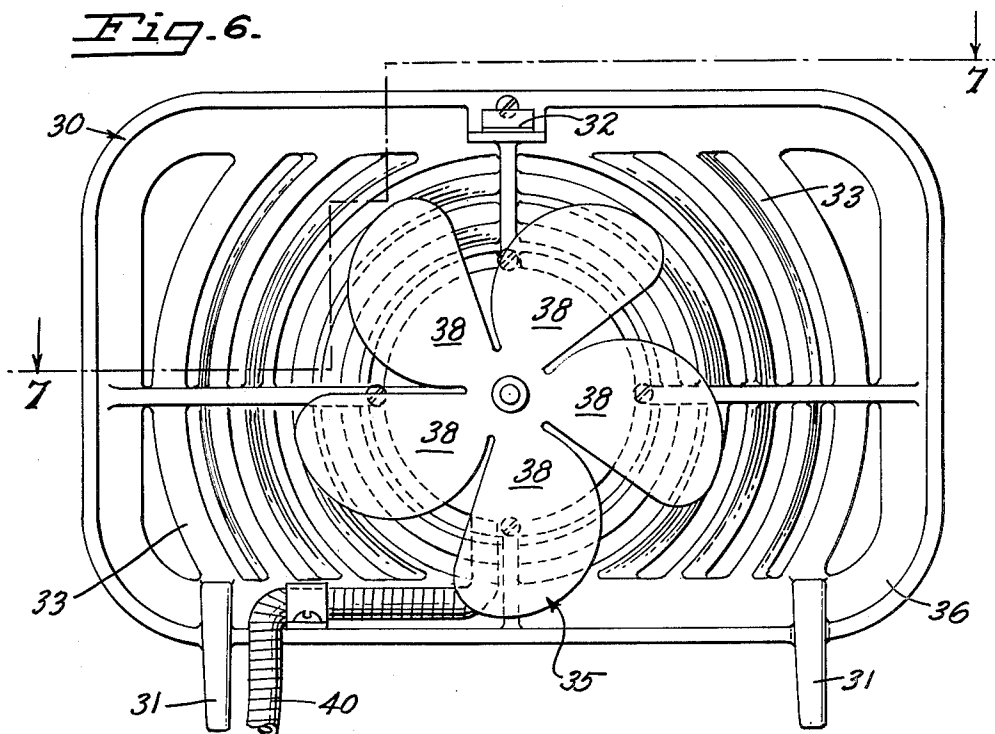
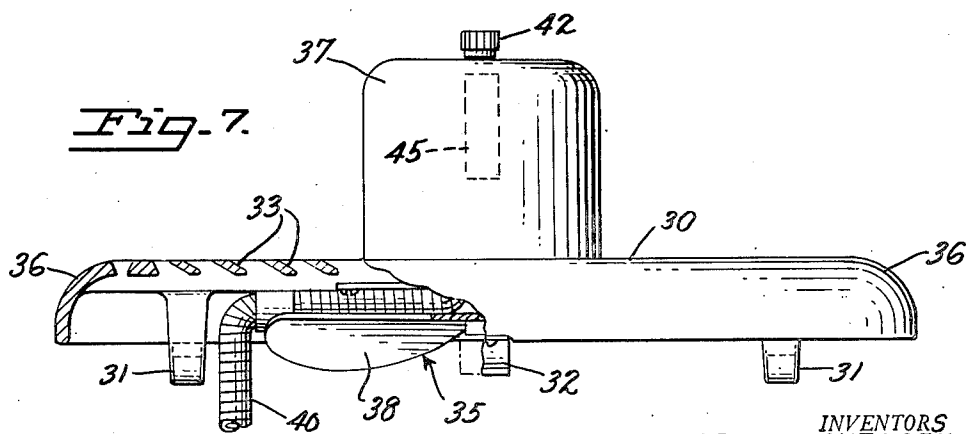


Fig. 7.



INVENTORS
GEORGE C. MITACEK
CHARLES T. HAMMONS
BY

Adrian A. Brown
ATTORNEY

UNITED STATES PATENT OFFICE

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SPACE HEATER AND AIR CIRCULATING
ACCESSORY THEREFOR

George C. Mitacek, San Francisco, and Charles T. Hammons, Berkeley, Calif., assignors to Spark Stove Co., Inc., Oakland, Calif., a corporation of California

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3 Claims. (Cl. 126—110)

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This invention relates to an improved forced air circulation device for a heating unit and more particularly to a novel door-mounted fan having important safety features.

One application of the device is to space-heating units of the cabinet type. These are self-contained furnaces which may be installed directly in the room to be heated and may use gas, oil, or other fuels. The combustion products are not exhausted into the room but are confined within a combustion chamber and are vented into a chimney. The heat on the outside walls of the combustion chamber is transmitted to the surrounding air, and carried into the room as the air is circulated inside the heater.

In such devices, the rapidity and efficiency of heat transfer from the combustion chamber walls to the room depends on the effectiveness of the air circulation. Some circulation may be obtained merely by having upper and lower louvers in the outer cabinet, so that the cool air near the floor will enter the cabinet at the bottom, be warmed by the transfer of heat from the combustion chamber walls inside the cabinet, and then carry this warmth into the room as it goes out through the upper louvers. However, such a system does not heat the room as speedily as is sometimes desired.

Heretofore, forced circulation systems have been bulky and complicated, and so have been incompatible with cabinet-type space-heaters whose chief advantage is that they take up so little space. Since the cabinet is in the room itself, the less space it consumes the better. To add a conventional type of forced circulation system would in most cases about double the effective space taken up by the heater.

Another problem has been that forced circulation systems usually employ fan blades rotating at high speed. This is satisfactory for central heating plants located in the basement, but where the heater is in the room itself, adequate safety structures are required to prevent accidents, especially where there are children playing about.

The present invention solves the problem of securing forced air circulation in a cabinet-type heater, by providing a fan mounted in a small door in the heater casing. This door may be installed in many already existing types of heating units without adding more than a few cubic inches to the volume of the heating unit. Another feature of the present invention is its safety. A grille outside the fan affords protection when the door is closed. When the door is

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opened, the fan motor circuit is automatically broken as soon as the door has swung open only a few degrees, so that the fan motor cannot receive any current when the fan blades are exposed.

Still other advantages and objects of the invention will appear from the following description of a particular embodiment thereof. This embodiment is described in detail in accordance with United States Revised Statutes, Section 4888, but it is not intended to narrowly limit the invention by so doing, except as the invention is described in the appended claims.

In the drawings:

Fig. 1 is a view in perspective of a cabinet-type space-heating unit incorporating the principles of the present invention.

Fig. 2 is a view in side elevation and in section of the unit of Fig. 1, taken along the plane 2—2 in Fig. 1.

Fig. 3 is a fragmentary enlarged view in side elevation and partly in section of the door-mounted fan unit showing the door partly opened to about the position where the electric switch that controls the fan motor circuit is automatically actuated to cut off the current supply.

Fig. 4 is a view similar to Fig. 3 showing the door in its fully open position.

Fig. 5 is a diagram of the electrical circuit used with the fan.

Fig. 6 is an enlarged view in elevation of the door and fan, looking out from the inside of the cabinet.

Fig. 7 is a plan view showing a section taken generally along the line 7—7 in Fig. 6.

A typical cabinet-type space-heating unit 10 with the present invention applied thereto is shown in Figs. 1 and 2. The unit 10 includes an outside cabinet housing 11 with louvers 12 at its upper end and louvers 13 at its lower end, so the air may enter through the lower louvers 13 and go out through the upper louvers 12.

An inner combustion chamber or heat-transfer housing 15 is mounted inside the outer housing 11. The fuel is burned inside the housing 15, the actual combustion taking place in and just above the burner 16 at the lower end of the housing 15. Air to support combustion is supplied through the vent openings 17 between the burner 16 and the housing 15 as well as through the burner casing.

The inner housing 15 is shaped to provide a large area of surface contact with the circulating air and to provide for a circuitous passage of the combustion products out into the chimney.

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There may be a secondary chamber 18 through which the gases must first pass on their way out in order to extract more heat from the gases, and for the same reason the outlet opening 20 may be lower than the opening 21 between the two chambers 15 and 18. A baffle 22 adjacent the opening 21 diverts the hot gases up above the opening 21, making their passage there-through more circuitous, in order that maximum heat transfer may be obtained.

In many heaters of this type a glass door is swingably mounted in the outer housing 11. In the present invention this glass door is replaced by a door having a fan mounted in it. In other types of heaters, a hole or socket will have to be made in the outer housing to accommodate the door or grille. Normally the door 30 would be installed in the furnace when it leaves the factory. However, it may be bought separately and installed in a finished unit. In any event the door 30 may be hinged in a frame 25 by means of sockets 26, in which the door's pivot members 31 may fit, and an upper flange 27, where the spring latch 32 on top of the door may lock.

The door 30 has a grille 33 through which air may be directed by a fan 35, which is mounted inside the grille 33. This grille may be made in any attractive pattern, preferably with its ribs spaced closely together and flared so that a child's finger cannot be inserted between the ribs (see Fig. 7). A concentric flared pattern is shown in the drawings. The outer edges of the grille 33 terminate in a curved door frame 36, so that the fan 25 may be set in almost flush with the frame.

The fan 35 is positioned on the inside of the door, and its motor is positioned on the outside of the door in a small housing 37. The fan blades 38 are preferably arranged with respect to the direction of rotation to move air out of the heater casing 10, although they could be rotated in the opposite direction to bring cold air into the heater, if that were desirable.

A shielded electric conduit 40 may lead from the motor through the door 30 to a suitable plug inside the furnace. The motor circuit may be arranged so that it is closed by hand at the switch 42, or it may be closed by a thermostatically controlled switch when the heater gets up to a predetermined heat level.

In the motor circuit there is a mercury switch 45 which operates as a safety. When the door 30 is opened to about the position shown in Fig. 3, the mercury will flow away from the switch contact points and will open the fan motor circuit. (See Fig. 5). This means that if a child or anyone opens the door 30 while the motor is rotating the fan, the motor will be deenergized before the door is open far enough for such a person to make contact with the fan blades while the power is on. The switch 45 makes it impossible for the fan 35 to be rotated by its motor 37 while the door 30 is in any position between that shown in Figs. 3 and 4.

In assembling the device, the fan 35 is installed in the door 30, and the whole unit is put in the heater case opening 25. When the door 30 is closed, the contacts in the mercury switch 45 close and the fan 35 may be controlled by the manual switch 42 or whatever other switch mechanism is provided. Air coming in through the louvers will be blown out into the room through the grille 33. This air will have contacted the walls 15 on its way through the heater and will therefore be warmed.

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With the door 30 closed, the grille 33 prevents accidents, because the fan blades 38 are on the inside. As soon as the door 30 is swung open just a few degrees, the mercury in the mercury switch 45 flows away from the contact points and opens the circuit to the fan motor, thereby cutting off any power to keep the fan 35 rotating. The fan then decelerates and cannot be made to revolve until the door 30 is almost closed again.

We claim:

1. An air circulating accessory adapted for insertion in an opening in the vertical side wall of a heater housing, comprising a generally rectangular, perforate, generally vertical frame having a generally horizontal lower edge; projecting pivot members extending out beyond the rear of said frame and then perpendicularly downward from near said lower horizontal edge and extending down beyond said lower horizontal edge, for engaging said housing when said frame is installed, the rear normally vertical edges of said pivot members being adapted for abutting a horizontal portion of said housing when said frame is swung outwardly on said members about an axis parallel to and adjacent to said frame's lower horizontal edge at a position when said rear edge is generally horizontal, the front edge of said pivot members being adapted to engage the rear face of the vertical wall of the housing when said frame is vertical, these engagements by said pivot members being at two different limiting positions 90° apart, so as to limit the movement of said frame between a vertical closed position and a generally horizontal open position; releasable latch means, on said frame for engaging said housing when said frame is in its upright position; an electric motor mounted in said frame with its shaft extending inside said housing when the frame is upright in said opening; a bladed fan mounted on said shaft for rotation thereby; an electric circuit for operating said fan motor; a manual switch for opening and closing said circuit so that said motor may be turned on and off; and a mercury switch on said frame in series with said manual switch and adapted to move with said frame so as to close said circuit when said frame is in upright position and to open said circuit whenever said frame is swung outwardly.

2. A space heating unit adapted to be located in living quarters to heat said quarters; including in combination a housing having air inlet openings and a door socket therein; a door pivotally mounted to swing outwardly in said door socket about a horizontal axis adjacent said door's lower edge, said door having perforate walls adapted to form a guard means; a motor-driven fan mounted on the inner side of said door; an electric circuit for operating said fan motor; a manual switch for opening and closing said circuit so that said motor may be turned on and off; and a mercury switch on said door in series with said manual switch and adapted to move with said door so as to close said circuit when said door is closed and to open said circuit whenever said door is open, so that said fan is then automatically turned off.

3. A space heating unit adapted to be used in living quarters to heat said quarters, including in combination an outer housing having a front wall with air inlet openings adjacent both its upper and lower edges and a generally central door socket therein; an inner housing inside said outer housing wherein combustion may take place, said inner housing being spaced from said outer housing to provide a passage through which air

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may circulate in passing between said openings and said door socket; a door pivotally mounted to swing outwardly in said door socket about a horizontal axis adjacent its lower edge, said door having perforate walls adapted to form a guard means; a motor-driven fan mounted on said door on the inner side of said guard means, there being no obstruction between said fan and said passage between said housings; an electric circuit for operating said fan motor; a manual switch for opening and closing said circuit so that said motor may be turned on and off; and a mercury switch on said door in series with said manual switch and adapted to move with said door so as to close said circuit when said door is in an upright position and to open said circuit whenever said door is swung outwardly into a position

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where the fan blades are exposed and would cause injury if contacted.

GEORGE C. MITACEK.
CHARLES T. HAMMONS.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,688,850	Calhoun -----	Oct. 23, 1928
1,792,514	Spear -----	Feb. 17, 1931
2,011,421	Searless -----	Aug. 13, 1935
2,228,201	Cotes -----	Jan. 7, 1941
2,479,906	Cole -----	Aug. 23, 1949