May 17, 1949. J. W. MILLER 2,470,571

FORCED AIR AND GRAVITY CIRCULATING HEATING APPARATUS

Filed Dec. 29, 1945 2 Sheets-Sheet 1

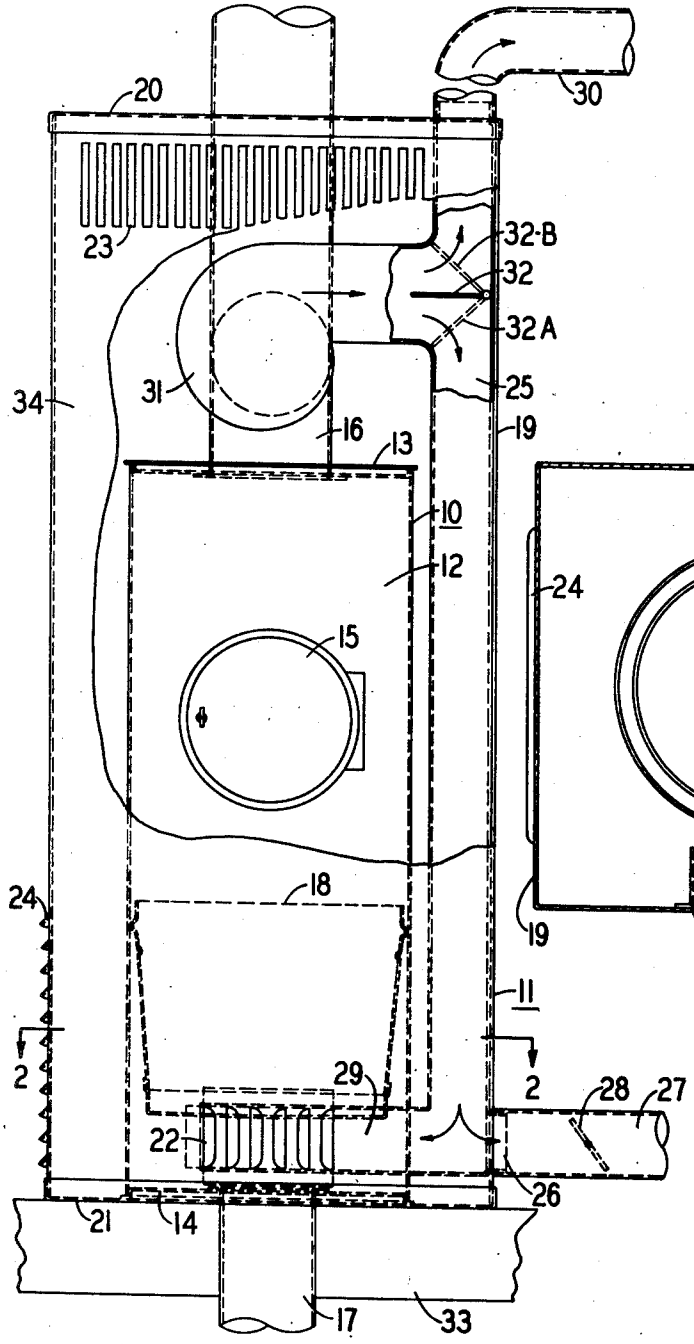


FIG. 1

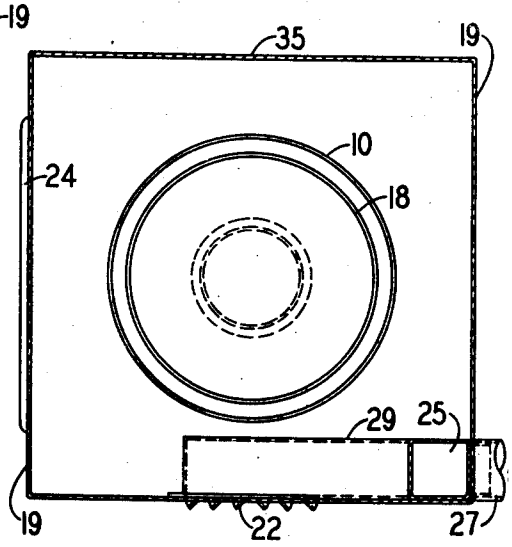


FIG. 2

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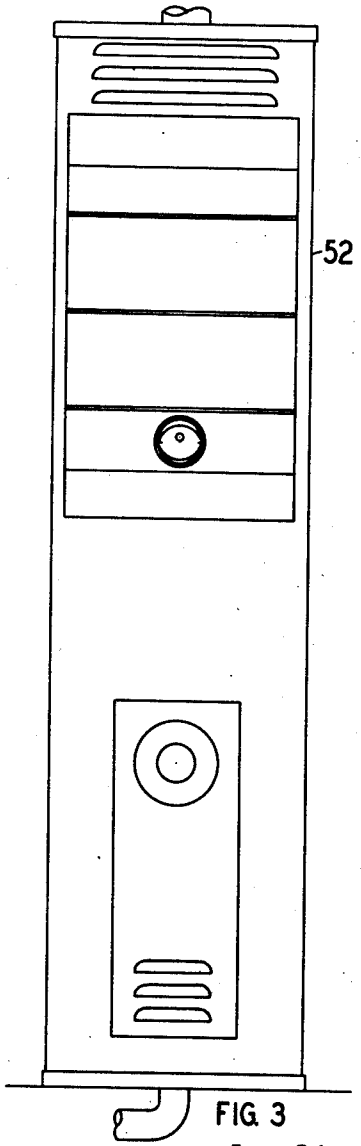


FIG. 3

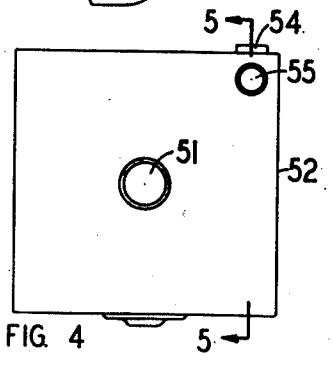


FIG. 4

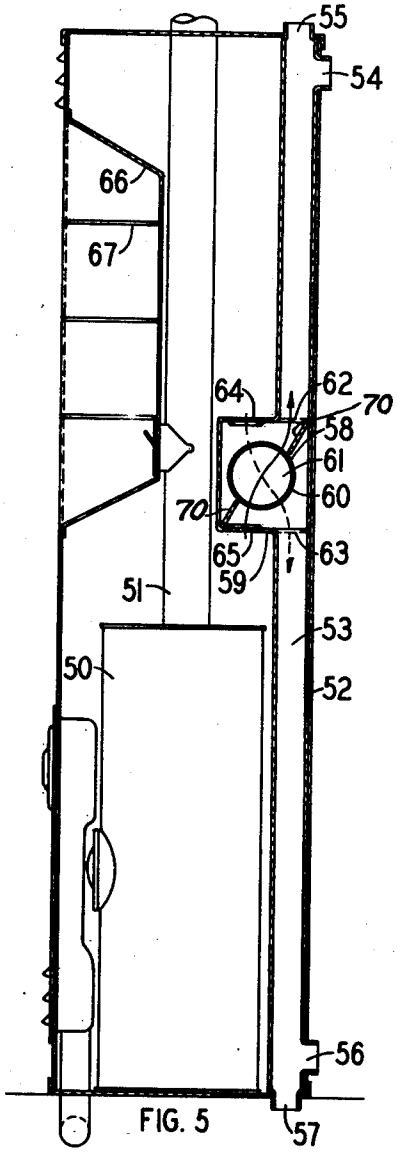


FIG. 5

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UNITED STATES PATENT OFFICE

2,470,571

FORCED AIR AND GRAVITY CIRCULATING HEATING APPARATUS

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Application December 29, 1945, Serial No. 638,152

2 Claims. (Cl. 126—110)

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This invention relates to heating apparatus, and more particularly to combination forced air and gravity circulating heating apparatus for small buildings.

In many small buildings, such as relatively small homes, house trailers and the like, where no basements are provided, a difficult problem of heating the building uniformly by the conventional type of heating apparatus arises. Ordinarily it is the practice to place a small circulating heater in one room of the building which suffices to heat that room. Usually it is not possible to heat other rooms in the building adequately with such heaters.

The principal object of the present invention is to provide a compact circulating heater which can be installed in one room of a building and which is provided with means for forcing warm air to other rooms in the building.

Another object of the invention is to provide such a heater in which provision is made for selectively discharging warm air through ducts arranged adjacent the ceiling or adjacent the floor of the building.

A further object of the invention is to provide such a heater of unitary construction which can be economically manufactured and easily installed in a building.

These objects will more fully appear in the following specification, when read in connection with the accompanying drawings, wherein:

Figure 1 is a front elevational view of a heater embodying the present invention, parts being broken away to more clearly show the construction thereof;

Figure 2 is a cross-sectional view taken on substantially the line 2—2 of Figure 1;

Figure 3 is a front elevational view of a modified form of heater;

Figure 4 is a top plan view of the same; and

Figure 5 is a cross-sectional view taken on substantially the line 5—5 of Figure 4.

Figures 1 and 2 disclose one form of the invention. The heater comprises a heat exchanger 10 substantially completely enclosed within an outer casing 11. The heat exchanger comprises a steel shell having a tubular side wall 12, a top wall 13 and a bottom wall 14. The tubular side wall is provided with an access opening closed by a hinged door 15. The top wall 13 is provided with an outlet opening to which is attached a stack 16 to discharge products of combustion. Preferably the bottom wall is provided with an opening to admit air for combustion to the heat exchanger. A duct 17 is attached to the bottom

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wall 14 around this opening. In the lower portion of the heat exchanger is an oil burner 18, preferably a burner of the vaporizing type.

The casing 11, as shown in Figures 1 and 2, is of generally rectangular configuration. It is made up of two side panels 19, a front panel 34, a back panel 35, a top panel 20 and a bottom panel 21, all of which are attached together in any suitable manner. Preferably the front panel 34 of the casing is provided with louvers 22 adjacent the bottom thereof and louvers 23 adjacent the top thereof. One side panel 19 is provided with louvers 24 adjacent the bottom thereof.

Located within the casing 11 is a vertically extending air duct 25. The lower end of the duct 25 has a short lateral extension 26 projecting out through the side wall of the casing to which a conduit 27 may be attached. The conduit 27 leads to a register in another room. Preferably a conventional pivoted damper 28 is mounted in the conduit 27.

The duct 25 is provided with another lateral extension 29 projecting into the casing 11. The extension 29 has an opening in the front thereof which communicates with the louvers 22 in the front panel of the casing.

The upper end of the duct 25 has an outlet opening at the top of the casing to which a conduit 30 may be attached. This conduit may lead to a register in another room of the building in which the heater is placed, or it may be arranged to discharge directly into the room in which the heater is installed.

A centrifugal fan 31 of the axial intake-radial discharge type is mounted within the casing 11 above the heat exchanger 10. The discharge opening in the fan 31 is connected to an opening in the side of duct 25 adjacent the top of the casing 11. A damper 32 is pivotally mounted at one edge thereof at one side of duct 25. The damper 32 is preferably arranged opposite the center of the discharge opening from the fan 31, as indicated in Figure 1.

The entire heater is shown as being installed on a floor 33 of a building. The duct 17 extends down through the floor 33 and may be connected by an extension, not shown, to the exterior of the building, or it may open directly beneath the floor 33.

It will be evident from the description of the heater that when the latter is in operation and the heat exchanger is hot, some air will circulate by gravity through the casing 11. The air enters the louvers 24, passes over the heat exchanger and is issued through the louvers 23.

Normally the air thus circulated is sufficient to heat the room in which the heater is installed.

In addition, hot air may be discharged from the casing by means of the fan 31 through the duct 25. By arranging the baffle 32 in the downwardly inclined position, indicated in dotted lines 32a, the lower part of the duct 25 is blocked off. The air from the fan then issues through the conduit 30 and is blown to the room to which the conduit 30 is connected. By swinging the damper 32 to its upwardly inclined position, indicated by dotted lines at 32b, the duct 30 will be blocked off. The warm air is then blown downwardly through duct 25 and out through louvers 22, or through conduit 27, or to some extent through both. It is often desirable to be able to discharge warm air adjacent the floor of the building in order to more effectively heat the same. All of the air discharged downwardly through duct 25 may be forced out through louvers 22 by closing the damper 28. It may be desirable to discharge warm air through both duct 25 and duct 30 simultaneously. To effect that result the damper 32 may be set in an intermediate position such as is shown in full lines.

Figures 3 to 5 illustrate a somewhat modified form of the invention. The heating apparatus disclosed in these figures comprises a heat exchanger 50 similar to the one described previously. A stack 51 is connected to the upper end of the heat exchanger and passes upwardly through the ceiling of the building in which the heater is installed.

The heat exchanger is surrounded by a casing 52 of generally rectangular configuration. The casing 52 is relatively tall and may extend to the ceiling of the room in which the heater is installed, if desired. A duct 53 is located in one corner of the casing 52 and extends vertically therethrough. The upper end of the duct is provided with a lateral outlet 54 and a vertical outlet 55. Either or both of these outlets may be connected by suitable conduits to other rooms of the building. Another pair of outlets 56 and 57 are formed adjacent the bottom of the duct 53. Duct 56 may discharge into another room of the building while duct 57 may discharge below the floor and be connected by a conduit to some other space within the building.

A fan 58 is positioned within the casing 52 above the heat exchanger 50. Preferably this fan is of the reversible type disclosed in my prior Patent No. 2,363,191, granted November 21, 1944. Fan 58 comprises a generally box shaped housing 59 having a cylindrical fan casing 60 rotatably mounted therein. A fan 61 of the radial discharge type is rotatably mounted within the casing 60. The housing 59 is provided with outlets 62 and 63 and inlets 64 and 65. The housing is also provided with diagonal baffles 70. By rotating the casing 60 air may be drawn in through inlet 64 and discharged through outlets 63 or it may be drawn in through inlet 65 and discharged through outlet 62, the baffles 70 serving as partition members within housing 59. Thus it will be seen that air can be directed through the duct 53 either upwardly or downwardly as desired.

Because of the relatively great height of the casing 52 it is possible to install therein a small cupboard 66 having shelves 67. The walls of the cupboard preferably are formed of metal so that the cupboard will be relatively warm and may be used for storage of such articles as it is desired to keep warm and dry.

From the foregoing it will be seen that the present invention provides a compact and economical unitary heater for a small dwelling that can be utilized to distribute heat uniformly throughout the dwelling. The heater is arranged so that warm air can be discharged either along the floor, which is usualy desirable in house trailers, or into the upper part or parts of the various rooms. The air circulating system can also be used to circulate air during warm weather when the heater is not operating, in order to maintain relatively comfortable temperatures within the dwelling.

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

I claim:

1. In a heater of the circulating type including a heat exchanger and a casing enclosing said heat exchanger in spaced relation thereto, said casing having openings therein at the top and bottom thereof for the circulation of air therethrough by gravity; the improvement which comprises, in combination, an air duct attached to said casing, said air duct having an inlet opening and a pair of spaced apart outlet openings communicating therewith exteriorly of said heat exchanger, said outlet openings being located adjacent the top and bottom of the heater respectively and being adapted for connection with conduits leading to rooms remote from the room in which said heater is located for conducting heated air to said remote rooms, an air circulating fan in said casing, said fan being located adjacent the top of the heat exchanger and arranged to discharge air from said casing into said duct through said air inlet opening, and a baffle in said duct, said baffle being adjustable in said duct to two extreme positions to divert air entering said air inlet opening selectively toward one or the other of said outlet openings for selectively heating one of said remote rooms.

2. A combination as defined in claim 1 wherein said baffle is adjustable to a position intermediate said extreme positions whereby to divert air to both of said outlet openings.

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