

July 15, 1952

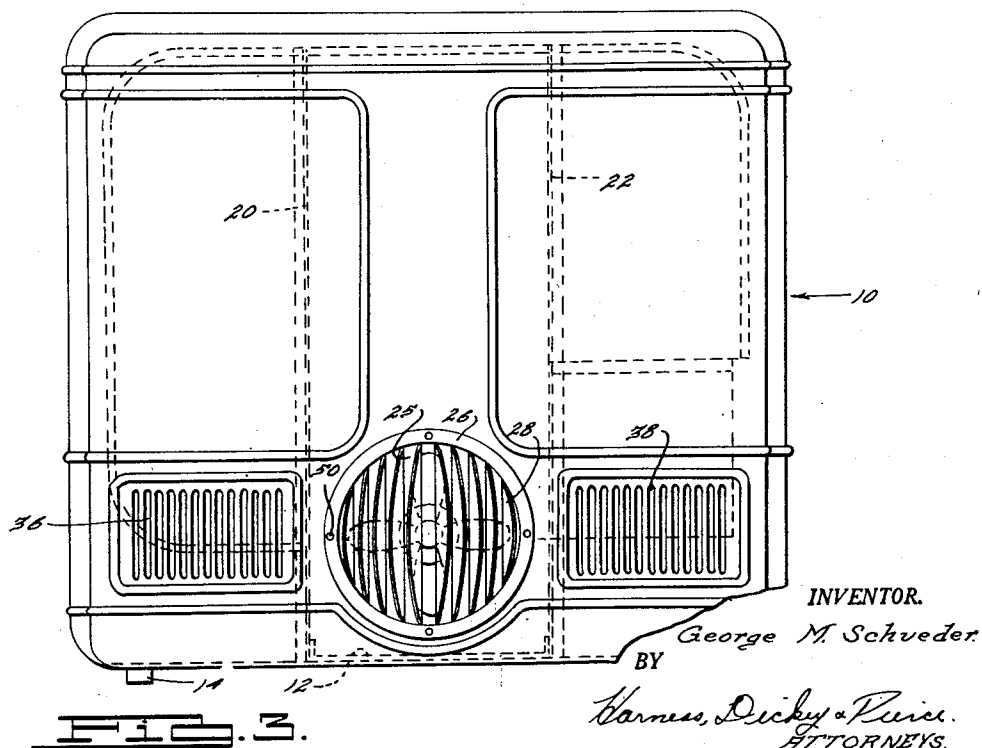
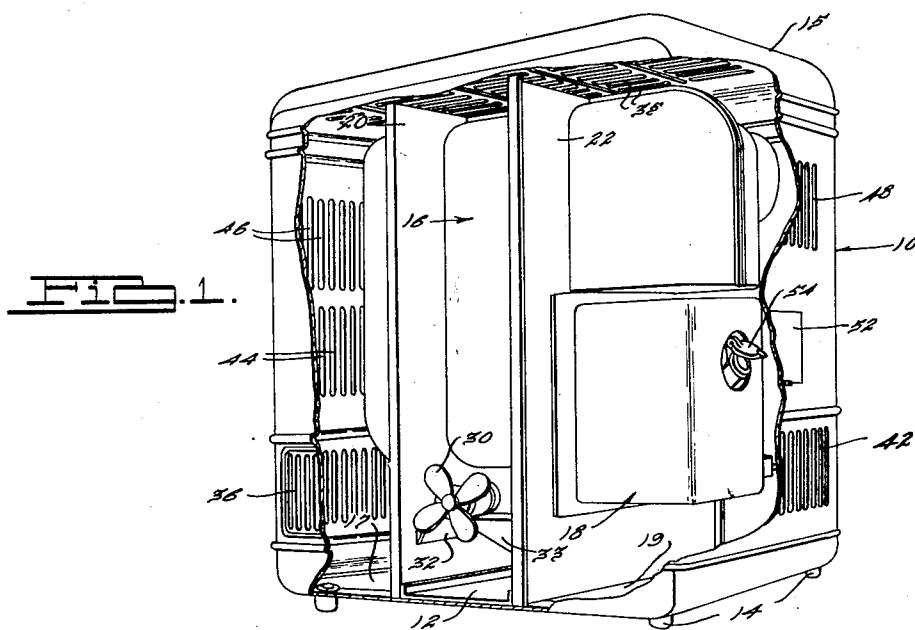
G. M. SCHUEDER

2,603,205

FUEL BURNING SPACE HEATER

Filed June 29, 1948

3 Sheets-Sheet 1



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3 Sheets-Sheet 2

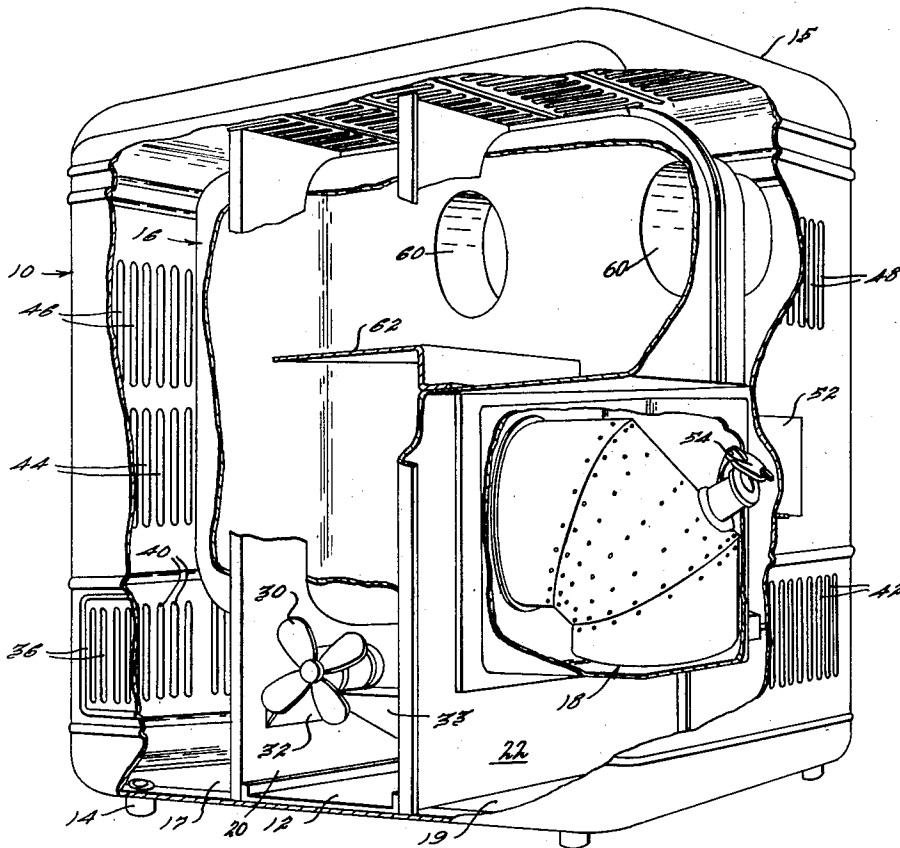


FIG. 2.

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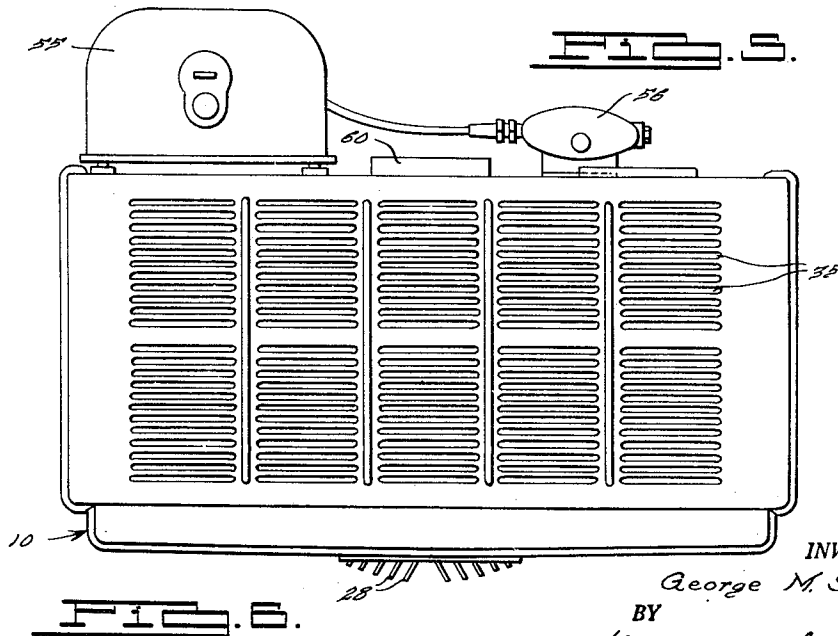
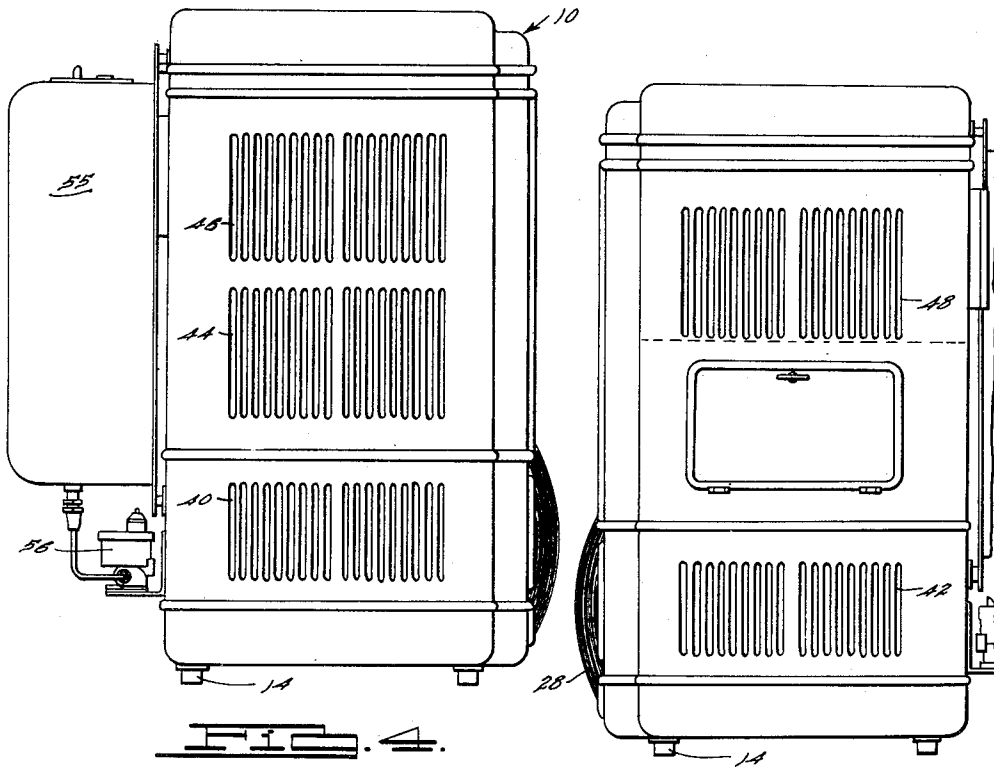
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UNITED STATES PATENT OFFICE

2,603,205

FUEL BURNING SPACE HEATER

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Application June 29, 1948, Serial No. 35,917

5 Claims. (Cl. 126-110)

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The present invention relates to heating apparatus and more particularly to space heaters of the so-called self-contained cabinet type widely used for the heating of relatively small areas such as individual rooms, small homes, stores, and the like. The invention constitutes a further development of that disclosed and claimed in United States Patent No. 2,268,778 granted January 6, 1942, and is illustrated as utilizing a generally horizontally discharging vaporizing pot burner embodying the invention disclosed and claimed in the copending application filed jointly by the present applicant and Harrison P. Zimmer, Serial No. 740,454 filed April 9, 1947.

An important object of the invention is to provide an improved space heater of the indicated variety incorporating novel means whereby effective forced discharge of a portion of the heated air is provided at a level close to but spaced above the floor and in a direction parallel to the floor. A related object is to achieve such a floor-heating blast by novel, improved means which does not prevent the heater from functioning at the same time as a radiant and convection type heater which always delivers a part of its output in the form of radiant heat and a part through the agency of heated air circulated by natural convection, the radiant and convection heating means being operative whether or not the forced-blast floor heating means is in operation. A further object is to provide such a combined radiant, circulating and forced air heater wherein the apportionment of that part of the air which is directed outwardly across the floor in a generally horizontal direction and that which flows upwardly under natural convection is such as to afford improved overall space heating characteristics, the comfort of a warm floor being achieved with the use of a smaller blower unit than it has heretofore been feasible to incorporate in circulating heaters having floor heating forced blast means. The ability to use a smaller blower entails important advantages in that the blower unit may not only be less expensive, but by reason of its smaller size may also be quieter in operation and less costly to operate (by reason of its lower current consumption).

Another object is to provide such a heater having improved characteristics in convection heating and in forced air heating, the floor heating forced draft means above referred to being so designed that when the blower is not operating, all portions of the apparatus may function to provide convection heating, so that the portions of the heat exchanging apparatus over which air

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is normally caused to flow by the blower means may be efficiently utilized whether or not the blower is operating. In this connection it has been found that the users of heaters of this class commonly keep the blower unit shut off except in very severe weather, since the heater is less expensive to operate when the blower is not running, and the floor heating blast is under most conditions not required except in severely cold weather. With my improved heating construction the overall efficiency of the unit is not impaired by the presence of the forced air means when the forced air means is not operating.

Other and more detailed objects and advantages of the invention will become apparent upon consideration of the present disclosure in its entirety.

In the drawing:

Figure 1 is a perspective view, with a part of the cabinet broken away, of a preferred embodiment of the invention;

Fig. 2 is a similar perspective view but with a part of the combustion and heat exchanging means also broken away;

Fig. 3 is a front elevational view, also partly broken away;

Figs. 4 and 5 are left end and right end elevational views respectively; and

Fig. 6 is a top plan view.

Referring now to the drawing, reference character 10 designates generally a sheet metal cabinet adapted to be supported above the floor or other supporting surface as by relatively short feet 14. The front and end walls of the cabinet are provided with a plurality of grille-defining slotlike openings, as also is the top or cover portion 15 of the cabinet.

Spacedly supported within the cabinet is a heat exchanger assembly which preferably, but not necessarily, corresponds to that disclosed in the copending application filed by the present applicant jointly with Ramond M. Krokus and Paul A. Tracht, Serial No. 36,738, filed July 2, 1948. The heat exchanger, generally designated 16, comprises a sealed sheet metal envelope so supported as to be internally spaced from all of the cabinet walls. The heat exchanger envelope 16 forms part of a combustion unit which also includes a burner assembly, generally designated 18, which preferably, although not necessarily, corresponds to that disclosed in the aforementioned copending application Serial No. 740,454. The heat exchanger and burner are rigidly united and the supporting means for the complete combustion unit includes a pair of vertical panels

20 and 22 also formed of sheet metal and extending from front to back of the cabinet, panels 20 and 22 having continuously sealed connection with the front and rear walls of the cabinet as well as with the outer surface of the heat exchanger envelope 16. It will be appreciated that these lines of juncture between the panels and cabinet and between the panels and envelope may be sealed and rendered firm by welding or other appropriate means. The bottoms of the panels 20 and 22 are tightly joined to a bottom panel 12, and the panels 12, 20 and 22 together with the front and rear walls of the cabinet form a box or central chamber enclosing a portion only of the envelope 16, the box thus defined being open at its top at a level approximately in horizontal alignment with the top of the heat exchanger and spacedly beneath the foraminous cover 15. No openings are formed in the portions of the front and back walls of the cabinet which define the front and back walls of the box with the exception of a single lowered opening 25 of generally circular form provided in the front wall near the bottom and which defines the floor level air discharge opening. A convex unitary sheet metal grille assembly 26 is mounted in the opening 25 formed in the front wall of the cabinet and carries the integral, vertically disposed sheet metal louvers 28. Louvers 28 diverge outwardly to direct the air laterally as well as forwardly and are so arranged as to distribute such air substantially uniformly throughout a wide angle in front of the heater.

The blower means may comprise a conventional electric fan of relatively small size, designated 30, mounted behind the grille 26, as upon supporting brackets 32 and 33 carried by the panels 20, 22 respectively, the fan being so positioned as to direct air outwardly through the slotlike openings 25 between the louvers. As pointed out above, the louvers 28 may be formed as part of an integral grille assembly, and are so angularly disposed as to deflect the blast from the fan laterally, over a wide area in front of the cabinet. Since when the fan is running the only air inlet to the downdraft air box is at the top, and the heat exchanger is spaced above the bottom of the unit, the air is drawn downwardly over the front and rear walls of the envelope 16 between the panels 20, 22 and heated during such downward passage so that the forced air blown outwardly from the cabinet by the fan 30 serves to effectively warm the portion of the heated zone along and close to the floor level, where, as above indicated supplemental heating in excess of that obtainable by direct radiation and natural convection is particularly desirable, especially in severely cold weather.

Inasmuch as the panels 20, 22 terminate at their tops approximately at the same level as the top of the heat exchanger envelope, some of the air drawn downwardly by the fan 30 may comprise air which has been heated while passing upwardly under the influence of natural convection over the end portions of the heat exchanger envelope in the side chambers between the partitions 20 and 22 and the sides of the cabinet, while a part of the downdraft air may also be drawn through the top grille openings 35. A pre-heating effect of at least part of the downdraft air is thus achieved. A counterflow principle which promotes more efficient heat transfer is also involved in the heating of the downdraft air, for the reason that the hottest portions of the envelope 16 are at the bottom and the tempera-

tures therefore increase in the direction of flow.

The burner 18 discharges horizontally directly into the lower portion of the heat exchanger envelope, as best shown in Fig. 2, and a horizontal baffle 62 within the envelope forces the gases of combustion to return upon a second horizontal pass before reaching the stack or flue outlets 60. The lower portions of the heat exchanger are therefore hottest, and the greatest percentage of the radiant heating occurs at a low level, which is highly desirable. Also as a result of this arrangement the air delivered by the fan 30 is at a more elevated temperature than the air flowing upwardly from the top of the cabinet under the influence of natural convection. Although such floor level air is highly heated, as indicated, it is not directed downwardly against the floor itself. Accordingly no undesirable heating of the floor to a degree which might harmfully affect certain types of floor coverings or cause undue drying will result. The blast from the fan emerges substantially horizontally and within the space of a few inches from the face of the grille 26 becomes so mixed with the atmosphere that its temperature is reduced to a level such that no floor damage would be caused in any event.

The bottom of the cabinet may be open in its areas outside the downdraft box space, as indicated at 17, 19 so that the convection heating portions of the assembly located in the side chambers on either side of the centrally disposed downdraft box are in effect open at the bottom for free admission of air from the floor. Air from a low level is also admitted to the cabinet through two series of grille slots 36, 38 formed in the front wall upon either side of downdraft box space and preferably in horizontal alignment with the lowered slots 25. Similar convection air inlet grilles as 40, 42 are formed in the end walls, while the end walls are also provided with a plurality of successively higher tiers of slots formed as indicated at 44, 46, and 48 in Figs. 4 and 5. It will be appreciated that the total area of the grille-defending slots is such that a large amount of radiant heating of the served area is afforded as well as free flow of air for heat transference by convection. Except to the extent of such downflow as is induced by the fan 30, the upflowing air heated by convection flows from the heater through the top slots 35.

The front grille assembly 25 may be removably secured in place as by means of sheet metal screws 50, and it will be appreciated that removal of this grille assembly permits ready access to the fan and its driving motor for any servicing, inspection or cleaning which may become necessary.

Access to the burner for lighting and inspection may be had through a sheet metal door 52 carried in the burner end of the cabinet, and through an inner cover 54 carried by a tubular neck projecting from the burner to a position accessibly located behind the door 52. For further details of the specific burner depicted, reference may be had to application Serial No. 740,454 above referred to, although it will be appreciated that any other suitable burner of the horizontally discharging type known in the art might be used rather than the specific form in question.

Other conventional appurtenances and portions of the heating unit depicted in the drawing and which will require no detailed description herein since they form no part of my present invention include a fuel tank 55 indicated as carried by the back wall of the heater and a float control valve

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assembly generally designated 56 also mounted on the back wall. It will be appreciated that in the ordinary mode of installation of heaters of this class such devices are hidden from view, since the rear wall is placed against and close to the chimney or flue-containing wall of the room in which the heater is installed.

It should further be observed that when the heater is operated with the fan shut off, air may enter the downdraft box through the front grille 26, and flowing upwardly through the box absorbs heat from the heat exchanging surface therewithin. The heat absorbing surface is of course augmented by the panels 20, 22. The air flowing upwardly through the box escapes from the top through grille openings 35, so that all portions of the heat exchanger may under such condition serve as convection heating surface. This is particularly desirable in view of the fact that, as above indicated, the users of heaters of this class frequently desire to operate them without the forced draft means. With my improved construction no heating surface is wasted during operation of the unit with the fan idle, while when the fan is operating the unit continues to function also as a convection heater and only so much forced draft heating is introduced as is necessary for adequate floor level heating. This is to be distinguished from the arrangement disclosed in the above mentioned Patent No. 2,268,778, issued to me jointly with Eugene F. Farrell, wherein when the fan is operating upward airflow is discontinued and the unit entirely ceases to function as a convection heater. It will be appreciated that with my improved construction herein disclosed it is possible to use a smaller fan which is less expensive both in first cost and in operation and which is also inherently quieter by reason of its smaller size.

While it will be appreciated that the preferred embodiment of the invention herein disclosed is well calculated to fulfill the objects and attain the advantages previously indicated, it will be apparent that the invention is susceptible to variation and modification without departing from the fair meaning and proper scope of the subjoined claims.

I claim:

1. In a space heater, the combination of a cabinet having opposite side walls and front and rear walls and a floor, vertical partitions in said cabinet extending from the front to the rear walls and from the floor to adjacent the top of the cabinet, said partitions serving to divide said cabinet into side chambers located between said side walls and said partitions and into a central chamber located between the partitions, heating means in the cabinet including a heat exchange drum mounted on the partitions above the floor and extending to adjacent the top of the cabinet, said drum having a bottom portion of substantial area located in said central chamber, said drum also having a substantial portion located in one

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of the side chambers, natural circulation air inlet and air outlet means in the cabinet for said one side chamber, burner means in the other of said side chambers and discharging heated gases into said drum, means in said drum for directing flame and heated gases from said burner means forwardly along the bottom of the drum, flue outlet means for the drum, the partitions and the front and rear wall portions which define said central chamber being substantially imperforate except for a common natural circulation air inlet and forced circulation air outlet opening in the front wall on a level adjacent the bottom of the drum, means at the top of the cabinet providing a common forced circulation air inlet and natural circulation air outlet for said central chamber, and blower means in said central chamber under the drum for forcing air from the space between the floor and bottom of the drum across the bottom of the drum and out of the opening in the front wall.

2. The invention set forth in claim 1 wherein said drum has a substantial portion located in the other side chamber above the burner means, and including natural circulation air inlet and outlet means in the cabinet for said other side chamber.

3. The invention set forth in claim 2 wherein said flue outlet means is located in the drum portion in said other side chamber.

4. The invention as set forth in claim 1 wherein the natural circulation air outlet means for said side chamber and the means providing a forced circulation air inlet for the central chamber are both located adjacent the top of the partition separating the side chamber and central chamber whereby said blower means may pull heated air from the side chamber into the central chamber.

5. The invention as set forth in claim 1 wherein said blower means comprises a fan mounted by brackets on said partitions and is the only structure in said central chamber between the bottom of the drum and the floor.

GEORGE M. SCHUEDER.

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