

Oct. 17, 1944.

J. E. LEONARD

2,360,611

FIREPLACE AIR CIRCULATING HEATER

Filed Nov. 18, 1940

2 Sheets-Sheet 1

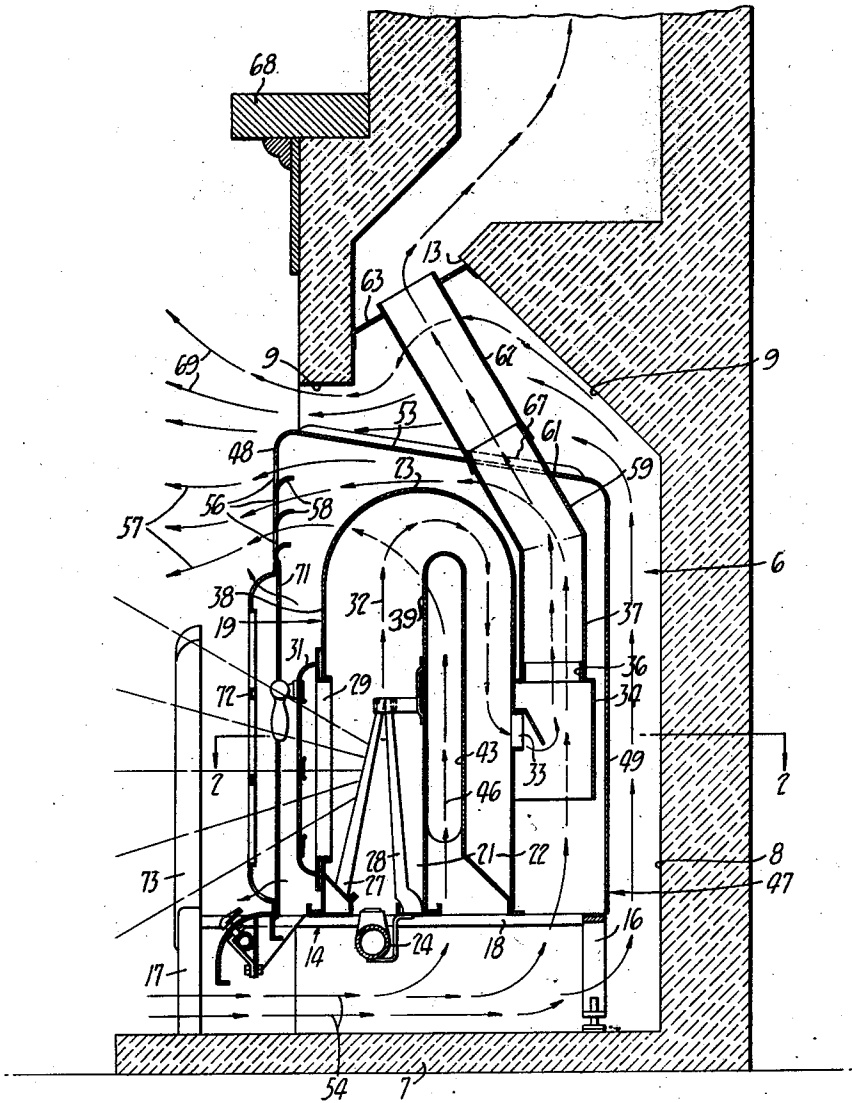


FIG. 1

INVENTOR
Joseph E. Leonard
BY Joseph B. Gardner
ATTORNEY

Oct. 17, 1944.

J. E. LEONARD

2,360,611

FIREPLACE AIR CIRCULATING HEATER

Filed Nov. 18, 1940

2 Sheets-Sheet 2

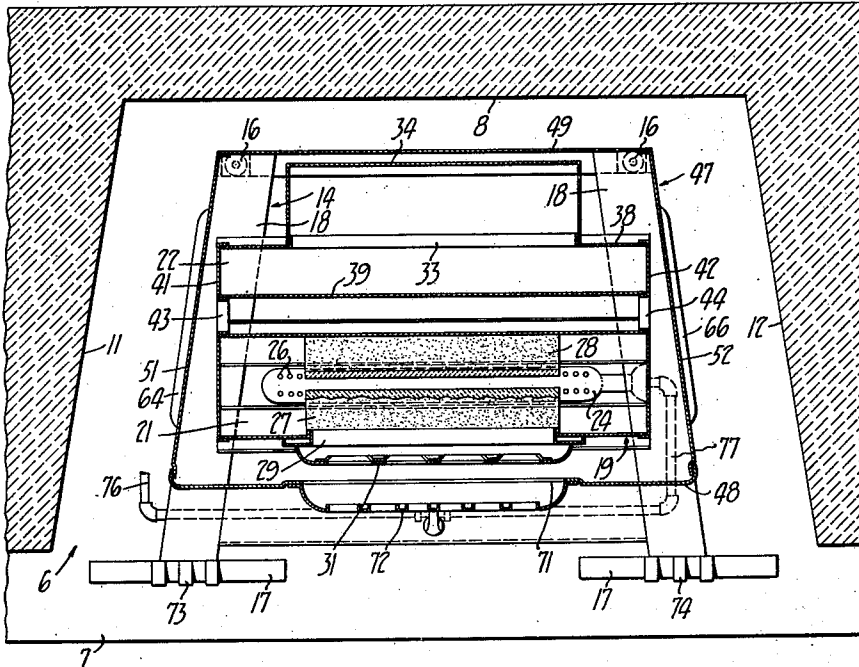


FIG. 2.

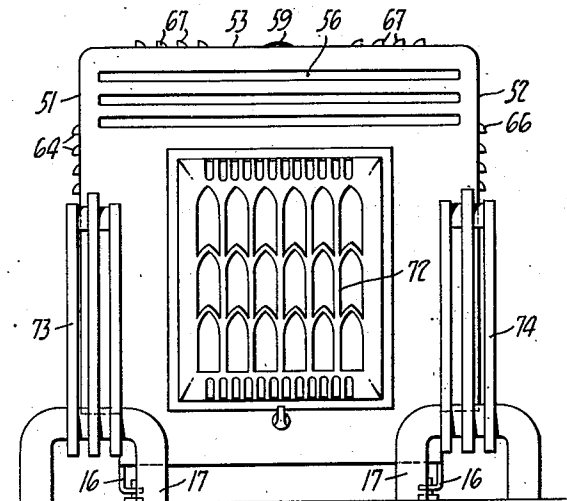


FIG. 3.

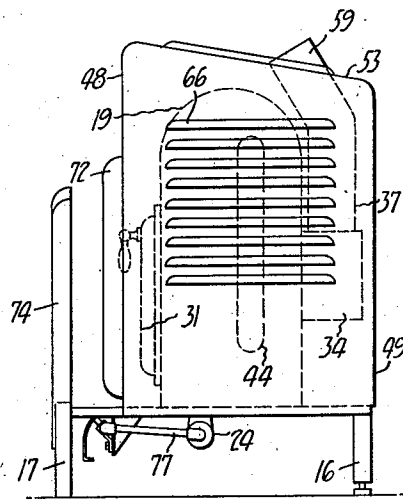


FIG. 4.

INVENTOR
Joseph E. Leonard
BY Joseph B. Sander
ATTORNEY

UNITED STATES PATENT OFFICE

2,360,611

FIREPLACE AIR CIRCULATING HEATER

Joseph E. Leonard, Berkeley, Calif.

Application November 18, 1940, Serial No. 366,033

4 Claims. (Cl. 126—121)

The invention relates to air circulating heaters and a principal object of the present invention is to provide an air circulating heater which is particularly designed and constructed for use in a fireplace chamber and which utilizes the walls of such chamber for providing air passages for circulating warm air into the adjacent room.

Another object of the invention is to provide an air circulating heater of the character described which is designed to obtain a maximum heating capacity in a minimum over-all size of the unit so arranged and formed to fit into a fireplace chamber to obtain the cooperative function above noted.

A further object of the invention is to provide a circulating heater of the character above which will provide an attractive appearance when installed in a fireplace and which embodies a radiant type burner and heater capable of supplying large amounts of direct visible radiant heat from the front of the unit simulating an ordinary fire in the fireplace chamber.

The invention possesses other objects and features of advantage, some of which, with the foregoing, will be set forth in the following description of the preferred form of the invention which is illustrated in the drawings accompanying and forming part of the specification. It is to be understood, however, that variations in the showing made by the said drawings and description may be adopted within the scope of the invention as set forth in the claims.

Referring to said drawings:

Figure 1 is a vertical sectional view of an air circulating heater constructed in accordance with the present invention and shown operatively positioned within a fireplace chamber.

Figure 2 is a plan sectional view of the unit taken on substantially the plane of line 2—2 of Figure 1.

Figure 3 is a front elevation of the air circulating heater illustrated in Figures 1 and 2.

Figure 4 is an end elevation of the heater illustrated in Figure 3.

The present invention combines an air circulating heater with a fireplace opening or chamber in such a manner as to utilize the walls of the fireplace opening, together with the walls of the heater unit to define air passages for circulating warm air into the adjacent room. The heater unit consists briefly of a heater shell and a surrounding casing spaced from the shell to define an air heating passage and the casing is itself spaced from the walls of the fireplace opening to define a second set of air passages and the

arrangement is such as to directly heat the fireplace walls from the heater shell by radiant heat whereby a highly efficient circulation of warm air is produced.

Referring more specifically to the accompanying drawings, the air circulating heater of the present invention is shown operatively positioned in the opening or chamber 6 of a fireplace, which chamber is defined by a bottom wall 7, rear wall 8, top wall 9 and end walls 11 and 12. The top wall 9 of the chamber is formed with a flue discharge opening 13 in the usual manner. The air circulating heater which is adapted for mounting in the fireplace chamber consists of a plurality of casings and parts generally assembled and supported on a base frame 14 having depending rear legs 16 and depending front legs 17. Mounted on the frame 14 as by means of channel members 18 extending across the frame, is a heater shell 19 which in the present construction is of inverted U-shape form having a forwardly positioned vertically extending chamber 21 and a rearwardly positioned vertically extending chamber 22, the shell having a connecting portion 23 joining the chambers 21 and 22 at the upper ends thereof. With reference to Figure 2, it will be noted that the chambers 21 and 22 extend transversely for a majority of the width of the unit and as here shown, the forward chamber 21 is of somewhat greater cross-sectional area than the chamber portion 22. The forward chamber portion 21 is open at the bottom end thereof and mounted therebelow in accordance with the present construction is an elongated gas burner 24 which is formed on the top side thereof with a plurality of gas ports 26 for directing vertical jets of flame into the lower end of the chamber 21. In order to increase the burning efficiency of the unit and to provide a radiant glow of heat and light, I prefer to mount a pair of refractory members 27 and 28 over the burner 24 which during the course of operation of the unit are heated to incandescence. A window opening 29 is formed in the front wall of the shell adjacent the refractory members 27 and 28 so as to permit direct radiation of heat and light exteriorly of the shell. Preferably a grill member 31 is mounted at the front of the shell for supporting a transparent pane of mica, glass or the like across the opening 29. The products of combustion travel upwardly from the burner through the chamber portion 21, as indicated by the series of arrows 32, through the connecting portion 23 and then downwardly in the rear chamber portion 22 to a vent opening 33 in the rear wall of the cham-

ber portion 22, wherein the products may escape into a flue box 34 carried on the rear wall of the shell. Preferably the flue box 34 is open at the bottom thereof to prevent any back-drafts in the chimney from affecting the operation of the unit and is formed at its upper end with a discharge neck 36 adapted to receive an end of a flue pipe piece 37. As will be clear from Figures 1 and 2, the heater shell has been designed to obtain a relatively long travel of the heated products of combustion in the shell and the latter is constructed in a manner permitting its ready and inexpensive manufacture. With regard to the latter feature, it will be noted that the entire shell may be constructed from flat strips of sheet metal. One strip 38 is bent and curved to define the forward wall of the chamber part 21 and the rear wall of the chamber part 22 and the top wall of the connecting chamber 23. A similar strip 39 of sheet metal is bent and curved to provide the rear wall of chamber 21, the forward wall of chamber 22 and the lower side of connecting chamber 23. These two strips of sheet metal are secured at their edges in end plates 41 and 42, see Figure 2, which are stamped to provide receiving flanges for the edges of the strips 38 and 39 and which are preferably punched to provide openings 43 and 44 communicating with the space between the rear wall of chamber 21 and the front wall of chamber 22, thereby permitting a circulation of air through this space, as indicated by the series of arrows 46. In this manner a relatively great amount of heat transfer area is provided by the chamber for direct transfer of heat from the walls thereof to the surrounding air, and the exterior of the shell is smooth and streamlined for most efficient movement of air thereover.

In accordance with the present construction a circulating air passage is provided around the shell 19 by enclosing the latter within an exterior casing 47 which is supported upon the base frame 14 and includes front, rear, end and top walls 48, 49, 51, 52 and 53 respectively which are each spaced from the corresponding walls of the combustion shell. As will be seen from Figure 1, the outer casing 47 is open at the bottom thereof and is held in an elevated position by the frame 14 so as to enable cold air, denoted by arrows 54, to pass thereunder and up through the vertical spaces provided between the several walls of the casing and the corresponding walls of the heater shell. Also the casing is formed with a plurality of air discharge openings 56 in the front wall 48 thereof adjacent the top of the wall to provide an exit means for the air heated in the several passages, the warm air discharging through these openings being here indicated by the series of arrows 57. If desired the openings 56 may be formed with louvres or vanes 58 for guiding and directing the discharging warm air.

As an important feature of the present construction, the flue box 34, mounted on the rear wall of the combustion shell, is contained within the rear wall 49 of the exterior casing and the products discharge conduit 37 is extended upwardly from the flue box within the casing and is provided with a forwardly tilted or inclined part 59 which projects through an opening 61 provided in the top wall 53 of the casing so that the axis of the discharge conduit at the top of the unit is inclined forwardly to facilitate connection of the conduit, as by means of a length of stove pipe 62, into the flue opening 13 of the

fireplace. In other words, the flue conduit is contained entirely within the unit and is inclined forwardly as the same projects through the top thereof to conform to the shape of the forwardly inclined rear top wall 9 of the fireplace, whereby a single straight length of stove pipe 62 may be used for connecting the conduit part 59 into the fireplace flue opening 13. Preferably a sealing plate 63 is mounted in the flue opening 13 surrounding the pipe 62 so as to seal off the air space around the casing from the flue.

As above noted, one of the principal features of the present construction is the utilizing of the walls of the fireplace to form air passages for the circulation of warm air into the adjacent room. As here shown, this is effected by spacing the walls of the exterior casing 47 from the corresponding walls of the fireplace so as to define air circulating passages therebetween. In order to accommodate the casing to the usual form of fireplace chamber, the end walls 51 and 52 of the casing are tapered rearwardly of the unit so as to generally conform to the rearwardly tapering form of the end walls 11 and 12 of the fireplace. Likewise, the top wall 53 of the casing is preferably sloped downwardly towards the rear thereof so as to conform to the general downward slope of the top wall 9 of the fireplace opening. In this manner a complete air space is provided around the exterior casing between such casing and the walls of the fireplace and likewise, a space is provided between the top wall 53 of the casing and the top wall 9 of the fireplace opening. In the operation of the unit, heat absorbed by the outside casing will be transferred to the air in these passages to promote an efficient circulation of air therethrough. In order to further increase this circulation, openings are formed in the exterior walls of the outer casing adjacent to the fireplace walls whereby heat will be directly radiated from the heater shell to the fireplace walls for transfer to the circulating air. As will be seen from Figures 1, 2 and 4, the end walls 51 and 52 of the casing are formed with a plurality of openings 64 and 66 and the top wall 51 is formed with a plurality of openings 67 for this purpose. In addition, these openings also serve as discharge openings for air heated within the casing 47. Of importance also is the fact that the bottom of the outer casing 47 is left open so as to cause a direct downward radiant heating of the bottom wall 7 of the fireplace, which heat is in turn transferred to the cold air passing thereover. By reason of the fact that fireplace walls are usually made of a refractory material such as brick or the like, these walls will conserve and maintain their heated condition for a substantial length of time after the fuel supply to the burner has been shut off and promote a gentle circulation of warm air into the room.

In accordance with the present arrangement, the air discharged from the front openings 56 in the casing 47 is of a substantially higher temperature than the air discharged from the front of the unit between the top of the casing and the top wall of the fireplace. One of the previous disadvantages of positioning an air circulating heater at the fireplace opening has been due to the fact that heated air passed upwardly across the front wall of the fireplace and in time dried out and deteriorated any wooden members thereon, such as the usual mantle 68. In the present construction, air streams 69 issuing from the space between the top of the casing

and the top of the fireplace are of sufficiently low temperature as to in no way injure the mantle 68 and this air traveling upward across the front of the fireplace serves as an insulating blanket and prevents contact of the more intensely heated air with the mantle.

Preferably, and as aforementioned, the construction of the assembly is such as to supply a relatively large amount of radiant heat to the front of the heater unit which will provide an advantageous warming of the floor and surrounding area at the front of the fireplace and also simulate the lively and attractive effect of the usual open fire in a fireplace. In the present construction the front wall 48 of the casing 47 is formed with a relatively large opening 71 which registers with the opening 29 in the front wall of the combustion shell, whereby the radiant glow of the refractory members 27 and 28 may be transmitted through the front of the casing. Preferably, an ornamental grill 72 is mounted across the opening 71.

Preferably, in order to provide a guard at the front of the heater, the forward legs 17 of the base frame are provided with vertically extending portions 73 and 74 which desirably extend up at least to a middle portion of the height of the outer casing 47. Desirably, these upwardly extending portions 73 and 74 are positioned adjacent to the transverse sides of the heater casing, as viewed in Figures 2 and 3, so that the same partially conceal the space between the sides of the heater casing and the side walls of the fireplace and particularly conceal the gas pipe installation connections 76 and the pipe connection 77 leading to the gas burner. As a feature of ornamental design, the guards 73 and 74 are preferably fashioned to simulate andirons so as to provide an attractive front appearance for the assembly.

While a gas burner has been used as a source of heat in the present construction, it will be clear that any other source of combustible fuel or electricity may be used for heating the inner shell of the unit.

I claim:

1. In combination with a fireplace having a fireplace opening and a fireplace recess provided with end and rear walls and a flue opening in the top thereof, an air circulating heater comprising, a heater shell, a burner mounted to heat the interior of said shell and to discharge its products of combustion into said shell, a flue pipe connecting said shell to said flue opening, means closing said flue opening about said pipe to prevent passage of air into said flue, a casing surrounding said heater shell in spaced relation to define a vertical air space therebetween for circulating heated air therethrough, said casing having provided in its walls adjacent the top and bottom thereof openings for inlet and discharge of air, said casing and shell being mounted within said fireplace recess with the walls of said casing spaced from the walls of said fireplace recess to define a second vertically ex-

tending air passage and top and bottom passages communicating therewith and with the atmosphere at the fireplace opening, said flue pipe extending through said top passage whereby the products of combustion passing from the shell to the flue opening may heat the air in said passage.

2. In combination with a fireplace having bottom, end, rear and top walls and a flue opening in said top wall, an air circulating heater comprising, a heater shell mounted in said fireplace, a burner mounted to heat the interior of said shell and to discharge its products of combustion into said shell, a flue pipe connected to said flue opening, a casing surrounding said shell in spaced relation to define an air circulating passage therebetween and having openings adjacent the bottom and top thereof to the exterior of said casing for introduction and discharge of air into and from said passage, said casing having rear and end and top walls mounted adjacent to but spaced from said fireplace rear and end and top walls so as to define air passages therebetween and being mounted in spaced relation above said fireplace bottom wall so as to provide a complete air passage across the under-side of said casing and up the rear and end sides thereof and across the top, said end and top walls of said casing being formed with openings therethrough for passage of radiant energy from said shell to said fireplace walls.

3. In combination with a fireplace recess having end and rear walls and a flue opening in the top thereof, an air circulating heater comprising a combustion shell, a flue therefor extending to said fireplace flue opening, means sealing said flue in said flue opening, and a casing surrounding said shell in spaced relation thereto and in spaced relation to the walls of said fireplace recess to define vertically extending air passages between said casing and shell and between said casing and fireplace recess walls, said casing having openings in certain of the walls thereof for the transfer of radiant heat energy from the shell to the recess walls and for the transfer of the heated air from the passages between the shell and casing to the passages between the casing and the recess walls.

4. In combination with a fireplace having side walls defining a fire chamber, an air circulating heater mounted in said chamber and comprising, a base frame having front and rear depending legs, inner and outer casings mounted on said frame in spaced relation to each other to define an air circulating passage, burner means for heating the inner of said casings, said outer casing being mounted in spaced relation to the side walls of said fireplace, and guard means extending vertically from said front legs and positioned forwardly of the front wall of said outer casing and covering at least a part of the space between said heater and fireplace side walls.

JOSEPH E. LEONARD.