Feb. 23, 1937. J. E. LEONARD 2,072,048

HEATER

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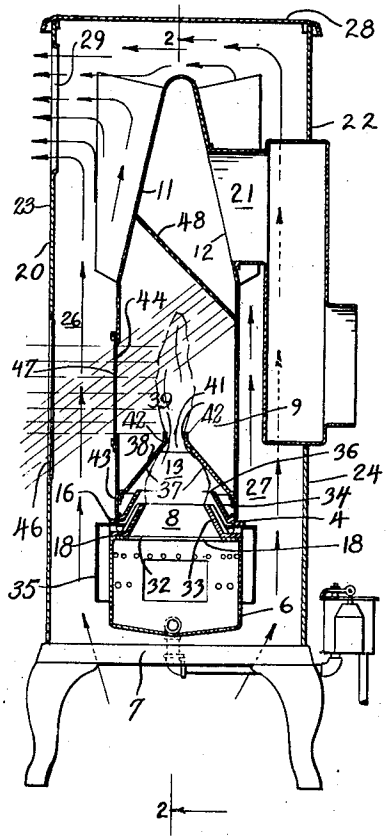


Fig. 1.

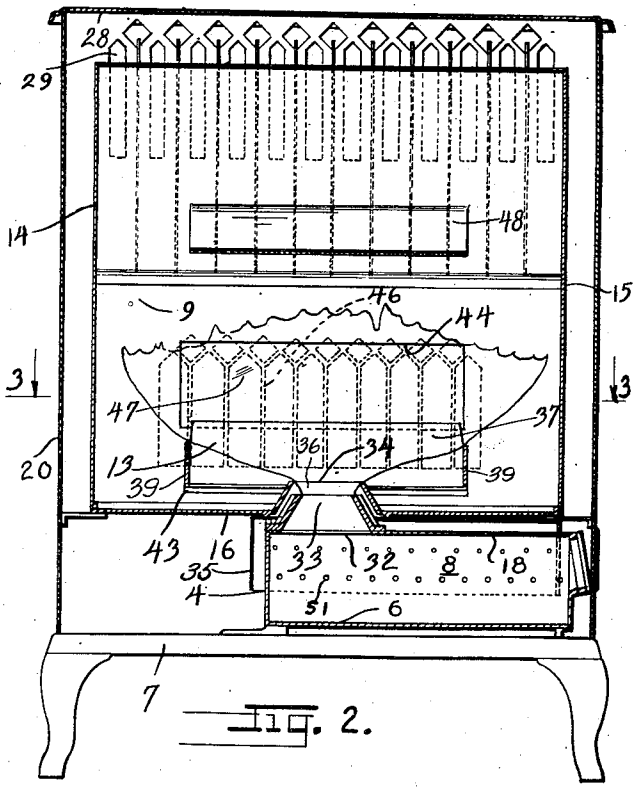


Fig. 2.

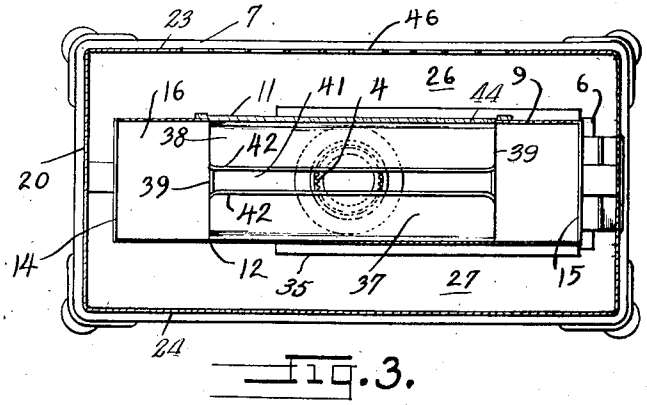


Fig. 3.

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HEATER

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4 Claims. (Cl. 126—93)

The invention relates to air circulating heaters, and particularly to the type which may be operated with gas or liquid fuel.

An object of the invention is to provide an air circulating heater which will afford complete warmth at the front of the heater from and at the floor of the room to the more elevated levels of the room.

Another object of the invention is to provide an air circulating heater of the character described which will be effective both for supplying a relatively large amount of heated air by circulation and for warming the space near the base of the heater directly by radiation.

A further object of the invention is to provide a liquid-fuel operated oil-circulating heater n which the flame issuing from the burner will be caused to spread far beyond the confines of the burner and rendered effective for its full spread for direct radiation to the exterior of the heater and for inducing and promoting the circulation of a maximum amount of uniformly heated air through the heater.

A still further object of the invention is to provide means in connection with the heater burner and the furnace whereby a flame from a relatively small burner positioned in a furnace of relatively great width and small depth may be spread to insure even heating all around the furnace and at the same time apply the heat evenly and intimately to the fuel for practically its full course of travel through the heater up to the time it reaches the flame area.

Yet another object of the invention is to provide a circulating heater of a type having air-circulating passages at the front and rear of the heating unit and provided with a common outlet at the front of the outer casing of the heater for the heated air in said passages, in which the top of said unit is so positioned relative to said outlet that a free and uninterrupted flow of the air from each of the passages to the exterior of the casing will be assured.

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 drawing accompanying and forming a part of the specification. It is to be understood, however, that variations in the showing made by the said drawing and description may be adopted within the scope of the invention as set forth in the claims.

Referring to said drawing:

Figure 1 is a vertical sectional view of the heater of my invention.

Figure 2 is a vertical sectional view of the heater taken at right angles to Figure 1, the plane of the section being indicated in said latter figure by the line 2—2.

Figure 3 is a horizontal sectional view of the heater taken on the line 3—3 of Figure 2.

In the embodiment of the invention illustrated the heater is of the air circulating type and is provided with a burner unit 4 designed for operation with liquid fuel particularly low gravity oils. The unit 4 which may be of any suitable type is here shown provided with a housing 6 supported on the heater frame 7 and forming what may be termed a volatilizing and carburetor chamber 8. Superimposed over the burner unit is a heater casing 9 whose front and rear walls 11 and 12 are relatively wide but spaced closely so as to define a combustion chamber 13 of considerable width but of small depth horizontally. The casing is provided with end walls 14 and 15 and a bottom wall 16 overlying the top wall 18 of housing 6. As will be clear from Figure 1, the side walls 11 and 12 converge to form a closed top for the casing and exit of the products of combustion from the casing is afforded by way of a vent 21 extending from the rear wall 12 and through the back wall 22 of an outer heater casing 20. The latter forms a complete enclosure for the casing 9 and has its walls, particularly the front and rear walls 23 and 24, spaced from the corresponding walls of the heater casing 9 so as to define air passages 26 and 27 through which the air to be warmed may be circulated. The top 28 of the casing is closed but spaced from the top of the casing 9 thereby permitting the air from rear passage 27, as well as from front passage 26, to exit from a discharge opening 29 provided in the upper portion of the front casing wall. A feature of importance is the relationship in the positioning of the opening 29 with respect to the circulating air passages and the tops of casings 9 and 20. By reference to Figure 1, it will be seen that the top of the casing 9 is in a plane intermediate the upper and lower edges of the discharge opening 29, and that therefore not only the air from the front passage, but the air from the rear passage may flow horizontally toward and through the opening 29, with the air from the front passage passing through the lower portion of the opening and with the air from the rear passage passing through the upper portion.

Thus a smooth, free, and direct flow of the air from both passages is assured.

The burner housing 6 as illustrated is relatively long and extends from approximately the end wall 15 to beyond the central portion of the casing 9. At the inner end of the burner housing, that is the end underlying the central portion of the casing 9, there is provided in the top wall 18 an opening 32 surrounding which is a collar 33 which may be conveniently termed a burner ring. Concentrically aligned with and positioned over but spaced from the ring 33, is a ring 34 preferably formed integral with the bottom wall 16 of the casing 9 and having an opening 36 which, together with opening 32, defines the burner throat. The space between the rings allows for the introduction of fresh air at the throat between the top and bottom thereof. This air is drawn from the space between the burner housing 6 and the outer casing 20 and from the lower open ends of air passages 26 and 27 and preferably means is extended into this space to divert air to the throat. As here shown an inverted casing 35 is extended transversely and downwardly from the burner ring 34 in spaced relation to the top and sides of the casing 9 so as to include part of the air rising in the passages 26 and 27 and direct the same to the space between the rings 33 and 34 and into the burner throat.

It will be evident that in order to maintain burner efficiency, the burner should be kept relatively small and compact, but such burner would of itself be ill adapted to heat up the long wide side walls of the heater casing here shown. Accordingly I have provided in connection with the burner a form of spreader 37 which will convert the otherwise long narrow blue flame into a relatively short luminous flame wide enough to insure a uniform heating of practically all portions of the heater casing walls. Then too, advantage may be taken of the flame when in this changed form to provide for direct radiation of heat at the front of the heater to an extent and over an area insuring comfort and warmth near the lower levels of the heater as well as at the upper ones. The spreader as here shown comprises a hood-like member formed with side and end walls 38 and 39, with the side walls extended upward beyond the end walls and converging toward each other to define a relatively long and narrow orifice 41 at the top of the spreader. Preferably the upper portions of the walls 38 extend vertically to form lips 42 which guide the flame from the orifice and at the same time provide increased surface for contact with the flame during passage of the latter through the orifice. The spreader is arranged for positioning above and in somewhat spaced relation over the upper burner ring and is supported in such position in the heater casing on rails 43, the portion of the spreader resting on the rails being preferably extended horizontally to provide a firm seat with the rails. It will be seen by reference particularly to Figure 3 that the spreader is of considerable length from end to end and that it is positioned in the heater casing with its greater length disposed widthwise of the casing. It will also be noted that since the discharge orifice 41 extends for the full length of the spreader, the flame emitted through the orifice will be spread for at least the full length of the spreader which as here shown is considerably more than one-half the width of the casing 9. Thus from the very base of the casing 9 heat from the flame will be imparted directly and evenly to all portions of the casing walls. Preferably the upper portions of the end walls 39 of the spreader are omitted so as to define end orifices below the top central orifice, which as will be understood permits an escape of fuel to the side and insures an abundance of fuel at the side ends of the flame. Also by reason of the taper of the side walls 38 the width of the end orifices at the base thereof will be somewhat wider and permit a greater area of flow of fuel therethrough per unit length than the top center orifice defined between the side walls. The increased area presented by the flame to the front of the burner casing at such a relatively low level is also taken advantage of for heating, by direct radiation from the flame, the space in front of the heater close to the floor or other surface on which the heater is supported. For permitting such direct radiation, there is provided in the front wall of the casing 9 an opening 44 which is approximately coextensive with the spreader and positioned to lie directly opposite the flame. Desirably the height and width of the opening corresponds with that of the flame so that practically all the heat radiated directly forwardly from the flame may pass out through the opening and at the same time the full glow of the flame is visible. Passage to the exterior of the heater of the heat thus radiated through the opening 44 is by way of an opening 46 provided in the front wall of the outer casing, the latter opening being somewhat larger than opening 44 and preferably provided like the upper opening 29 with a grill covering of an ornamental character. Preferably also the opening 44 is provided with a covering 47 of isinglass or other material affording visibility and a minimum resistance to the free passage of the heat rays. It may be explained that the side and end walls of the heater casing, as well as of the outer casing, are desirably formed of sheet metal whereas the spreader, the bottom wall of the heater casing, and the rings are preferably of cast iron.

As a means of augmenting the radiation of heat from the flame through the opening 44, a deflecting plate 48 is positioned in the heater chamber and extends upwardly and forwardly from the rear wall 12 to the front wall 11 in somewhat spaced relation over the point reached by the flame. More specifically the angular relation and position of the plate with respect to the flame and the opening 44 is such that the heat rays from the flame will be reflected from the plate back through said opening and upon the floor in front of the heater. It will now be clear that notwithstanding the fact that the heater is of an air circulating type, a large amount of heat will be directed at the lower levels of the heater and upon the floor, and since such heat is the result of direct radiation the space in front of the heater will be made warm and comfortable practically as soon as the fuel is lighted.

The deflector plate also functions to prevent the too ready escape of the heated products in the heater casing, and in this connection forces the products to travel to the ends of the furnace chamber before being allowed to escape into the flue, the plate as indicated in Figure 2 being terminated inwardly of the end walls of the furnace.

Of considerable importance in the efficient operation of the burner unit is the relationship of the spreader and the volatilization chamber 8. As will be understood, owing to the fact that the walls of the spreader serve to enclose a large por-

tion of the flame, considerable heat will be reflected by said walls downwardly against the burner. In the present case, owing to the fact that the spreader overlies and is coextensive with so large a portion of the length of the housing which defines the volatilization chamber, a uniform heating of the fuel in the chamber will be effected almost from the time the fuel enters the chamber. In this manner air may be drawn into the chamber such as through perforations 51 in the housing, in relatively large amounts for admixture with the volatilized oil, practically throughout the entire course of movement of the latter in the chamber.

I claim:

1. In a heater of the character described, a casing defining a combustion chamber with the width exceeding the depth thereof, an oil burner adjacent the bottom of said chamber provided with a relatively small throat communicating with said chamber and from which a flame is arranged to issue, a spreader over and extending in opposite directions from said throat and toward the end of said chamber and so constructed as to shape said flame to fan-like form widthwise in said chamber, and an outer casing for said first casing and defining therewith an air circulating passage therebetween.

2. In a heater of the character described, a casing defining a combustion chamber with the width exceeding the depth thereof, an oil burner adjacent the bottom of said chamber provided with a relatively small throat communicating with said chamber and from which a flame is arranged to issue, a spreader over and extending in opposite directions from said throat and toward the end of said chamber and so constructed as to shape said flame to fan-like form widthwise in said chamber, and an outer casing for said first casing and said outer casing having openings, whereby flame may be visible from the exterior of said heater.

3. In a heater of the character described, a casing defining a combustion chamber with the width exceeding the depth thereof, an oil burner adjacent the bottom of said chamber and including an elongated carburetor casing mounted with the length thereof widthwise of said heater casing, said burner being provided with a relatively small throat communicating with said chamber and from which a flame is arranged to issue, a spreader over and extending in opposite directions from said throat and toward the end of said chamber and so constructed as to shape said flame to fan-like form widthwise in said chamber, and an outer casing for said first casing and defining therewith an air circulating passage therebetween.

4. In a heater of the character described, a casing defining a combustion chamber with the width exceeding the depth thereof, an oil burner under said casing and including a carburetor casing and provided with a relatively small throat communicating with said chamber and from which a flame is arranged to issue, a spreader over and extending in opposite directions from said throat and toward the end of said chamber and so constructed as to shape said flame to fan-like form widthwise in said chamber, an outer casing spaced from said first and second casings and defining therewith an air circulating passage, and means extending from said throat and into said passage for diverting air to said throat.

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