Feb. 2, 1926.

1,571,636

F. A. NIEBERDING

HEATER

Filed August 8, 1921

5 Sheets-Sheet 1

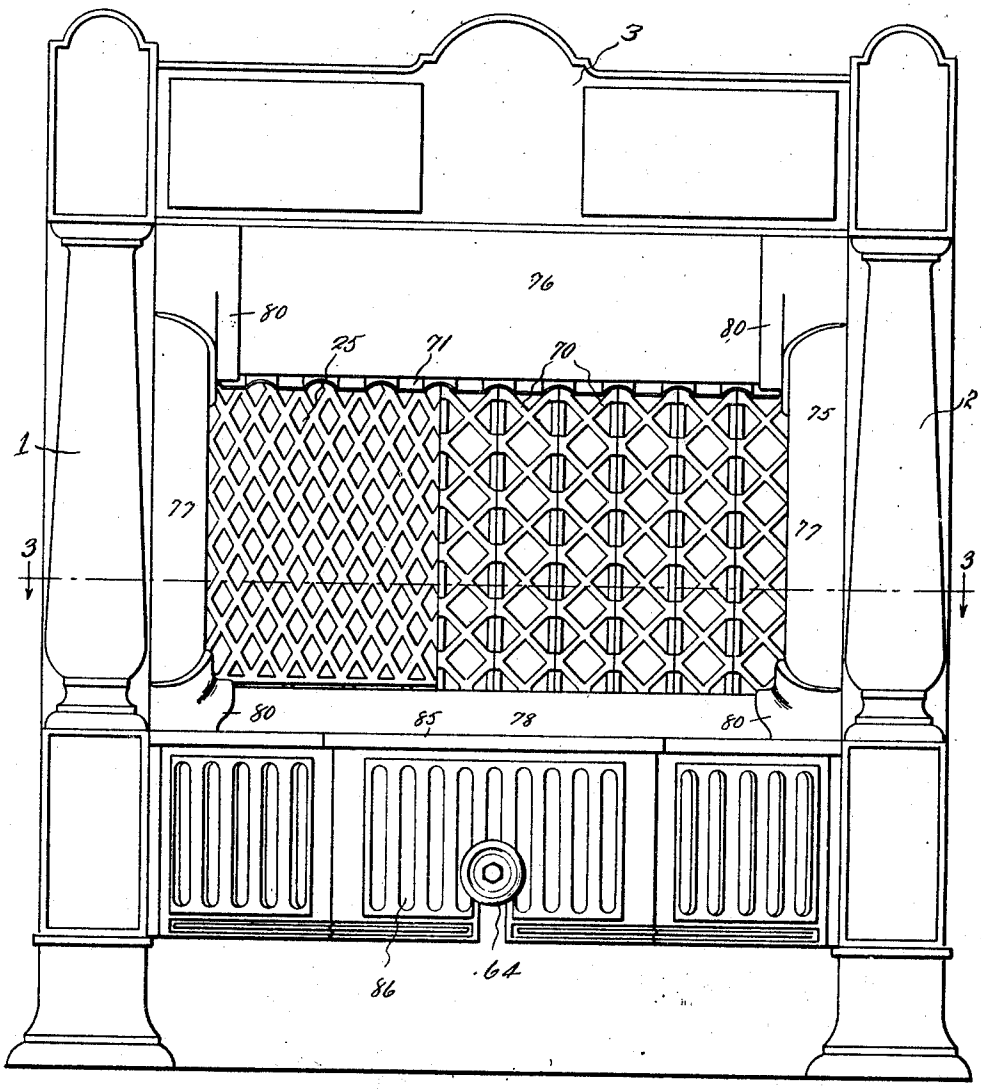


Fig. 1

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Feb. 2, 1926. 1,571,636

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HEATER

Filed August 8, 1921 5 Sheets-Sheet 2

Fig. 12

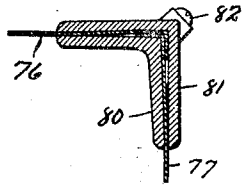


Fig. 2

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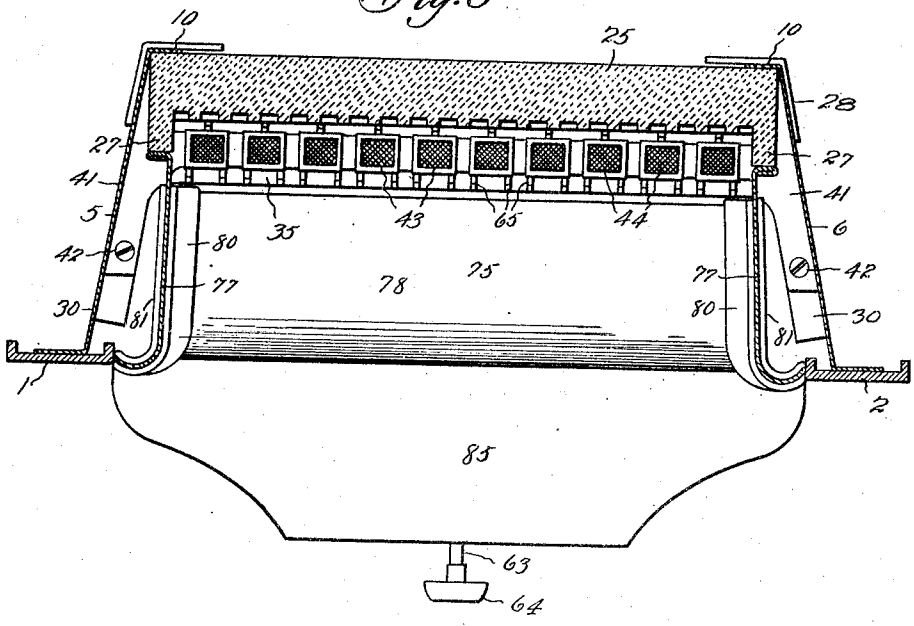
1,571,636

HEATER

Filed August 8, 1921

5 Sheets-Sheet 3

Fig. 3



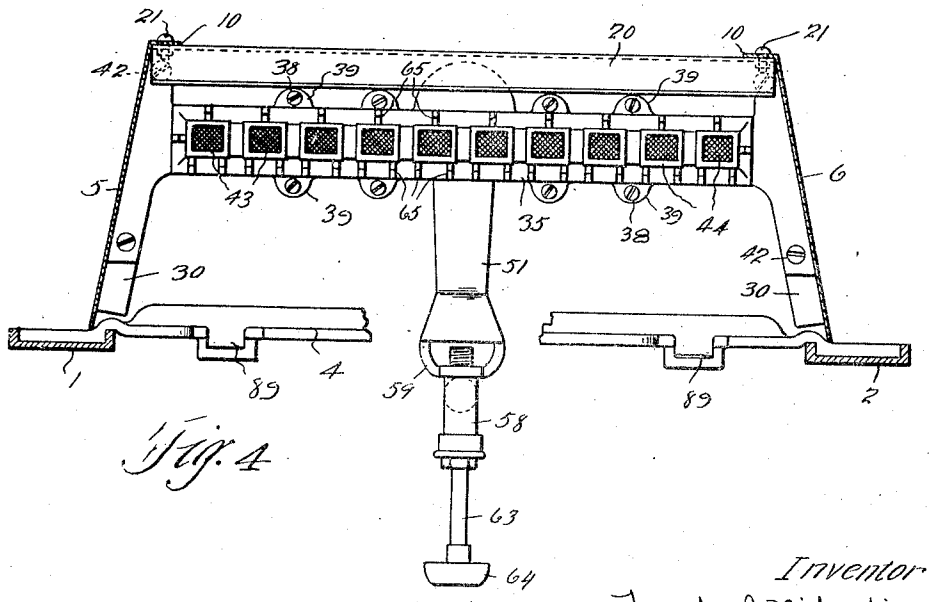


Fig. 4

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1,571,636

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Filed August 8, 1921

5 Sheets-Sheet 4

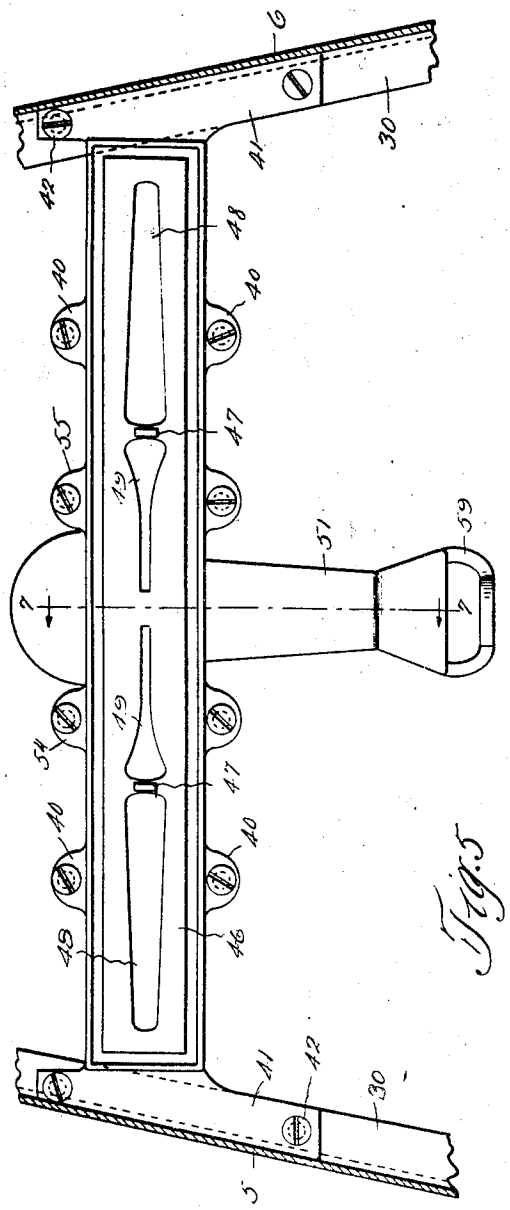


Fig. 5

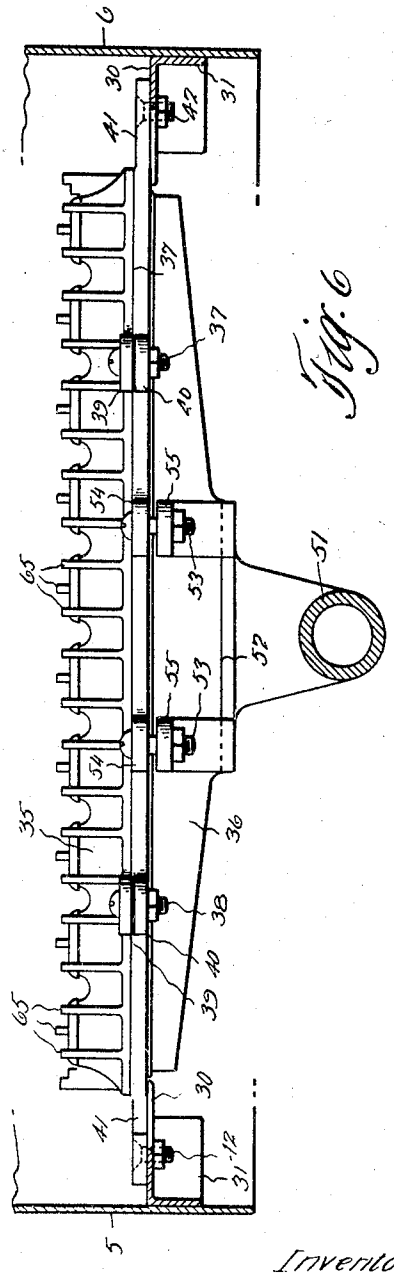


Fig. 6

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Feb. 2, 1926. 1,571,636

F. A. NIEBERDING

HEATER

Filed August 8, 1921 5 Sheets-Sheet 5

Fig. 1

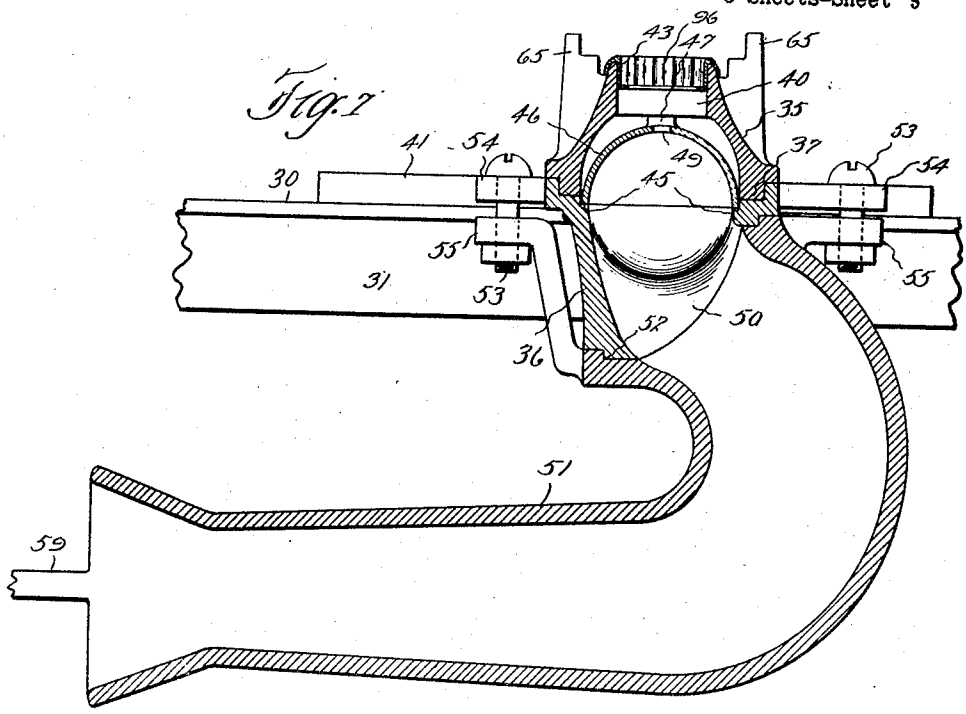


Fig. 8

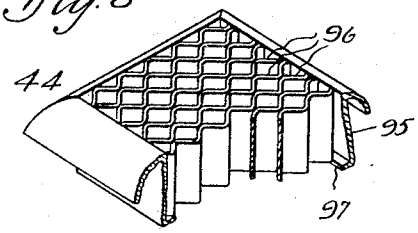
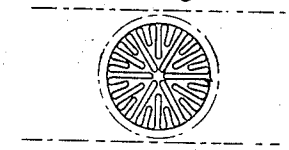


Fig. 11



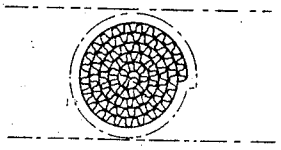


Fig. 9

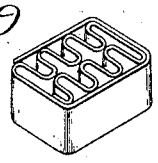


Fig. 10

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Patented Feb. 2, 1926. 1,571,636

UNITED STATES PATENT OFFICE.

FRANK A. NIEBERDING, OF CLEVELAND, OHIO; MARGARET H. NIEBERDING ADMINISTRATRIX OF SAID FRANK A. NIEBERDING, DECEASED.

HEATER.

Application filed August 8, 1921. Serial No. 490,574.

To all whom it may concern:

Be it known that I, FRANK A. NIEBERDING, a citizen of the United States, residing at Cleveland, in the county of Cuyahoga and State of Ohio, have invented a certain new and useful Improvement in Heaters, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings.

This invention relates to improvements in stoves or heaters and among its several objects are the production of a highly efficient stove or heater of comparatively simple and substantial construction, that is particularly convenient of installation and is economical in its consumption of fuel.

Further objects are to provide a burner through which a uniform distribution of gas to all jet openings is effectually accomplished; to provide a unique tip for the jet openings which, while affording the maximum flow of gas, causes the gas to issue quietly from the openings under all adjustments of the valve; and to provide a burner wherein, notwithstanding the free passage of the gas through the jet openings, propagation or "back-firing" of the flame is effectually avoided.

With these in view and others which will hereinafter appear, the invention may be defined as consisting of the combination of elements set out in the claims annexed hereto and illustrated in the drawings accompanying and forming a part hereof and wherein Fig. 1 is a front elevation of my improved heater with some of the radiants removed to reveal the back wall; Fig. 2 is a central vertical section through the heater, from front to rear; Fig. 3 is a horizontal section on the lines 3—3 of Figs. 1 and 2; Fig. 4 is a similar sectional view taken immediately above the burner with the reflector and fender removed; Fig. 5 is a fragmentary section through the stove on a scale somewhat enlarged over the former views and corresponding in plane to the section of Fig. 4 but showing the burner with the top shell removed; Fig. 6 shows the burner and adjacent stove parts in sectional front elevation; Fig. 7 is a section through the burner on the line 7—7 of Fig. 5 and on a further enlarged scale; Fig. 8 is a fragmentary perspective view, much exaggerated as to size, of one of the burner tips; Figs. 9, 10 and 11 show modifications of the tip; while Fig. 12 (Sheet 2) is a sectional detail on the line 12—12 of Fig. 2.

The front frame of the stove or heater is comprised of columns 1 and 2 that are connected together at their upper ends by a plate 3, and at a suitable distance upwards of their lower ends by a bar 4. These parts may be cast, and those numbered 1, 2 and 3 be embellished with suitable ornamentations to impart to the front of the stove an artistic appearance. The foregoing parts may be integral, or made separate and joined together according to any approved method.

Side plates 5 and 6 have their forward edges flanged and secured to the rear sides of the respective columns 1 and 2, the rear edges of the side plates being provided with inwardly directed flanges 10. A top wall 11 extends from one to the other of the side plates and has its rear edge flanged downwardly, as indicated at 12, and its forward edge flanged upwardly, as indicated at 13, where it is spaced a suitable distance rearwardly of the plate 3. Projected upwardly through an opening 14 in the top wall is the skirt portion 15 of a flue collar 16 that is provided for the usual flue connection. The bottom of the skirt 15 is flanged outwardly for attachment to the wall 11, and at the rear side has a depending flange 18 that is spaced a suitable distance forwardly of the previously mentioned flange 12 of the top wall. Extending between the rear edges of the side plates 5 and 6, in about the same horizontal plane as the bar 4, is a Z-bar 20, the ends of which are secured, as by bolts 21, to the flanges 10 of the side walls. The horizontal flange of the Z-bar 20 provides a seat for a back wall 25 which may be of suitable refractory material. The upper end of the back wall is reduced in thickness and confined between the flanges 12 and 18, and said reduced portion is of sufficient vertical extent to permit the wall to be lifted so that its reduced lower end may be passed over the forward vertical flange of the Z-bar 20 when emplacing or removing the back wall. Rearward dislodgement of the back wall from the Z-bar is prevented by the flanges 10 of the side walls wherewith the ends of the back wall engage. The front surface of the back wall may be corrugated, as shown particularly in Fig. 1, and flanges 26 and 27 extend, respectively, across the top and down the sides thereof. Legs 28,

that are secured to the rear corners of the side walls 5 and 6, provide a support for the rear portion of the structure.

Burner supporting ledges 30 are carried by the side walls approximately in the plane of the bar 4, and in the present instance these ledges consist of angle bars which have their vertical flanges 31 secured in any suitable manner to the side plates 5 and 6.

The burner is composed of top and bottom shells 35 and 36, respectively, and these shells meet on a horizontal plane and with a broken joint 37 which may be calked or sealed with a suitable substance and drawn tightly together by bolts 38 which are engaged through ears 39 and 40 of the respective shells. Wings 41 extend from the ends of shell 36 and rest upon the ledges 30 to which they may be secured, as by bolts 42. The top shell is provided throughout its length with gas-emitting openings 43 (hereinafter referred to as jet openings or orifices), the shell being flanged about the individual openings to provide bosses within the upper ends of which tips 44 may be inserted. These tips will be described in detail hereinafter. Shoulders 45 are formed on the interior of the shell 36 in the region of the joint 37, and a distributor 46 is held between this shoulder and the top wall of shell 35. This distributor is in the form of a transversely curved plate and has bosses 47 that are adapted to be engaged by the top wall of the shell 35 to hold the edges of the plate against dislodgement from the shoulders 45. As will be seen more clearly from Fig. 5, the distributor is provided near its ends with slots 48 and near its center with slots 49. The former slots enlarge gradually inwardly from their outer ends, while the latter slots decrease in area quite abruptly from their outer toward their inner ends. It will be observed that while the top shell 35 is substantially uniform in cross section throughout its length, the bottom wall of the lower shell 36 is gradually inclined downwardly from its outer ends toward its middle portion where it is provided with an opening 50 through which the interior of the burner communicates with a mixing tube 51, the tube and shell having mating parts which are shown as fitting together with a broken joint, as indicated at 52, and which joint may be calked with a suitable sealing substance and rendered leakproof when the shell and mixing tube are drawn together by bolts 53 that are engaged through ears 54 and 55 of the respective parts.

Attention is called particularly to the shape of the mixing tube. It will be observed from Figs. 2 and 7 that the same extends rearwardly and downwardly from the burner and is then turned forwardly in a gradual curve where it terminates in a flared end that is substantially flush with the front of the heater. From Figs. 5 and 6 it will be seen that the tube is enlarged in a lateral direction as it approaches the burner so that its capacity gradually increases inwardly from the throat adjacent its flared outer end. It is quite generally known that this latter condition is essential to a proper mixing of the gas, and it is also a recognized fact that the mixing tube must be of sufficient length to allow the gas and air to properly intermingle before it enters the burner. By constructing the tube as I do, I maintain the proper length and at the same time attain the advantages of locating the tube at the center of the burner and extending it from front to rear, imparting to the burner a symmetrical design and locating the tube in a particularly convenient position for making connection between the valve situated at its forward end, and the gas supply pipe which, as when the burner is incorporated in the so-called fire-place heater, comes up through the floor under and well toward the rear of the heater. Such a connection is illustrated in Fig. 2 and will be further commented upon hereinafter. This arrangement, therefore, eliminates a very common difficulty and annoyance that is experienced in the installation of heaters, especially of the "fire-place" type. Furthermore, this goose-neck formation which effects a foreshortening of the mixing tube results in the valve being situated close up to the front of the heater and permits of the use of a comparatively shallow fender.

As gas enters a burner, its natural tendency is to continue in the same direction in which it is traveling when emitted from the mixing tube. In the present instance this would result in a greater amount of gas issuing from the openings near the center of the burner than would pass through the ones toward the ends were it not for the distributor 46 which, by virtue of its openings 49, deflects the gas laterally toward the ends of the burner, only a limited amount of gas passing through the restricted ends of the openings 49. When the gas is deflected laterally, the tendency is for it to rush to the ends of the burner where its upward passage is retarded by the somewhat restricted outer ends of the openings 48. Consequently, by reason of the shapes of the openings, a very uniform distribution of gas from one end to the other is accomplished, and all jet orifices receive substantially a like amount of gas.

A suitable gas valve 58 is shown as maintained in proper relation to the receiving end of the mixing tube by means of a yoke 59 which is preferably cast integral with the tube, the valve being thus positioned for a convenient attachment, as through a union 60, with the forward extension 61 of the supply pipe 62, these parts being shown in

Fig. 2 as they would appear particularly in a fire-place installation. The valve stem 63 projects forwardly and is equipped with the usual hand wheel 64.

Associated with the jet openings of the burner are lugs 65 which serve to support and properly position with respect to the openings radiants 70 that rest against the back wall and are held at their upper ends from tilting forwardly by a bar 71 that is carried, through arms 72, from the top wall 11, the arms being shown in the present embodiment as secured to the top wall through certain of the bolts 73 which attach the collar 16 to said wall.

Adapted to be set into the front of the heater is a reflector, designated generally by the numeral 75, and in the present instance made up of a top plate 76, side plates 77 and a bottom plate 78. These plates are clamped together at the corners of the reflector between inner and outer angle members 80 and 81 that are drawn together by screws 82, and to insure against the plates pulling apart, the adjacent ends of adjoining plates are flanged and overlapped as shown in Fig. 12. The top plate 76 is curved upwardly and over at its forward edge and protrudes some distance beyond the front frame to protect the member 3 thereof from the intense heat which might have a discoloring effect upon it. The side plates 77 are similarly formed and protrude, more toward their upper ends where the heat is greater, for the same purpose. The bottom plate 78 is bulged upward transversely adjacent its forward edge to shield the hearth plate 85 of the fender 86 from the direct rays of heat from the lower ends of the radiants. The angle members 80 and 81 are designed to conform to the shapes of the plates. The reflector 75, as a self contained unit, is adapted to be placed within the heater, when the fender 86 is removed, by inserting a flange 88 that rises from the front edge of its top wall 76 into the restricted space between the lower edge portion of the frame member 3 and the flange 13 of the top wall 11, the reflector being then swung back into place with the front edge of its bottom plate 78 resting upon the downwardly and rearwardly inclined tops of the sockets 89 that are formed in the bar 4 for the reception of lugs 90 that depend from the rear edge of the hearth plate 85. The interengagement of these lugs and the sockets provide the sole connection between the fender and the frame of the heater, and the fender, in turn, holds the reflector in place. Consequently the fender and reflector may be very conveniently removed without the use of tools to give unrestricted access to the parts ordinarily concealed thereby. Thereafter the back wall may be removed, after laying aside the radiants by lifting it enough to disengage it from the Z-bar 20 and then lowering it to withdraw its upper end from between the flanges 12 and 18.

Returning now to a detailed description of the present preferred form of tip, shown in perspective in Fig. 8, the same comprises a frame 95, preferably of sheet metal, that fits snugly within one of the jet openings of the burner and has its upper end turned outwardly and downwardly to fit the boss that surrounds said opening. A suitable grouting material may be filled in about the tip to seal the joint between it and the boss. A series of crimped or corrugated strips 96 are forced into the frame 95, their upper edges being substantially flush with the top of the frame when their lower edges engage at their ends with an inwardly directed flange 97 that surrounds the lower edge of the frame. According to the present design, the corrugations of the strips 96 give a honey-comb appearance to the tip. The strips, being thin, have very little retarding effect on the flow of gas, but they are made wide enough to afford sufficient depth to the individual orifices as compared to the latter's cross-sectional area to effectually prevent the flame from propagating into the mixer.

Figs. 9, 10 and 11 show modifications of the tip which will be readily understood from the illustrations, and in these, as in the case just described, the tips are preferably made of sheet metal. In connection with the form shown in Fig. 10, a scroll-shaped boss may be provided for its accommodation, while with the form shown in Fig. 11, a circular boss would be required. The outlines of such bosses are indicated in dotted lines in the respective views.

Having thus described my invention, what I claim is:

1. In a heater of the character set forth, the combination of an open front casing, a burner within the casing, a back wall insertable through the open front and engaging parts of the casing to sustain the back wall against rearward dislodgment, a reflector also insertable through said open front and cooperating with the back wall to prevent forward displacement of the latter the reflector having a part cooperating with a part of the casing to assist in holding the reflector in place, and a fender detachably connected to the front of the casing and serving when in place to secure the reflector within the casing.

2. In a heater of the character set forth, the combination of an open front casing, a burner supported within the casing, a reflector insertable through the open front of the casing and having a lip adjacent its upper end for interlocking engagement with an adjacent part of the casing, the casing having below its open front socket members whereon the lower front edge of the re-

flector engages, the tops of the socket members being inclined downwardly and rearwardly, and a fender for application to the front of the casing and having lugs which enter the aforesaid sockets for holding the fender in place, the fender when thus attached to the casing serving to secure the reflector in place.

3. In a heater of the character set forth, the combination of an open front casing, a burner supported within the casing, a reflector comprising top, bottom and side walls insertable through the open front of the casing and having a lip adjacent its upper end for interlocking engagement with an adjacent part of the casing, the casing having below its open front socket members whereon the lower front edge of the reflector engages, and a fender for application to the front of the casing and having lugs which enter the aforesaid sockets for holding the fender in place, the fender when attached to the casing serving to secure the reflector in place.

4. In a heater of the character set forth, the combination of a casing incorporating a back wall support, a back wall cooperating with the support in such manner as to be held against forward displacement when resting thereon, the back wall interfitting with parts of the casing so as to be held upright when the back wall is resting upon the support, the interfitting parts permitting said wall to be lifted free from the support, and a burner within the casing forwardly of the back wall.

5. In a heater of the character set forth, the combination of a casing comprising a front frame, side walls extending rearwardly from the side members of the frame, and a top wall extending from one of the side walls to the other and from the frame to the rear edges of the side walls, a back wall support extending from one side wall to the other, a back wall sustained thereby, top wall having parts between which the upper edge of the back wall may be inserted to hold the back wall in place and from which said edge may be disengaged upon removing the back wall from its support, and a burner supported within the casing forwardly of the back wall.

6. In a heater of the character set forth, the combination of a casing comprising an open frame, side walls extending rearwardly from the side members of the frame and flanged inwardly at their rear edges, a back wall supporting bar extending between the rear edges of the side walls and having an upwardly extending flange at its forward edge, a back wall resting upon the bar to the rear of said flange and forwardly of the flanged rear edges of the side walls, a top wall extending between the side walls and from a point adjacent the front frame rearwardly to the back wall, the top wall having a part engaging the upper edge of the back wall to retain the latter in place, and a burner support within the casing forwardly of the back wall.

7. A heater of the character set forth comprising a casing having a top wall that is provided with an opening, a back wall support situated in the rear of the casing, a flue collar having a depending skirt, that terminates at its lower end in a peripheral flange and which is adapted to be projected upwardly through the opening in the top wall with said peripheral flanges attached to the top wall, the peripheral flange having a depending lip at its rear edge, a back wall resting upon the aforesaid support and held in upright position by the said lip, and a burner within the casing.

8. In a heater of the character set forth, the combination of an open front casing, a burner supported within the casing, and a reflector sustained within the forward portion of the casing and comprising top, bottom and side walls, the top wall protruding beyond the front plane of the casing, as and for the purpose specified.

9. In a heater of the character set forth, the combination of an open front casing, a burner supported within the casing, and a reflector sustained within the forward portion of the casing and comprising top, bottom and side walls, the side walls being projected beyond the front wall of the casing, as and for the purpose specified.

10. In a heater of the character set forth, the combination of an open front casing, a burner supported within the casing, a hearth plate projecting forwardly from the lower front portion of the casing, and a reflector sustained within the forward portion of the casing and comprising top, bottom and side walls, the bottom wall being raised adjacent its forward edge sufficiently to protect the hearth plate from the direct rays of heat.

11. In a heater of the character set forth, the combination of an open front casing, a burner supported within the casing, and a reflector sustained within the forward portion of the casing and comprising independent top, bottom and side walls, and inner and outer angle members between which adjacent ends of adjoining walls are clamped at each corner of the reflector.

12. In a heater of the character set forth, the combination of an open front casing, a burner supported within the casing, and a reflector sustained within the forward portion of the casing and comprising independent top, bottom and side walls, the ends of the walls being flanged for overlapping engagement with each other, and inner and outer angle members between which adjacent ends of adjoining walls are clamped at each corner of the reflector.

13. In a heater of the character set forth, the combination of an open front casing, a burner supported within the casing, and a reflector sustained within the forward portion of the casing and comprising independent top, bottom and side walls, and inner and outer angle members between which adjacent ends of adjoining walls are clamped at each corner of the reflector, and means for connecting and drawing together the inner and outer angle members.

14. In a heater of the character set forth, the combination of an open front frame, a side wall extending rearwardly from each side member of said frame, a burner extending between the side walls and rigidly connected thereto thereby to maintain the side walls in properly spaced relation and impart stability to the structure, the burner having jet openings and radiant positioning means adjacent thereto, a back wall of refractory material disposed between the rear edges of the side walls, and a plurality of radiants supported directly by the burner forwardly of the back wall.

15. In a heater of the character set forth, the combination of a front frame, side walls extending rearwardly from the side members of the front frame, a back wall supporting bar sustained by and between the rear edges of the side walls, the front edge of said bar being turned upwardly and the rear edges of the side walls turned inwardly, a back wall of refractory material resting upon the supporting bar and bearing on the inturned rear edges of the side walls, a top wall, a member applied to the top wall to the rear of which the upper edge of the back wall reposes, a burner supported by and extending between the side walls forwardly of the back wall, and a plurality of radiants supported directly by the burner.

16. In a heater of the character set forth, the combination of a front frame, side walls extending rearwardly from the side members of the front frame, a back wall supporting bar sustained by and between the rear edges of the side walls, the front edge of said bar being turned upwardly and the rear edges of the side walls turned inwardly, a back wall of refractory material resting upon the supporting bar and bearing on the inturned rear edges of the side walls, a top wall, a member applied to the top wall to the rear of which the upper edge of the back wall reposes, a burner supported by and extending between the side walls forwardly of the back wall, the burner having apertures and lugs adjacent thereto, a plurality of radiants supported solely by the burner and positioned at their lower ends by said lugs in operative relation to the burner apertures, and a member depending from the top wall and cooperating with the upper ends of the radiants for holding them in place.

In testimony whereof, I hereunto affix my signature.

FRANK A. NIEBERDING.