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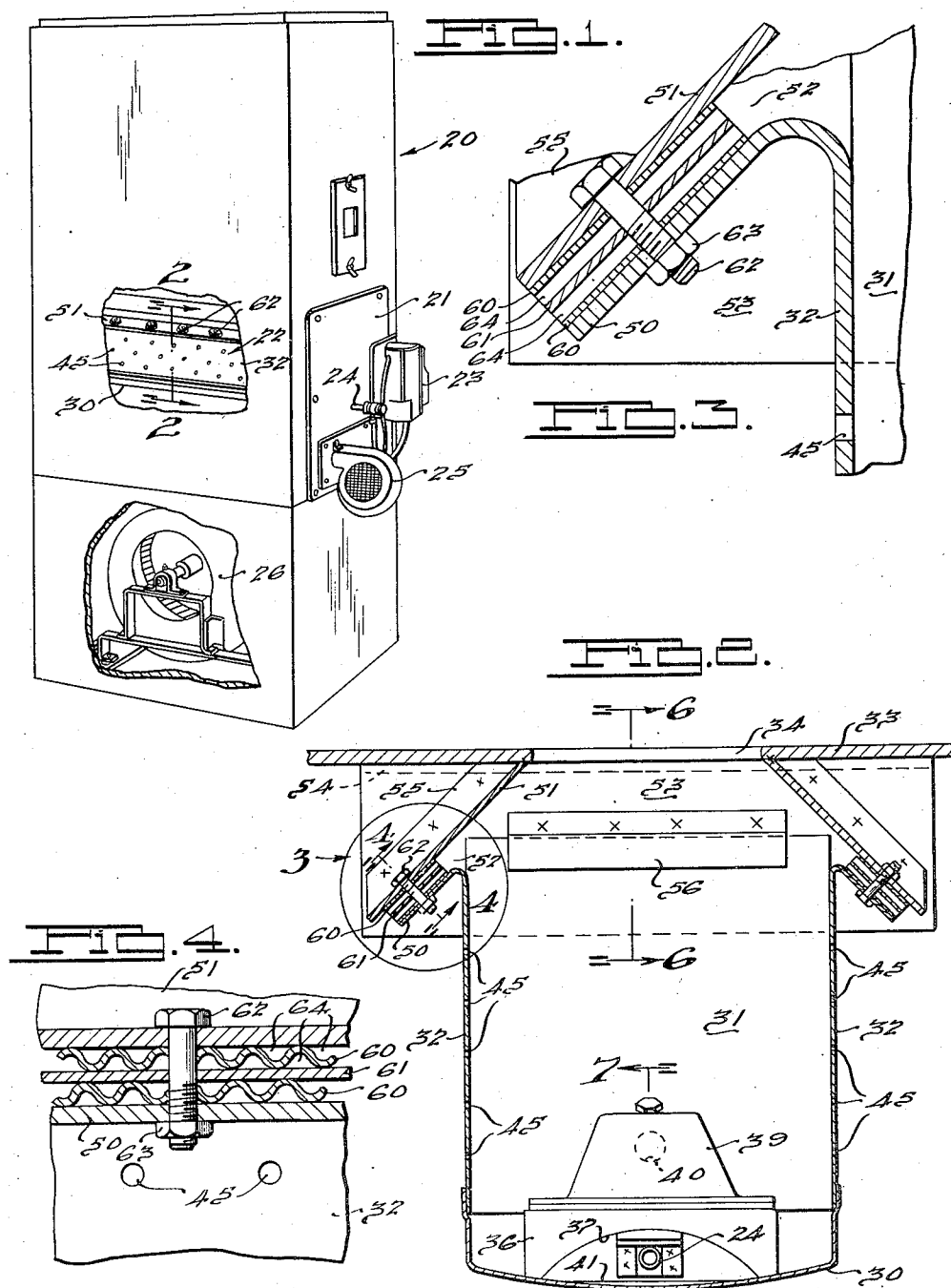
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2,369,833

RECTANGULAR POT BURNER

Filed Jan. 18, 1943

3 Sheets-Sheet 1



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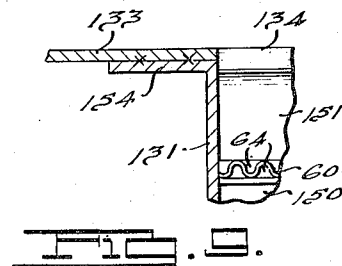
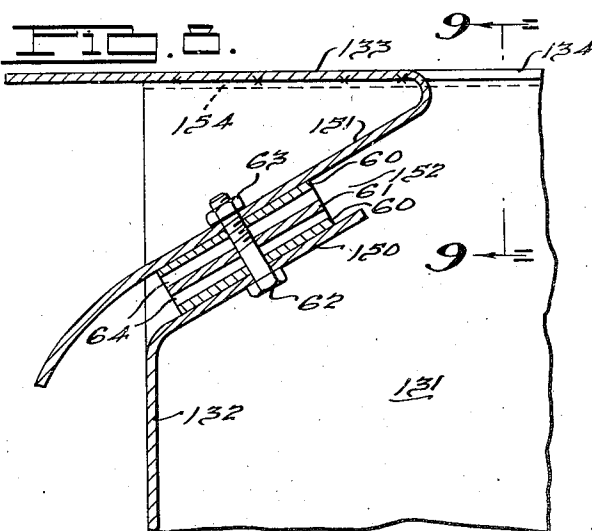
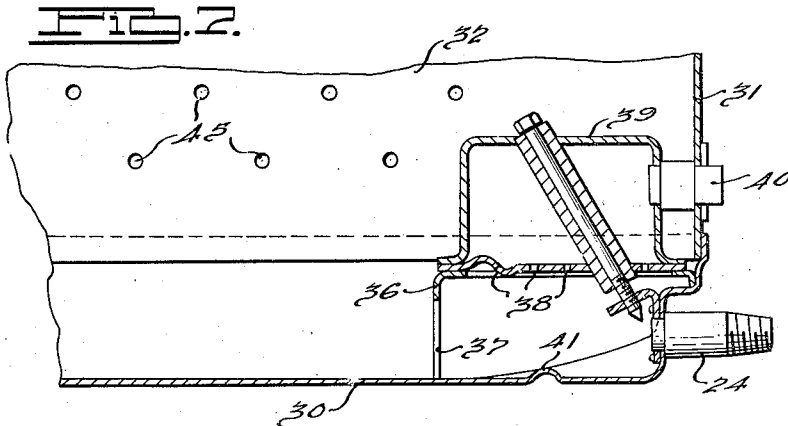
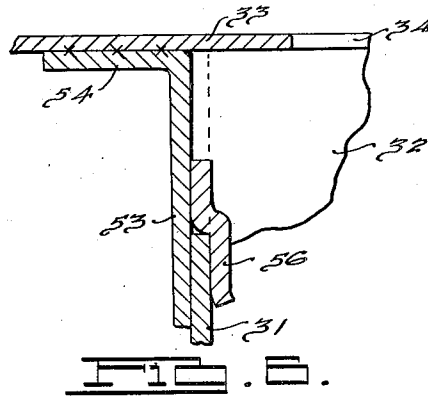
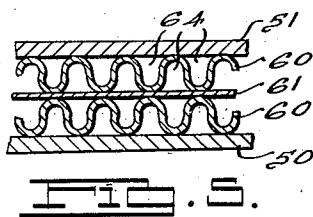
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RECTANGULAR POT BURNER

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3 Sheets-Sheet 2



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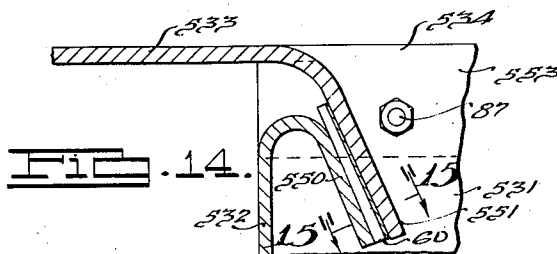
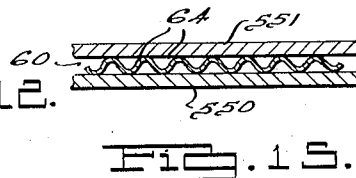
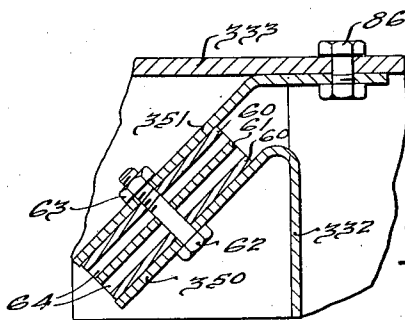
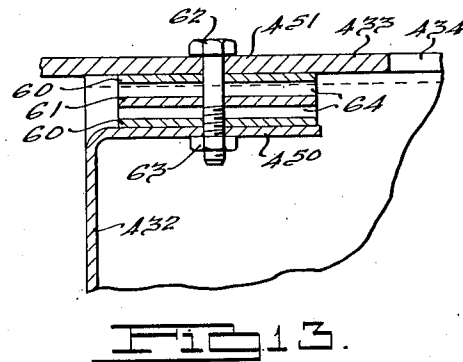
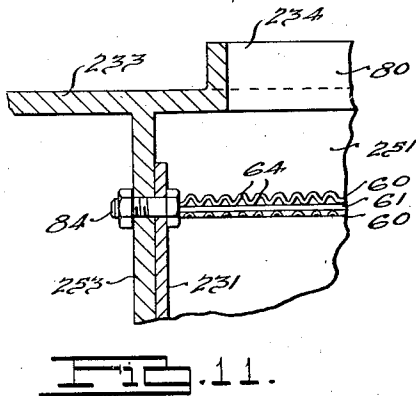
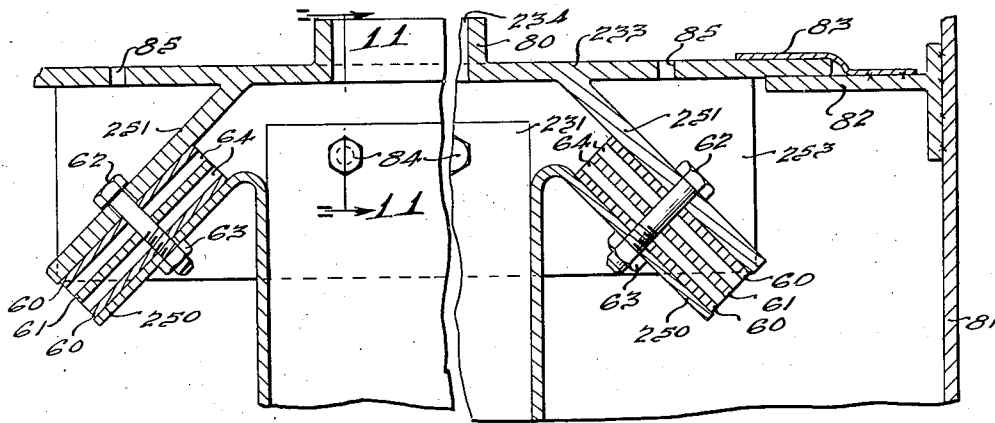
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RECTANGULAR POT BURNER

Filed Jan. 18, 1943

3 Sheets-Sheet 3



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UNITED STATES PATENT OFFICE

2,369,833

RECTANGULAR POT BURNER

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Application January 18, 1943, Serial No. 472,673

2 Claims. (Cl. 158—91)

My present invention relates to liquid fuel burners of the vaporizing type comprising a receptacle wherein liquid fuel is vaporized by the reflected and retained heat of combustion of previously combusted fuel, the vaporized fuel is mixed with primary air admitted through a plurality of perforations in the side wall of the receptacle, and secondary air is admitted above the primary air to support the final combustion of the rich mixture formed by the primary air, the receptacle being provided with a top having a centralized opening through which the burning mixture escapes into the interior of a heating appliance.

The primary object of the present invention is to provide a simplified form of construction functioning in accordance with known and previously demonstrated principles of this type of burner. This object is achieved in part by forming the secondary air supply openings in the form of channels provided by a pair of flanges retaining therebetween a transversely corrugated strip, the channels being of sufficient length to impart definite direction to the streams of secondary air.

A secondary object of the present invention is to provide a vaporizing burner of rectangular shape in order that a heating appliance of greater efficiency per pound of metal employed may be used. Heretofore, vaporizing burners have ordinarily been cylindrical in shape, the shape of the flame issuing therefrom being such as to require a cylindrical firebox or heating chamber. With my invention I am able to employ a long, narrow receptacle having a slot through which the flame emerges in a flat sheet and which may be used in a narrow rectangular heat exchanger which permits greater transmission of heat per pound of metal employed.

Another object of the present invention is to provide means for forming secondary air openings for a vaporizing burner, the openings being capable of imparting direction to the streams of secondary air, which means may be easily and economically formed as distinguished from prior art practices of drilling holes and deforming the metal around the holes.

These and other objects and advantages of the present invention will be more readily understood by reference to the following specification and accompanying drawings wherein like numerals refer to like parts throughout.

In the drawings,

Fig. 1 discloses a heating appliance having a burner embodying the present invention employed therein;

Fig. 2 is a vertical section through the burner taken substantially along line 2—2 of Fig. 1;

Fig. 3 is an enlarged detail of the portion of Fig. 2 encircled in the circle marked 3;

Fig. 4 is an enlarged section taken substantially along line 4—4 of Fig. 2;

Fig. 5 is a section similar to the section of Fig. 4 showing how the size of each of the secondary airstreams may be easily altered by substituting variously shaped corrugated strips;

Fig. 6 is a vertical section taken substantially along line 6—6 of Fig. 2 showing a detail of construction;

Fig. 7 is a vertical section taken substantially along line 7—7 of Fig. 2;

Fig. 8 is a vertical section similar to Fig. 2 illustrating a modified form of the present invention;

Fig. 9 is a vertical section taken substantially along line 9—9 of Fig. 8;

Fig. 10 is an enlarged vertical section partly broken away illustrating a further modification of the present invention and illustrating one manner in which the present invention may be mounted in a heating appliance;

Fig. 11 is a vertical section taken substantially along line 11—11 of Fig. 10;

Fig. 12 is a vertical section taken substantially in the plane of Fig. 3 showing a further modification in construction;

Fig. 13 is a similar section showing a further modification;

Fig. 14 is a similar view showing a further modification; and,

Fig. 15 is a sectional view taken substantially along line 15—15 of Fig. 14.

While the present invention may be used in any type of appliance, I have illustrated the invention as being associated with a warm air furnace 20 provided with a burner mounting plate 21 upon which the burner 22 may be mounted. The mounting plate may also support a fuel metering device 23 adapted to admit a definite flow of liquid fuel through the inlet tube 24 extending into the lower portion of the interior of the burner. The mounting plate may also support a forced draft blower 25 which may be omitted in the event that natural draft is desired. The furnace may comprise an air blower 26, if desired.

The burner of the present invention comprises a bottom 30, which may be provided by a stamped metal dish-like member, to which vertical end walls 31 and side walls 32 are attached to form a relatively long, narrow receptacle. The burner also comprises a top portion 33 having a central-

ized slot 34 therethrough, the slot running from adjacent the top of one end wall to adjacent the top of the other end wall and being preferably narrower than the width of the receptacle.

It is to be appreciated that the construction is preferably as described in the preceding paragraph due to the ease and convenience of assembly thus afforded and the desirably shaped flame created, but that the construction may be adapted to other forms of burners, such as the ordinary cylindrical burner.

In order to provide a pilot flame for the burner, I prefer a known type of pilot device consisting of a receptacle 36 surrounding the outlet end of the tube 24 and provided with an inwardly facing pilot flame opening 37. The top of the receptacle is provided with a plurality of perforations 38 through which air may be admitted from a pilot air inlet box 39 having a pilot air inlet tube 40 extending therefrom through the end wall 31. The bottom wall 30 is preferably provided with a raised ridge 41 providing a dam behind which a slight pool of oil may be retained. In accordance with usual practice the metering device 23 is set to provide a minimum flow such that all of the fuel admitted during pilot operation will be vaporized within the pilot device, mixed with air emerging from the pilot air openings 38 sufficiently to support combustion, and burned as it emerges from the pilot flame opening 37. The heat of the pilot flame will heat the bottom wall 30 sufficiently for a considerable area beyond the pilot device to vaporize fuel overflowing the dam 41 when the metering device permits the full flow of fuel to cause high flame operation of the burner. It is to be appreciated that the pilot device forms no part of my present invention and that many other forms of pilot devices could successfully be employed with the present invention.

In order to support high flame combustion the side walls 32 are provided with a plurality of horizontal rows of spaced perforations 45 adapted to admit a plurality of spaced streams of primary air of combustion for admixture with the vaporized fuel rising from the lower portion of the receptacle. The induction of primary air through the openings may be due to the natural draft created by the chimney effect of the appliance or may be due to the forced draft blower 25. In accordance with known theory the primary air openings are so spaced and sized as to create streams of a rich mixture of fuel and air which tend to merge together as they rise toward the combustion opening 34.

In order to provide for secondary air sufficient to support combustion adjacent the opening 34, and in order to assemble the top portion and the receptacle, I provide means as follows: In the preferred form of the invention illustrated in Figs. 1 to 6, inclusive, each side wall 32 is bent outwardly and downwardly along its top edge to provide an outwardly and downwardly inclined support flange 50. A complementary flange 51 is welded to the edge of the opening 34 and extends outwardly and downwardly in a direction substantially parallel to the support flange and is so proportioned as to provide a slot 52 between the two flanges. Adjacent each end of the combustion opening 34 I preferably provide an end plate 53 of such dimensions as to cover completely the ends of the slots 52. The plate 53 may be provided with a horizontal flange 54 adapted to be welded to the lower surface of the top member 33, and the complementary flanges 51 may be provided with

end flanges 55 adapted to be welded to the end plate 53. The top portion is thus formed as a rigid unitary structure to which the receptacle can be readily attached and, in the event of failure of the receptacle due to overheating or other causes common to vaporizing burners, the receptacle may be easily and economically replaced. The end plate 53 may be provided with a clip bar 56 welded thereto in position to embrace the upper edge of the end wall 31 to form an air-tight assembly as illustrated in Fig. 6.

In order to provide a plurality of spaced secondary airstreams flowing through the slots 52, with which the upwardly rising mixture of fuel vapor and primary air approaching the opening 34 may be intimately mixed into a homogeneous mixture, I preferably provide a pack, consisting of a plurality of transversely corrugated strips 60 and a plain spacer strip 61, embraced between the support flange 50 and the complementary flange 51. Bolts 62 may be passed through openings drilled for the purpose and nuts 63 applied to hold the structure together. The width of the strips is sufficient to provide a plurality of spaced channels 54 of sufficient length to impart definite direction to the streams of secondary air. In the preferred form of the invention as shown in Figs. 2 and 3 the channels 54 terminate exteriorly of the plane of the side wall 32 and are directed toward the edge of the combustion opening 34.

As illustrated by comparison of Fig. 5 with Fig. 4, the secondary air channels may be enlarged or decreased by changing the characteristics of the corrugated strips 60 and/or the plain strip 61. By the simple substitution of one type of strip for another, the secondary air channels may be increased or decreased in size or may be more or less widely spaced from each other. This is of great importance in experimental work since the sizes and spacings of the secondary air inlets must be delicately balanced in relation to the size of the receptacle, the amount of fuel, the amount of primary air, and other factors; and, whereas the prior art practice of drilling holes through the wall usually required arduous substitutions of one drilled receptacle for another, the present invention permits of substantially immediate substitution of one type of secondary air channel for another.

In order to illustrate the adaptability of the present invention to many different theories of secondary air supply and further to illustrate various means of forming the assembly, I have shown modifications of the present invention in the figures succeeding Fig. 7.

The form of the invention illustrated in Figs. 8 and 9 comprises support flanges 150 extending upwardly and inwardly from the side wall 132. The end wall 131 extends above the secondary air slot 152 and is provided with a horizontal flange 154 which may be welded or otherwise conveniently fastened to a top plate 133 having a combustion opening 134 formed by cutting the top plate and bending flanges 151 downwardly and outwardly to overlie the support flanges. The flanges 151 may be long enough or may have an extension welded thereto, to provide a downwardly curved lip lying beyond the walls 132 to form air scoops for the secondary air. The corrugated and plain strip packs may be bolted in the slots 152 or otherwise fastened therein.

In the form of the invention disclosed in Figs. 10 and 11, the top 233 may comprise a casting having a combustion opening 234 therethrough

surrounded, if desired, by a raised flange 80. The top portion, and the receptacle depending therefrom, may be supported in the heating appliance firebox 81 by resting the edges of the top portion upon a flange 82 having clips 83 designed to form an air-tight joint. The complementary flanges 251 and the end plates 253 may be cast integrally with the top plate 233. In the illustration the support flanges 250 extend outwardly and downwardly, and the secondary air channel forming members are as previously illustrated and described. The end walls 231 may be bolted to the end plates 253 by means of bolts 84. Further combustion supporting air may be supplied by means of vertical holes 85 drilled through the top portion 233 or by other means as well-known in the art.

In the form of the invention disclosed in Fig. 12, the side walls 332 are provided with outwardly and downwardly extending support flanges 350, and the complementary flanges 351 are provided by fastening separate members to the top plate 333 by means of bolts 86. In this illustration the secondary air is directed against the portion of the top plate overlying the receptacle, and the secondary air is given greater turbulence by causing it to impinge and change direction.

In the form of the invention illustrated in Fig. 13, the side walls 432 are provided with horizontal inwardly extending support flanges 450, and the complementary flange portions 451 constitute horizontal portions of the top member 433. In this form of the invention the secondary air is directed horizontally through and into the fuel mixture rising through the combustion opening 434.

In the form of the invention illustrated in Figs. 14 and 15, the side walls 532 are provided with inwardly and downwardly extending support flanges 550, and the top member 533 is provided with complementary flanges 551 extending inwardly and downwardly so that the edge of the combustion opening 534 overlies the secondary air inlet channels. The top member 533 may be provided with an end plate 553 adapted to be bolted to the end wall 531 by bolts 87. I have here illustrated that a single corrugated strip 60 may be used to provide a single row of secondary air inlet channels 64.

It is to be appreciated that any of the details of construction illustrated in regard to one modification may be used in another modification, the purpose of showing so many modifications being clearly to demonstrate the wide range of adaptability of the present invention comprising essentially the use of corrugated strips to provide secondary air channels of considerable length with respect to their greatest cross dimension.

Having illustrated and described several modifications of the present invention, it should be apparent to those skilled in the art that the same permits of various modifications in arrangement and detail. All such modifications as come within the scope of the following claims are considered a part of my invention.

I claim:

1. An oil burner of the fuel vaporizing type comprising a receptacle having means to admit liquid fuel into the lower portion thereof to be vaporized therein, said receptacle comprising a side wall and a top portion having a centralized opening therethrough from which the vaporized fuel escapes during the combustion thereof, at least a portion of said side wall being provided with a plurality of spaced perforations to admit streams of primary air of combustion for admixture with the vaporized fuel and with a support flange adjacent its upper edge above said perforations, a complementary flange extending from said top portion in a plane substantially parallel to the flange of said wall portion, and a transversely corrugated strip retained between said support flange and said complementary flange to provide a plurality of secondary air supply inlet channels of sufficient length to impart definite direction to the plurality of spaced streams of secondary air of combustion admitted therethrough into the mixture of vaporized fuel and primary air approaching said centralized opening, said support flange lying in a plane extending outwardly and downwardly inclined from said side wall whereby the channels supplying secondary air direct the secondary airstreams upwardly and inwardly toward said centralized opening and terminate outside of said vertical wall.
2. An oil burner of the fuel vaporizing type comprising a substantially rectangular receptacle having means to admit liquid fuel into the lower portion thereof to be vaporized therein, said receptacle comprising relatively narrow end walls, relatively long side walls and a top portion having a centralized long and narrow opening therethrough from which the vaporized fuel escapes during the combustion thereof, each of said side walls being provided with a plurality of spaced perforations to admit streams of primary air of combustion for admixture with the vaporized fuel and with a support flange adjacent its upper edge above said perforations, a pair of complementary flanges extending from said top portion in planes substantially parallel to the flanges of said wall portions, and a transversely corrugated strip retained between each of said support flanges and said complementary flanges to provide a row of secondary air supply inlet channels extending along the top of each of said side walls, said channels being of sufficient length to impart definite direction to the plurality of spaced streams of secondary air of combustion admitted therethrough into the mixture of vaporized fuel and primary air approaching said centralized opening, said support flanges lying in planes extending outwardly and downwardly inclined from said side walls whereby the channels supplying secondary air direct the secondary airstreams upwardly and inwardly toward said centralized opening and terminate outside of said vertical wall.

ALLEN P. LIVAR.