Jan. 15, 1946. A. P. LIVAR ET AL 2,393,176

POT BURNER AND PILOT ASSEMBLY

Filed Jan. 18, 1943 2 Sheets-Sheet 1

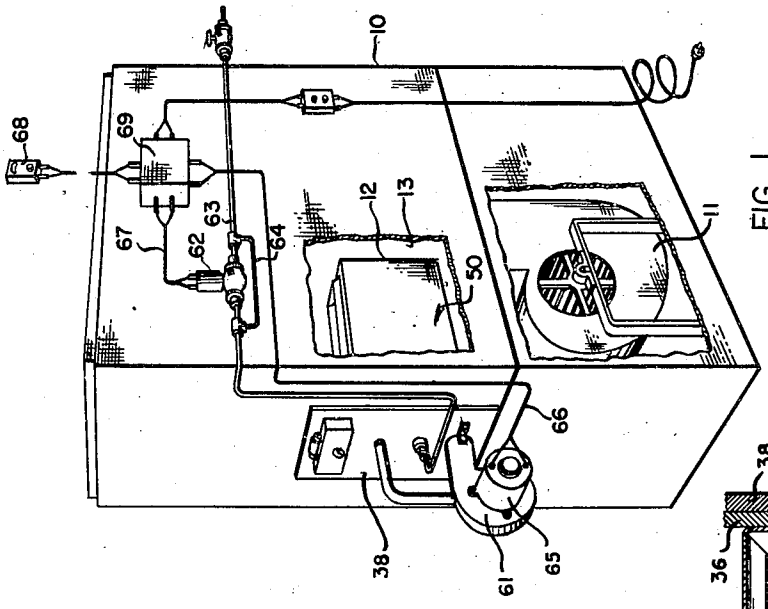


FIG. 1.

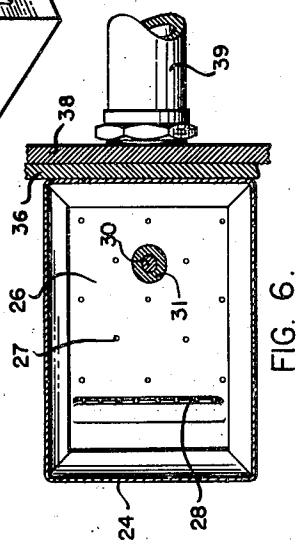


FIG. 6.

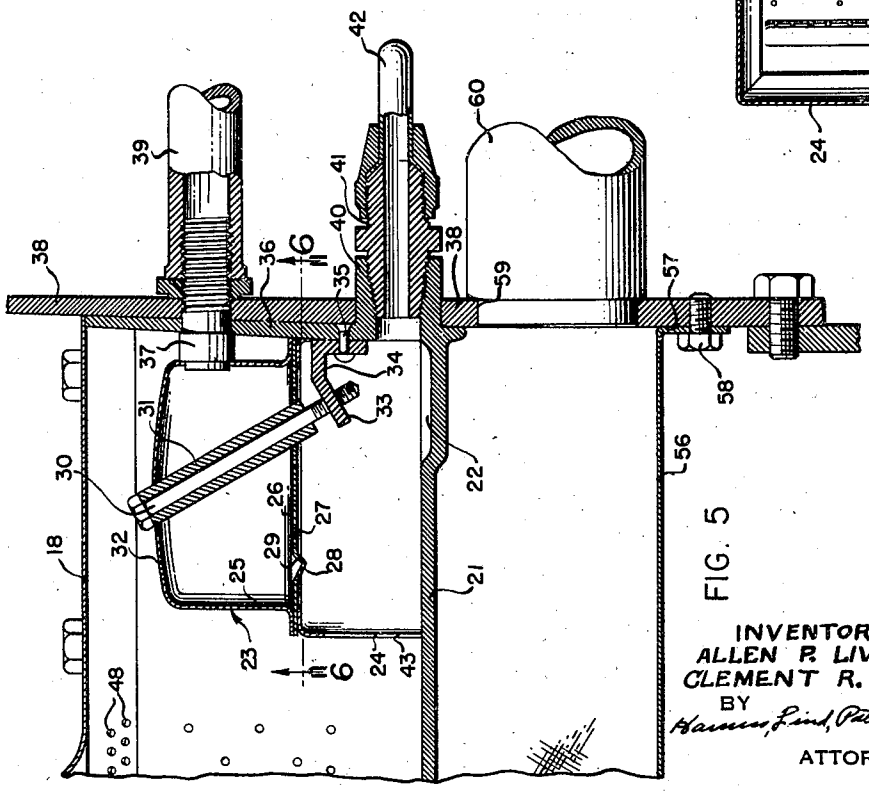


FIG. 5

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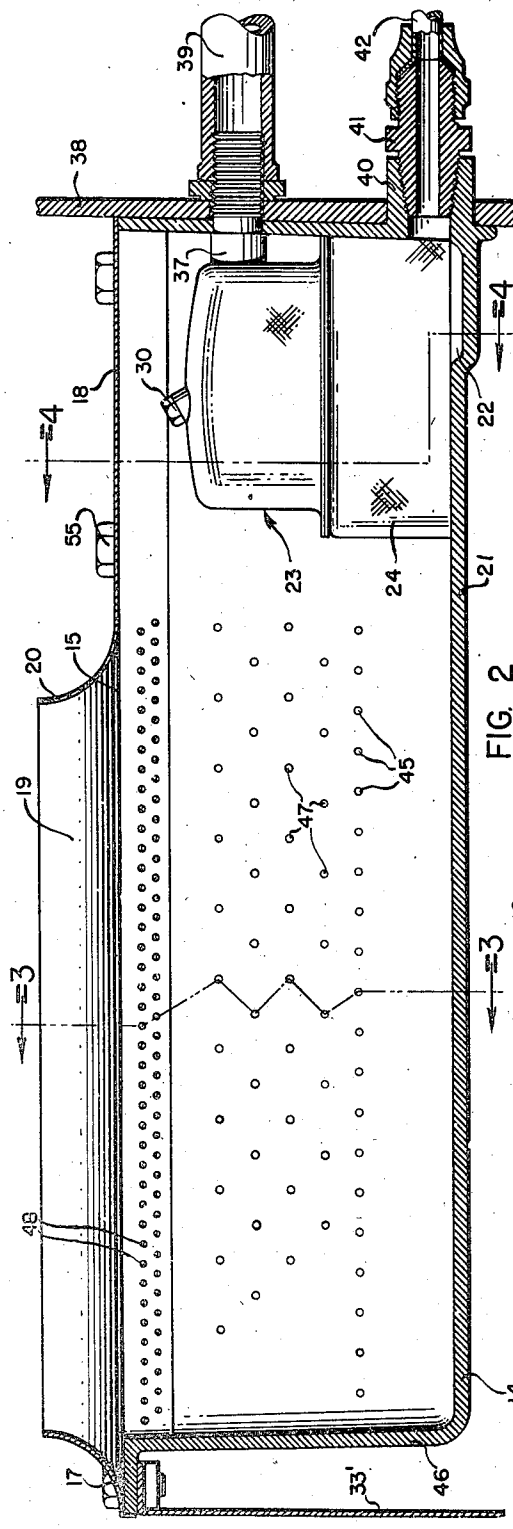


FIG. 2

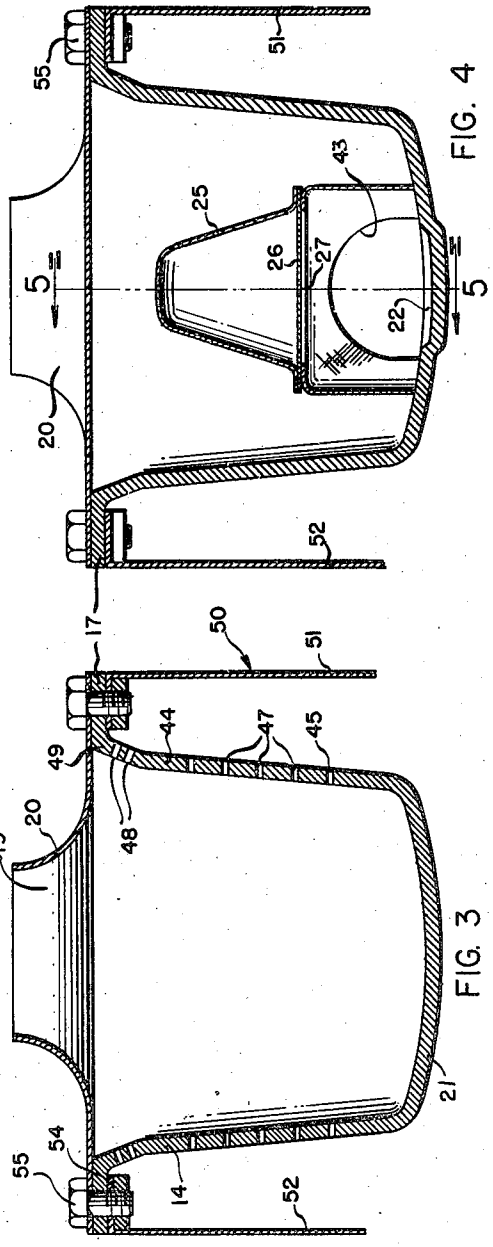


FIG. 4

FIG. 3

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2,393,176

POT BURNER AND PILOT ASSEMBLY

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Application January 18, 1943, Serial No. 472,674

12 Claims. (Cl. 158—91)

This invention relates to improved liquid fuel burning apparatus.

In particular the invention pertains to apparatus of this kind in which liquid fuel is vaporized in a pot type container by reflected and retained heat from previously burned fuel and suitably mixed with air to promote combustion of the resulting mixture at a predetermined location in the container.

One of the main objects of the invention is to provide a pilot in the burner pot of liquid fuel burning apparatus of this kind which is operated under natural, or forced draft of a low order, in order to maintain an igniting flame and initial vaporizing heat between periods of normal combustion in the pot and under forced draft of a higher value during normal combustion periods so as to utilize the pilot as a vapor generator and to distribute the flame over a substantial area having portions spaced relatively distant from the pilot.

Other objects of the invention are to utilize the forced air pilot draft to drive the vaporized fuel out of the pilot and toward the flame and fuel mixture outlet of the pot in order to discourage the occurrence of combustion below a predetermined elevation in the pot; to provide a forced air pilot draft which increases the rate of the vaporization of fuel and correspondingly increases the capacity of the burner without requiring an increase in its dimensions, and to obviate the necessity of accurately locating the floor of the pot so that fuel will be properly distributed thereover by forcing the fuel mainly in vaporized state from the pilot.

Additional objects of the invention are to provide a vaporizing burner of rectangular shape in order that a heat appliance of greater efficiency per pound of metal employed may be used; and to provide improved means for discharging a fuel and air mixture into a rectangular pot of this type which is adapted to introduce the fuel mixture at one longitudinal extremity thereof and to forcefully drive it toward its opposite longitudinal extremity.

A further object of the invention is to provide sufficient forced draft on the pilot of a fuel burning pot of this kind to keep the pilot free from excessive carbon deposits during and between periods of normal combustion. Another object is to provide a forced draft on the pilot of a fluid fuel burning pot which serves to supply a portion of the air required to produce a primary fuel and air mixture of insufficient air content to promote combustion and to mix the fuel and initial air increment of the primary mixture.

Further objects of the invention are to provide in the lower portion of a rectangular pot of this kind a plurality of air inlet holes for supplying the remaining portion of the air content of the primary mixture and which are so distributed as to maintain sufficient temperature at the bottom of the pot during commencement of combustion to prevent collecting and puddling of fuel; and to provide a distribution of the primary air inlet holes which guards against building up of the air content to an extent sufficient to support combustion in the lower portion of the pot at the end thereof remote from the pilot by the combined action of the forced pilot draft and the other primary air admission.

An additional object of the invention is to provide a combustion plate at the flame and fuel mixture outlet of the pot which is so curved in cross-section as to prevent air turbulence as the flame is emitted from the pot and to thus avoid flame puffing and sound disturbances.

An illustrative embodiment of the invention is shown in the accompanying drawings, in which:

Fig. 1 is a perspective view, partly in section, of a hot air furnace having liquid fuel burning apparatus embodying the invention.

Fig. 2 is a vertical longitudinal sectional view of the fuel burning pot shown in Fig. 1.

Fig. 3 is a transverse sectional view taken on the line 3—3 of Fig. 2.

Fig. 4 is a transverse sectional view taken on the line 4—4 of Fig. 2.

Fig. 5 is a fragmentary vertical sectional view taken on the line 5—5 of Fig. 4.

Fig. 6 is a fragmentary horizontal sectional view taken on the line 6—6 of Fig. 5.

The improved fluid fuel burning apparatus is illustrated in the drawings as embodied in a hot air furnace, generally designated by the numeral 10, of the type which has a blower 11 for forcing the air to be heated through the furnace. The fluid fuel burning apparatus comprises a rectangular pot type burner, generally designated by the numeral 12, which is disposed in a chamber 13 of the furnace 10 located above the blower 11. The flame, products of combustion and heat issue from the outlet of the pot type burner 12, enter a heat transfer compartment in the upper section of the furnace 10 and transfer heat to the air current propelled through the furnace by the blower 11 in a conventional manner.

The burner 12, as shown in Figures 2 to 6 inclusive, comprises a pot 14 of rectangular cross-

section having an upper open extremity 15 surrounded by an outwardly extending flange 17. The horizontal cross-section of the rectangular pot is of substantially greater length than width and the length of the pot materially exceeds the depth thereof. Seated on the framelike flange 17, which surrounds the open upper extremity of the pot, is a sheet metal flame plate 18 having a central rectangular slot-like opening 19 therein which extends from the rear or left end of the pot to a location substantially ⅓ of the length of the pot from the front or right end thereof. The rectangular slot 19 forms a flame and fuel mixture outlet and is surrounded by a flange 20 of arcuate cross-section. The contour of the cross-section of the flange 20 preferably conforms to streamlined curvature in order to fill in that space in which air turbulence would be created by emission of a flame and fuel mixture by the sharp edge of an outlet formed in a flat flame plate. By guarding against the creation of turbulence around the edge of the flame pattern, flame pulsation is greatly reduced. The bottom wall 21 of the pot 14 has a slight depression or well 22 located at its front end portion and substantially centrally of the floor of the pot. Disposed over the well 22 is a pilot housing generally designated by the numeral 23. The pilot housing, best shown in Fig. 5, comprises a sheet metal casing having a lower section 24 of substantially rectangular shape and an upper section 25 of inverted U-shaped cross-section, as shown in Fig. 4. Interposed between the upper and lower sections 25 and 24, respectively, is a partition 26 having a plurality of apertures 27 therethrough. The partition 26 also has a downwardly offset ridge 28 comprising a forwardly inclined side in which are formed a row of apertures 29 for directing air toward the front end of the lower casing section 24. The pilot 23 is preferably detachably secured in the burner pot 14 by a bolt 30 extending through a sleeve 31 fixed to the top wall 32 and the partition 26 of the pilot housing. The bolt 30 has a lower threaded end which is threaded in a flange 33 of a bracket 34. The bracket 34 is riveted or otherwise suitably secured at 35 to the front end wall 36 of the pot 14.

A fitting 37 extending through an aperture formed in the front wall of the upper casing section 25 also extends through registering openings in the front wall 36 of the pot and in a mounting plate 38 by which the pot is supported and which is adapted to mount it in a furnace as illustrated in Fig. 1. The external end of the fitting 37 is threaded for connection with a pipe or other suitable conduit 39 by which a forced draft of air is supplied to the upper casing section of the pilot housing from a source hereafter set forth. Formed on the front wall 36 of the pot 14 at the lower extremity thereof is a tubular boss 40 having a central passage leading to the interior of the lower casing section of the pilot and provided with threads for receiving a nipple 41 by which a fluid fuel supply conduit 42 is detachably connected to the fuel burner.

The front wall of the lower casing section 24 of the pilot has an outlet opening 43 facing the longitudinal extremity of the pot 14 opposite that at which the pilot is located.

Provided in the opposite longitudinal side walls 44 of the pot 14 is a lower row of primary air inlet holes 45 which extend from a location substantially directly below the front longitudinal extremity of the rectangular slot or flame outlet opening 19 to a location substantially adjacent the rear end wall 46 of the pot. Four additional rows of primary air inlet openings 47 are located above the lower row of inlet holes 45. The uppermost row of primary air inlet holes 47 extends from a location below the front extremity of the slot 19 to a location spaced from the rear wall 46 of the pot and each successively adjacent lower row of holes 47 is spaced a greater distance from the rear end wall 46 of the pot than the upper adjacent row. With this arrangement, the rows of primary air inlet holes 47 terminate on a line inclined rearwardly with respect to the length of the pot 14 and there is a decrease in the amount of primary air admitted at the rear end of the pot to compensate for the quantity of primary air which tends to be forced toward the rear end of the pot by the forced draft of the pilot as well as the accumulation of primary air admitted through the row of openings 45 and 47. The decrease in the number of holes at the rear end portion of the pot thus prevents unintended formation of a fuel and air mixture of combustible proportions at a low level in the rear end portion of the pot. The lowermost row of primary air inlet openings 45 serves to assure the admission of a sufficient primary air supply throughout the length of the floor 21 of the pot to prevent accumulation of liquid fuel thereon in puddles. Formed in the upper marginal portion of the side walls 44 of the pot 14 are rows of closely spaced secondary air inlet openings 48 which are arranged to discharge air inwardly and upwardly toward the slot 19 in the flame plate 18. The sections 49 of the side walls 44 in which the secondary air inlet apertures 48 are provided are inclined outwardly with respect to the main body portions of the side walls 44 in order to direct the flow of air through the apertures 48 inwardly of the pot and upwardly toward the flame outlet thereof.

The body portion of the pot 14 is enclosed in a casing, generally designated by the numeral 50, which comprises opposite longitudinal sides and rear end walls 51, 52, and 33' each provided with an inwardly extending flange 54 upon which the flanges 17 of the pot rest. The flame plate 18, the flanges 17 of the pot and flanges 54 of the casing 50 are detachably secured together in airtight relationship by bolts 55 as illustrated in Figs. 2, 3 and 4. The mounting plate 38 forms the front end wall of the casing 50, as illustrated in Fig. 5, and the lower wall 56 of the casing 50 has a flange 57 secured by bolts 58 to the mounting plate.

As illustrated in Figs. 1 and 5, the mounting plate 38 is provided with an aperture 59 leading to the interior of the casing 50 and through which extends a discharge tube 60 of a blower 61. The blower 61 supplies a forced draft of air to the interior of the casing 50 which is admitted to the interior of the pot 14 through the primary air inlet openings 45 and 47 and secondary air inlet openings 48. The pilot draft tube 39 is connected with the discharge side of the casing of the blower 61 so as to supply a forced air draft to the interior of the pilot housing 23.

In Fig. 1 of the drawings is illustrated diagrammatically a control system for the fluid fuel burning apparatus. This control system includes a solenoid valve 62 in a fuel line 63 which is connected with the fluid fuel supply tube 42. A bypass passage is provided around the valve 62 by a conduit 64 connected with the fuel line 63 on respectively opposite sides of the valve 62. When the valve 62 is opened, sufficient fuel to produce normal combustion operation of the fuel burning apparatus is permitted to flow into the lower casing section 24 of the pilot. When the valve 62 is

closed, the by-pass 64 accommodates the flow of a lesser amount of fuel to the pilot housing which is of sufficient quantity to maintain the pilot lighted between normal combustion operations.

The blower 61 has an electric motor 65 which is supplied with current from a circuit 66. A circuit 67 is provided for operating the solenoid valve 62. The circuits 66 and 67 may be controlled by suitable temperature responsive mechanism including a thermostat 68 and relay 69 to simultaneously open the valve 62 and actuate the blower 61 when the thermostat 68 calls for heat. After the enclosure to which heated air is supplied by the furnace 10 has reached a predetermined temperature the valve 62 is closed in accordance with conventional fluid fuel burner control performance, and operation of the blower 61 may be completely discontinued or continued at a lower speed as desired. If operation of the blower is discontinued between normal combustion periods the fuel supplied to the pilot housing 23 through the by-pass 64 mixes with air supplied through the tube 39 to the pilot housing 23 by gravity, there being sufficient fuel and air mixture to maintain the pilot lighted and heated sufficiently to initiate vaporization of fuel at the commencement of a normal combustion period. If the blower 61 is reduced to part speed when the valve 62 is closed, then there is present a supply of forced draft of air to the pilot housing between normal combustion periods. During normal combustion periods the fluid fuel is vaporized and mixed with air entering the pilot housing 23 and the resulting mixture, which is not of combustible proportions, is forcibly driven through the pilot opening 43 toward the rear end of the pot 14. More air is added to the mixture through the primary air inlet openings 45 and 47 as the mixture traverses the length of the pot, however, the total air supplied by the forced pilot draft and apertures 45 and 47 is insufficient to support combustion at a location in the pot below the upper extremity thereof. The secondary air inlet openings 48 supply an additional quantity of air to the primary fuel and air mixture raising its air content to combustible proportions and the mixture burns through the slot 19 and produces a flame extending the full length of the slot and projecting substantially above the latter. The pilot serves to produce a mixture of fuel vapor and air during normal combustion operations and to maintain an igniting light between combustion operations as well as to maintain the temperature of the pilot and portions of the pot in the vicinity of the latter at a sufficiently high value to encourage fuel vaporization during the initial stages of a combustion period. The forced pilot draft drives the fuel and air mixture produced in and immediately in front of the pilot toward the rear end of the pot and also tends to force it upwardly toward the outlet or slot 19 of the pot thus deterring burning of fuel at a low elevation in the pot. A combined pilot and fuel and air mixing device of this kind having a forced pilot draft enables the use of a pot of rectangular cross-section having substantially greater length than transverse dimensions and secures distribution of the fuel and air mixture throughout the length of the pot and over the entire length of an elongated flame outlet. The provision of a forced draft on the pilot maintains a clean flame during pilot operation and prevents the formation of carbon in and about the pilot housing and pot during normal combustion operation. The air pressure on the pilot increases the rate of vaporization of fuel and thus increases the capacity of the burner without requiring an increase in its size. Inasmuch as fuel vapor is forcefully discharged from the pilot housing by the pilot draft the disposition of the floor of the pot with respect to a horizontal plane is not critical.

Although but one embodiment of the invention is herein shown and described, it will be understood that various changes in the sequence of operations, steps and materials employed may be made without departing from the spirit of the invention.

We claim:

1. A liquid fuel burner of the pot type comprising a rectangular fuel burning pot having a fuel mixture and flame outlet slot in its upper wall, a pilot housing in said pot adjacent one end wall comprising a casing having an outlet facing the opposite end wall of said pot for directing fuel mixture toward the latter and having a perforated partition dividing said casing into fuel and air receiving compartments, means for supplying liquid fuel to said fuel compartment, and means for discharging a forced air draft into said air compartment for producing a fuel and air mixture in said pilot housing and driving it through said pilot outlet toward said last mentioned end of said pot, some of the perforations of said partition being disposed to direct air jets away from said pilot outlet for producing turbulence in said pilot housing.

2. A liquid fuel burner of the pot type comprising a rectangular fuel burning pot having a fuel mixture and flame outlet slot in its upper wall, a pilot housing in said pot adjacent one end thereof having an outlet facing the opposite end of said pot for directing fuel and air mixture toward the latter, means for supplying liquid fuel to said pilot housing, means for discharging a forced air draft into said pilot housing for producing an initial fuel and air mixture of relatively small air content and driving the same through said pilot outlet, the lateral side walls of said pot having a series of secondary air inlet openings adjacent said slot and successive rows of primary air openings below said secondary air openings, the lower row of primary air inlet openings extending substantially from said pilot housing to within close proximity to said opposite end of said pot, the next adjacent row terminating in substantially greater spaced relation to said opposite end of said pot and each successive row above said latter row terminating in less spaced relation to said last mentioned end of said pot than the row below it.

3. Liquid fuel burning apparatus comprising a casing having an opening in its upper side, a blower for discharging a forced air draft into said casing, a fuel burning pot disposed in said opening having a flame outlet at its upper extremity, said pot having opposite end walls and having spaced side walls provided with primary air inlet openings and secondary air inlet openings between the former and said flame outlet all communicating with the interior of said casing for receiving air from said blower, a pilot member located adjacent one of said end walls of said pot comprising a casing having impervious external walls, one of said external walls of said pilot member being provided with an outlet opening facing the other end wall of said pot, means for supplying liquid fuel to said pilot member, and means for conducting a forced air draft to said pilot member for producing a fuel and air

mixture therein and driving said mixture from said pilot member toward said last mentioned end wall of said pot, the combined air supply through said last mentioned means and said primary air inlet openings being insufficient to support combustion during normal combustion operation of said burner.

4. Liquid fuel burning apparatus comprising a casing having an opening in its upper side, a blower for discharging a forced air draft into said casing, a fuel burning pot disposed in said opening having a flame outlet at its upper extremity, said pot having opposite end walls and having side walls provided with primary air inlet openings and secondary air inlet openings between the former and said flame outlet all communicating with the interior of said casing for receiving air from said blower, a pilot member located adjacent one of said end walls of said pot, means for supplying liquid fuel to said pilot member, means for conducting a forced air draft from said blower to said pilot member for producing a fuel and air mixture therein and driving said mixture from said pilot member toward the other end wall of said pot, the combined air supply through said last mentioned means and said primary air inlet openings being insufficient to support combustion within said pot during normal combustion operation of said burner, and control mechanism for said liquid fuel supply means and blower adapted to reduce the supply of fuel and air to said pilot member for discontinuing normal combustion operation of said burner and to bring the fuel and air mixture in said pilot member to a combustible state for maintaining the pilot lighted between periods of normal combustion operation.

5. Liquid fuel burning apparatus comprising a fuel burning pot having a flame outlet at its upper extremity and an adjacent combustion zone immediately below the latter, said pot having opposite end walls and having side walls provided with primary air inlet openings and secondary air inlet openings between the latter and said flame outlet, means for discharging air under pressure through said primary and secondary air inlet openings, a pilot member in said pot located adjacent one of said end walls comprising a hollow casing having impervious exterior walls and a perforated partition dividing its interior into upper and lower air and fuel receiving chambers, respectively, said lower fuel receiving chamber having an outlet facing the other end wall of said pot, means for supplying liquid fuel to said lower chamber of said pilot member, means for discharging a forced air draft into said upper chamber of said pilot member and downwardly through the perforations of said partition for vaporizing fuel in said lower chamber and driving the resulting vaporized fuel through said pilot outlet toward said last mentioned end wall of said pot, the combined air supply from said primary inlet openings and through said last mentioned means being insufficient to support combustion in said pot below said combustion zone.

6. Liquid fuel burning apparatus comprising a fuel burning pot having a flame outlet at its upper extremity and an adjacent combustion zone immediately below the latter, said pot having opposite end walls and having side walls provided with primary air inlet openings and secondary air inlet openings between the latter and said flame outlet, means for discharging air under pressure through said primary and secondary air inlet openings, a pilot member in said pot located adjacent one of said end walls comprising a hollow casing having a perforated partition therein dividing its interior into fuel and air receiving chambers, respectively, said fuel receiving chamber having an outlet facing the other end wall of said pot, means for supplying liquid fuel to said fuel receiving chamber of said pilot member, means for discharging a forced air draft into said air receiving chamber of said pilot member for vaporizing fuel in said fuel receiving chamber and driving the resulting vaporized fuel through said pilot outlet toward said last mentioned end wall of said pot, the combined air supply through said primary inlet openings and through said last mentioned means being insufficient to support combustion in said pot below said combustion zone, and control mechanism for said liquid fuel supply and forced air draft discharge means adapted to reduce the supply of fuel and air to said pilot member for discontinuing combustion at said combustion zone and to bring the fuel and air mixture in said pilot member to a combustible state for maintaining the pilot lighted between periods of combustion at said combustion zone.

7. Liquid fuel burning apparatus comprising a casing having a rectangular opening in its upper side, a blower for discharging a forced air draft into said casing, a rectangular fuel burning pot extending into said opening having its main body portion disposed in said casing and having a flame outlet at its upper extremity extending from one end of said pot to a location spaced from its opposite end, the lateral side walls of said pot having a row of secondary air inlet openings therein communicating with the interior of said casing and extending from said first mentioned end of said pot throughout the length of said flame outlet and having a series of primary air inlet openings below said secondary air inlet openings, the number of primary air inlet openings in said series being reduced toward the first mentioned end of said pot, a hollow housing member disposed in said pot at a location between said opposite end of said pot and the adjacent end of said flame outlet and having a discharge opening facing said first mentioned end of said pot, means for supplying liquid fuel to said casing, and means for discharging a forced air draft into said casing for vaporizing fuel therein and driving a fuel and air mixture through the discharge opening of said housing member toward said first mentioned end of said pot.

8. Liquid fuel burning apparatus comprising a casing having a rectangular opening in its upper side, a blower for discharging a forced air draft into said casing, a rectangular fuel burning pot extending into said opening having its main body portion disposed in said casing and having a flame outlet at its upper extremity extending from one end of said pot to a location spaced from its opposite end, the lateral side walls of said pot having a row of secondary air inlet openings therein communicating with the interior of said casing and extending from said first mentioned end of said pot throughout the length of said flame outlet and having a series of primary air inlet openings below said secondary air inlet openings, the number of primary air inlet openings in said series being reduced toward the first mentioned end of said pot, a hollow housing member disposed in said pot at a location between said opposite end of said pot and the adjacent end of said flame outlet and having a discharge opening facing said first mentioned end of said pot, means for supplying liquid fuel to said casing, means for discharging a forced air draft into said

casing for vaporizing fuel therein and driving a fuel and air mixture through the discharge opening of said housing member toward said first mentioned end of said pot, and a flange of curvilinear cross-section extending upwardly from and surrounding said flame outlet for guarding against noise creating turbulence in the air surrounding the flame emitted through said flame outlet.

9. A liquid fuel burner of the pot type comprising a fuel burning pot having a fuel mixture and flame outlet in its upper side, a pilot housing in said pot including an apertured partition dividing the interior thereof into upper and lower air and fuel-receiving compartments, respectively, and having an outlet leading from said lower compartment and facing a wall portion of said pot spaced from pilot housing for directing fuel mixture toward said wall portion, means for supplying liquid fuel to the lower compartment of said pilot housing, and means for discharging a forced air draft into the upper compartment of said pilot housing and downwardly through said partition at a location above said liquid fuel supply for producing a fuel and air mixture in said lower compartment and driving said mixture through said pilot outlet toward said wall portion of said pot.

10. A liquid fuel burner of the pot type comprising a fuel burning pot having spaced side and end walls and including a concaved floor portion and having a chamber immediately above said floor portion for accommodating a fuel and air mixture of non-combustible proportions during normal combustion operation of said burner, said pot having a flame outlet in its upper side, means in said pot providing an enclosure therein adjacent one end wall of said pot for receiving liquid fuel, said enclosure having an outlet facing the opposite end wall of said pot and having an open lower side disposed adjacent the floor of said pot and over the concaved portion thereof, means for supplying liquid fuel into said enclosure and the concaved portion of said floor, means for discharging a forced draft into said enclosure for producing an initial fuel and air mixture in said enclosure and for driving said mixture through the outlet of said enclosure toward said opposite end of said pot, the side walls of said pot being provided with primary air inlet openings for supplementing the air content of the mixture in said non-combustible mixture chamber and with a plurality of secondary air inlet openings at a location between said chamber and the flame outlet of said pot for bringing the air content of said mixture to a combustible value.

11. Liquid fuel burning apparatus comprising a casing; a blower for discharging a forced air draft into said casing, a fuel burning pot disposed in said casing having a flame outlet at its upper extremity, said pot having opposite end walls and having spaced side walls provided with primary air inlet openings and secondary air inlet openings between the former and said flame outlet all communicating with the interior of said casing for receiving air propelled by said blower, means in said pot providing a pilot chamber adjacent one of said end walls, said chamber having a wall provided with an outlet opening facing the other end wall of said pot, and means for supplying liquid fuel to said pilot chamber, said pilot chamber having an air inlet for admitting thereinto air propelled by said blower for producing a fuel and air mixture in said pilot chamber and for driving said mixture from the latter toward said last mentioned end wall of said pot, the combined air supply through said pilot chamber and said primary air inlet openings being insufficient to support combustion in said pot during normal combustion operation of said burner.

12. Liquid fuel burning apparatus comprising a casing, a blower for discharging a forced air draft into said casing, a fuel burning pot disposed in said casing having a flame outlet at its upper extremity, said pot having opposite end walls and having spaced side walls provided with primary air inlet openings and secondary air inlet openings between the former and said flame outlet all communicating with the interior of said casing for receiving air propelled by said blower, means in said pot providing a pilot chamber adjacent one of said end walls, said chamber having a wall provided with an outlet opening facing the other end wall of said pot, means for supplying liquid fuel to said pilot chamber, said pilot chamber having an air inlet for admitting thereinto air propelled by said blower for producing a fuel and air mixture in said pilot chamber and for driving said mixture from the latter toward said last mentioned end wall of said pot, the combined air supply through said pilot chamber and said primary air inlet openings being insufficient to support combustion at a location in said pot substantially below said secondary air inlet openings during combustion at said combustion zone, and control mechanism for said liquid fuel supply means and blower adapted to reduce the supply of fuel and air to said pilot chamber for discontinuing combustion at the vicinity of said secondary air inlet openings and to bring the fuel and air mixture in said pilot chamber to a combustible state for maintaining a pilot light between periods of combustion at the vicinity of said secondary air inlet openings.

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