Oct. 9, 1945. M. D. HUSTON 2,386,556

HORIZONTAL POT TYPE BURNER

Filed March 25, 1943 2 Sheets-Sheet 1

Fig. 2

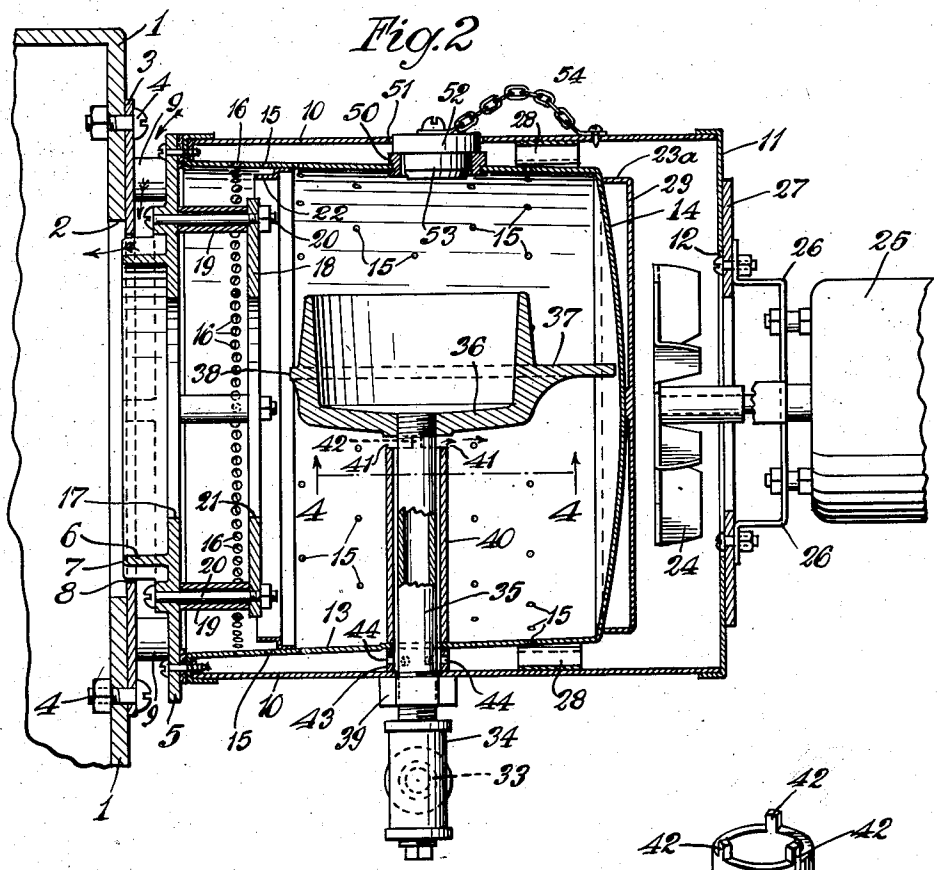
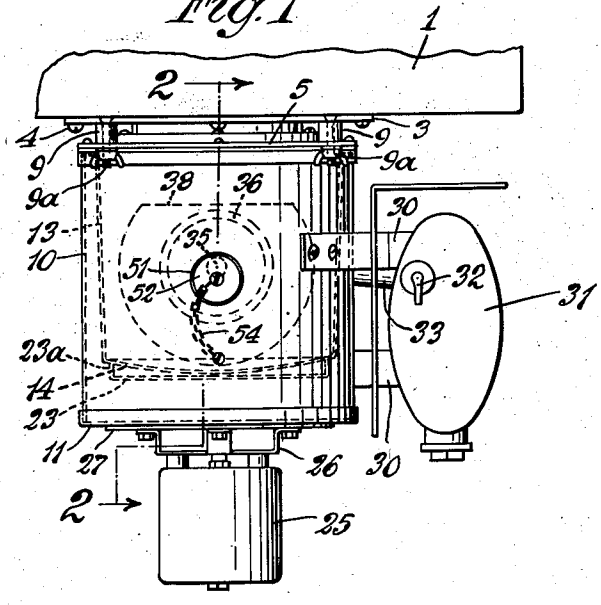


Fig. 1



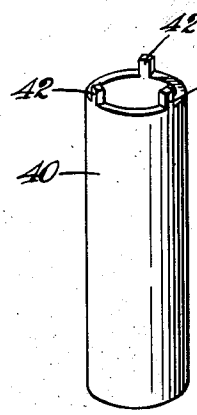


Fig. 3

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Fig. 5

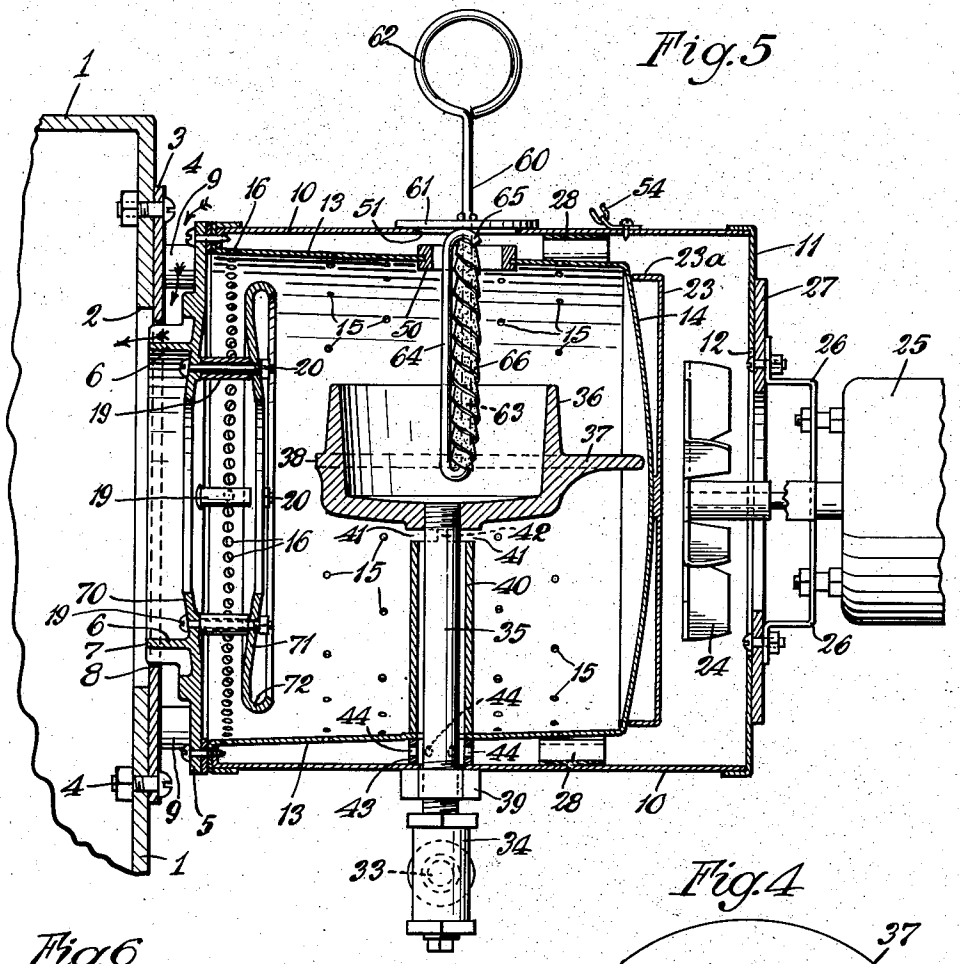


Fig. 6

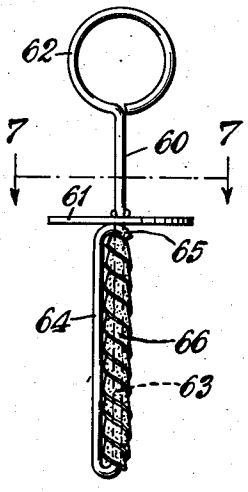


Fig. 7

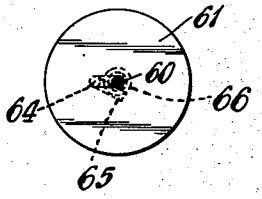
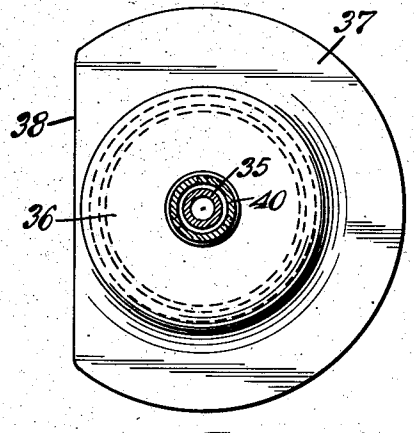


Fig. 4



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UNITED STATES PATENT OFFICE

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HORIZONTAL POT TYPE BURNER

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Application March 25, 1943, Serial No. 480,443

16 Claims. (Cl. 158—91)

My invention relates to an improvement in horizontal pot type burners. One object of the invention is to provide improved means for subjecting the fuel of a pot type burner to the heat of combustion, in order to vaporize the fuel.

Another object is to provide improved means for supplying air at low stages of combustion.

Another object is to provide an improved means for recirculating the mixture within the pot.

Another object is to provide means for preventing undue cooling of any portion of the pot which is subjected to a direct flow of cold air.

Another object is to provide means for lighting the burner.

Other objects will appear from time to time in the course of the specification.

My invention is illustrated more or less diagrammatically in the accompanying drawings, wherein:

Figure 1 is a plan view;

Figure 2 is a section on an enlarged scale along the line 2—2 of Figure 1;

Figure 3 is a perspective of a detail;

Figure 4 is a section along the line 4—4 of Figure 2;

Figure 5 is a section similar to Figure 2 through a variant form of the device and illustrating a lighter;

Figure 6 is a side elevation of the lighter;

Figure 7 is a section along the line 7—7 of Figure 6.

Like parts are indicated by like characters throughout the specification and drawings.

Referring to the drawings, 1 indicates generally any suitable heater structure or flame receiving member, the details of which do not form part of the present invention. It is provided with an aperture 2 for admitting the flame and exhaust gases from the burner. 3 is any suitable exterior abutment plate which may be secured to the member 1, in any suitable manner as for example, by bolts 4. The plate 3 may serve as a supporting means for the burner unit as a whole. Mounted on this base plate 3 is a ring 5, having an annular flange 6 aligned with the aperture 2 and herein shown as having its inner lip 7 spaced within and terminating in the general plane of the edge 8 of a generally central aperture in the base plate 3. It may be removably mounted on the base plate 3 by any suitable spacers 9 and bolts 9a. For example, I may employ spacers 9 and bolts 9a extending therethrough outwardly from the base plate 3 through any suitable ears or enlargements of the ring 5. Securing nuts such as thumb nuts may be employed. The entire assembly can be removed as a unit from the base plate 3. It will be observed that air may flow along the path indicated by arrows at the top of Figure 2 and may enter through the aperture between the flange 6 and the base plate 3.

Secured to the ring 5 is an outer housing 10, herein shown as cylindrical and as having an end 11 with the generally central aperture 12. 13 generally indicates the burner pot proper with a bottom or end 14. Its generally cylindrical but slightly tapered wall is provided with a plurality of primary air inlets 15. Similar inlets could, if desired, be employed in the end or bottom wall, and it will be understood that substantial variations of size, spacing and arrangement of primary air inlet apertures may be employed.

Secondary air may be admitted through a row of larger and more closely spaced secondary air inlet apertures 16 located adjacent the ring 5. It will be understood that the inner portion of the ring 5 operates as a flame ring and is provided with a central aperture 17 aligned with the corresponding apertures in the member 1 and the base plate 3. I may, if desired, employ a recirculating ring 18, herein shown as mounted on the flame ring 5 by any suitable spacers 19 and securing members 20. The inner edge of the recirculating ring is spaced inwardly from the wall of the pot 13. The recirculating ring has a central aperture 21 of about the same diameter as the aperture 17 of the flame ring and preferably axially aligned therewith. I illustrate the outer row of primary air inlet apertures 15 as partially masked by a deflector 22 which directs air from this row upwardly across the path of delivery of air through the secondary air inlets 16. 23 indicates a shield or baffle secured to the bottom or end 14 of the pot in line with the delivery of air thereaginst by a fan 24 actuated by any suitable motor 25 mounted by brackets 26 on the removable ring 27 secured to the bottom or end 11 of the outer housing 10. The diameter of the fan 24 is preferably such that it may pass through the aperture 12 in the bottom of end member 11. The shield is in the form of a flat disk which may be centrally welded or otherwise secured to the bottom or end of the pot 13. Portions of the edge of the disk are inwardly bent as at 23a, to provide spacing abutments for engaging the bottom or end of the pot. 28 is any suitable guiding means for directing air forwardly through the space between the pot 13 and the outer housing 10.

Mounted on the outer housing 10 by any suitable bracket or support 30 is any suitable fuel control means such as the float chamber 31, with any suitable valve control handle 32. The details of the float chamber and valve do not of themselves form part of the present invention but it will be understood that a liquid fuel may be delivered to the float chamber from any suitable source and that the float chamber serves to control the level of the fuel in the below described vaporizing cup 36.

33 indicates any suitable duct or pipe extending from the float chamber to any suitable sump element 34 located beneath the lower side of the housing 10. 35 is a generally perpendicular fuel duct shown as extending through the walls of the members 10 and 13. Its upper end is shown as screw threaded to receive a vaporizing cup 36 which is shown as provided with a horizontally extending flange 37. This flange is generally circular in plan view but is cut away at one side as at 38. The pipe 35 may be screw threaded or otherwise secured to the sump 34 and 39 indicates any suitable exterior lock nut.

40 is a tubular passage member surrounding the fuel pipe 35 and outwardly spaced therefrom to provide an air passage through which air passes upwardly about the pipe 35 and reaches the interior of the pot through apertures 41 which are formed by spacing lugs 42 which space the top of the sleeve 40 from the bottom of the cup. 43 is an apertured air admitting spacer ring surrounding the pipe 35 where it passes through the space between the members 10 and 13. Through the apertures 44 of this ring, air from the space between the members 10 and 13 is admitted to the interior of the sleeve 40 and flows upwardly about the pipe 35 until it reaches the interior of the pot at the level of the bottom of the cup.

It will be understood that the relation between the level of the fuel in the cup 36 and the level of the fuel in the float valve structure 31 is such that the level of liquid fuel in the bottom of the cup 36 may be controlled by the setting of the valve control element 32.

In order to light the fuel, I provide a lighting aperture; I illustrate for example, a ring 50 on the top of the pot. In line with the ring, the outer housing 10 is apertured as at 51. Any suitable closure plug 52 may be employed which rests gravitationally against the upper surface of the ring 50 in a firm closing relationship. The plug is also provided with a downwardly extending portion 53 of reduced diameter, which more or less snugly fits the aperture of the ring 50. The plug may be held against loss by any suitable means 54.

In the form of Figure 5, I illustrate the employment of a lighter which works equally well with the other forms, such as that of Figure 1. The plug 52 may be manually withdrawn and the securing member 54 will keep it from being lost. The operator then inserts the lighted lighter element shown in Figures 5 to 7. This element is shown as including a wire stem 60 which passes through a supporting disk 61. On one side of the disk 61 is a finger ring or any suitable handle 62. At the opposite side of the disk 61, the stem 60 is continued by a straight portion 63, the end of which is bent back as at 64 and terminates in a bend 65 adjacent the bottom of the disk 61. About the member 63, any suitable wick material may be wound as at 66. The material may be fibrous or it may be metallic, the essential thing being that by material or shape, it must be adapted to hold a primer fuel in sufficient quantities to initiate combustion within the cup. When the plug 52 is removed and the lighter is dropped in position, it will be observed that there is a substantial clearance between the disk 61 and the ring 50. Through this space a substantial flow of air passes inwardly about the wick 66. As long as the lighter is in the position in which it is shown in Figure 5, an ample supply of air is provided for maintaining combustion. In fact, I thus obtain a substantial local excess supply of air. As soon as the fuel in the bottom of the cup 36 is ignited, the operator can withdraw the lighter and drop the plug 52 back in position.

It will be observed that in Figure 5, the recirculating ring and the flame ring are somewhat different shaped than in the form of Figure 2. There is illustrated for example the conic inner edge portion 70 of the flame ring. The recirculating ring includes an oppositely conic portion 71 and a downwardly and inwardly recurved outer edge portion 72. It will be observed that the separation between the conic portions 70 and 71 increases progressively inwardly from the outer edge of the recirculating ring to its inner aperture.

It will be realized that while I have shown and described an operating device, still many changes may be made in the size, shape, arrangement, number and disposition of parts without departing materially from the spirit of my invention. I wish, therefore, that my showing be taken as in a large sense diagrammatic and illustrative.

The use and operation of my device are as follows:

In the present burner, which is of the hydroxilating type, primary air is delivered to the pot 13 through air inlet apertures 15. I may use natural draft or I may use other means such as the fan 24 to cause the air to flow into the pot. A liquid fuel is delivered to the bottom of the cup 36 upwardly along the passage or pipe 35. The level of the fuel and the rate of flow are controlled by the adjustment of the manual valve control member 32 of the flow chamber assembly. Assuming that combustion is already taking place in the pot, the inflowing liquid fuel is vaporized in the cup 35 and the vaporized fuel joins with the primary air to form a partially combustible primary mixture. This mixture is completed by the flow of air through the secondary air inlet apertures 16. The flange 37 about the cup assists in conducting the heat of combustion to the cup and maintaining it hot enough for proper vaporization of the liquid fuel at all stages or rates of flow. I find it useful to recirculate the primary mixture at the level or zone of delivery of the secondary air supply. Thus the secondary air delivered inwardly through the apertures 16 flows into the space between the recirculating ring and the flame ring and causes an upward flow of the mixture about the outer edge of the recirculating ring. The final mixture passes inwardly through the central aperture of the flame ring and at high stages of fuel delivery burns in a long torch-like flame within the member 1. The shape of the flame ring and the recirculating ring can be substantially varied but I find it desirable to flare them apart as shown in Figure 5 to provide a passage or space, the width of which increases toward the center of the burner. Smooth recirculation is also promoted by the recurvature of the outer edge of the recirculating ring as at 72.

I claim:

1. In a pot type horizontal burner, a burner pot having a circumferential wall with a plurality of air inlet apertures therein, a vaporizing cup located within said pot, means for directing a flow of liquid fuel to the interior of said cup and means for maintaining the heat of said cup, including a generally horizontal circumferential flange extending outwardly from the outside of the cup.

2. In a pot type horizontal burner, a burner pot having a circumferential wall with a plurality of air inlet apertures therein, a vaporizing cup located within said pot, means for directing a flow of liquid fuel to the interior of said cup and means for maintaining the heat of said cup, including a generally horizontal circumferential flange extending outwardly from the outside of the cup, the outer edge of said flange being circular throughout the greater part of its circumference, with a rectilinear edge portion generally perpendicular to the axis of the pot wall.

3. In a pot type horizontal burner, a burner pot having a circumferential wall with a plurality of air inlet apertures therein, a vaporizing cup located within said pot, means for directing a flow of liquid fuel to the interior of said cup and means for maintaining the heat of said cup, including a generally horizontal circumferential flange extending outwardly from the side of the cup, the outer edge of said flange being of circular contour with a straight edge portion on the side of the cup adjacent the mouth of the pot.

4. In a pot type burner, a burner pot having a circumferential wall with a plurality of air inlet apertures therein, a vaporizing cup located within said pot, means for directing a flow of liquid fuel to the interior of said cup, and means for delivering air to an area adjacent the bottom of the cup and thereby maintaining combustion adjacent the bottom of the cup.

5. In a horizontal pot type burner, a burner pot having a circumferential wall with a plurality of air inlet apertures therein, a vaporizing cup located within said pot, means for directing a flow of liquid fuel to the interior of the cup, a flame ring partially closing the end of the pot and a recirculating ring spaced inwardly from said flame ring and spaced circumferentially inwardly from the circumferential wall and having a central aperture, said cup being located in general horizontal alignment with said aperture, and adjacent said recirculating ring.

6. In a horizontal pot type burner, a burner pot having a circumferential wall with a plurality of air inlet apertures therein, a vaporizing cup located within said pot, means for directing a flow of liquid fuel to the interior of the cup, a flame ring partially closing the end of the pot and a recirculating ring spaced inwardly from said flame ring and spaced circumferentially inwardly from the circumferential wall and having a central aperture, said cup being located in general horizontal alignment with said aperture, and adjacent said recirculating ring, and means for directing secondary air inwardly into the space between said flame ring and said recirculating ring.

7. In a horizontal pot type burner, a burner pot having a circumferential wall with a plurality of air inlet apertures therein, a vaporizing cup located within said pot, a hollow stem extending upwardly through the pot wall, the cup being secured to its upper end, a fuel supply means in communication with the interior of said stem, and means for delivering liquid fuel therethrough and through the stem to the bottom of the cup, an outer housing surrounding said pot, means for delivering air into the space between said housing and said pot, and means for delivering air to the interior of the pot adjacent the bottom of the cup, including a duct in communication with the space between the outer housing and the pot and having an air delivery aperture located adjacent the bottom of the cup.

8. In a horizontal pot type burner, a burner pot having a circumferential wall with a plurality of primary air inlet apertures therein, a flame ring to which the pot is secured, said flame ring having a generally central aperture, a recirculating ring adjacent said flame ring and spaced inwardly therefrom in the pot, said recirculating ring having a central aperture aligned with the aperture of the flame ring, the outer edge of the recirculating ring being spaced inwardly from the wall of the pot, said pot wall being provided with secondary air inlet apertures adapted to deliver secondary air inwardly into the space between the flame ring and the recirculating ring, a vaporizing cup positioned within the burner pot on the opposite side of the recirculating ring from the flame ring and means for delivering a liquid fuel to the interior thereof.

9. In a horizontal pot type burner, a burner pot having a circumferential wall with a plurality of primary air inlet apertures therein, a flame ring to which the pot is secured, said flame ring having a generally central aperture, a recirculating ring adjacent said flame ring and spaced inwardly therefrom in the pot, said recirculating ring having a central aperture aligned with the aperture of the flame ring, the outer edge of the recirculating ring being spaced inwardly from the wall of the pot, said pot wall being provided with secondary air inlet apertures adapted to deliver secondary air inwardly into the space between the flame ring and the recirculating ring, a vaporizing cup positioned within the burner pot on the opposite side of the recirculating ring from the flame ring and means for delivering a liquid fuel to the interior thereof, and means for heating the cup, including a circumferential flange extending horizontally outwardly from the cup.

10. In a horizontal pot type burner, a burner pot having a circumferential wall with a plurality of primary air inlet apertures therein, a flame ring to which the pot is secured, said flame ring having a generally central aperture, a recirculating ring adjacent said flame ring and spaced inwardly therefrom in the pot, said recirculating ring having a central aperture aligned with the aperture of the flame ring, the outer edge of the recirculating ring being spaced inwardly from the wall of the pot, said pot wall being provided with secondary air inlet apertures adapted to deliver secondary air inwardly into the space between the flame ring and the recirculating ring, a vaporizing cup positioned within the burner pot on the opposite side of the recirculating ring from the flame ring and means for delivering a liquid fuel to the interior thereof, and means for heating the cup, including a circumferential flange extending horizontally outwardly from the cup, said flange being cut away on the side of the cup adjacent the recirculating ring.

11. In a horizontal pot type burner, a burner pot having a circumferential wall with a plurality of air inlet apertures therein, a vaporizing cup located within said pot, means for directing a flow of liquid fuel to the interior of the cup, a flame ring partially closing the end of the pot and a recirculating ring spaced inwardly from

said flame ring and spaced circumferentially inwardly from the circumferential wall and having a central aperture, said cup being located in general horizontal alignment with said aperture, and adjacent said recirculating ring, the space separating the flame ring and the recirculating ring increasing radially inwardly toward the central apertures of the two rings.

12. In a horizontal pot type burner, a burner pot having a circumferential wall with a plurality of air inlet apertures therein, a vaporizing cup located within said pot, means for directing a flow of liquid fuel to the interior of the cup, a flame ring partially closing the end of the pot and a recirculating ring spaced inwardly from said flame ring and spaced circumferentially inwardly from the circumferential wall and having a central aperture, said cup being located in general horizontal alignment with said aperture, and adjacent said recirculating ring, the space separating the flame ring and the recirculating ring increasing radially inwardly toward the central apertures of the two rings, the outer edge of the recirculating ring being recurved.

13. In combination with a horizontal pot type burner including a horizontally axised pot having a circumferential wall provided with a plurality of primary air inlet apertures, a vaporizing cup positioned within the burner pot and an outer housing about said pot, said outer housing and said pot being apertured in alignment with and over the top of the cup, a lighting member including a stem having a wick element adapted to extend adjacent said cup when the lighting member is in position, and a closure on said lighting member adapted to close the aperture in the outer housing when the lighting member is in position, the wick of said lighting member being adapted to extend through the aperture in the pot with a substantial clearance, whereby air may pass inwardly through said pot aperture when the lighting member is in position, and the aperture in the outer housing is closed.

14. In combination with a horizontal pot type burner including a horizontally axised pot having a circumferential wall provided with a plurality of primary air inlet apertures, a vaporizing cup positioned within the burner pot and an outer housing about said pot, said outer housing and said pot being apertured in alignment with and over the top of the cup, a lighting member including a stem having a wick element adapted to extend adjacent said cup when the lighting member is in position, and a closure on said lighting member adapted to close the aperture in the outer housing when the lighting member is in position, the wick of said lighting member being adapted to extend through the aperture in the pot with a substantial clearance, whereby air may pass inwardly through said pot aperture when the lighting member is in position, and the aperture in the outer housing is closed, the aperture in said outer housing being of greater diameter than the aperture in said pot.

15. In a horizontal pot type burner, a burner pot having an open end, a closed end wall and a circumferential side wall with a plurality of air inlet apertures therein spaced from end to end of the pot, and spaced circumferentially about the pot, a centrally apertured flame ring partially closing the open end of said pot, an open topped vaporizing cup located within said pot and spaced away from the walls of the pot, said cup being of heat conductive material, means for delivering a liquid fuel, for vaporization, to the interior of the cup, said fuel being in direct contact with the heat conductive bottom of the cup and being subjected, through the open top of the cup, to the heat of combustion taking place in the pot above said cup, and means for maintaining the heat of the cup, including a heat conducting flange extending outwardly from said cup and adapted to be subjected directly to the heat of combustion taking place within said pot, the bottom of said cup being directly subjected to the heat of combustion taking place in the pot about and below the cup.

16. In a horizontal pot type burner, a burner pot having an open end, a closed end wall and a circumferential side wall with a plurality of air inlet apertures therein spaced from end to end of the pot, and spaced circumferentially about the pot, a centrally apertured flame ring partially closing the open end of said pot, an open topped vaporizing cup located within said pot and spaced away from the walls of the pot, said cup being of heat conductive material, means for delivering a liquid fuel, for vaporization, to the interior of the cup, said fuel being in direct contact with the heat conductive bottom of the cup and being subjected, through the open top of the cup, to the heat of combustion taking place in the pot above said cup, and a horizontally extending flange about said cup, located intermediate the top and bottom of the cup.

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