Dec. 18, 1945. S. PERRY 2,391,069

HORIZONTAL POT TYPE BURNER

Filed March 18, 1944

Fig. 1

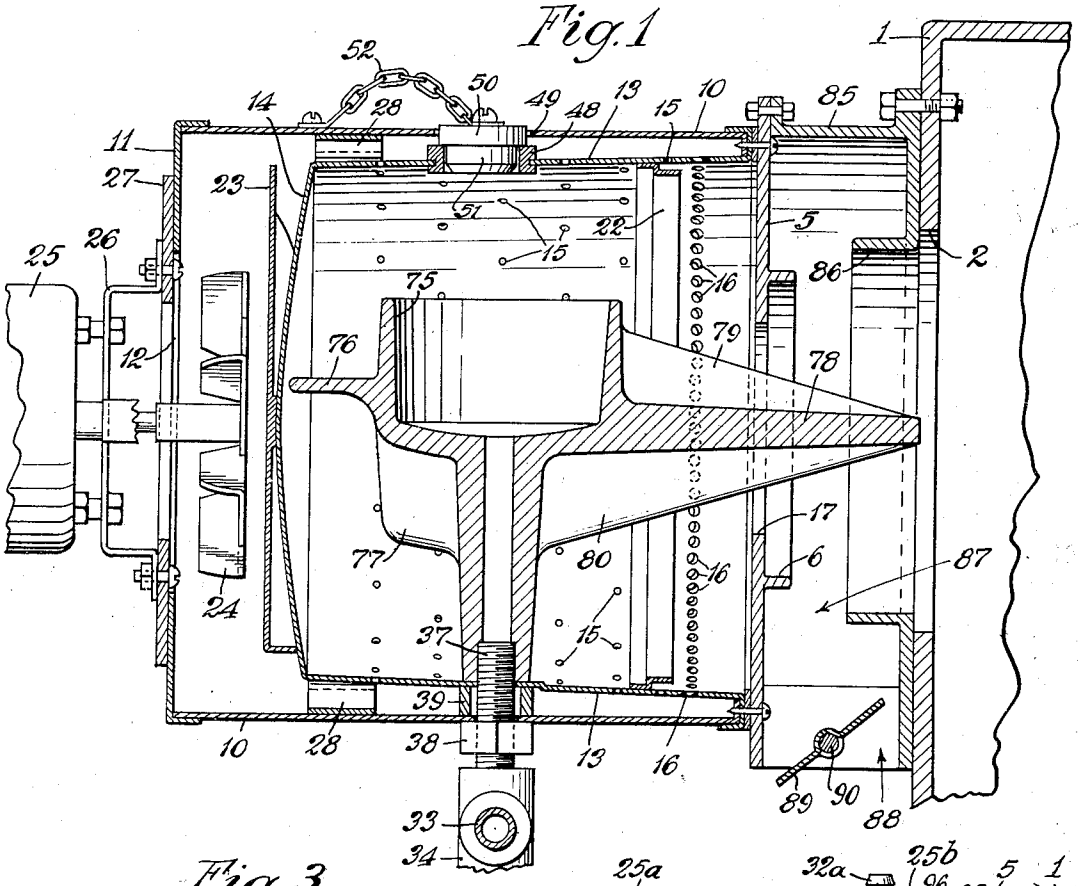


Fig. 3

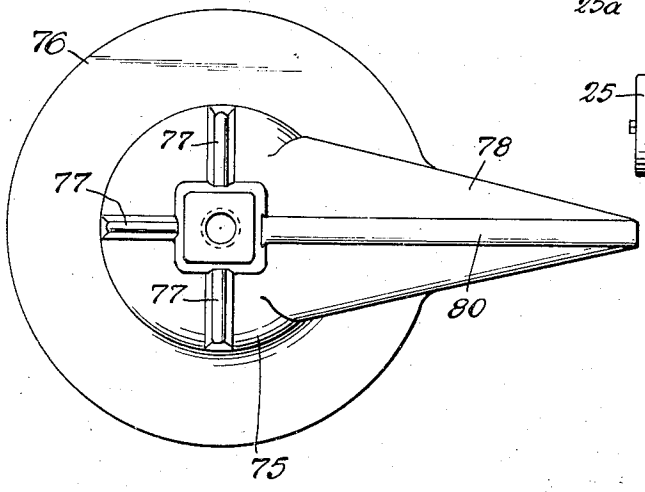
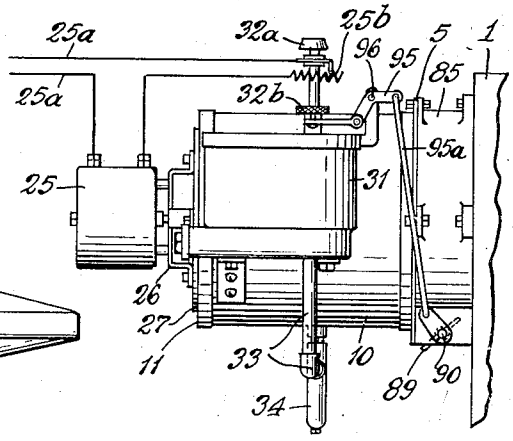


Fig. 2



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HORIZONTAL POT TYPE BURNER

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4 Claims. (Cl. 158—91)

This invention relates to an improvement in horizontal pot type burners and has for one object to provide an improved means for subjecting the fuel oil in liquid form to the heat of combustion, in order to vaporize the fuel.

Another purpose is to provide improved means for providing air to a horizontal pot type burner.

Another purpose is to provide improved means for varying or controlling the flow of air in such a burner.

Another purpose is to provide improved means for supplying excess air at certain times in the use of a burner, when excess air is particularly necessary.

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

The present application covers material disclosed in co-pending application Serial No. 480,450, filed March 25, 1943, and owned by the present assignee.

The invention is illustrated more or less diagrammatically in the accompanying drawing, wherein:

Figure 1 is a vertical axial section and Fig. 2 is a side elevation on a reduced scale with an electric circuit diagrammatically illustrated.

Figure 3 is a bottom plan view of the fuel cup illustrated in Figure 1.

Like parts are indicated by like numbers throughout the specification and drawing.

Referring to the drawing:

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 of the burner. Secured to the member 2 is any suitable tertiary air box, generally indicated as a cylindrical housing 85, provided with a delivery lip 86, defining an annular passage 87, aligned with the aperture 2. The outer side of the tertiary air box 85 is closed by a flame ring 5, having a circumferential flange 6 and a flame aperture 17, generally axially aligned with the aperture 2 and the passage 87. Secured to the flame ring 5 is an outer housing 10, herein shown as generally cylindrical and having a bottom 11 with an axial aperture 12. Located within the housing 10, and generally co-axial therewith, is the pot member 13, having a bottom 14, provided with a double bottom member 23, aligned with a fan 24, adapted to be driven by a motor 25, mounted on a support 26 secured to a ring or plate 27, which, in turn, is secured to the bottom or end 11 of the housing 10. 28 are baffles extending longitudinally in the space between the outer housing 10 and the pot 13. The pot is provided with a plurality of primary air inlet apertures 15, located at various distances from the ends of the pot. 16 indicates a row of secondary air inlet apertures located adjacent the end of the pot closest to the flame ring 5. The secondary air inlet apertures 16 may be inclined toward the flame aperture 17 of the ring 5. The baffle 22 may be employed to direct air from the topmost row of primary air inlets toward the partly open end of the pot and thus across the secondary air inlets 16.

In describing the structure shown in the drawing, it will be understood that it is particularly adapted for use in a horizontal burner in which the axis of the pot is horizontal. However, the pot axis may be substantially inclined in relation to the horizontal, and when the terms "top" or "upper" are employed in connection with the pot, it will be understood that they relate to the right-hand end of the pot in the position in which it is shown in Fig. 1. Similarly, the member 14 may be described as the closing end or the bottom of the pot.

When the structure is employed in connection with a horizontal burner as shown in the present drawing, a cup 75 may be positioned in the pot. In the particular form shown, a unitary structure is employed, in which the cup is provided with downwardly extending flanges 77 and 80, a circumferential horizontal flange 76, a forwardly extending beak 78, and an upwardly extending flange 79. This beak structure is shown as extending through the aperture 17 and into the passage 87. The cup assembly thus shown may be secured in position by a screw-threaded pipe 37, positioned by a securing nut 38. 39 is a spacer in the space between the housing 10 and the pot 13. 34 is a sump member in communication with the connection 37. Extending from it is a liquid fuel supply pipe 33, which carries liquid fuel from any suitable float chamber or valve assembly 31. Fuel may be supplied to the float chamber 31 by any suitable means, not herein shown, from any suitable liquid fuel source.

In order to light the fuel in the cup 75, there is provided a spacing ring 48 in the wall of the pot 13, aligned with an aperture 49 in the housing 10. During combustion the closure plug 50, 51, closes the aperture defined by the member 48. A chain 52 prevents loss of the plug 50. When the plug 50, 51, is removed, a match can be dropped into the cup 75.

Air is admitted to the space within the hous-

ing 10 through the aperture 12. The inflow of air can be increased by operation of the fan 24. Air is admitted to the tertiary chamber 85 through a bottom passage 88, which may be controlled by a shutter 89, pivoted as at 90. The shutter, in turn, may be positioned from the float chamber 31 by a structure including a bell crank lever 95 and a connecting link 95a. The bell crank lever is pivoted as at 96, and its opposite arm is connected to the oil flow control member 32b. Its position is controlled by the manual control knob 32a. In operation the tertiary air supply means is controlled in unison with the manual control of the flow of oil to the burner. When the control member 32a is set to provide a relatively low flow of oil, the motor circuit, which includes the motor 25, may be broken. As shown in Fig. 2, this circuit includes a conductor 25a and a rheostat 25b. When the control knob 32a is set at the pilot or low fire stage, current does not pass through the conductor 25a to actuate the motor 25. When the knob 32a is moved toward the high fire or large flow position, electric power to energize the motor 25 is allowed to pass through the circuit 25a. At the same time, the rotation of the control knob 32b, which may be set to rotate in unison with the knob 32a, actuates the shutter 89 and varies the supply of air admitted through the space 88 to the passage 87.

It will be realized that whereas there is herein described and shown a practical and operative device, nevertheless many changes may be made in the size, shape, number and disposition of parts. It will be particularly understood that the specific circuit employed and the specific connection between the oil flow control and the tertiary air inlet control may be widely varied. It is found practical, however, to provide a simultaneous control of the air supplying motor 25, the oil flow controlling member 32b and the tertiary air controlling shutter 89. While the structure is most advantageous in connection with a horizontal burner, its application is not limited to a horizontal burner.

It will be realized, therefore, that the description and drawing should be taken as in a broad sense illustrative and diagrammatic.

The use and operation of the invention are as follows:

In the present burner, which is of the hydroxilating type, primary air is delivered to the interior of the pot 13 through primary air inlet apertures 15. The device may employ natural draft, or the fan 24 may be used to cause air to flow into the pot. A liquid fuel is delivered to the bottom of the cup 75 along the fuel pipe 33. Once combustion has been initiated, the fuel is vaporized by the heat of combustion in or adjacent the pot, and the vaporized hydrocarbon mingles with the primary air to produce a primary, partially combustible mixture. This mixture is directed, either under natural draft, or by the fan 24, through the central aperture of the flame ring 5 and into the interior of the member 1. At high fire, a flame is delivered horizontally to a substantial distance. The cup is adequately heated by combustion going on about it, and vaporization of the fuel is efficiently maintained. The secondary air needed to produce the final combustible mixture is delivered through the apertures 16 and through the upper or inner row of apertures 15, within the deflector 22. As the secondary air joins with the primary mixture, a completely combusible mixture is formed, and the flame of this combustible mixture extends into the interior of the member 1. The passage 88 of the base member 85 serves for the admission of additional tertiary air, which prevents smoking and completes the combustion of all or substantially all of the carbon delivered into the interior of the member 1.

At the lower stages of combustion, a much smaller rate of flow is maintained to the cup 75. Combustion takes place at or above the lip of the cup and more or less around the sides of the cup. In order to adequately heat the cup, it is important that this heat of combustion be adequately conducted to the cup and particularly to the bottom of the cup.

In the present burner it is important that the liquid fuel supplied to the vaporizing cup be completely consumed. The cup must be hot enough for complete vaporization and the less volatile portions of the fuel must be consumed or reduced to a powder or light ash. This is particularly the case when relatively heavy fuels, such as Diesel oil, are burned.

At the high fire stage, tertiary air may advantageously be admitted for passage into the housing 85 and thence to the stove 1. The inflow of the tertiary air is controlled by the shutter 89. This shutter, in turn, is controlled by the manipulation of the manual control members 32a or 32b. It will be observed that when the rate of flow of liquid fuel is increased above a certain point, the motor 25 is cut in, and at the same time the supply of tertiary air is increased. The rheostat may also be employed as a speed control means for the motor. The greater the rate of flow of the fuel, the greater will be the speed of the motor, and the greater will be the volume of inflow of tertiary air.

I claim:

1. In a pot type burner, a pot having a circumferential wall with a plurality of primary air inlet apertures, a vaporizing cup located within said pot, means for directing a flow of liquid fuel to the cup, a control means for varying the rate of flow of liquid fuel to the cup, means for delivering secondary air adjacent the mouth of the pot, additional means for delivering tertiary air to the mixture of vaporized fuel primary and secondary air, including a tertiary air chamber adjacent the mouth of the pot, said chamber having a circumferential tertiary air delivery aperture, means for controlling the flow of air into said tertiary air chamber and means for coordinately controlling said tertiary air flow controlling means and said fuel flow controlling means.

2. In a pot type burner, a pot having a circumferential wall with a plurality of primary air inlet apertures, a vaporizing cup located within said pot, means for directing a flow of liquid fuel to the cup, a control means for varying the rate of flow of liquid fuel to the cup, means for delivering secondary air adjacent the mouth of the pot, additional means for delivering tertiary air to the mixture of vaporized fuel primary and secondary air, including a tertiary air chamber adjacent the mouth of the pot, said chamber having a circumferential tertiary air delivery aperture, means for controlling the flow of air into said tertiary air chamber, an outer housing surrounding said pot, motor means for delivering air to the space between said housing and pot, and means for coordinately controlling said tertiary air flow controlling means and said fuel flow controlling means and the operation of said motor.

3. In a pot type burner, a pot having a circumferential wall with a plurality of primary air inlet apertures said pot having means for admitting secondary air, a vaporizing cup located within said pot, means for directing a flow of liquid fuel to the cup, a control means for varying the rate of flow of liquid fuel to the cup, means for delivering tertiary air to the mixture of vaporized fuel primary air and secondary air, including a circumferential tertiary air chamber adjacent the mouth of the pot, said chamber having a tertiary air delivery aperture, means for controlling the flow of air into said tertiary air chamber, an outer housing surrounding said pot, motor driven means for delivering air to the space between said housing and pot, and means for coordinately controlling said tertiary air flow controlling means and said fuel flow controlling means and the operation of said motor, including a unitary control element, an operating connection between said unitary control element and the tertiary air flow controlling means, an operating connection between said unitary control element and said fuel flow controlling means, a circuit for said motor, a rheostat in said circuit, and means for actuating said rheostat in response to movement of said unitary control element.

4. In a pot type burner, a pot having a circumferential wall with a plurality of primary air inlet apertures, a vaporizing cup located within said pot, means for directing a flow of liquid fuel to the cup, a control means for varying the rate of flow of liquid fuel to the cup, means for delivering secondary air adjacent the mouth of the pot, additional means for delivering tertiary air to the mixture of vaporized fuel primary air and secondary air, including a circumferential tertiary air chamber adjacent the mouth of the pot, said chamber having a tertiary air delivery aperture, means for controlling the flow of air into said tertiary air chamber and means for coordinately controlling said tertiary air flow controlling means and said fuel flow controlling means, including a unitary control element, an operating connection between said unitary control element and the tertiary air flow controlling means and an operating connection between said unitary control element and the fuel flow control means.

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