Aug. 6, 1946. B. HAYTER 2,405,212

HYDROXYLATING POT TYPE BURNER

Filed Nov. 15, 1943

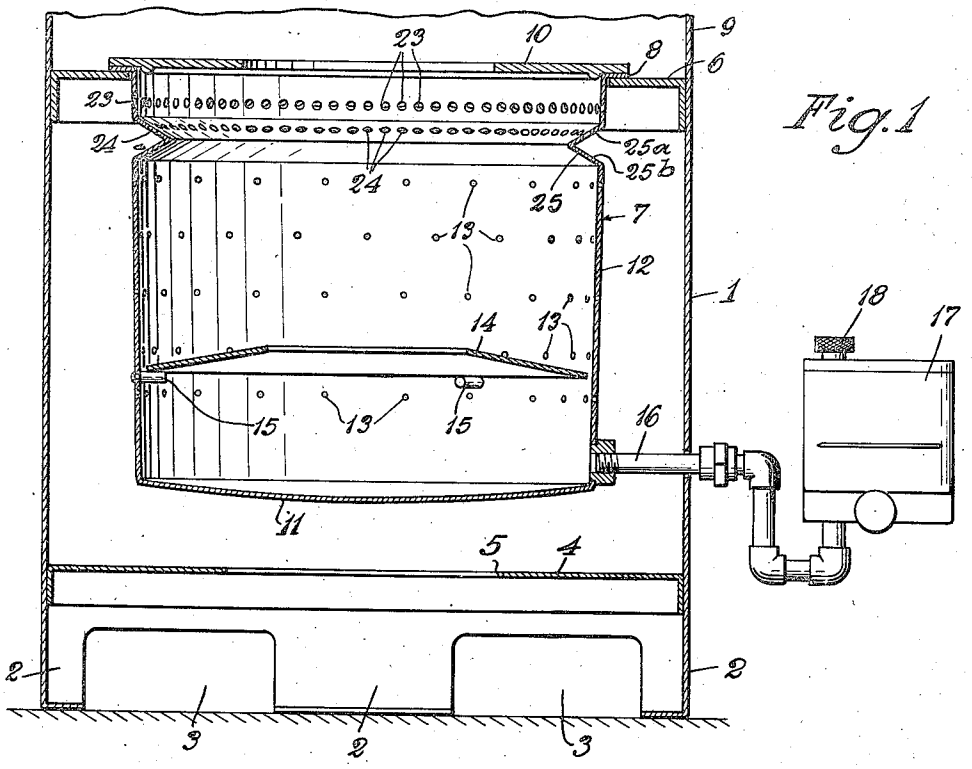


Fig. 1

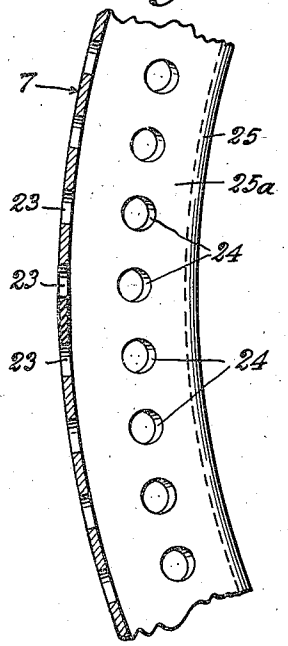


Fig. 3

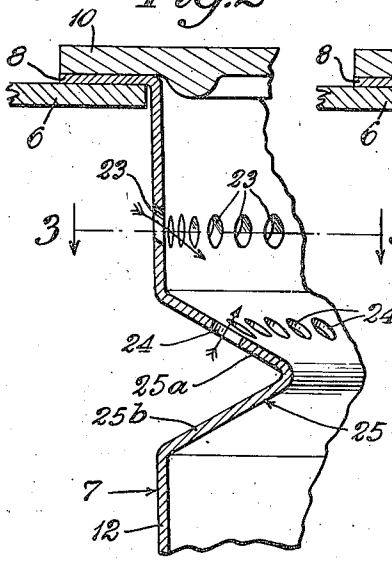


Fig. 2

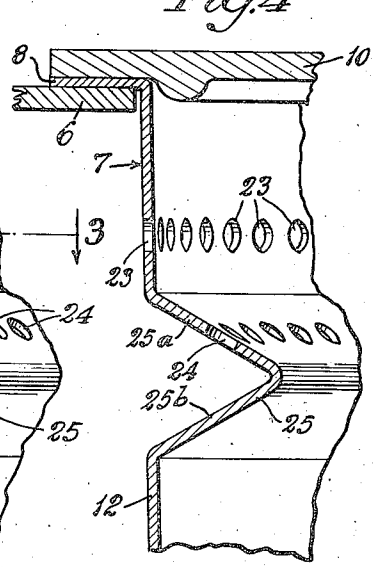


Fig. 4

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HYDROXYLATING POT TYPE BURNER

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Application November 15, 1943, Serial No. 510,306

6 Claims. (Cl. 158—91)

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My invention relates to an improvement in pot type burners and has for one purpose to provide improved means for delivering air to a liquid hydrocarbon burner. Another purpose is to provide improved means for supplying secondary air to the mixture of vaporized hydrocarbon and primary air, in a hydroxylating, pot type burner. Another purpose is to obtain silent combustion. Other purposes will appear from time to time in the course of the specifications and claims.

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

Figure 1 is a vertical axial section of an embodiment of my invention;

Figure 2 is a partial, vertical axial section on an enlarged scale;

Figure 3 is a section on the line 3—3 of Figure 2; and

Figure 4 is a section similar to Figure 2 of a slight variation.

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

Referring to the drawing, 1 generally indicates an outer housing having a plurality of feet 2 between which are air inflow spaces 3. The housing is partly closed by a horizontal partition 4 centrally apertured as at 5. 6 is an angle ring which receives the upper outwardly extending flange 8 of a burner pot 7. 9 indicates an upper portion of the housing 1, which serves as a combustion chamber, or a heat radiating member. Any suitable draft means, not herein shown, may be provided for disposing of the heated gases and by-products of combustion. One end of the pot is partially closed by a centrally apertured flame ring 10. The pot is shown as having the other end closed as at 11 and a generally cylindrical side wall 12 provided with a plurality of primary air inlet apertures 13, circumferentially spaced about the wall 12 and located at various distances from the closed end of the pot. Located beyond the primary air inlet apertures 13 nearest the closed end is a centrally apertured pilot baffle ring 14 supported on any suitable pins or supports 15. A liquid fuel is supplied to the pot along the pipe 16, the rate of flow being controlled by any suitable control means generally indicated as at 17. I illustrate, for example, a known type of float valve assembly with a manual control knob 18 for controlling the flow of fuel along the pipe 16. However, it will be understood that any suitable control means, manual or automatic, may be provided for varying the rate of flow of liquid fuel along the pipe 16 or for maintaining a uniform rate of flow, when a uniform rate is desired. It will be understood that whereas I have shown a vertically axised pot, the pot may be horizontally axised or the axis may be variously inclined in relation to the vertical.

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It will be understood that in pot type burners of the present type, a liquid hydrocarbon is vaporized by the heat of combustion taking place in or above the pot. The liquid hydrocarbon is admitted to the interior of the pot and is initially partially vaporized by the heat of hydroxylation taking place in the pot. As the liquid hydrocarbon is vaporized in the pot it rises and is surrounded by a film of secondary air. The radiant heat from this secondary combustion supplies the remainder of the additional heat necessary to vaporize all of the liquid hydrocarbon. There is a differentiation in action between the so-called primary air and the so-called secondary air admitted to the interior of the pot. With reference to the present structure, the air entering through the primary apertures 13 has a different action than the air entering through the secondary apertures 23 and 24. All of the oxygen in the air entering through the primary apertures 13 is fully consumed in the process of hydroxylation. The oxygen in the air entering through the secondary apertures 23 and 24 is only partially consumed, but all of the vaporized hydrocarbons surrounded by the secondary air are entirely consumed.

When the pot is burning at the high fire stage, combustion takes place at or near the top of the pot and the flame flows through the central aperture of the flame ring 10 and into the combustion chamber 9. The present structure provides a particularly efficient means for supplying the secondary air and for providing a silent and efficient combustion. In the specific structure herein shown I employ a pair of rows of secondary air inlets 23 and 24 which are herein shown as inclined toward each other in such fashion as to cause the air directed into the interior of the pot from the two rows to impinge in a zone or area not far removed from the inner face of the pot wall. This slows down the flame jets. The upper row of secondary air inlets 23 is in a generally cylindrical upper portion of the pot, adjacent the open end of the pot. The lower row 24 is formed in the upper wall of the offset generally indicated at 25. The offset 25 includes the upper wall 25*a* and the lower wall 25*b*, the walls converging as shown. The axis of the apertures 23 are, by the inclination of the wall 25*a*, arranged to converge inwardly toward the axis of the pot and to project

secondary air generally forwardly as well as inwardly toward the open end of the pot. The upper apertures **23** may be downwardly inclined as shown in Figure 2, to cause the jets from the two rows of apertures to impinge closely adjacent the inner face of the pot wall or their axes may be horizontal as shown in Figure 4, to provide an impingement somewhat more remote from the pot wall. It will be understood that either row or both rows of apertures may be inclined, or the angle between the cylindrical portion of the wall and the offset wall **25***a* may be varied, in order to obtain any desired relationship between the axes of the apertures, and any desired distance of impingement of the jets, in relation to the pot wall. I have illustrated the apertures **23** and **24** as arranged in pairs so that the individual jets impinge against each other. But, as in effect the rows of closely spaced holes deliver a sheet or almost continuous mass of air, matching up the individual apertures of the separate rows may not under all circumstances be necessary. However, I find it advantageous.

It will be realized that whereas I have described and illustrated a practical and operative device, nevertheless many changes may be made in the size, shape, number and disposition of parts without departing from the spirit of my invention. I therefore wish my drawing and description to be taken as in a broad sense illustrative or diagrammatic, rather than as a limitation to my precise showing.

The use and operation of the invention are as follows:

In pot type liquid hydrocarbon burners it is highly important to provide an adequate supply of secondary air to a primary mixture in such a fashion that combustion noises are substantially prevented. It is important that the secondary air be provided in such quantities and at such location that the final mixture will burn steadily clear back to the wall of the pot, at the point of admission of the secondary air supply. In the present structure the secondary air is supplied in impinging jets which engage at a short distance inwardly from the wall of the pot and which provide an ample supply of secondary air at the point of admission. In practice, the form of the structure herein shown with its impinging jets, provides quiet and efficient combustion, with an ample supply of air at the base of the jet. The impingement of the two inclined jets holds down the speed of flow of the flame and prevents any tendency for the flame to burn away from the inner face of the pot. Thus I obtain the advantage of the admission of the air at a relatively low rate and of the provision of an ample supply of air at the base of the secondary jet.

A primary cause of noisy combustion is the tendency of the flame to leave the immediate vicinity of the orifice through which the air enters. By providing impinging jets I control or limit the speed of the air jet flow, and at the same time insure an ample supply of secondary air at the base of the jet, adjacent the inner face of the pot wall.

It will be understood that the pot ring shown may be used with either horizontal or vertical pot type burners and may be set at any desired angle. Therefore, when in the claims, such as claims 1 and 2, I mention the upper face of the offset I wish these terms to be interpreted with sufficient breadth to indicate that face of the offset which is closest to the open end of the pot, regardless of the position in which the pot is positioned.

I claim:

1. In a burner pot for pot type burners, a pot member having an open end, a circumferential pot wall and a closed end wall, said circumferential pot wall having therein a plurality of primary air inlet apertures, located at various distances from the ends of the pot, and a pair of rows of secondary air inlet apertures, located adjacent the open end of the pot, said pot having a circumferential inward offset in its side wall, one of said rows of secondary air inlet apertures being in the upper face of said offset, the other row being in the circumferential pot wall between said offset and the open end of the pot.

2. In a burner pot for pot type burners, a pot member having an open end, a circumferential pot wall and a closed end wall, said circumferential pot wall having therein a plurality of primary air inlet apertures, located at various distances from the ends of the pot, and a pair of rows of secondary air inlet apertures, located adjacent the open end of the pot, said pot having a circumferential inward offset in its side wall, one of said rows of secondary air inlet apertures being in the upper face of said offset, the other row being in the circumferential pot wall between said offset and the open end of the pot, the upper row of apertures being downwardly tilted toward said offset and being thereby adapted to direct jets of air impinging against those directed from the row of apertures in said offset.

3. In a burner pot for pot type burners, a pot member having an open end and a circumferential pot wall, said circumferential pot wall having formed therein a circumferential inward offset including a pair of inwardly converging wall portions, the wall portion which faces the open end of the pot having a circumferentially extending row of air inlet apertures, and that part of the pot wall between the open end of the pot and the inward offset having a row of air inlet apertures extending circumferentially thereabout, the relation of the axes of the apertures of the two rows being such that each row directs its jets of air toward air jets from the other row, said rows extending substantially entirely about the pot wall.

4. In a burner pot for pot type burners, a pot member having an open end, a circumferential side wall and a closed end wall, said side wall including a circumferentially extending inwardly offset portion positioned nearer to the open than to the closed end of the pot, said inwardly offset portion having a row of air inlet apertures extending around the pot, and located at the side of the offset facing the open end of the pot, the side wall of the pot between said offset and the open end of the pot having a row of air inlet apertures extending circumferentially about the pot, the relation of the axes of the apertures of the two rows being such that each row directs its jets of air toward those of the other row.

5. In a burner pot for pot type burners, a pot member having an open end a circumferential side wall and a closed end wall, said side wall including a circumferentially extending inwardly offset portion positioned nearer to the open than to the closed end of the pot, said inwardly offset portion having a row of air inlet apertures extending around the pot, and located at the side of the offset facing the open end of the pot, the side wall of the pot between said offset and the open end of the pot having a row of air inlet

apertures extending circumferentially about the pot, the relation of the axes of the apertures of the two rows being such that each row directs its jets of air toward those of the other row, the axes of the apertures in said offset being inclined toward the central axis of the pot.

6. In a burner pot for pot type burners, a pot member having an open end a circumferential side wall and a closed end wall, said side wall including a circumferentially extending inwardly offset portion positioned nearer to the open than to the closed end of the pot, said inwardly offset portion having a row of air inlet apertures extending around the pot, and located at the side of the offset facing the open end of the pot, the side wall of the pot between said offset and the open end of the pot having a row of air inlet apertures extending circumferentially about the pot, the relation of the axes of the apertures of the two rows being such that each row directs its jets of air toward those of the other row, the axes of the apertures between said offset and the open end of the pot being inclined toward the closed end of the pot.

BRUCE HAYTER.