Jan. 18, 1944. B. HAYTER 2,339,637

POT TYPE BURNER WITH DOUBLE BAFFLE STRUCTURE

Filed March 14, 1942 2 Sheets-Sheet 1

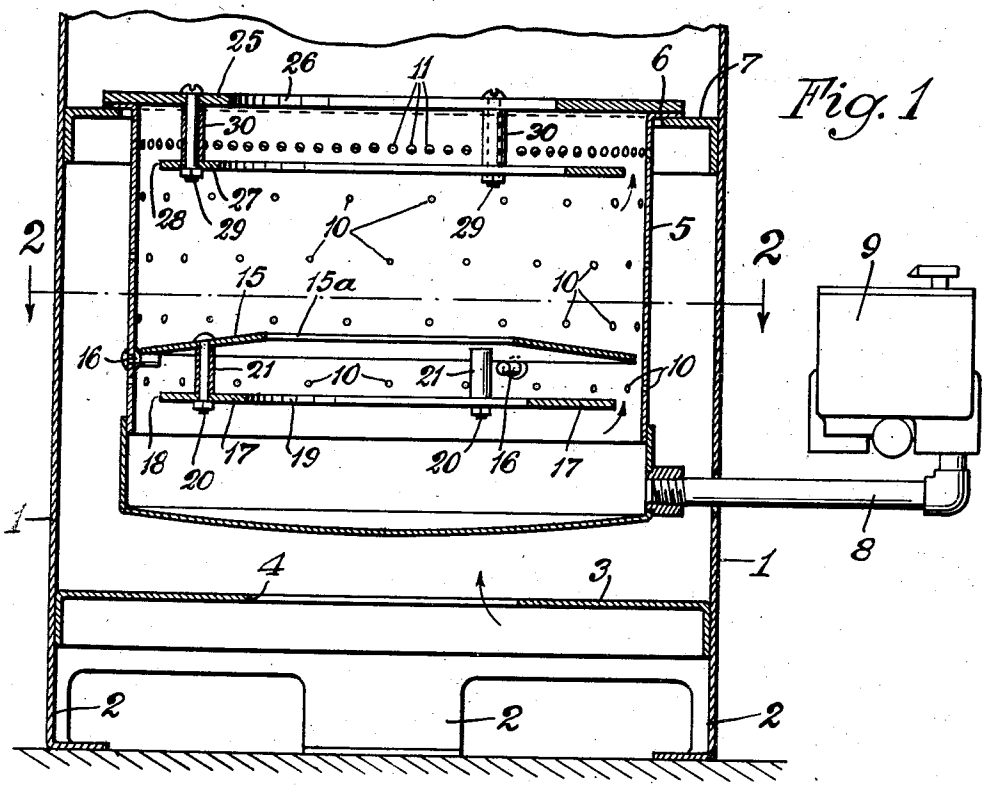

Fig. 1

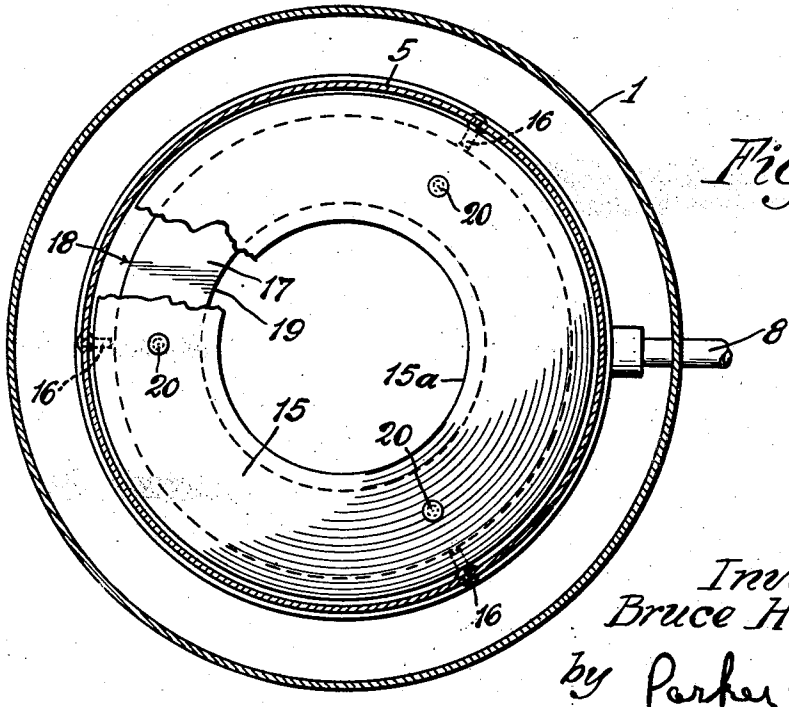

Fig. 2

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POT TYPE BURNER WITH DOUBLE BAFFLE STRUCTURE

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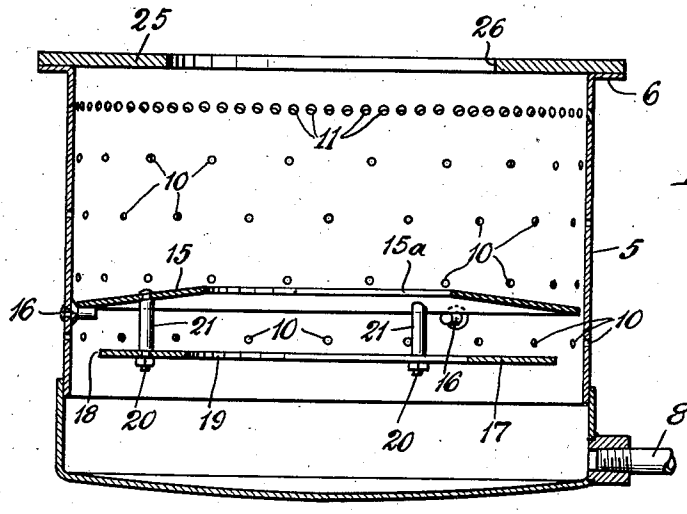

Fig. 3

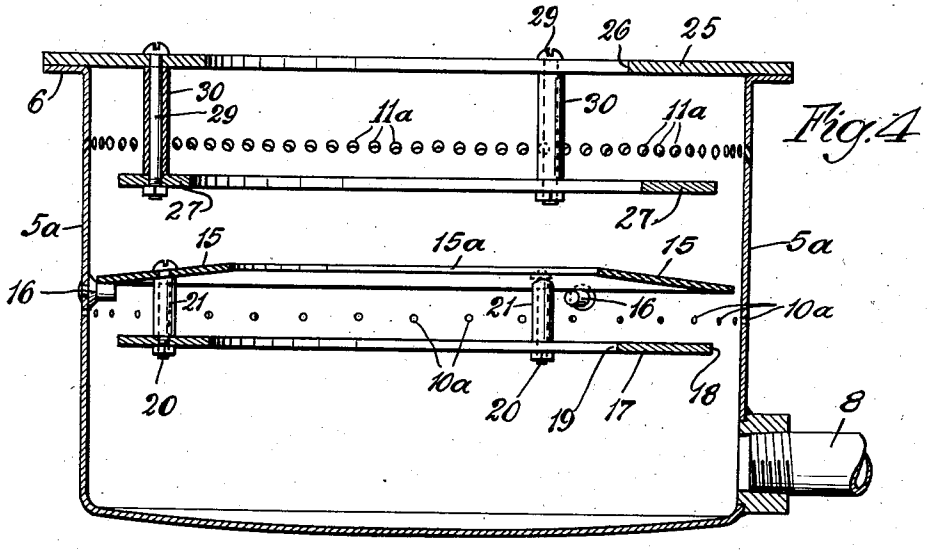

Fig. 4

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POT TYPE BURNER WITH DOUBLE BAFFLE STRUCTURE

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Application March 14, 1942, Serial No. 434,662

8 Claims. (Cl. 158—91)

My invention relates to an improvement in pot type oil burners and has for one purpose to provide an improved burner in which a cleaner flame is produced.

Another purpose is to provide an improved baffle structure for such burner.

Another purpose is to provide an improved pilot structure or pilot baffle.

Another purpose is to provide improved baffle structures for pot type burners which provide recirculation of the vaporized fuel and assist in mixing the vaporized fuel and the inflowing air.

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

I illustrate my invention more or less diagrammatically in the accompanying drawings wherein:

Fig. 1 is a vertical axial section;

Fig. 2 is a section on the line 2—2 of Fig. 1;

Fig. 3 is a vertical axial section illustrating a variant form of the device; and

Fig. 4 is a vertical axial section illustrating a still further variant of the device.

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

Referring first to the form of Figs. 1 and 2, 1 generally indicates an outer housing, which may be of any suitable size, shape and proportion, but which is herein shown as a generally cylindrical drum. It may include or have any suitable supporting members 2, which space the lower edge of the drum above the floor or surface upon which the heater is positioned. 3 is a lower partition having a central air inlet aperture 4. 5 indicates a burner pot which has an outwardly extending top flange 6, which may rest upon any suitable annular support 7 inwardly extending from the wall of the housing 1.

8 is any suitable fuel pipe, the flow of fuel along which may be controlled in any suitable manner, for example by the float structure generally shown at 9, the details of which do not form part of the present invention. It will be understood that the rate of flow of liquid fuel inwardly along the pipe 8 to the bottom of the pot 5 may be regulated manually or automatically, whereby the desired supply of fuel is delivered to the pot. Preferably the control device is operated so as to maintain at all times at least a minimum flow of fuel sufficient to maintain a pilot flame.

The wall of the pot 5 is provided with a plurality of primary air inlet apertures 10. Any suitable means may be provided for providing a secondary air supply at or adjacent the top of the pot 5. I illustrate, however, a single top row of secondary air inlet apertures 11, which are preferably upwardly and inwardly tilted and which are larger or more closely spaced than the primary air inlet apertures 10, or both.

15 indicates a pilot baffle centrally apertured as at 15*a* and positioned intermediate the upper and lower primary inlets 10. I illustrate it, for example, as located above the lowest row of apertures 10. It may be mounted on pins 16 or any other suitable securing means. Positioned below the lowest air inlet apertures 10 I provide a supplemental or recirculating ring 17, the outer edge of which is spaced inwardly, as at 18, a substantial distance from the opposed inner wall of the pot 5. The baffle 17 has a central aperture 19 axially aligned with the central aperture 15*a* of the pilot baffle 15, and is herein shown as of somewhat greater diameter. The baffle 17 is preferably supported upon or suspended from the baffle 15, for example by bolts 20 and spacing sleeves 21. Thus the pilot structure, including both rings, may be unitarily inserted into or removed from the pot. The pins 16 may be of such length as to permit the ready passage therebetween of the ring 17.

Located at the top of the pot 5 and partially closing it is a flame ring 25 having a central aperture 26. It will be observed that the secondary air inlet apertures 11 are located below the flame ring. Located below the flame ring 25 is the recirculating ring 27, which, like the lower recirculating ring 17, is of such diameter that there is a substantial gap between its outer edge 28 and the inner face of the pot 5. It may be suspended from or mounted on the flame ring 25, as by bolts 29 and spacing sleeves 30, so that it may also be removed from the pot unitarily with the flame ring 25.

As shown in Fig. 3, the upper recirculating ring 27 may be omitted, and the flame ring 25 is shown as without any depending supporting structure.

Referring to Fig. 4, I illustrate a variant form of the device in which in the pot 5*a* a single row of primary air inlets 10*a* is employed, and a single row of secondary air inlets 11*a*. The pilot structure, which may be identical with that shown in Fig. 1 and is similarly numbered, is located at the level of the single row of primary air inlets 10*a*, the pilot 15 being above that row and the recirculating ring 17 being below it. Similarly, the flame ring 25 and the recirculating ring 27 are located, respectively, above and below the secondary air inlet apertures 11*a*.

The structure of Figures 3 and 4 may be used with a housing and valve as shown by Figure 1,

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 description and drawings to be taken as in a broad sense illustrative or diagrammatic, rather than as limiting me to my precise showing.

It will be understood also that when in the specification or claims I speak of the top of the pot, I mean the open mouth of the pot. When I speak of one part being below another, I use the term in relation to the relative distance of the various parts from the open mouth of the pot.

The use and operation of my invention are as follows:

All the forms of the present device illustrate the multiple ring or baffle structures including an upper ring and a lower ring, which may for convenience be suspended from the upper ring. Thus, 27 is suspended from 25, and 17 from 15. It will be understood that in the form of either Figs. 1 or 4, the double ring can be used either at the top or at the pilot stage, or at both. In Fig. 1 I illustrate it located both at the pilot stage and at the top at the higher fire stage. In Fig. 3 it is located only at the pilot stage. It will be understood, however, that with either form of pot, the recirculating ring may be employed at the high stage or at the low stage, or at both. The rings 17 and 27 each serves a recirculating function, and the gases circulate upwardly about the outer edge of each ring in response to or in association with the inwardly directed jets of air from the apertures 10 or 11, or 10*a* or 11*a*. Each element is in fact a return gas system.

In the operation of the device, and assuming that the burner of any of the figures is burning at the pilot stage, the relatively small amount of fuel delivered by the passage 8 is vaporized by the heat of combustion going on above it in the pot. At the pilot stage the combustion is taking place at or near the level of the pilot ring 15. The primary air supply for the pilot stage is directed inwardly through the apertures 10 in a plurality of jets which extend substantially inwardly toward the center of the pot. These jets of fresh air entrain and carry on with them a primary mixture of air and vaporized fuel, which flows upwardly through the gap about the exterior of the pilot ring 17, and then flows inwardly with and along the jets delivered by the lowest row of apertures 10, or by the row of apertures 10*a*. Thoroughly mixed air and vaporized fuel flows upwardly through the central aperture 16 of the pilot ring 15, and in the form of Fig. 1 secondary air is provided by the upper apertures 10. In the form of Fig. 4 all of the secondary air is delivered through the secondary apertures 11*a*, but in both forms the burner at the pilot stage maintains combustion adjacent the level of the pilot ring 15.

The burner is made to burn at the higher stage simply by increasing the rate of flow of fuel through the pipe 8. At that stage all of the apertures 10 of Fig. 1 then provide a primary air supply for a mixture which receives its secondary air through the apertures 11. The recirculation then takes place at the top of the pot, the primary mixture being drawn upwardly and outwardly about the outer edge of the ring 27 by the jets of air delivered inwardly and somewhat upwardly by the secondary air inlets 11. The same is, of course, true of the form of Fig. 4.

I find it highly desirable to recirculate the gases at the pilot stage, or at the high fire stage, or both. The result is stabilized combustion and better mixing of the fuel, and a great reduction in the tendency to form carbon. A quieter fire is also provided.

I claim:

1. In a pot type burner, a burner pot having a generally cylindrical wall with a plurality of air inlet apertures therein, means for supplying liquid fuel to the interior of the pot, a centrally apertured ring mounted on said pot, and a centrally apertured recirculating ring located in said pot, adjacent said first mentioned ring, said rings overlapping and defining, between them, a recirculating area generally perpendicular to the axis of the pot, the outer diameter of the recirculating ring being substantially less than that of the first mentioned ring, its outer edge being spaced substantially inwardly from the wall of the pot.

2. In a pot type burner, a burner pot having a generally cylindrical wall with a plurality of air inlet apertures therein, means for supplying liqiud fuel to the interior of the pot, a centrally apertured ring mounted on said pot, and a centrally apertured recirculating ring located in said pot, adjacent said first mentioned ring, said rings overlapping and defining, between them, a recirculating passage generally perpendicular to the axis of the pot, the outer diameter of the recirculating ring being substantially less than that of the first mentioned ring, its outer edge being spaced substantially inwardly from the wall of the pot, the pot wall having secondary air inlet apertures aligned with and adapted to deliver air into the space between said rings.

3. In a pot type burner, a burner pot having a generally cylindrical circumferential wall, means for delivering a liquid fuel to the interior of the pot, the wall of the pot having primary air inlet apertures therein, means for supplying secondary air to the mixture formed in said pot, a centrally apertured pilot ring located in said pot intermediate top and bottom thereof, and above the lowest of the primary air inlet apertures, and a centrally apertured recirculating ring located in said pot below the lowest row of said primary air inlet apertures, the outside diameter of the recirculating ring being smaller than the outside diameter of the pilot ring, the outer edge of the recirculating ring being spaced inwardly from the wall of the pot sufficiently to provide a substantially circumferential recirculating passage therebetween.

4. In a pot type burner, a burner pot having a generally cylindrical circumferential wall, means for delivering a liquid fuel to the interior of the pot, the wall of the pot having primary air inlet apertures therein, means for supplying secondary air to the mixture formed in said pot, a centrally apertured pilot ring located in said pot intermediate top and bottom thereof, and above the lowest of the primary air inlet apertures, and a centrally apertured recirculating ring located in said pot below the lowest row of said primary air inlet apertures, the outside diameter of the recirculating ring being smaller than the outside diameter of the pilot ring, the outer edge of the recirculating ring being spaced inwardly from the wall of the pot sufficiently to provide a substantially circumferential recirculating passage therebetween, said recirculating ring being se-

cured to said pilot ring and being unitarily removable therewith.

5. In a pot type burner, a burner pot having a generally cylindrical circumferential wall, means for delivering a liquid fuel to the interior of the pot, the wall of the pot having a plurality of primary air inlet apertures arranged in a single row extending about the pot, a centrally apertured ring located above said row of holes and a recirculating ring located below said row of holes, the outside diameter of the recirculating ring being less than the outside diameter of the first mentioned centrally apertured ring, the outer edge of the recirculating ring being spaced inwardly from the wall of the pot sufficiently to provide a substantially circumferential recirculating passage therebetween.

6. In a pot type burner, a burner pot having a generally cylindrical circumferential wall, means for delivering a liquid fuel to the interior of the pot, the wall of the pot having a plurality of primary air inlet apertures arranged in a single row extending about the pot, a centrally apertured ring located above said row of holes and a recirculating ring located below said row of holes, the outside diameter of the recirculating ring being less than the outside diameter of the first mentioned centrally apertured ring, the outer edge of the recirculating ring being spaced inwardly from the wall of the pot sufficiently to provide a substantially circumferential recirculating passage therebetween, said recirculating ring being secured to said first mentioned ring and being unitarily removable therewith.

7. In a pot type burner, a burner pot having a generally cylindrical circumferential wall, means for delivering a liquid fuel to the interior of the pot, the wall of the pot having a plurality of primary air inlet apertures, means for supplying secondary air to the mixture formed in said pot, including a row of secondary air inlet apertures located adjacent the top of the pot, a centrally apertured flame ring partially closing the top of the pot and located above said secondary air inlet apertures and a centrally apertured recirculating ring located below said secondary air inlet apertures, and having an outside diameter substantially less than that of the flame ring, the outer edge of the recirculating ring being spaced inwardly from the pot wall sufficiently to provide a substantially circumferential recirculating passage therebetween.

8. In a pot type burner, a burner pot having a generaly cylindrical circumferential wall, means for delivering a liquid fuel to the interior of the pot, the wall of the pot having a plurality of primary air inlet apertures, means for supplying secondary air to the mixture formed in said pot, including a row of secondary air inlet apertures located adjacent the top of the pot, a centrally apertured flame ring partially closing the top of the pot and located above said secondary air inlet apertures and a centrally apertured recriculating ring located below said secondary air inlet apertures, and having an outside diameter substantially less than that of the flame ring, the outer edge of the recirculating ring being spaced inwardly from the pot wall sufficiently to provide a substantially circumferential recirculating passage therebetween, said recirculating ring being secured to said flame ring and being initially removable therewith.

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