

Aug. 8, 1944.

J. L. BREESE ET AL

2,355,418

TWO-LEVEL LIQUID FUEL BURNER

Filed May 16, 1942

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Fig. 2.

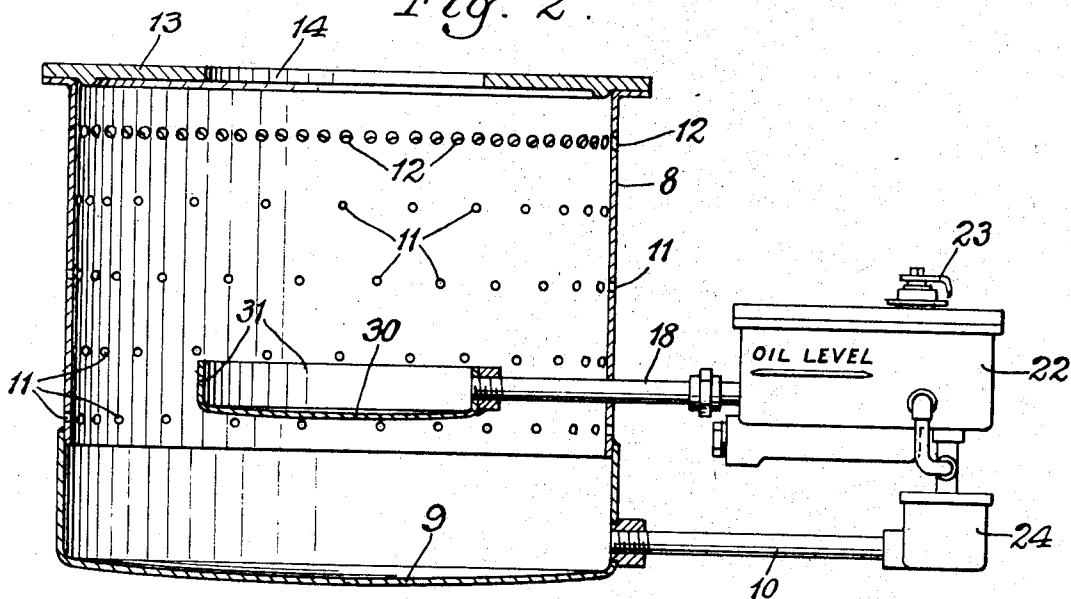
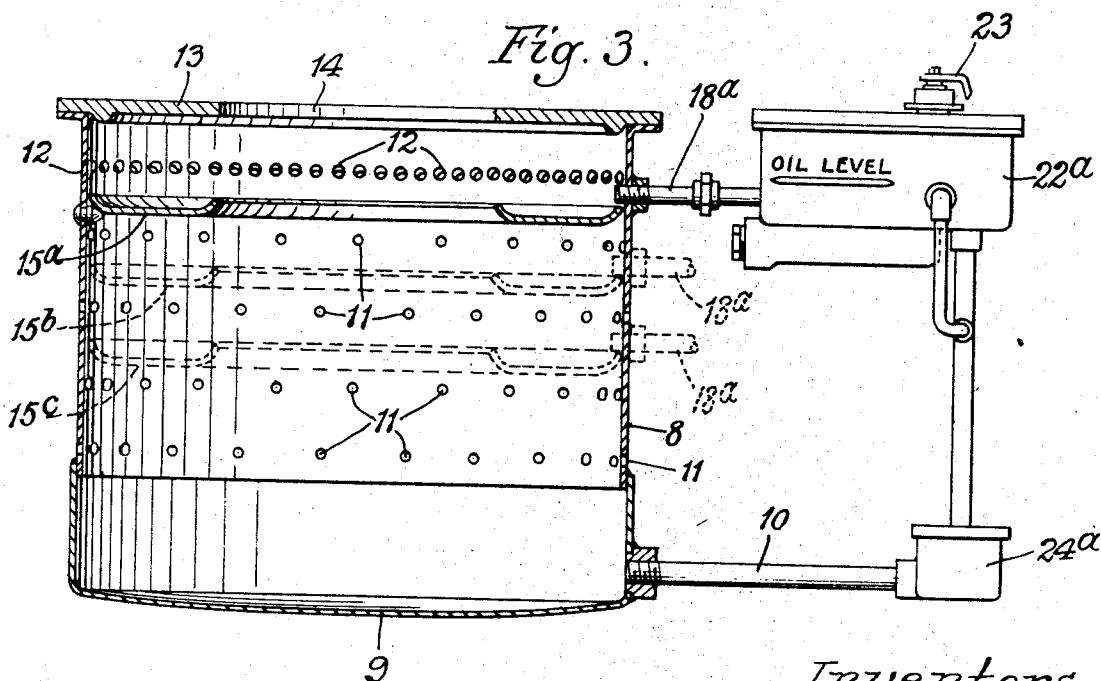


Fig. 3.



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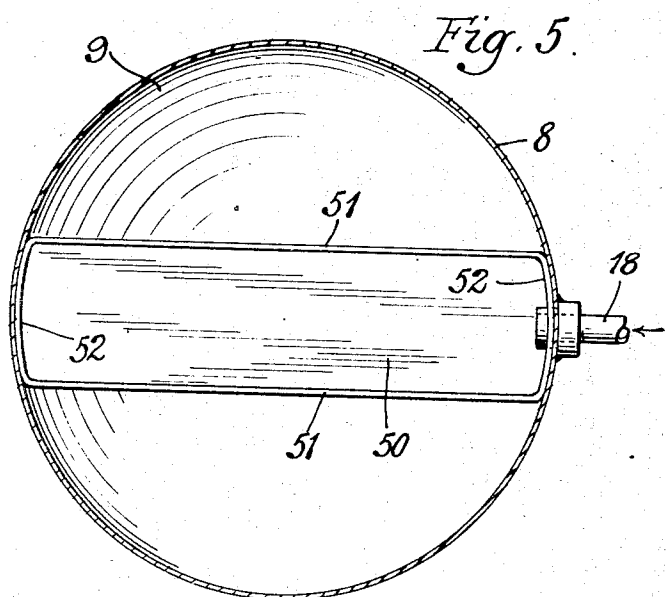
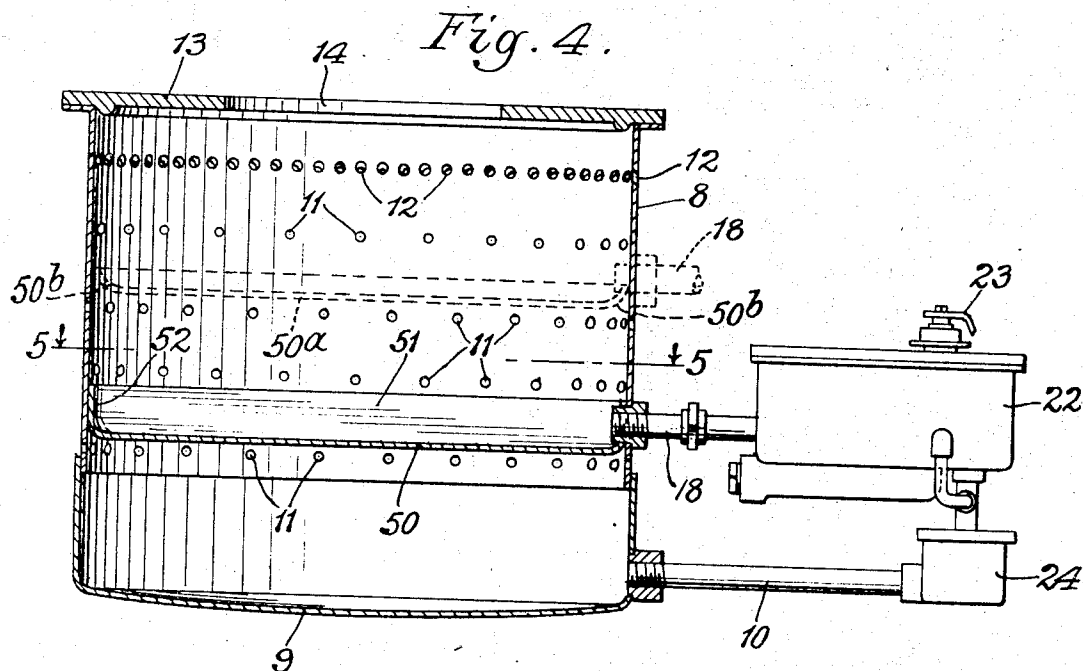
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UNITED STATES PATENT OFFICE

2,355,418

TWO-LEVEL LIQUID FUEL BURNER

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Application May 16, 1942, Serial No. 443,261

5 Claims. (Cl. 153-91)

Our invention relates to an improvement in pot type burners and has for one purpose the provision of a pot type burner in which a liquid fuel is supplied to the burner at a plurality of separate points.

Another purpose is to provide such a burner in which the fuel is supplied at a plurality of different levels.

Another purpose is to provide such a burner in which a liquid fuel is delivered to the bottom of the pot at a relatively low rate to support pilot or low fire combustion, the major supply of fuel being delivered at a higher level to support intermediate or high fire combustion.

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

We illustrate our invention more or less diagrammatically in the accompanying drawings wherein:

Fig. 1 is a vertical axial section through one form of our invention;

Fig. 2 is a vertical axial section through a variant form;

Fig. 3 is a vertical axial section through a still further variant form;

Fig. 4 is a vertical axial section through a still further variant form;

Fig. 5 is a section on the line 5-5 of Fig. 4; and

Fig. 6 is a partial section through a variation of the device.

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

Referring to Fig. 1, 1 indicates any suitable outer housing or drum, with supporting means or legs 2 to space it above the floor or member 3 upon which it is positioned, thus providing air gaps 4 to permit air to flow into a lower portion of the housing. 5 is a bottom element illustrated as having a central aperture 6 to permit air to flow upwardly in the lower portion of the housing 1. 7 is any suitable supporting means, herein shown as an angle ring, upon which rests the upper flange of the pot 8. The pot has a generally concave bottom 9, to which a liquid fuel is supplied along a fuel inlet 10.

The wall of the pot is provided with a plurality of primary air inlet apertures 11, located at various levels. Any suitable means may be employed for admitting secondary air at or near the top of the pot. We illustrate for example a row of secondary air inlets 12. The top of the pot is partially closed by a flame ring 13, with a central flame aperture 14. 15 is a vaporizing ring herein shown as located above the lowest

row of holes 11, and mounted for example on a plurality of pins or supports 16. The ring 15 may have a circumferential clearance gap 17, if desired, or it may be fitted snugly into the pot.

18 is a fuel pipe for delivering fuel to the vaporizing ring. The vaporizing ring is somewhat dishd, and has an outer upwardly turned rim 19 and an inner upwardly turned rim or edge 20. Thus, an annular trough is provided about a central aperture 21, axially aligned with the flame aperture 14.

22 indicates any suitable float chamber or control, the details of which do not of themselves form part of the present invention. Fuel may be delivered to the control 22, from any suitable source of liquid fuel not herein shown, and a supply of fuel may flow thence along the pipe 18. 23 indicates any suitable control means for controlling the volume of flow along the pipe 18. It will be understood that it may be operated manually, or, if desired, any suitable automatic control means may be employed whereby, for example, under the control of a thermostat, an increased flow of fuel may be supplied when heat is desired, and the flow may be lowered or cut down to zero when less heat or no heat is desired.

We illustrate a supplemental control chamber 24, which receives fuel from the top chamber and delivers it along the pipe 18. The fuel control means is preferably adapted to deliver constantly sufficient fuel along the pipe 18 to maintain a pilot fire in the lower part of the pot below the vaporizing ring 15. We may employ a two-level control device such as is shown in the co-pending application Serial No. 431,792, filed February 21, 1942, but it will be understood that any suitable means for supplying a liquid fuel at the two levels or two points may be employed.

Referring to the form of Fig. 2, in place of the ring 15, we provide a cup or pan 30, which is herein shown as located just above the lowest row of primary air inlets 11. It will be understood, of course, that it may be located at other levels. Preferably it may be made circular, its rim 31 being generally concentric with the center of the pot 8. It will be understood that other forms and shapes of pan may be employed, the major characteristic of the form of Fig. 2 being that the vaporizing element, instead of being adjacent the wall of the pot, as shown in Fig. 1, is spaced inwardly from the wall.

Referring to Fig. 3, we illustrate variant locations of the vaporizing pan. In Fig. 3, for example, in full line, an upper position 15a is indicated just below the secondary air inlet 12. A

second position is indicated as at 15b, and a third position as at 15c. It will be understood that the location of the upper chamber 22a of the oil control is varied to suit the level of the vaporizer, the lower chamber 24a being advantageously left in its original position, in general horizontal alignment with the bottom of the pot.

Referring to the form of Figs. 4 and 5, in the place of either the ring 15 of Fig. 1, or the pan 30 of Fig. 2, we employ a trough 50, which may extend from side to side of the pot, the vaporizing area or the area to receive the fuel to be vaporized being defined by the side walls 51, herein shown as parallel and as extending across the pot. End walls 52 close the space and prevent oil leakage.

As shown in Fig. 4, in full line, the container is just above the lowest row of primary air inlets, but as indicated in dotted line at 50a, it will be understood that the pan may be positioned at other levels. Note also a difference in shape in the pan 50a, the ends being rounded, as at 50b.

Referring to Fig. 6, we illustrate a circumferential trough 60 having an outer flange 61, a downwardly extending inner lip or bead 62, and an upwardly extending cylindrical flange 63 terminating in a lip 64. If desired, an oil inlet 65 may be made integral with or may be secured permanently to the trough. The trough may be supported in any suitable fashion as upon pegs or pins 66.

It will be realized that, whereas we have illustrated and described 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 the invention. We therefore wish that the drawings and description be taken as in a broad sense illustrative or diagrammatic, rather than as a limitation to the precise showing. For example, whereas we have illustrated a loose, removable ring 15 in the pot, the ring may be permanently secured, or other means may be employed for providing a vaporizing member intermediate top and bottom of the pot.

The location of the vaporizing container may be varied from near the top to near the bottom of the pot. The shape may be widely varied, the forms herein shown being merely illustrative, and the number of vaporizing containers may be varied.

The use and operation of the invention are as follows:

The upper part of the housing 1 serves as a combustion chamber 30. At the high fire the fuel supplied to the ring 15 will be vaporized by the combustion taking place above it, and will mix with the primary air supply through the apertures 11 to produce a primary incompletely combustible mixture. As this mixture rises, it receives its secondary air from the apertures 12, and the final mixture is burned at or above the level of the flame ring 13. The rate of combustion is controlled by varying the rate of flow of fuel along the pipe 18.

Where a minimum fire is desired, the control device may be turned, for example, to cut off any flow of liquid at all along the pipe 18, a minimum flow of liquid continuing along the pipe 10. This liquid is vaporized on the bottom 9 of the pot and receives its air supply through the lowest row of holes 11. Combustion then may take place at or near the ring 15. The pilot flame will give off only a small amount of heat, but it will be suf-

ficient to keep the ring 15 heated, and the burner hot enough so that when, in response to manual manipulation or thermostatic control, fuel again flows along the pipe 18, the rate of vaporization will at once go up, the level of combustion will rise in the pot, and the heater will operate as an efficient heating unit.

In the various forms illustrated herein, in each case a vaporizing container ring, pan or trough is shown, located intermediate the top and bottom of the pot. The major supply of fuel is delivered to this container for vaporization. The pilot flow of fuel is delivered through the lower passage 10 to the bottom of the pot. In each form herein shown the vaporizing container is of such size and shape as to leave ample communicating space between the upper and lower portions of the pot. And the pilot flame is effective to maintain the container properly heated for the prompt initiation of full combustion when an additional supply of fuel is provided. It will be understood that we may, as shown in Fig. 3, employ a plurality of containers of any suitable size and shape and may permit the fuel to cascade down the series of containers.

We claim:

1. In a pot type burner, a burner pot with a circumferential wall having a plurality of air inlet apertures located at various levels in the wall, means for delivering secondary air adjacent the top of the pot, an open topped liquid fuel vaporizing container located intermediate the top and bottom of the pot, and spaced upwardly above and away from the bottom of the pot, means for delivering a liquid fuel to said vaporizing container and for maintaining a predetermined level of liquid fuel therein, and additional means for delivering liquid fuel to the bottom of the pot at a level below said vaporizing container, the fuel in said vaporizing container being subjected to the heat of combustion taking place in and above that portion of the pot which is located above said vaporizing container.

2. In a pot type burner, a burner pot with a circumferential wall having a plurality of air inlet apertures located at various levels in the wall, means for delivering secondary air adjacent the top of the pot, an open topped liquid fuel vaporizing container located intermediate the top and bottom of the pot, and spaced upwardly above and away from the bottom of the pot, means for delivering a liquid fuel to said vaporizing container and for maintaining a predetermined level of liquid fuel therein, and additional means for delivering liquid fuel to the bottom of the pot at a level below said vaporizing container, the fuel in said vaporizing container being subjected to the heat of combustion taking place in and above that portion of the pot which is located above said vaporizing container, said vaporizing container being in the form of an annulus having a central aperture surrounded by an upwardly extending wall.

3. In a pot type burner, a burner pot with a circumferential wall having a plurality of air inlet apertures located at various levels in the wall, means for delivering secondary air adjacent the top of the pot, an open topped liquid fuel vaporizing container located intermediate the top and bottom of the pot, and spaced upwardly above and away from the bottom of the pot, means for delivering a liquid fuel to said vaporizing container and for maintaining a predetermined level of liquid fuel therein, and ad-

ditional means for delivering liquid fuel to the bottom of the pot at a level below said vaporizing container, the fuel in said vaporizing container being subjected to the heat of combustion taking place in and above that portion of the pot which is located above said vaporizing container, said vaporizing container being in the form of an annulus having a central aperture surrounded by an upwardly extending wall, the bottom of said annulus having its deepest portion adjacent and surrounding said central aperture.

4. In a pot type burner, a burner pot with a circumferential wall having a plurality of air inlet apertures located at various levels in the wall, means for delivering secondary air adjacent the top of the pot, an open topped liquid fuel vaporizing container located intermediate the top and bottom of the pot and spaced upwardly above and away from the bottom of the pot, means for delivering a liquid fuel to said vaporizing container and for maintaining a predetermined level of liquid fuel therein, and additional means for delivering liquid fuel to the bottom of the pot at a level below said vaporizing container, the fuel in said vaporizing container being subjected to the heat of combustion

taking place in and above that portion of the pot which is located above said vaporizing container, and means for selectively mounting said vaporizing container at a plurality of levels in the pot.

5. In a pot type burner, a burner pot with a circumferential wall having a plurality of air inlet apertures located at various levels in the wall, means for delivering secondary air adjacent the top of the pot, an open topped liquid fuel vaporizing container located intermediate the top and bottom of the pot, and spaced upwardly above and away from the bottom of the pot, means for delivering a liquid fuel to said vaporizing container and for maintaining a predetermined level of liquid fuel therein, and additional means for delivering liquid fuel to the bottom of the pot at a level below said vaporizing container, the fuel in said vaporizing container being subjected to the heat of combustion taking place in and above that portion of the pot which is located above said vaporizing container, said vaporizing container being located above the lowest and below the highest of said air inlet apertures.

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