April 18, 1944. J. L. BREESE ET AL 2,346,817

POT WITH SUPPLEMENTAL PILOT CHAMBER

Filed Feb. 21, 1942 2 Sheets-Sheet 1

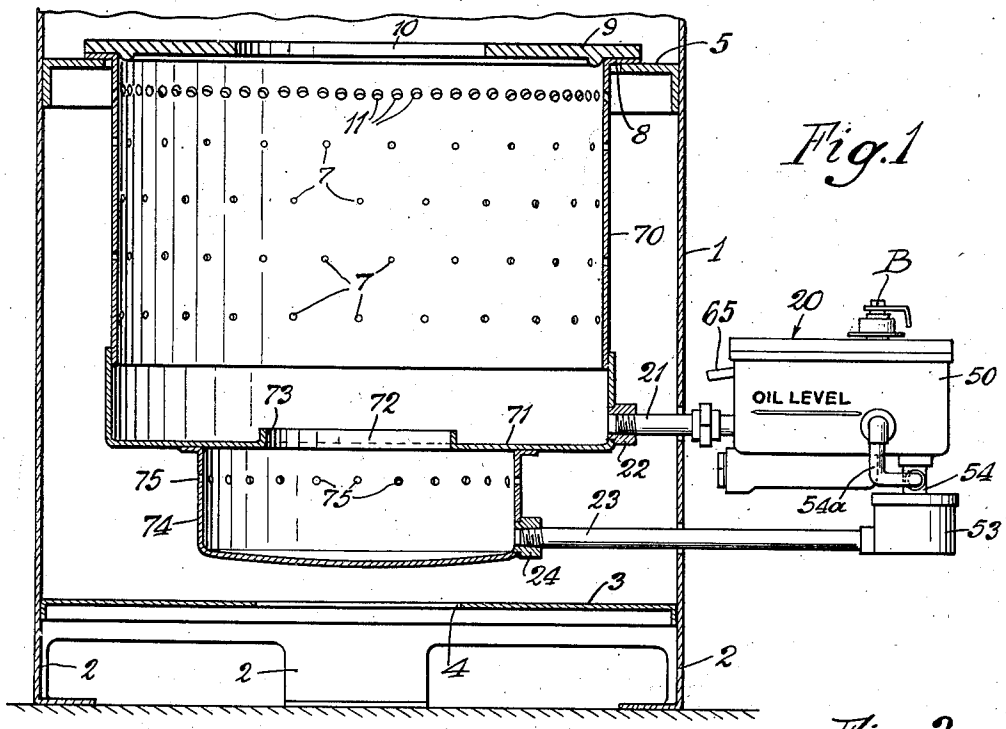

Fig. 1

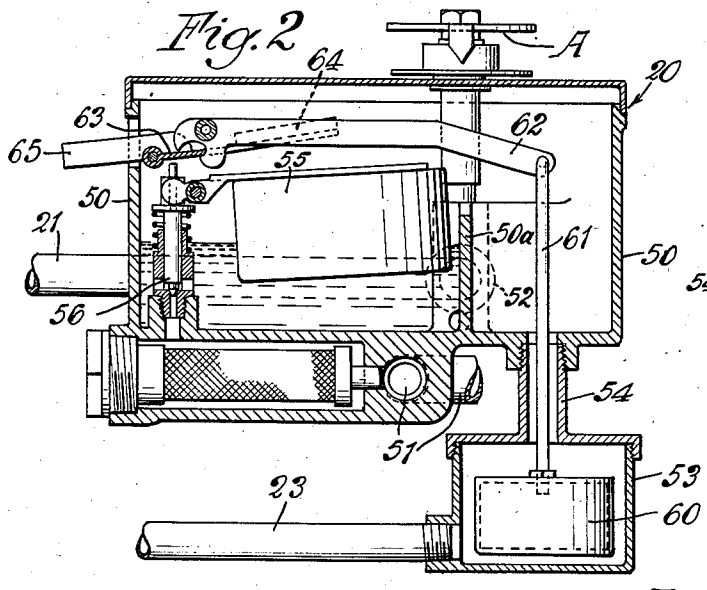

Fig. 2

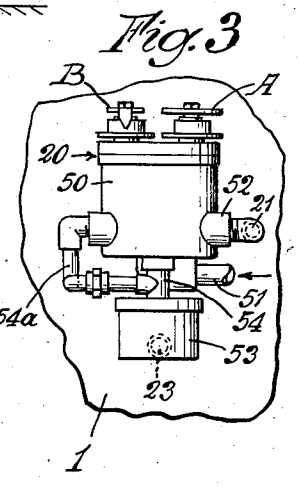

Fig. 3

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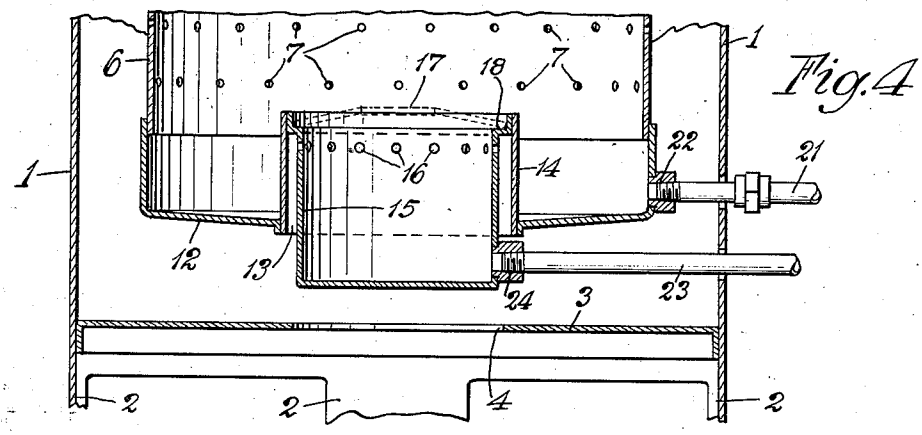

Fig. 4

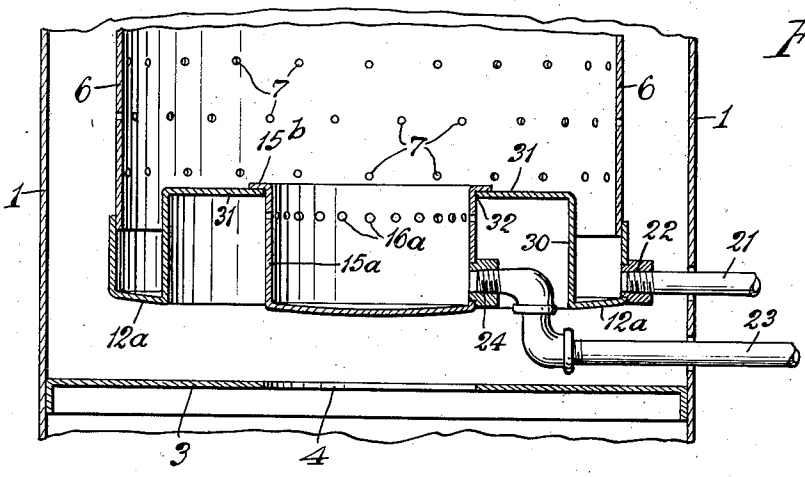

Fig. 5

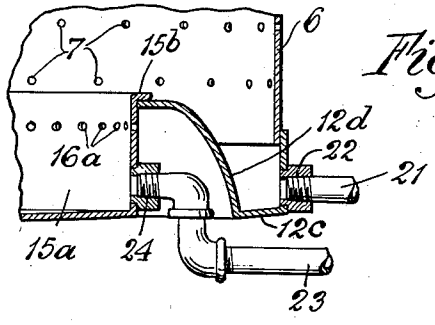

Fig. 6

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POT WITH SUPPLEMENTAL PILOT CHAMBER

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Application February 21, 1942, Serial No. 431,792

10 Claims. (Cl. 158—91)

Our invention relates to an improvement in burners or heating devices and has for one purpose the provision of an improved burner adapted for the employment of a liquid fuel.

Another purpose is the provision of an improved burner in which provision is made for the maintenance of combustion at two or more separate zones.

Another purpose is the provision of an improved burner in which the fuel is supplied to the burner at a plurality of points.

Another purpose is the provision of an improved burner in which two burner elements are provided, with a separate fuel supply to the two elements.

Another purpose is the provision of a burner in which two burner elements located at different levels and with communicating interiors are provided, with separate means for supplying the fuel to the two burner elements.

Another purpose is the provision of a multiple burner with fuel supply means for each of several burner elements, in which one burner element serves as a combustion chamber for another burner element.

Another purpose is the provision of a burner of the so-called pot type in which a lower pot is employed, communicating with and through the bottom of the upper pot, and with means for supplying a liquid fuel to the bottoms of the two pots, the interior of the upper pot being in communication with the interior of the lower pot and serving as a combustion zone therefor.

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

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

Fig. 1 is a vertical section of an embodiment of our invention;

Fig. 2 illustrates a float valve structure available for use with the burner shown in Fig. 1;

Fig. 3 is an end view of the structure shown in Fig. 2, on a reduced scale; and

Figs. 4, 5 and 6 are partial vertical sections through variant forms of the device.

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

Referring to the drawings, 1 generally indicates an outer housing or drum, which may be of any suitable size or shape, but is herein shown as cylindrical. It may be supported on the ground by any satisfactory supporting means. We illustrate for example a plurality of legs 2. The bottom of the member 1 may be closed for example by a bottom member or horizontal partition 3, which may be apertured, as at 4, to permit air to enter the interior of the member 1.

5 is an annular angle, which may be secured in any suitable manner to the inner face of the member 1. Positioned thereupon is a burner pot 10, herein shown as generally cylindrical in form and provided with a plurality of primary air inlet apertures 7, which may be located at a plurality of levels. 8 is any satisfactory flange whereby the pot may be supported upon the ring 5. 9 is a flame ring adapted partially to close the top of the pot 10 and which is shown as provided with a central aperture 10.

Any suitable means for admitting secondary air to or adjacent the top of the pot 10 may be employed. We illustrate a plurality of secondary air inlets 11, shown as upwardly and inwardly inclined and as both larger and more closely spaced than the primary air inlets 7. 71 is any suitable pot bottom member, herein shown as being centrally apertured, as at 72, and as having a central upwardly extending flange 73, which surrounds the aperture 72. Located below the bottom 71 is a separate burner pot 74, which may be welded or otherwise secured to the bottom 71. It will be observed that the diameter of the pot 74 is shown as substantially greater than the aperture 72 in the upper bottom 71. We prefer to employ a plurality of air inlets 75 located at a single level in the pot 74.

20 generally indicates a practical float valve structure which may be employed for controlling the flow of fuel when, as in the form of Fig. 1, the level of delivery of the fuel in the two pots is different. Referring generally to the valve structure shown for example in Fig. 2, the outer housing 50 may be employed with any suitable fuel inlet pipe 51 from any suitable source of liquid fuel not herein shown. 52 indicates an outlet in communication with any suitable fuel pipe 21, which terminates, as at 22, at the wall or bottom portion of the upper pot 10, as in Fig. 1. The flow of fuel through 52 and the pipe 21 may be controlled by any suitable valve mechanism A, the details of which do not form part of the present invention. A second valve mechanism B may control a smaller flow of fuel to a lower housing 53, which is in communication with the main housing 50, as by a passage 54. 54a is the passage for delivering fuel from the main chamber of 50 to 53 or the passage 54.

23 indicates a pipe from this lower housing 53 which extends to the pot 74. 55 indicates any suitable float controlling the valve 56, which in

turn controls the flow of fuel into the housing **50** from the pipe **51** and maintains a constant level of fuel in said housing. In the event of flooding we provide a safety or trip mechanism which includes a supplemental float **60** in the chamber **53**, which communicates along the passage **54** by means of a link **61**, with a trip lever **62**, which in turn normally holds the trip **63**, with its weight **64**, in the inoperative position in which it is shown in Fig. 2. If excess fuel is present in the chamber **53**, as for example if the pilot pot **15** or **74** becomes flooded, or if oil spills from the top pot, the float **60** lifts and releases the member **63**, **64**, which then drops to close the valve **56**. **65** is any suitable outside reset handle. **50***a* is a partition defining the main float chamber. If the main chamber floods, and spills over **50***a*, the trip is actuated.

It will be understood that in the normal operation of the device a flow of the fuel is maintained either constantly or with a controlled minimum, whereby at all times sufficient fuel is preferably delivered to the pot **74** to maintain combustion in the lower burner thus provided. The air flowing inwardly through the inlets or apertures **75** provides both the primary and secondary air necessary to maintain combustion of the liquid hydrocarbon in the lower burner **74**. Thus, the combustion air supply for the pilot or lower stage is delivered through the walls of the pot **74**. It will be understood that the combustion taking place at or above the top of the pot **74** is sufficient for the vaporization of the fuel flowing to the bottom of the pot **15** along the inlet **23**. It will also be understood that, through the communicating aperture **72**, the interiors of the pots **74** and **70** are in communication, and the upper pot may serve as a combustion chamber or flame chamber for the mixture of air and vaporized fuel of the lower pot **74**.

When a second flame is desired or needed, a float device, indicated at **20**, is operated, for example either manually or thermostatically, in such fashion as to cause the delivery of fuel through the pipe **21**. This additional fuel is vaporized by the heat of pilot combustion, and receives its primary air through the apertures **7**. At the full fire stage all of the apertures **7** serve as means for admitting primary air for the vaporization of the mixture, and the secondary air supplied through the apertures **11**, full combustion of the final mixture taking place at or above the level of the secondary air inlets **11**.

It will be understood that, while the fuel supply to the two pots is separately admitted to the pots, it may be subjeced to the control of any suitable float valve structure. We have illustrated in Figs. 2 and 3 a float and valve assembly which may be used, with the burner shown in Fig. 1. It will be understood that we do not wish to be limited to any particular control means, since our duplex burner can be employed with a variety of different controls.

It will also be understood that, whereas we illustrate in Fig. 1 a pot type burner with a lower pot in communication through a central aperture with the upper pot, it is possible and in many instances practical to employ a pair of pots which may be horizontally or otherwise aligned, and in which the circulation of air and vaporized fuel may be generally horizontal, or at least not vertical. Therefore, unless the claims herein are specifically limited, we do not wish them to be interpreted as limited to vertically aligned chambers. Our description and drawings are to be taken as in a broad sense illustrative and diagrammatic. Many changes may be made in the size, shape, number and disposition of parts employed. As examples, we illustrate varying forms of burner in Figs. 4, 5 and 6.

Referring for example to Fig. 4, we illustrate a pot **6**, having a bottom **12**, with an upwardly extending sleeve **14** therein, in which is positioned a smaller pot **15**, herein shown as having a single row of air inlet apertures **16** in the upper portion thereof. Air may be admitted through the aperture **13** between the members **14** and **15**. The pot **15** has an upper ledge **18**, which may if desired receive a centrally apertured flame ring **17**. In this form the fuel inlet ducts **21** and **23** communicate with the two pots at different levels, and the control means shown in Figs. 2 and 3 may if desired be employed.

In Fig. 5 the pot bottom **12***a* is upwardly offset, as at **30**, and is provided with an inwardly extending flange **31**, centrally apertured to receive the outwardly extending flange **15***b* of the pot **15***a*. The central aperture of the flange **31** is indicated as at **32**. A plurality of air inlets, shown as the single row **16***a*, may be employed. It will be observed that the fuel is supplied, as at **22** and **24**, at the same level for the two pots. It will be understood that any suitable oil control means may be employed, but that the two-level control shown in Figs. 2 and 3 would not be necessary.

The form of Fig. 6 differs from the form of Fig. 5 merely in that, for the wall **30**, **31**, is substituted the inwardly and upwardly inclined curved wall **12***d*, whereby the bottom portion **12***c* is more directly subjected to the heat of combustion in the pot.

It will be observed that in all forms herein shown, a plurality of pots or burner elements are employed, the interiors of which are connected so that the interior of one pot may serve as a combustion chamber for the other pot.

Referring to the particular forms of device herein shown, we find it advantageous to employ a single row of holes in the lower pot, and to place the row sufficiently high so that the float **60** will cut off the supply of oil in the event the lower pilot becomes extinguished, long before the level reaches the holes **75**. There is thus no possibility of oil flowing out of the holes or of any clogging of the holes, or any vaporization of oil outside of the pot.

In the form of Fig. 1 the structure is particularly advantageous in that the bottom of the upper burner serves as the flame ring of the lower burner. We wish also to emphasize the importance of the fact that the mixing chamber of the upper burner serves also as the combustion chamber of the lower burner. Or, stated differently, where two burners are employed, each with its separate supply of fuel and air, and regardless of whether they are vertically or horizontally aligned, the mixing chamber of one burner may serve as the combustion chamber of the other burner. And regardless of the alignment or relative location of the burner elements, we find it highly advantageous to admit a liquid fuel at two or more different localities in a burner assembly, in order to vary the zone of combustion, the zone of combustion being varied by the admission of the oil into different zones.

In the operation of the control, with reference for example to Figs. 1 and 2, it will be understood that the shutoff may result from a number of different eventualities. In the first place, if the fire

goes out in the small pot 74 and oil continues to flow inwardly along the pipe 23, the float 60 will be actuated before the oil reaches the level of the apertures 75. In other words, sufficient oil cannot accumulate in the pot 74 to flood the apertures 75. On the other hand, if for any reason there is an excess delivery of fuel inwardly along the pipe 21 so that fuel flows over the partition 72 and accumulates in the bottom of the pot 74, the same result will ensue. Also, if for any reason excess oil flows over the partition 50a and down the passage 54, there is the same result.

We claim:

1. In combination, in an oil burner, a main burner pot having a side wall having air inlet apertures therein, and a bottom portion, and a pilot pot extending below said bottom portion, the interior of said pilot pot being in communication with the interior of the main pot, said pilot pot having one or more air inlet apertures, individual liquid fuel ducts extending to said main pot and said pilot pot, respectively, a float valve assembly in communication with both said ducts, and means for cutting off the fuel supply in response to flooding of the pilot pot.

2. In combination, in an oil burner, a burner pot having a side wall having air inlet apertures therein, and a bottom portion, and a pilot pot below said bottom portion, said bottom portion having an aperture therein aligned with the pilot pot, and of a diameter less than the diameter of the pilot pot, said pilot pot being provided with one or more air inlet apertures, and means for separately delivering a liquid fuel to said main pot and to said pilot pot.

3. In combination, in an oil burner, a generally cylindrical walled burner pot, the wall of which is provided with a plurality of air inlet apertures, said pot having a bottom having a generally central aperture therein, a pilot pot located below said bottom and abutting against the lower face thereof, said pilot pot being provided with one or more air inlet apertures, means for separately delivering a liquid fuel to said main pot and to said pilot pot, and a flange upwardly extending from the burner pot bottom and surrounding said aperture in said bottom.

4. In combination, in an oil burner, a pair of vertically aligned burner pots, the upper pot having a bottom with a central aperture, a lower pot below and in engagement with the bottom of the upper pot, means for delivering a liquid fuel separately to each said pot, each of said pots having a circumferential wall having a plurality of air inlet apertures, the apertures formed in the wall of the upper pot being located at various levels, and there being a single row of air inlet apertures formed in the wall of the lower pot located in a single generally horizontal plane.

5. In combination, in an oil burner, a main burner pot having a side wall with a plurality of air inlet apertures therein and a bottom portion, said bottom portion having a substantially central aperture, a pilot pot in communication with said central aperture, said pilot pot having a side wall with one or more air inlet apertures therein, the pilot pot having a closed bottom, the diameter of the pilot pot being substantially smaller than the diameter of the main pot, the pilot pot being located entirely within the vertical projection of the periphery of the main pot, individual liquid fuel ducts extending to said main pot and said pilot pot respectively, and means extending upwardly from the bottom of the main pot and adapted, with the bottom and the lower portion of the peripheral wall of the main pot, to form a liquid fuel receiving area extending circumferentially about the opening between the main pot and the pilot pot, said area being directly exposed to the heat of combustion, when combustion takes place in the upper part of the main pot.

6. In combination, in an oil burner, a main burner pot having a side wall with a pluraltiy of air inlet apertures therein and a bottom portion, said bottom portion having a substantially central aperture, a pilot pot in communication with said central aperture, said pilot pot having a side wall with one or more air inlet apertures therein, the pilot pot having a closed bottom, the diameter of the pilot pot being substantially smaller than the diameter of the main pot, the pilot pot being located entirely within the vertical projection of the periphery of the main pot, individual liquid fuel ducts extending to said main pot and said pilot pot respectively, means extending upwardly from the bottom of the main pot and adapted, with the bottom and the lower portion of the peripheral wall of the main pot, to form a liquid fuel receiving area extending circumferentially about the opening between the main pot and the pilot pot, said area being directly exposed to the heat of combustion, when combustion takes place in the upper part of the main pot, and means for cutting off the supply of fuel to both pots when the liquid fuel in the pilot pot reaches a predetermined maximum level, said level being lower than the lowest air inlet aperture in the wall of said pilot pot.

7. In combination, in an oil burner, a main burner pot having a side wall with a plurality of air inlet apertures therein, and a bottom portion, and a pilot pot located within the periphery of the main pot, the interior of the pilot pot being in communication with the interior of the main pot, said pilot pot having a side wall with one or more air inlet apertures, individual liquid fuel ducts extending to said main pot and said pilot pot respectively, and a float valve assembly in communication with both said ducts and including a plurality of separate float containers, one of said float containers being in direct communication with each of said ducts, and means for cutting off the fuel supply to the float valve assembly in response to the flooding of the pilot pot, including a float located in the float container in direct communication with the pilot pot, valve means adapted to control the inflow of fuel to the float container in communication with the main pot and an actuating connection between said float and said valve means.

8. In combination, in a liquid fuel burner, a pair of aligned concentrically axised open topped burner pots, each pot having a side wall with a plurality of air inlet apertures therein, one of said pots being of substantially larger diameter than the other, the larger pot having a bottom with a central aperture, the smaller pot having its open top in communication with such aperture, a unitary outer housing surrounding both pots, the interior of said housing being in communication with the atmosphere, and means for delivering a liquid fuel separately to the interior of each pot, the interior of the smaller pot being exposed to the heat of combustion taking place in or above the larger pot.

9. In combination, in a liquid fuel burner, a pair of aligned concentrically axised open topped burner pots, each pot having a side wall with a plurality of air inlet apertures therein, one of

said pots being of substantially larger diameter than the other, the larger pot having a bottom with a central aperture, the smaller pot having its open top in communication with such aperture, a unitary outer housing surrounding both pots, the interior of said housing being in communication with the atmosphere, and means for delivering a liquid fuel separately to the interior of each pot, the interior of the smaller pot being exposed to the heat of combustion taking place in or above the larger pot, the bottom of the smaller pot being located below the level of the bottom of the larger pot.

10. In combination, in a liquid fuel burner, a pair of aligned concentrically axised open topped burner pots, each pot having a side wall with a plurality of air inlet apertures therein, one of said pots being of substantially larger diameter than the other, the larger pot having a bottom with a central aperture, the smaller pot having its open top in communication with such aperture, a unitary outer housing surrounding both pots, the interior of said housing being in communication with the atmosphere, means for delivering a liquid fuel separately to the interior of each pot, the interior of the smaller pot being exposed to the heat of combustion taking place in or above the larger pot, the lowest air inlet aperture in the smaller pot being located above the level of delivery of the liquid fuel to the interior of the larger pot.

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