Aug. 12, 1941. J. L. BREESE 2,252,162

BURNER FOR LIQUID FUELS

Filed Sept. 16, 1938

Fig. 1

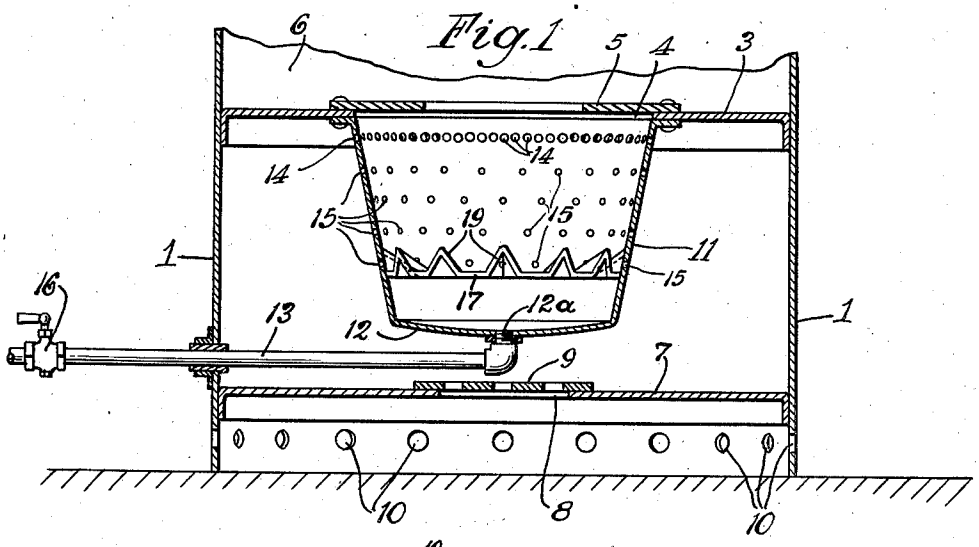


Fig. 2

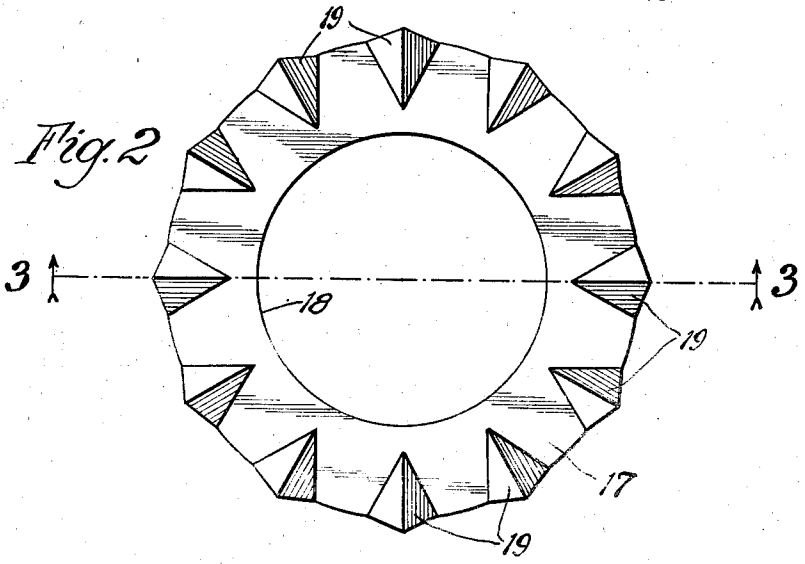
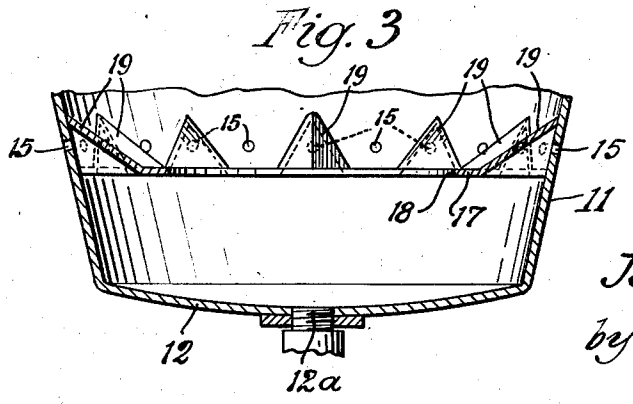


Fig. 3



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BURNER FOR LIQUID FUELS

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Application September 16, 1938, Serial No. 230,165

6 Claims. (Cl. 158—91)

My invention relates to an improvement in pilot means for fluid hydrocarbon burners. One purpose is the provision of means for providing a maximum turn-down for the so-called pot type burner.

Another purpose is the provision of an improved baffle member which may be positioned so closely adjacent the bottom of a pot type burner as to provide the maintenance of an exceedingly low flame which may have a pilot function and be so low as to provide practically no heat delivery for the apparatus as a whole.

Another purpose is the provision of a pilot ring for pot type burners which shall be located lower than the lowest primary air inlet or inlets.

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

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

Figure 1 is a vertical axial section;

Figure 2 is a plan view of the baffle element on an enlarged scale; and

Figure 3 is a section on the line 3—3 of Figure 2 illustrating the baffle member associated with the walls and bottom of the pot of the pot type burner.

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

Referring to the drawing, 1 generally indicates the outer member or housing of a stove. 3 indicates an intermediate partial closure or ring located within the member 1 and extending from side to side thereof. It is shown as provided with a central aperture 4 which may be partially closed by any suitable baffle 5. The space 6 above the baffle 5 is that space in which the combustion takes place or in which flame is located when the burner is burning at high fuel capacity.

7 is any suitable transverse closure at a level lower than the ring 3. It may be provided with an aperture 8 which if desired may be closed by any suitable grill or foraminous element 9 whereby air is supplied to the space between the members 3 and 7. I may for example provide a plurality of apertures 10 in the bottom of the member 1 through which air is admitted to the foraminous plate 9 and the space between the members 3 and 7.

11 indicates a mixing chamber or pot herein shown as having a downwardly tapered side wall terminating in a bottom 12. 13 is any suitable fuel supply pipe or member which delivers liquid fuel to the bottom of the pot as through the aperture 12a. The pot is adapted for the so-called hydroxylation type of combustion. It is provided adjacent its upper edge with a plurality of secondary air apertures 14, preferably upwardly tilted. Below the secondary apertures 14 I provide a plurality of more sparsely scattered and preferably smaller apertures 15 for admitting the primary air supply. These apertures are preferably located in a plurality of levels whereby the intermediate portion of the pot 11 is more or less evenly provided with these primary air apertures. It will be understood that the air admitted to the space between the closures 3 and 7 flows in through the wall of the pot 11 through the primary and secondary air apertures.

Combustion is controlled in great part by controlling the flow of the liquid hydrocarbon through the line. The details of this control are not herein shown but I illustrate for example the hand valve 16. Any suitable automatic or semi-automatic control may be associated therewith or substituted therefor whereby combustion is varied or controlled by increasing or diminishing the rate of flow of the liquid hydrocarbon along the line 13 to the bottom of the pot 11.

17 illustrates a baffle member or ring provided with a central aperture 18. This baffle is preferably located in the pot 11 at a level lower than the lowest primary air apertures 15. When so located, it is desirable to provide a minimum supply of air to the space below the baffle 17. I may provide therefor one or more hoods or deflectors 19 to project upwardly above the level of the lowest primary air apertures 15, and mask some of said apertures and deflect the air delivered therethrough to the space below the baffle 17.

The primary purpose of the baffle is to permit a very low turn-down of the unit. I find it desirable to segregate as small a proportion of the cubic content of the pot 11 as possible. A minimum supply of primary air, however, is necessary to maintain even pilot combustion and therefore I provide any suitable means for bringing air from a higher level downwardly into the space beneath the member 17. As an example of such means I illustrate the hoods 19. I may employ any suitable number of these hoods but I find it practical to employ sufficient hoods to take about half the air from the lowest row of primary apertures 15. I deliver this air to the space below the baffle 17.

In practice the baffle 17 functions to prevent eddy currents or down drafts of air or mixed air and gases from above the baffle 17 when the de-

vice is running at the pilot or low turn-down stage. Enough air is provided to maintain adequate and non-carbon forming combustion by means of the deflector action of the hoods 19. The baffle 17 is effective to prevent down drafts or disturbance of combustion conditions below the baffle and the result is a proper burning of the liquid hydrocarbon, without deposit of soot or free carbon, even though a very low flame is maintained and only a very small proportion of the cubic content of the pot 11 is involved.

It will be realized that whereas I have herewith shown and described a practical operative device, nevertheless many changes might be made in the size, shape, number and disposition of parts without departing from the spirit of the invention and I wish, therefore, that my showing be taken as in a sense diagrammatic.

The use and operation of my invention are as follows:

In the normal operation of my device the characteristic combustion process of my Patent 1,702,929 can be carried on. A primary air supply enters through the primary air apertures and mingles with the hydrocarbon vaporized by combustion. The heat of combustion, once the device is in operation, vaporizes the hydrocarbon. The vaporized hydrocarbon rises and mixes with the primary air supply to form a primary mixture. This primary mixture moves upwardly toward the top of the pot and there receives the secondary air supply which may be admitted through the apertures 14, although it will be understood that the secondary air may be supplied by other instrumentalities, for example it may be supplied above the top of the pot. The addition of secondary air produces the final mixture which burns. Combustion takes place normally above the top of the pot and provides the heat for the stove or furnace unit.

Whether by natural draft or by any suitable fan or the like, not herein shown, sufficient air is admitted for maintaining combustion at a rate sufficient to give the desired heat. Any suitable control means, thermostatic or otherwise, may be employed for controlling the desired heat produced, for example by controlling the position of the valve 16.

In the event that it is desired to turn down the unit to a minimum heat, or to practically no heat, and to obtain a pilot light effect, the supply of fuel is reduced and combustion is correspondingly reduced. In the structure as shown in my Patent 1,702,929 there is a limit below which the unit does not operate efficiently. For example, unless a sufficient rate of combustion is maintained, the secondary air tends to eddy back and circulate down into the primary combustion zone, with the result that the balance between the primary and secondary zones is destroyed and my mode of combustion is interrupted, resulting in inefficient combustion and the deposit of carbon. The interposition of a baffle, such as is shown at 17, prevents this down draft, and the primary mixing may be carried on below the baffle, the air admitted above the baffle 17 serving as the secondary air or providing a final combustion which takes place on a reduced scale at or just above the baffle 17.

I find it desirable to provide a minimum chamber or cubic content below the baffle 17. I therefore position the baffle 17 below the lowest of the primary air apertures 15. However, it is desirable to bring air downwardly into the space below the baffle 17 and therefore I take air from the lowest row of primary air apertures 15. I thus obtain a very small area for the pilot combustion and supply to it a relatively small volume of air. In the form of the device herein shown, for example, the hoods 19 are shown as intercepting the air from about half of the lowest row of primary air apertures 15. This decrease of the volume of air delivered to the pilot area beneath the baffle 17 therefore permits a smaller fuel consumption than would be possible with the baffle 17 positioned above the lowest row of primary air apertures. The result is a highly efficient pilot device which maintains sufficient combustion to launch full combustion in response merely to opening of the valve 16 and admitting a larger volume of liquid hydrocarbon to the bottom of the pot.

I claim:

1. In a mechanism for burning liquid hydrocarbons, a pot and means for delivering a liquid hydrocarbon to said pot, the walls of said pot being provided with a plurality of primary air inlet apertures located at various levels, and a baffle member located in said pot at a level below the lowest of said primary air apertures, and including deflector means extending upwardly from and above the level of said baffle member and in communication with some of the primary air inlet apertures.

2. In a mechanism for burning liquid hydrocarbons, a pot and means for delivering a liquid hydrocarbon to the pot, the walls of the pot being provided with a plurality of primary air inlet apertures located in general horizontal rows at various levels, and a baffle member located in the pot at a level below the lowest row of said primary air apertures, and means for delivering air from said lowest row of primary air inlet apertures to the space beneath said baffle member, including deflector means extending upwardly from and above the level of said baffle member.

3. In a mechanism for burning liquid hydrocarbons, a pot and means for delivering a liquid hydrocarbon to the pot, the walls of the pot being provided with a plurality of primary air inlet apertures located in general horizontal rows at various levels, and a baffle member located in the pot at a level below the lowest row of said primary air apertures, and means for delivering air from said lowest row of primary air inlet apertures to the space beneath said baffle member, including deflector means extending upwardly above the level of said baffle member, said deflector means being unitary with the baffle member.

4. In a mechanism for burning liquid hydrocarbons, a pot and means for delivering a liquid hydrocarbon to said pot, the walls of said pot being provided with a plurality of primary air inlet apertures located at various levels, and a baffle member located in said pot at a level below the lowest of said primary air apertures, said baffle member including a plurality of spaced hoods extending upwardly therefrom into communication with a plurality of the lowest of the primary air apertures.

5. In a mechanism for burning liquid hydrocarbons, a pot and means for delivering a liquid hydrocarbon to the lower portion of said pot, the walls of said pot being provided with a plurality of primary air inlet apertures located at various levels, a centrally apertured baffle member located in said pot at a level below the lowest of said primary air apertures, said baffle member being provided adjacent its periphery with por-

tions inclined upwardly and outwardly with respect thereto and associated with certain of said primary air apertures for directing air downwardly and inwardly from some of said primary air apertures into the space beneath said baffle member.

6. In a mechanism for burning liquid hydrocarbons, a pot and means for delivering a liquid hydrocarbon to the lower portion of said pot, the walls of said pot being provided with a plurality of primary air inlet apertures located at various levels, a centrally apertured baffle member located in said pot at a level below the lowest of said primary air apertures, the baffle member having a diameter such that it closely approaches the wall of said pot to prevent downward passage of air currents around the periphery thereof, said baffle member being provided adjacent its periphery with portions having an upward and outward inclination with respect thereto and in predetermined relation with certain of said primary air apertures for directing air from some of said primary air apertures downwardly and inwardly through the peripheral portions thereof and into the space beneath said baffle member.

JAMES L. BREESE.