July 18, 1939. J. L. BREESE 2,166,231

BURNER FOR LIQUID FUELS

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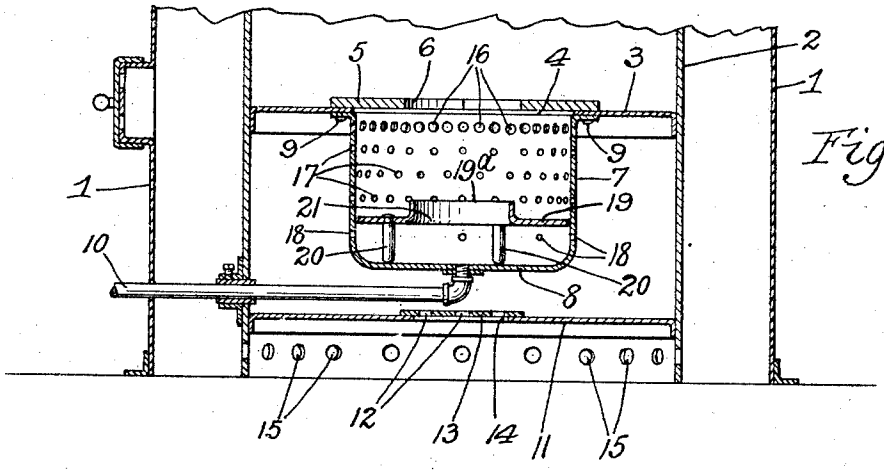

Fig. 1.

Fig. 2.

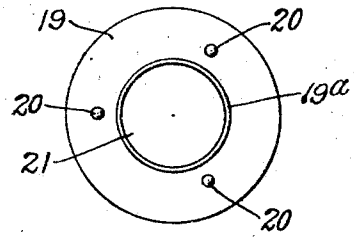

Fig. 3.

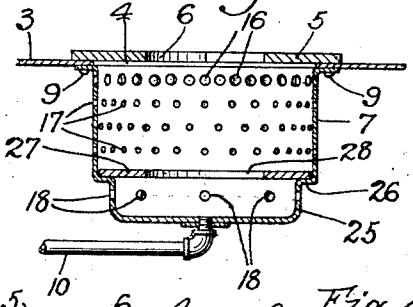

Fig. 5.

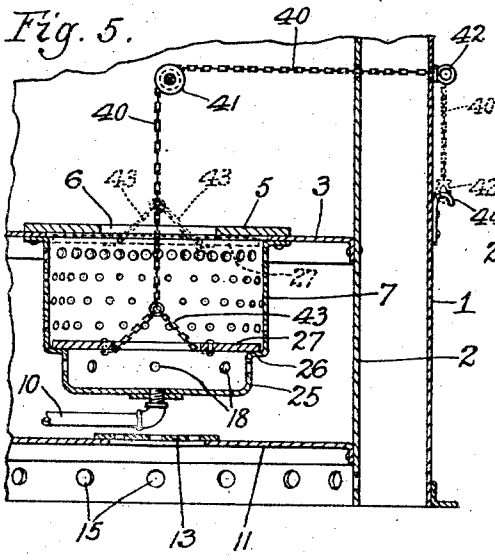

Fig. 4.

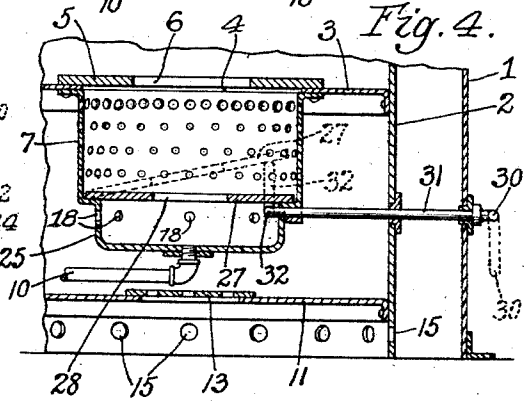

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Fig. 7.

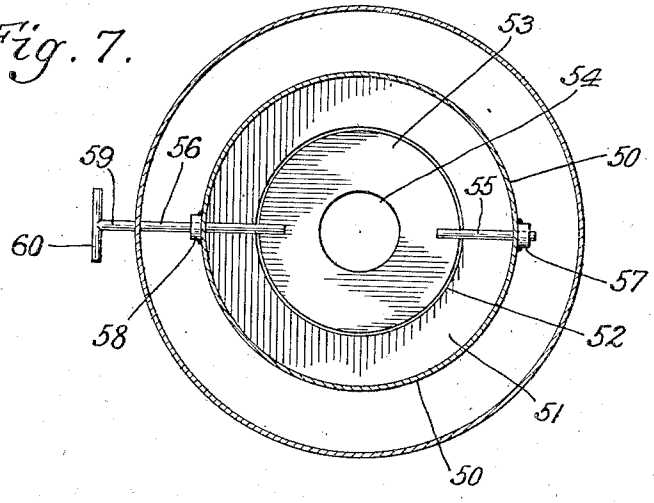


Fig. 6.

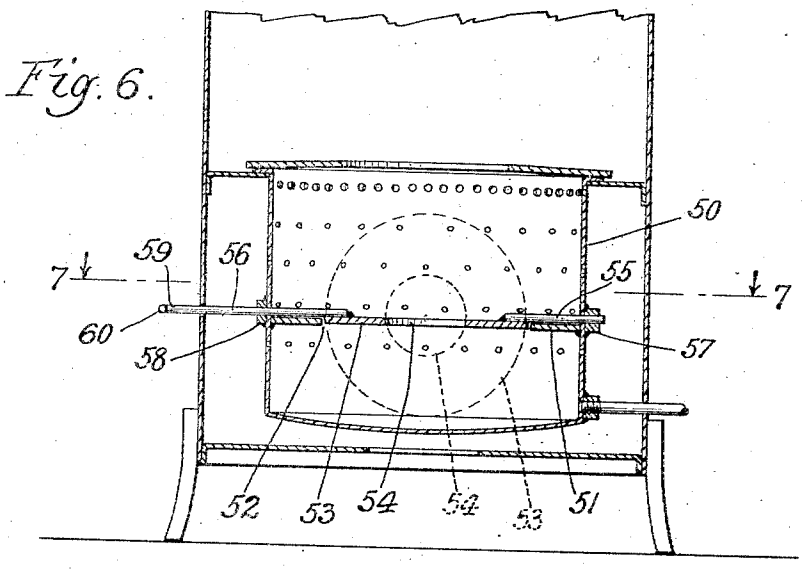
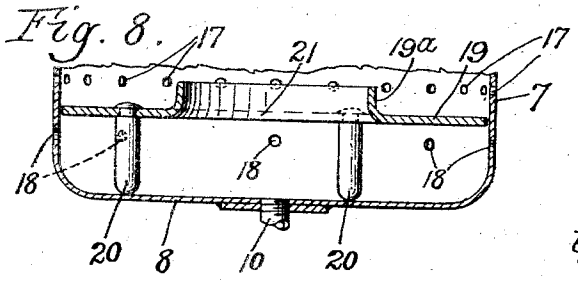


Fig. 8.



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2,166,231

UNITED STATES PATENT OFFICE

2,166,231

BURNER FOR LIQUID FUELS

James L. Breese, Santa Fe, N. Mex., assignor to Oil Devices, Santa Fe, N. Mex., a limited partnership of Illinois

Application February 8, 1937, Serial No. 124,695

6 Claims. (Cl. 158—91)

My invention relates to an improvement in burners for burning liquid fuels, such as hydrocarbons, and has for one purpose the provision of a burner which can be turned down to a very small fire, or low draft, without destroying the characteristic mode of combustion described, for example, in my prior issued Patent No. 1,702,929, issued on February 19, 1929.

Another purpose is the provision of means for permitting low draft burning with such a burner, while preventing down drafts from upper portions of the combustion chamber, which would disadvantageously affect combustion.

Another purpose is the provision of such means which are adaptable for ready removal to permit easy cleaning of the burner and for adjustment of the burner capacity.

Another purpose is the provision of a burner for carrying on my characteristic combustion method which constitutes or includes a plurality of superposed burners of varying diameters.

Another purpose is the provision, in connection with one of my burners, of a lower supplementary burner which may have the functions of a pilot light for maintaining combustion during periods when a minimum heat or no heat is desired.

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 drawings wherein:

Figure 1 is a vertical axial section;

Figure 2 is a plan view of a portion of the device;

Figure 3 is a partial vertical axial section of a variant form of the device;

Figures 4 and 5 illustrate the application to Figures 1 and 3, respectively, of means for raising the baffles to give an increased supply of air for the initial period of combustion;

Figure 6 illustrates a vertical axial section of a further variation;

Figure 7 is a section on the line 7—7 of Figure 6, illustrating the movable parts in a different position than in Figure 6; and

Figure 8 is a partial section on an enlarged scale of the structure shown in Figure 1.

Referring to the drawings, 1 generally indicates an outer furnace or heater shell and 2 an inner shell. 3 is a horizontal partition secured to the inner shell and provided with a central aperture 4. 5 is a preferably removable baffle, with a central aperture 6. 7 is a combustion chamber member, herein shown as generally cylindrical, with a bottom 8 which may be formed, if desired, in one piece and may be secured in any suitable way, as by bolts or welding 9, to the member 3.

10 is any suitable fuel supply pipe extending to the bottom 8. The means for supplying the fuel is not herein shown since it does not of itself form part of the present invention, but it will be understood that any suitable float chamber or the like may be employed for governing the desired flow of fuel, for example a liquid hydrocarbon fuel, to the bottom 8.

11 is a closure member secured within the shell 2 and provided with apertures 12, which may be in a separate removable plate 13 closing the central aperture 14 of the member 11. I herein illustrate air inlet apertures 15 in the bottom of the shell 2 and it will be understood that any suitable means, whether by natural draft or forced draft, may be used to supply air to the space between the shells 1 and 2, which air is caused to flow through the apertures 15, upwardly through the apertures 12, and into the space between the members 7 and the shell 2. The member 7 is provided with an upper row of secondary air inlet apertures 16, herein shown as upwardly and inwardly inclined. A plurality of preferably smaller apertures 17 are shown arranged in rows in a lower portion of the member 7. The bottom row 18 is also indicated.

Positioned above the bottom row 18 is a removable baffle ring 19, herein shown as provided with a plurality of legs or supports 20, whereby the baffle ring 19 is removably supported on the bottom 8. Other supporting means may be employed but I find the employment of legs 20 a practical solution of the problem. The ring 19 has a central aperture 21 corresponding to the aperture 6 in the baffle plate 5.

In the form of Figure 3, the member 7 is provided with a lower portion 25 of smaller diameter, the two being connected by an off-set or shelf 26 adapted to receive the removable baffle ring 27 with its central aperture 28.

In the normal operation of the device, the characteristic combustion method of my Patent Number 1,702,929 may be carried on. The primary air supply enters through the apertures 17 and mingles with the hydrocarbon vaporized by combustion. The heat of combustion, once the device is in operation, vaporizes the hydrocarbon and the vaporized hydrocarbon rises and mixes with the primary air supply to form a primary mixture. This primary mixture moves upwardly toward and through the aperture 6 of the baffle 5 and there receives the secondary air supply ad-

mitted through the apertures 16. This produces a final mixture which burns and provides the heat for the stove or furnace unit.

Preferably, 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.

In the event that it is desired to turn down the unit to a minimum heat, or to practically no heat, the air supply is reduced and combustion is correspondingly reduced. In the structure as shown in my Patent Number 1,702,929, there is a limit below which the stove does not operate efficiently. For example, unless a sufficient air supply and sufficient rate of combustion is maintained, the secondary air or the air above the baffle 5 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 method of combustion is interrupted, resulting in carbon deposit, and inefficient combustion.

I find that the interposition of a baffle, such as the one shown herein at 19, prevents this down draft and my primary mixing and combustion may be carried on by means of the holes 18, and the secondary air may then be supplied by some or all of the holes 17. In other words, the primary zone moves down to or is limited to the holes below the baffle, and the holes above the baffle, which previously operated as a source of primary air, then becomes the source of secondary air.

Referring to Figure 4, 30 illustrates an exterior handle associated with a shaft 31 having at the end thereof a lever 32 adapted in response to the rotation of the handle 30 to tilt the baffle 27 from the full line to the dotted line position. This allows an increased supply of air to enter the space below the baffle 27 which is important in the initial period of combustion. For instance, I find that if the baffle 27 or 19 is made with a relatively small hole in the center, I can employ or obtain a minimum flame and, in fact, in a broad sense, the size of the central hole 21 or 28 determines the minimum combustion. However, if a very small hole is used, for example a two-inch hole in a ten-inch burner, it is difficult to light the burner as there is insufficient air in the lowest zone and the mixture may become so rich that the flame dies out before the burner is properly heated. Also, with such a small hole in the baffle, it sometimes happens that when the burner is turned high, the oil accumulates in the bottom below the baffle and does not vaporize rapidly enough.

The smaller the opening in the baffle, the lower the minimum flame, and the greater the possible turndown of the pilot light. There is a critical point in the size of the aperture, taken in connection with the position of the baffle, at which the aperture is adequate to support pilot combustion when ignition has already begun, but is insufficient to support ignition when the device is being initially lighted. However, in order to obtain a sufficient turndown, it is important to be able to locate the baffle so low in the chamber that the initiation of combustion is difficult or impossible to obtain.

I find that I can overcome these difficulties by introducing an additional supply of air during the warming up period or by changing the position of the baffle ring so that it is raised during the lighting period and during the period of high fire or maximum combustion. It will be understood that the ring may be lifted either directly vertically or it may be tilted so that some of the primary air is forced down toward the floor of the burner. Both methods are in practice quite practical and Figure 4 illustrates means for obtaining the latter result.

In Figure 5 I illustrate the employment of means for lifting the baffle 27 directly upwardly against the bottom of the upper baffle 5. Any suitable means may be employed, but I illustrate a chain 40 passing over any suitable roller 41 extending out to any suitable handle 42. The lower end of the chain may be secured to the baffle 27 by any suitable means. I illustrate for example chain branches 43. It will be understood that a pull on the handle 42 serves to raise the baffle. The baffle may be kept in raised position by engaging the chain or handle by any suitable abutment mechanism generally indicated at 44.

Figures 6 and 7 illustrate a variant form in which the baffle or pilot ring is pivoted so that it can be rotated. Referring to those drawings, 50 indicates a burner pot or combustion chamber herein shown as cylindrical and provided with an intermediate normally fixed ring or baffle 51, which has the same function as the ring 19 of Figure 1 or the ring 27 of Figure 5. It is provided, however, with a considerably larger central opening 52. 53 illustrates a baffle or pilot ring having substantially the same outer diameter as the aperture 52 and adapted to close said aperture when rotated into the plane of the ring 51. It is provided, however, with a considerably smaller preferably central and concentric aperture 54. The ring 53 may be mounted for rotation as upon the stems or shafts 55, 56, mounted in any suitable bearings or apertures 57, 58. The shaft 56 is shown as having outward extensions 59 terminating in a manual handle 60.

It will be understood that the user may rotate the ring 53 by manipulation of the outer handle 60. Assume that the ring is in the position in which it is shown in Figures 6 and 7, it then substantially closes the aperture 52 and the pilot or lower portion of the pot 50 is connected with the upper portion only by the relatively small aperture 54. When the ring 53 is rotated through ninety degrees, to the dotted line position of Figure 6, the aperture 52 is then completely unmasked, providing a maximum opening between the two portions of the pot 50.

Referring to Figures 1 and 8, I illustrate a turned up central guide portion 19a which guides the secondary air upwardly and eliminates a smoky period when the burner is passing from the pilot light stage to a higher fire. That is to say, the primary air from the apertures 18 passes upwardly through the aperture 21 and is mixed with the secondary air from the holes above. The secondary air from the holes next above the flange or baffle 19 is upwardly directed by the upturned portion 19a and in practice, especially at the time when the burner is being turned up for higher heating, the tendency to an intermediate smoky period is eliminated.

Preferably, as shown in Figures 1 and 8, the upturned flange 19a terminates at about the level of the lowermost row of holes 17 above the baffle 19 and the baffle 19 may be positioned about half way between the row of holes 18

and the bottom row of holes 17. This in practice eliminates any smoky period which may otherwise ensue when the burner is turned up or the flame is increased from the pilot stage to the full combustion stage.

I claim:

1. A mechanism for burning liquid fuel which includes a chamber and means for admitting a liquid fuel to the bottom thereof, a wall for said chamber, provided with a plurality of rows of primary air apertures positioned above the level of the liquid fuel, said wall being further provided adjacent its upper edge with a plurality of secondary air inlet apertures, a baffle positioned above said secondary apertures, a baffle positioned in said chamber at a level above the lowest row of said primary air apertures, said last mentioned baffle being provided with a central aperture, and means for moving said baffle above the level of primary air apertures of a higher row or rows whereby to put air apertures of said higher row or rows in communication with the space beneath said baffle.

2. A mechanism for burning liquid fuel which includes a chamber and means for admitting a liquid fuel to the bottom thereof, a baffle located intermediate the top and bottom of the chamber, said baffle having a central aperture, air inlet means located below said baffle, a plurality of inlets located at various levels above said baffle, and means for tilting said baffle into a position higher than its normal position, and for thereby putting the space beneath said baffle into communication with additional air inlets.

3. A mechanism for burning liquid fuel which includes a chamber and means for admitting a liquid fuel to the bottom thereof, a baffle located intermediate the top and bottom of the chamber, said baffle having a central aperture, air inlet means located below said baffle, a plurality of inlets located at various levels above said baffle, and means for tilting said baffle into a position higher than its normal position, and for thereby putting the space beneath said baffle into communication with additional air inlets, including an exterior handle and a lever associated therewith opposed to a lower portion of the baffle.

4. A mechanism for burning liquid fuel which includes a chamber having an upper portion defined by a generally cylindrical wall, a lower portion defined by a generally cylindrical wall, the two walls being concentric, the lower wall being of substantially smaller radius than the upper, air apertures formed in both walls, and means for supplying air thereto, a liquid fuel inlet in communication with the chamber defined by the lower wall, a centrally apertured baffle separating the two chambers and a centrally apertured upper baffle partially closing the top of the upper chamber, the two chambers being connected by a generally horizontal wall portion, the first mentioned baffle normally resting upon said wall portion, and means for lifting it therefrom, sufficiently to put in communication with the space below said baffle air inlet apertures which, when said baffle rests on said wall portion, are in communication with the space above said baffle.

5. A mechanism for burning liquid fuel which includes a chamber having an upper portion defined by a generally cylindrical wall, a lower portion defined by a generally cylindrical wall, the two walls being concentric, the lower wall being of substantially smaller radius than the upper, air apertures formed in both walls, and means for supplying air thereto, a liquid fuel inlet in communication with the chamber defined by the lower wall, a centrally apertured baffle separating the two chambers and a centrally apertured upper baffle partially closing the top of the upper chamber, the two chambers being connected by a generally horizontal wall portion, the first mentioned baffle normally resting upon said wall portion, and means for lifting it therefrom, sufficiently to put in communication with the space below said baffle air inlet apertures which, when said baffle rests on said wall portion, are in communication with the space above said baffle, including a manually controllable member located exteriorly of the mechanism.

6. A mechanism for burning liquid fuel which includes a chamber and means for admitting a liquid fuel to the bottom thereof, a wall for said chamber provided with a plurality of rows of primary air apertures positioned above the level of the liquid fuel, a baffle positioned in said chamber at a level above the lowest row of said primary air apertures, said baffle being provided with a central aperture, and means for moving said baffle above the level of primary air apertures of a higher row or rows, whereby to put air apertures of said higher row or rows in communication with the space beneath said baffle.

JAMES L. BREESE.