Nov. 15, 1927. 1,649,218

H. L. GILBERT

HEATER

Filed June 15, 1926

Fig:1

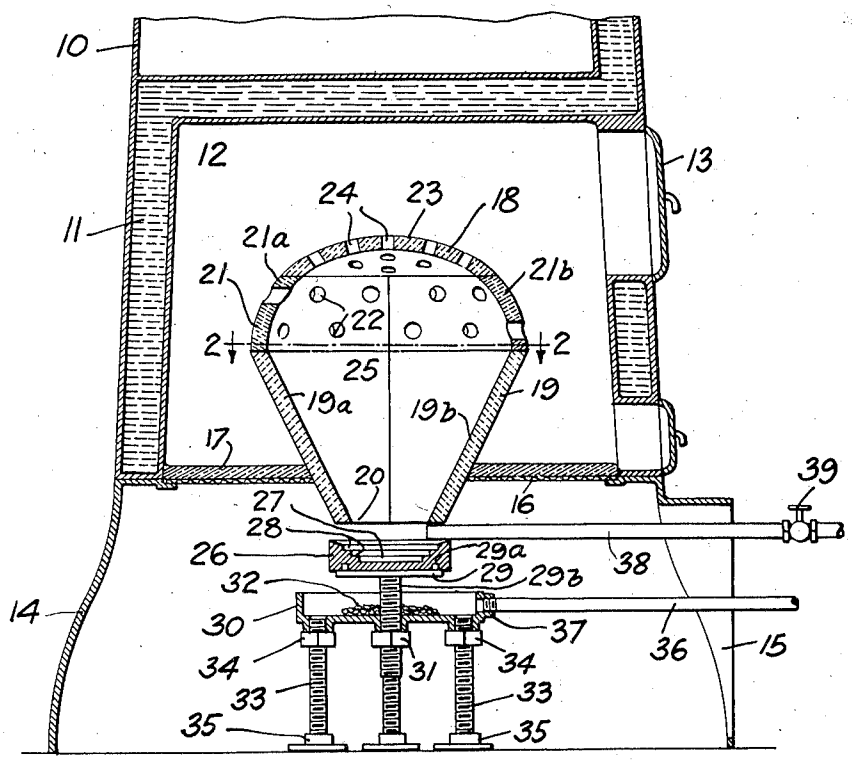


Fig:2

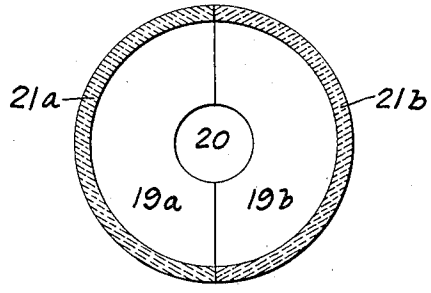
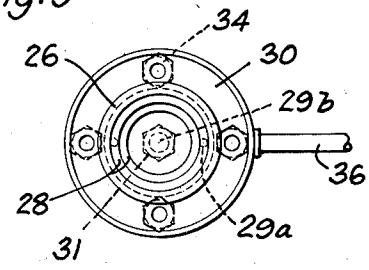


Fig:3



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HEATER.

Application filed June 15, 1926. Serial No. 116,147.

This invention relates to heaters, especially the kind used for heating domestic furnaces or boilers by means of liquid fuel.

The particular objects of the invention are to provide a burner of the natural draft type that can easily be installed in existing domestic heating plants; to enable the same to be used for solid or gas or other fuel, instead of liquid fuel, if circumstances require it, without any material alterations; to cause complete combustion with the use of liquid fuel, thereby eliminating carbon; to effect relatively low stack temperatures, so that the maximum amount of heat is retained within the furnace or boiler for heating purposes; to produce a device accomplishing these ends which can be manufactured economically and which is devoid of intricate mechanical detail, so that expensive servicing is not required. Still other objects will become apparent in the following specification and the accompanying drawings in which

Fig. 1 is a fragmentary longitudinal sectional view through a house heating boiler showing the burner in position within its firebox and ash pit;

Fig. 2 is a horizontal cross sectional view through the combustion chamber along the plane of line 2—2 in Fig. 1; and

Fig. 3 is a plan view of the burner mechanism proper.

Like numbers of reference denote similar parts throughout the several views and the specification.

10 is a steam boiler of the usual house heating type, having a water jacketed shell 11 surrounding a firebox 12 which is provided with a firing door 13. The shell 11 rests upon a base 14 which in boilers of this kind serves as an ash pit. 15 is an opening in the front wall of the base, ordinarily used to remove the ashes therefrom and to admit sufficient air to support combustion. In place of the grates customarily separating the firebox 12 from the ashpit is a sheet 16 of wire mesh which is covered with asbestos cement 17.

Placed within the firebox 12 on, preferably, the center of its bottom wall 16—17 is a housing 18. This housing is made in three sections, all of refractory material. Its bottom section 19 is funnel shaped and consists of two halves 19ª and 19ᵇ, closely fitted together, their lower ends projecting through the bottom 16—17 of the firebox and defining a restricted opening 20. An intermediate section 21 of spherical zone-like shape is made in two halves, closely matched, 21ª and 21ᵇ, and is provided with a number of staggered openings 22. The bottom of the intermediate section 21 rests upon and is of the same size as the top of the bottom section 19. 23 is a top formed by a spherical segment resting on the intermediate section 21 and forming a continuation thereof. The top 23 is also provided with staggered openings 24. The various sections of the housing 18 confine within its walls a combustion chamber 25.

Below the bottom opening 20 of the combustion chamber 25 is a generator 26, its top having a bowl-like depression 27 in its center, having terraced sides 28. Generator 26 is loosely mounted upon a plate 29 having two small pins 29ª which project into corresponding sockets at the bottom of the generator. 29ᵇ is a threaded shank at the underside of plate 29 which is screwed into the center of an overflow bowl 30 and projects through the bottom thereof, being held in a fixed position by a lock nut 31. The overflow bowl or pan 30 is open at its top and of a larger diameter than the outside of the generator 26. 32 is asbestos wicking, waste or similar material within the bowl 30. Legs 33 are screwed into correspondingly threaded openings in the bottom of the bowl 30 and adjustably secured thereto by lock nuts 34. The lower ends of legs 33 engage flanged plates 35 which secure them to the floor of the ashpit. The generator 26 is maintained in a level position by adjustment of the legs 33.

36 is an overflow pipe connected to the side of the overflow bowl 30 at 37, and 38 is an oil supply pipe resting upon the generator 26. 39 is a regulating valve for the oil supply.

The operation of the device is as follows:

The wicking or waste 32 is ignited which heats the generator 26. The oil valve is then opened slowly and oil is allowed to run down the terraced sides 28 of the bowl 27 of the generator, where the oil is vaporized, its gases ignited and drawn into the combustion chamber 25 through opening 20 by the natural draft of the chimney communicated from the firebox 12 of the boiler to the combustion chamber 25 through openings 22 and 24 in its top sections which causes air under

atmospheric pressure to be drawn in through the annular space between the generator 26 and the bottom of the housing 18. The flame usually fills the greater part or all of the combustion chamber, causing the housing 18 which is made of refractory material to become incandescent. The flame is not permitted to strike directly the cold metal surfaces of the firebox whereby carbon deposits are formed impairing the thermal efficiency of the boiler, but heat is transmitted by radiation. It is obvious that, because of the extremely high temperature within the combustion chamber 25 and that of its walls, no free carbon can escape through the openings of the chamber.

With the use of this chamber, it has been found possible to burn under natural draft conditions oil of a much lower gravity than heretofore, because of the absence of carbon formation due to the very high degree of heat generated within the combustion chamber.

The device is very easily cleaned and has no intricate mechanism liable to get out of order. To clean the generator, it is only necessary to remove the oil supply pipe resting thereon which for this purpose is preferably of a flexible construction, and lift the generator out of engagement with the lugs 29[a] of plate 29, for cleaning or replacement purposes. Due to the cup-shaped center on top of the generator very little oil is wasted by overflowing as common to the usual outside cone-shape of the generator, but the oil can be regulated so as to vaporize and burn right in this cup.

The intermediate and bottom sections of the housing 18 are each made in halves so that the same can be easily inserted through the firing door of the boiler when assembling, and furthermore to effect economy of production and replacement.

The construction of the specific form of device disclosed herein may be applied particularly well to small domestic heating plants, especially in view of the fact that it can be readily adapted to a variety of local conditions. Normally the combustion chamber may be used as shown in Fig. 1. Where the draft is poor, the top section may be taken off entirely, or the holes therethrough enlarged. The amount of air drawn in may be regulated by varying the distance between the bottom of the housing 18 and the generator 26 by means of shank 29[b] and lock nut 31.

Should it at any time be found necessary to reverse to coal as a fuel instead of oil, no change in the apparatus need be made, only the top section 23 and, if desired, the intermediate section 21 of the housing 18 have to be removed, and coal may then be fed into the funnel-shaped bottom section 19. Sufficient air for combustion will be drawn in through the air space around the bottom opening 20. In such case, on account of the radiant quality of the combustion chamber walls, a very fine ash is formed around the inner sides of the chamber which is automatically discharged at the annular space below opening 20 by the weight of the solid fuel in the center.

While I have shown in the drawings and described in the specification a preferred embodiment of my invention, I do not wish to limit myself to the particular construction disclosed, but wish it to be understood that various changes in the form, proportion of parts and minor details of construction may be resorted to without departing from the principles or sacrificing any part of the invention as defined in the appended claims.

What I claim as new, is:

1. The combination with a furnace of an air tight wall between its firebox and ashpit, a housing of refractory material defining within it a combustion chamber, having an opening at its bottom and a perforate top, the said housing being fastened to the said wall and being in communication with the ashpit through the said bottom opening, and a heating agent associated with the said housing adapted to cause the housing to become incandescent.

2. The combination with a furnace of an air tight wall between its firebox and ashpit, a housing of refractory material defining within it a combustion chamber, having an opening at its bottom and a removable perforate top, the said housing being fastened to the said wall and being in communication with the ashpit through the said bottom opening, and a heating agent associated with the said housing adapted to cause the housing to become incandescent.

3. The combination with a furnace of an air tight wall between its firebox and ashpit, a housing of refractory material of substantially dome shape defining within it a combustion chamber, the said housing comprising a perforate top section, an intermediate section, and a bottom section fastened to said wall, the said bottom section opening at its bottom into the ashpit, and a heating agent associated with the said housing adapted to cause the housing to become incandescent.

4. The combination with a furnace of an air tight wall between its firebox and ashpit, a housing of refractory material of substantially dome shape defining within it a combustion chamber, the said housing comprising a perforate top section, a perforate intermediate section, and a bottom section fastened to the said wall, the said bottom section opening at its bottom into the ashpit, and a heating agent associated with the said housing adapted to cause the housing to become incandescent.

5. The combination with a furnace of an air tight wall between its firebox and ashpit, a housing of refractory material of substantially dome shape defining within it a combustion chamber, the said housing comprising a perforate top section, an intermediate section, and a bottom section fastened to the said wall, the said bottom section opening at its bottom into the ashpit, the said intermediate and bottom sections being divided in lateral halves, and a heating agent associated with the said housing adapted to cause the housing to become incandescent.

6. The combination with a furnace of an air tight wall between its firebox and ashpit, a housing of refractory material defining within it a combustion chamber, having an opening at its bottom and a perforate top, the said housing being fastened to the said wall and being in communication with the ash pit through the said bottom opening, and a liquid fuel burner below the bottom opening of the said housing and in spaced relation thereto.

7. The combination with a furnace of an air tight wall between its firebox and ashpit, a housing of refractory material defining within it a combustion chamber, having an opening at its bottom and a perforate top, the said housing being fastened to the said wall and being in communication with the said ashpit through the said bottom opening, and a liquid fuel burner below the bottom opening of the said housing and in adjustable spaced relation thereto.

In testimony whereof I have hereunto set my hand.

HORACE L. GILBERT.