

Aug. 12, 1941.

B. B. KAHN

2,252,182

HEATING DEVICE AND BURNER THEREFOR

Filed May 10, 1938

2 Sheets-Sheet 1

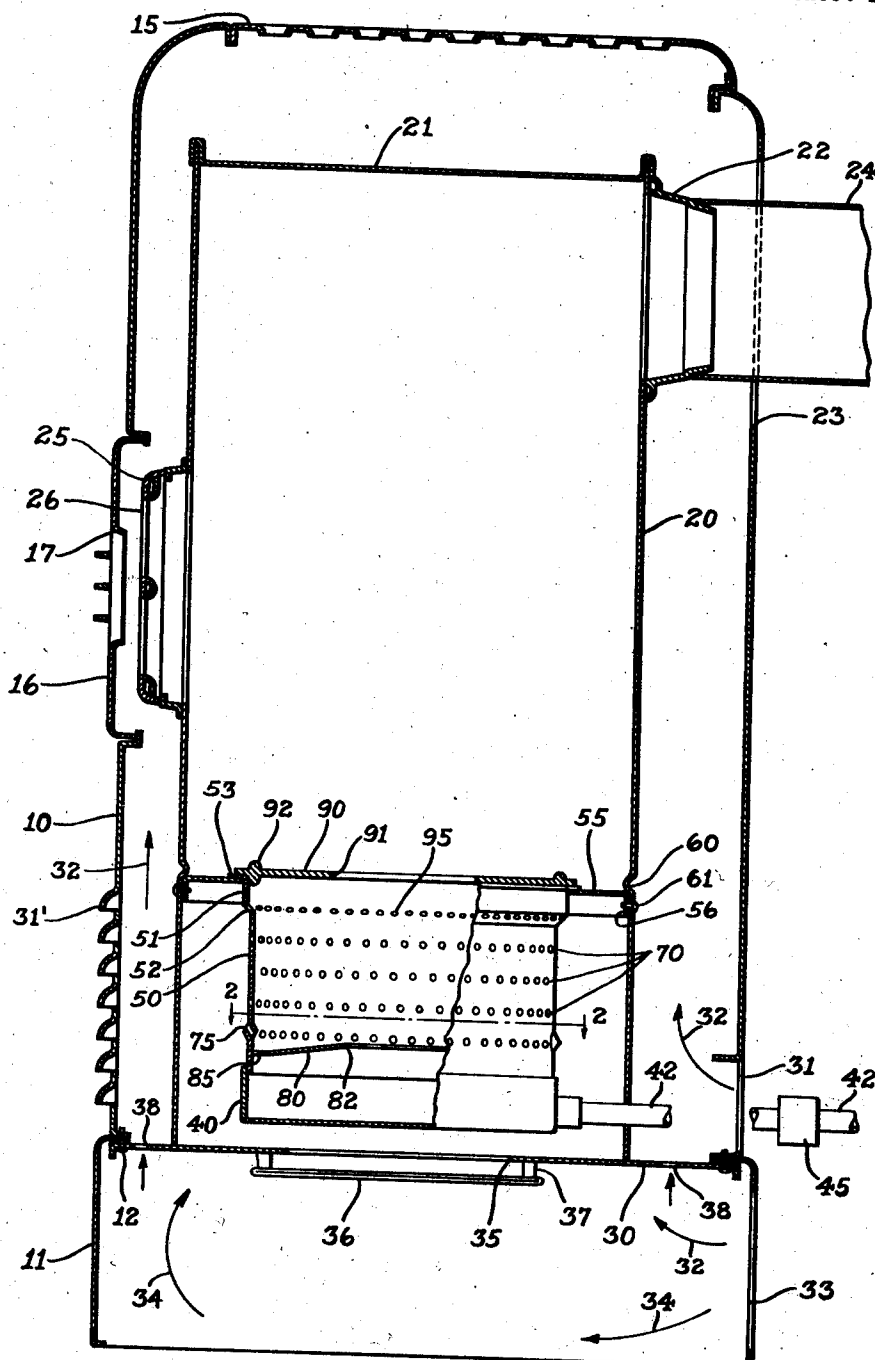


Fig. 1

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2 Sheets-Sheet 2

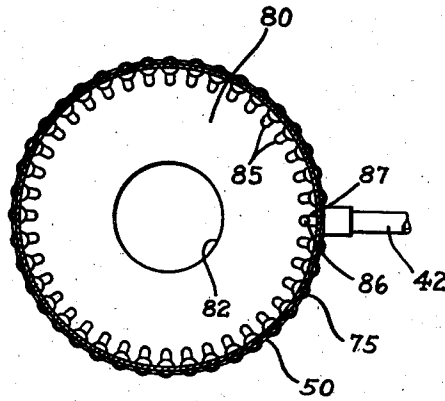


Fig. 2

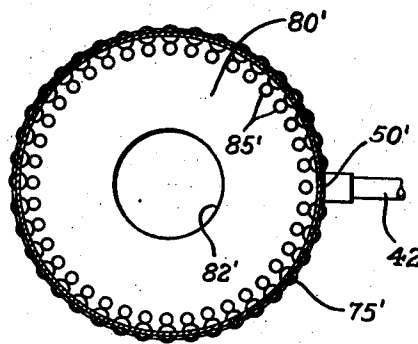


Fig. 3

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HEATING DEVICE AND BURNER THEREFOR

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Application May 10, 1938, Serial No. 207,064

20 Claims. (Cl. 158—91)

This invention relates to heating devices and burners therefor, and more particularly to oil burners and heating devices utilizing same.

One of the principal objects of the invention is the provision of an oil burner operating to provide an efficient and effective new process in the carrying on of the combustion therein.

Another object of the invention is to provide such a process of combustion in which the amount of liquid fuel which may be burned within a given apparatus may be varied over a wide range without any material adverse effect upon efficiency and effective operation.

Another object is to provide such a process of burning the fuel that the combustion may be carried on at a high rate of fuel consumption for liberating large quantities of heat in the heating device and may be carried on also effectively and efficiently at very low rate of consumption of the fuel.

Still another object of the invention is to provide a burner construction adapted for carrying out the said process of combustion.

Another object of the invention is to provide an oil burning heating device including such an oil burner, and which is simple in construction, assembly and operation and effective and efficient over a wide range of fuel consumption in operation.

Other objects and advantages of the invention will be apparent from the description together with the accompanying drawings and claims hereinafter set out.

In the drawings in which like characters designate like parts throughout the several views,

Fig. 1 is a vertical sectional view through a heater comprising an oil burner and embodying a preferred form of apparatus for carrying out the said process;

Fig. 2 is a sectional view through the burner pot along the line 2—2 of Fig. 1; and

Fig. 3 is a sectional view corresponding to Fig. 2 but showing a somewhat modified form of construction.

The heating appliance illustrated comprises a hollow casing 10, which is preferably of rectangular outline, primarily for purposes of appearance. This casing is suitably formed of sheet metal and is supported upon a base member 11, the casing and base member being interconnected, as by means of stove bolts through the cooperating flanges designated generally by the numeral 12.

The drawings illustrate a heating device of

the air circulating type, the casing 10 having an opening in the top containing a grill member designated by the numeral 15, and having suitable openings therein through which heated air may escape from the casing, usually at considerable velocity, during operation, to cause the circulation of air within the room or space in which the heater is placed and thus to cause resulting circulation of air within the room, as is well understood. A suitable door 16 is provided for permitting access to the interior of the space within the casing 10; and, as shown, this door is placed within the front panel of the heating appliance and has a grill work opening designated generally 17 through which the combustion conditions within the heater unit may be observed.

Suitably supported within the casing 10, and spaced from the walls thereof to provide an air passage for the upflow of air to be heated and its outflow through the grill work 15, is a hollow member 20 within which the combustion takes place. This member is provided with a top 21 which closes the upper end thereof. Also it has a flue outlet 22, opposite an opening 23 in the back panel of the casing 10, to receive a flue pipe section 24 to connect the interior of the combustion chamber 20 to the chimney.

The combustion chamber 20 is also provided with a door 25 preferably having mica or other transparent heat resistant material 26 therein so that the interior of the combustion space may be observed without the opening of the door 25 and also without the opening of the door 16. Each of the two doors 16 and 25 is carried by its own hinges, are placed adjacent each other and the opening for the door 16 is larger than the door 25 so that both doors may be opened to thus give access to the interior of the combustion chamber 20 for the purpose of igniting the fuel whenever necessary.

The lower end of the casing 20 is closed by means of a plate 30, the combustion chamber casing 20 and base plate 30 being suitably supported by the base member 11. The back panel 23 is provided at the bottom with an air inlet opening 31. The front panel 10 and the two side panels are provided below the door with a series of openings and louvers 31'; these openings being of sufficient size to permit the ingress of the air to flow upwardly between the members 10 and 20 to be heated and discharged through the grill 15 for circulation into the room or space around the heater which is to be heated. The air which rises upwardly and is heated in its upflow is indicated generally by the arrows

32. The base member 11 is provided at the rear with an opening 33 which preferably extends across the back and down to the floor. Through this opening air flows along the floor, under the effect of the draft resulting from the flue action in operation, as indicated by the arrows 34, and this portion of air provides that utilized for combustion. This plate 30 has a centrally arranged opening 35 therein, and the plate also carries a baffle plate 36 supported upon downwardly depending lugs 37, this baffle plate being of greater diameter than the opening 35. This plate 30 also has some openings 38 opening into the space between the inner and outer casings for setting up a more rapid circulation of air under the heater to thus prevent undue heating of the floor.

Mounted within the combustion chamber 20 immediately above the opening 35 is the burner. This burner, as shown, comprises a cylindrical pan shaped member or bowl 40 preferably made of a steel stamping, which has an inlet nipple to which is attached the oil supply pipe 42, and as shown diagrammatically this oil supply pipe 42 is provided with suitable accurate oil flow control member designated by the numeral 45. This flow control member may be one of the well-known and satisfactorily operating flow control devices used upon oil burners; but it should be so designed as to give very accurate control even at very low rates of flow—for example 4 cc. per minute or less.

Mounted within the lower imperforate wall of the oil pan member 40 is a generally cylindrical side portion 50, likewise preferably made of sheet steel or the like, the lower end being welded or otherwise tightly connected within the upstanding wall of the pan 40. The upper end of this member 50 is somewhat enlarged as indicated by the numeral 51, and the two portions 50 and 51, as illustrated, are preferably interconnected by an angularly inclined portion 52, the upper end of the portion 51 being rolled over to form a connecting flange 53 which rests upon and preferably is welded to a partition or flange member 55, which in turn is provided with a downturned flange 56. The flange 56 is shaped snugly to conform to the inside wall of the combustion member 20. If desired the space between the two may be calked as by means of asbestos wicking to prevent uncontrolled flow of air upwardly from below the flange 55, so that none of the combustion air coming up through the opening 35 will pass through this joint. As shown the metal wall of the combustion member 20 is provided with a circular bead 60, which prevents upward displacement of the flange 55 and the burner pot carried thereby, and preferably several connecting screws or bolts 61 are provided to prevent possible rotation between these members.

The cylindrical wall portion 50 is provided with a plurality of series of holes or passages—three series of such holes having substantially horizontal axes being designated by the numeral 70, these holes permitting the flow of streams of combustion air into the interior of the burner pot for commingling with and the combustion of the oil vapors evolved from the oil flowing into the heated burner through the pipe 42 during operation. The lowermost row of holes, designated by the numeral 75, are preferably formed by first drilling or punching them with substantially horizontal axes through the side wall 50, like the holes 70, after which a suitable tool is inserted

through each of these holes and then moved to bend the metal of the wall 50 to change the direction of the axis of each hole to approximately a 45° angle as shown, this operation causing some enlargement of these passages with respect to their original cross sectional dimensions. The air flowing through the holes 70, under the flue action will tend to escape into the inside of the pot 50 in a substantially horizontal direction, whereas the air entering through the downwardly inclined openings 75 will be downwardly directed in accordance with the angle of inclination of the axes of these several holes.

Positioned below this lowermost series of holes 75 is a plate member 80, preferably loosely supported within the member 50 upon a plurality of pins inserted through openings drilled in the wall 50 and peened or riveted tightly in place. This plate 80 is provided with a centrally arranged opening 82, which with the proportions of the other parts as shown will function very satisfactorily when of about the diameter indicated. This opening 82 provides a combustion connection between the lower fuel chamber and the upper combustion space above the partition. Preferably this plate 80 is somewhat dished or cone-shaped. Such shape helps to compensate for irregularities in expansion of the metal thereof during operation as the plate becomes heated in operation. Preferably, also, this plate should have some clearance within the inside of the cylindrical member 50 to prevent adverse effects of expansion. This plate 80 has its outer peripheral portion preferably arranged substantially horizontally and provided with a plurality of spaced openings 85. These openings, in the device as shown, particularly in Fig. 2, are so positioned that each of the openings 85 opens through the peripheral edge of the plate 80 and each is arranged in a generally radial direction. Also the plate 80 is held, as by a locating pin and slot 86—87, so that each opening is in alignment with one of the inclined passages 75. As shown, the plate 80 has no opening 85, directly above the oil inlet into the bowl 40 by which arrangement there is less tendency to localize combustion at one side of the lower combustion chamber. The dimensions and proportions of the parts and openings have been found in practice to be quite important for accomplishing satisfactory results with burners of this type, particularly under very low load and with low fuel consumption and very satisfactory operating results have been secured with substantially the proportions shown, wherein the plate 80 is supported above the bottom of the pan 40 a distance representing approximately 25% of the total internal height of the burner pot, and with the plate 80 below the row of passages 75.

The open upper end of the portion 51 is partly closed by means of a plate 90, which is shown as a casting having a central aperture 91, and provided with circular beads 92 on each side thereof, this plate resting on top of the flange 53 under its own weight and because of the circular beads 92 being reversible and self-centering and providing a combustion connection between the upper combustion space or chamber above the partition 80 and the combustion space within the combustion chamber 20.

The inclined portion 52 is provided with a series of holes 95 placed much closer together than the holes 70, these holes or passages being arranged so that each has its axis extending upwardly at an angle of approximately 45° so that

streams of air entering therethrough under the flue action will be directed upwardly into the combustion space in the pot at approximately that angle.

In operation the control valve is opened so that oil will be introduced slowly into the imperforate walled fuel space or lower combustion space below the partition 80. This oil is ignited, in the usual manner, by means of applying a lighted match to an asbestos wick lying in the pan 40. At first the oil will burn from the wick and the floor of the pan with a smoky or sooty flame, and oil will flow in somewhat more rapidly than it is consumed. However, as the device heats up the oil will be vaporized rapidly and the character of the flame will change in appearance. Under these conditions, with a minimum amount of oil introduced and during starting, the flame will be generally confined within the space below the partition. It will be somewhat localized in its burning until the device begins to heat up but with the arrangement of openings 85 shown the flame may be located near the center of the chamber. Without this arrangement the flame may be considerably concentrated at first adjacent the place of entry of the fuel through the pipe 42 and there will be tongues of yellow smoky flame which will extend upwardly through the opening 82 and some of the openings 85 into the upper portion of the combustion pot—i. e., the upper combustion space between the partition 80 and cover 90. As the device heats up the oil over the bottom of the pan will become vaporized and the flame will spread to consume all the oil admitted and its character will change so that it will lose its smoky characteristics. As the device heats up sufficiently to vaporize the oil as rapidly as it flows in through the pipe 42, under low fuel consumption conditions, the flame will be confined almost entirely to the space below the partition 80 some combustion taking place at the opening 82 and the flame extending up through that opening into the upper combustion space, depending on the rate of inflow of oil and of air drawn in by the stack action. Combustion air, under the flue action, will flow downwardly through the passages 75 into the space above the partition 80 and additional air also flows in horizontally above the partition through the opening 70. Some of this air will pass downwardly through the openings 85 to provide the combustion air for sustaining the combustion within this space below the partition. The jets of air flowing down through the openings 75 are directed toward the openings 85 and, depending on proportions, may entrain other air and direct currents or eddies of air down through the openings 85. This air from above the partition flows down at an angle and causes an organized turbulence and brings about the clean combustion. At low oil consumption the clean burning with a yellow flame is important as the minimum oil consumption is dependent on air inflow for the combustion and clean yellow flame connotes good, low consumption, conditions. By this construction and process in the combustion effective and efficient operation is secured at very low oil consumption.

It has been found in practice that with a burner of this sort, with the portions 40 and 50 made from sheet steel of approximately .05 inch thick, with the openings 85 approximately $\frac{3}{8}$ " in width, the openings or passages 75 having an area of approximately .083 square inch

the openings 70 having a cross sectional area of approximately .075 square inch in diameter, the openings 52 slightly larger, with the internal diameter of the portion 50 approximately 10 inches, the distance from the bottom of the pan 40 to the lower peripheral supporting wall of the partition 80 approximately 2 inches and the over all height of the pot from the lower wall of the pan 40 to the bottom of the top plate 90 approximately 8 inches, the burner can be operated effectively and efficiently with a clear smokeless yellow flame, burning within the space below the partition at a rate of 3.5–4 cc. of fuel oil of specific gravity 36–40, per minute or less; the plate 80 being preferably made of cast iron substantially $\frac{1}{8}$ " thick. Cast iron is preferable to steel for this plate 80 because it is more durable under the conditions of heat and service, and less likely to warp and distort.

When the rate of oil supply is increased, to meet heavier heating requirements, the character of the flame does not change materially, being still almost completely a clean yellow, but the burning of the vapors begins to take place to a greater and greater extent in the space above the partition 80, the added combustion air being introduced through the openings 70, 75 and the inclined openings 95 at increased velocities. And as the rate of combustion is still more increased the vapor burns upwardly through the opening 91 and into the combustion space above the burner pot. While the dimensions given above are not necessarily essential nevertheless variations in any dimension without corresponding variation in the others may result in materially different and less efficient and effective combustion conditions. For example, increasing the thickness of the metal from which the parts of the burner pot are made would tend to increase the time necessary for heating up those parts and thus would increase the length of time necessary for starting up the burner to clean burning conditions.

It has heretofore been urged that a blue burning flame was indicative of the most desirable type of combustion for oil burners of the vaporizing pot type; but actual operation with the burner construction hereinabove described, and with the combustion air directed in the manner described, with no primary air inlet opening through the wall of the burner pot into the space below the partition and with currents or eddies flowing down through the openings 85 to effect proper turbulence and mixture of the air and vapor in the lower fuel or combustion space below the partition has shown that completely satisfactory clean burning of the fuel is secured with a yellow flame, with great effectiveness and efficiency, and with a cleanness of burn comparable to that of the best of the other types of burners commercially utilized.

In Fig. 3 is shown a somewhat modified form of construction of plate 80'. As described above, this plate is preferably loosely supported within the member 50', is provided with a centrally arranged opening 82', and is also somewhat dished or cone shaped. In this modified form of construction, however, the plate is provided in its outer peripheral portion with a series of spaced holes 85', instead of the openings 85 which in the modification shown in Figs. 1 and 2 open out through the peripheral edge of the plate. In this construction also the baffle plate is arranged to be located so that the holes 85' are in axial alignment with the inclined passages 75'; but with this

arrangement it has been found that greater care is ordinarily required to secure direct axial alignment of the hole 75' and the holes 85' in order to secure equally satisfactory operating results under all conditions. Also, with the proportions as specified above, very satisfactory results are secured where the holes 85' have a diameter of approximately $\frac{1}{2}$ inch, to give an area of approximately .2 square inch, which is comparable to the area of the openings 85. While it is preferable to use cast iron for the baffle plate, the plate when made of such material is somewhat heavier than when made of steel and therefore it may slightly affect the time necessary for bringing the parts of the burner up to a temperature at the beginning of operations; but this slight difference is usually offset by the added durability under heat and the likelihood of less permanent warping or distortion.

While the method herein described, and the form of apparatus for carrying this method into effect, constitute preferred embodiments of the invention, it is to be understood that the invention is not limited to this precise method and form of apparatus, and that changes may be made in either without departing from the scope of the invention which is defined in the appended claims.

What is claimed is:

1. In a combustion device of the type described comprising a casing, an open top burner within said casing, said burner comprising a lower fuel feed combustion chamber having an imperforate side wall, an upper combustion chamber having a side wall with perforations therein for supplying to the interior of said upper combustion chamber an amount of air necessary for combustion of the fuel introduced during operation; a partition within said burner located between said upper perforated and said lower imperforate side wall portions and separating said chambers, said partition having a central orifice providing a combustion connection between the chambers, and a plurality of openings in said partition about said central orifice to permit the down flow of currents of air from said upper combustion chamber to the fuel feed chamber below said partition and within said imperforate side wall portion.

2. In a combustion device of the type described comprising a casing, an open top burner within said casing, said burner comprising a lower fuel feed combustion chamber having an imperforate side wall, an upper combustion chamber having a side wall with perforations therein for supplying to the interior of said upper combustion chamber an amount of air necessary for combustion of the fuel introduced during operation, a partition within said burner located between said upper perforated and said lower imperforate side wall portions and separating said chambers, said partition having a central orifice providing a combustion connection between the chambers, and a plurality of openings in said partition adjacent the periphery thereof to permit the down flow of currents of air from said upper combustion chamber to the fuel feed chamber below said partition and within said imperforate side wall portion, each said opening being opposed to an adjacent perforation in the side wall for the upper combustion chamber.

3. In a combustion device of the type described comprising a casing, an open top burner within said casing, said burner comprising a lower fuel feed combustion chamber having an imperforate side wall, an upper combustion chamber having a side wall with a plurality of series of vertically

spaced perforations therein for supplying to the interior of said upper combustion chamber an amount of air necessary for combustion of the fuel introduced during operation, a partition within said burner located between said upper perforated and said lower imperforate side wall portions and separating said chambers, said partition having a central orifice providing a combustion connection between the chambers, and a plurality of openings in said partition adjacent the periphery thereof to permit the down flow of currents of air from said upper combustion chamber to the fuel feed chamber below said partition and within said imperforate side wall portion, each said opening being opposed to an adjacent perforation in the side wall for the upper combustion chamber, the perforations in the side wall of the upper combustion space adjacent the peripheral openings in the partition plate being inclined downwardly so that the velocity of the air flowing in through said downwardly inclined perforations into the upper combustion space will set up currents of air to flow from said upper combustion space through said partition openings into the fuel feed chamber below the partition.

4. In a combustion device of the type described comprising a casing, an open top burner within said casing, said burner comprising a lower fuel feed combustion chamber having an imperforate side wall, an upper combustion chamber having a side wall with perforations therein for supplying to the interior of said upper combustion chamber an amount of air necessary for combustion of the fuel introduced during operation, a partition within said burner located between said upper perforated and said lower imperforate side wall portions and separating said chambers, said partition having a central orifice providing a combustion connection between the chambers, a plurality of openings in said partition about said central orifice to permit the down flow of currents of air from said upper combustion chamber to the fuel feed chamber below said partition and within said imperforate side wall portion, and means for causing the air flowing into said upper combustion chamber to cause air currents to pass from said upper combustion chamber to said fuel feed chamber during combustion.

5. In a combustion device of the type described comprising a casing, an open top burner within said casing, said burner comprising a lower fuel feed combustion chamber having an imperforate side wall, an upper combustion chamber having a side wall with perforations therein for supplying to the interior of said upper combustion chamber an amount of air necessary for combustion of the fuel introduced during operation, a partition within said burner located between said upper perforated and said lower imperforate side wall portions and separating said chambers, said partition having a central orifice providing a combustion connection between the chambers, and a plurality of openings in said partition adjacent the periphery thereof to permit the down flow of currents of air from said upper combustion chamber to the fuel feed chamber below said partition and within said imperforate side wall portion, each said opening being opposed to an adjacent perforation in the side wall for the upper combustion chamber, the perforations adjacent the upper end of said upper combustion chamber being upwardly inclined to cause the flow of upwardly inclined air jets into the upper combustion chamber adjacent its upper outlet.

6. In a combustion device of the type described comprising a casing, an open top burner within said casing, said burner comprising a lower fuel feed combustion chamber having an imperforate side wall, an upper combustion chamber having a side wall with perforations therein for supplying to the interior of said upper combustion chamber an amount of air necessary for combustion of the fuel introduced during operation, a partition within said burner located between said upper perforated and said lower imperforate side wall portions and separating said chambers, said partition having a central orifice providing a combustion connection between the chambers, a plurality of openings in said partition about said central orifice to permit the down flow of currents of air from said upper combustion chamber to the fuel feed chamber below said partition and within said imperforate side wall portion, and means for causing the air flowing into said upper combustion chamber to cause air currents to pass from said upper combustion chamber to said fuel feed chamber during combustion, the proportions and spacing of said perforations and openings being such as to cause organized turbulence within the fuel feed chamber below the partition to effect predetermined controlled combustion of the fuel therein during low fire.

7. In a combustion device of the type described comprising a casing, an open top burner within said casing, said burner comprising a lower fuel feed combustion chamber having an imperforate side wall, an upper combustion chamber having a side wall with perforations therein for supplying to the interior of said upper combustion chamber an amount of air necessary for combustion of the fuel introduced during operation, a partition within said burner located between said upper perforated and said lower imperforate side wall portions and separating said chambers, said partition having a central orifice providing a combustion connection between the chambers, and a plurality of openings in said partition about said central orifice to permit the down flow of currents of air from said upper combustion chamber to the fuel feed chamber below said partition and within said imperforate side wall portion, the upper end of said upper combustion chamber being formed to provide an orifice for combustion connection between said upper combustion chamber and the space within said casing above the burner member.

8. In a combustion device of the type described, a fuel burner comprising a lower fuel receiving bottom member, a substantially cylindrical side wall member extending upwardly from said bottom member, means for introducing fuel onto said fuel receiving bottom member, a partition within said burner positioned within said side wall member, intermediate its vertical height and more nearly adjacent the bottom fuel receiving member, said partition having a central orifice therein and dividing the space within said burner into an upper combustion chamber and a lower fuel receiving and low consumption combustion chamber, a plurality of perforations within the upper portion of said side wall and opening into the upper combustion chamber above the partition, the side wall below said partition being imperforate, and a plurality of openings in said partition connecting the upper perforated wall combustion chamber with the lower imperforate wall combustion chamber to permit the down flow of currents of air from said upper com-

bustion chamber to said fuel feed or lower combustion chamber to provide combustion air within said lower combustion chamber for low combustion conditions.

9. In a combustion device of the type described, a fuel burner comprising a lower fuel receiving bottom member, a substantially cylindrical side wall member extending upwardly from said bottom member, means for introducing fuel onto said fuel receiving bottom member, a partition within said burner positioned within said side wall member, intermediate its vertical height and more nearly adjacent the bottom fuel receiving member, said partition having a central orifice therein and dividing the space within said burner into an upper combustion chamber and a lower fuel receiving and low consumption combustion chamber, a plurality of perforations within the upper portion of said side wall and opening into the upper combustion chamber above the partition, the side wall below said partition being imperforate, and a plurality of openings in said partition connecting the upper perforated wall combustion chamber with the lower imperforate wall combustion chamber to permit the down flow of currents of air from said upper combustion chamber to said fuel feed or lower combustion chamber to provide combustion air within said lower combustion chamber for low combustion conditions, and means for accurately controlling the supply of fuel to said lower combustion chamber.

10. In a combustion device of the type described, a fuel burner comprising a lower fuel receiving bottom member, a substantially cylindrical side wall member extending upwardly from said bottom member, means for introducing fuel onto said fuel receiving bottom member, a partition within said burner positioned within said side wall member, intermediate its vertical height and more nearly adjacent the bottom fuel receiving member, said partition having a central orifice therein and dividing the space within said burner into an upper combustion chamber and a lower fuel receiving and low consumption combustion chamber, a plurality of perforations within the upper portion of said side wall and opening into the upper combustion chamber above the partition, the side wall below said partition being imperforate, and a plurality of openings in said partition adjacent the periphery thereof connecting the upper perforated wall combustion chamber with the lower imperforate wall combustion chamber to permit the down flow of currents of air from said upper combustion chamber to said fuel feed or lower combustion chamber to provide combustion air within said lower combustion chamber for low combustion conditions, each of said peripheral openings in said partition being opposed to an adjacent perforation in the side wall for the upper combustion chamber.

11. In a combustion device of the type described comprising a casing, an open top burner within said casing, said burner comprising a lower fuel feed combustion chamber having an imperforate side wall, an upper combustion chamber having a side wall with perforations therein for supplying to the interior of said upper combustion chamber an amount of air necessary for combustion of the fuel introduced during operation, a partition within said burner located between said upper perforated and said lower imperforate side wall portions and separating said chambers, said partition having a central

orifice providing a combustion connection between the chambers, and a plurality of openings in said partition adjacent to and opening through the periphery thereof to permit the down flow of currents of air from said upper combustion chamber to the fuel feed chamber below said partition and within said imperforate side wall portion, each said opening being opposed to an adjacent perforation in the side wall for the upper combustion chamber.

12. Combustion apparatus of the vaporizing pot type comprising a burner having a lower fuel feed combustion chamber having an imperforate side wall, an upper combustion chamber having a side wall with a plurality of vertically spaced perforations therein for supplying to the interior of said upper combustion chamber an amount of air necessary for combustion of the fuel during varying load operation, a partition within said burner located between said upper perforated and said lower imperforate side wall portions and separating said chambers, said partition having a central orifice providing a combustion connection between the chambers and an air passageway spaced from said central orifice and adjacent the periphery of said partition to permit the down flow of air from said upper combustion chamber to the fuel feed chamber below said partition and within said imperforate side wall portion, said passageway being located adjacent perforations in the side wall of the upper combustion chamber which perforations are inclined with relation to said passageway so that the inflow of air through said inclined passageways will cause combustion air to flow from said upper combustion space through said passageway into the fuel feed chamber below the partition.

13. A heating device of the character described comprising a casing, an open top burner within said casing, said burner comprising a lower fuel feed combustion chamber having an imperforate side wall, an upper combustion chamber having a side wall with perforations therein for supplying to the interior of said burner an amount of air necessary for combustion of the fuel introduced during operation, said burner adjacent its upper end having an imperforate attaching flange for attaching said burner within said casing and with its side walls spaced from the side walls of the casing, said casing having a combustion air inlet opening thereinto below the attaching imperforate flange and into the space about said burner, a partition within said burner located between said upper perforated and said lower imperforate side wall portions and separating said upper and lower combustion chambers, said partition having a central orifice providing a combustion connection between the chambers, and a plurality of openings in said partition about said central orifice to permit the downflow of currents of air to the fuel feed chamber below said partition and within said imperforate side wall portion.

14. A heating device of the character described comprising a casing, an open top burner within said casing, said burner comprising a lower fuel feed combustion chamber having an imperforate side wall, an upper combustion chamber having a side wall with perforations therein for supplying to the interior of said burner an amount of air necessary for combustion of the fuel introduced during operation, said burner adjacent its upper end having an imperforate attaching flange for attaching said burner within said casing and with its side walls spaced from the side walls of

the casing, said casing having a combustion air inlet opening thereinto below the attaching imperforate flange and into the space about said burner, a partition within said burner located between said upper perforated and said lower imperforate side wall portions and separating said upper and lower combustion chambers, said partition having a central orifice providing a combustion connection between the chambers, a cover member for said burner separating the upper combustion chamber from the combustion space within said casing and having an orifice therein providing a combustion connection therebetween, and a plurality of openings in said partition about said central orifice to permit the downflow of currents of air to the fuel feed chamber below said partition and within said imperforate side wall portion.

15. A heating device of the character described comprising a casing, an open top burner within said casing, said burner comprising a lower fuel feed combustion chamber having an imperforate side wall, an upper combustion chamber having a side wall with perforations therein for supplying to the interior of said burner an amount of air necessary for combustion of the fuel introduced during operation, said burner adjacent its upper end having an imperforate attaching flange for attaching said burner within said casing and with its side walls spaced from the side walls of the casing, said casing having a combustion air inlet opening thereinto below the attaching imperforate flange and into the space about said burner, a partition within said burner located between said upper perforated and said lower imperforate side wall portions and separating said upper and lower combustion chambers, said partition having a central orifice providing a combustion connection between the chambers, a cover member for said burner separating the upper combustion chamber from the combustion space within said casing and having an orifice therein providing a combustion connection therebetween, the uppermost perforations in the side wall of the upper combustion space being inclined upwardly and inwardly toward said cover, and a plurality of openings in said partition about said central orifice to permit the downflow of currents of air to the fuel feed chamber below said partition and within said imperforate side wall portion.

16. 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 in said pot entirely located at a level below the lowest of said primary air apertures, and means separate from said baffle member and effective upon air flowing in above said baffle for directing air downwardly and inwardly from some of said primary air apertures to flow into the space beneath said baffle member.

17. In a combustion device of the type described comprising a casing, an open top burner within said casing, said burner comprising a lower fuel feed combustion chamber having an imperforate side wall, an upper combustion chamber having a side wall with perforations therein for supplying to the interior of said upper combustion chamber an amount of air necessary for combustion of the fuel introduced during operation, a partition within said burner located between said upper perforated and said

lower imperforate side wall portions and separating said chambers, said partition having a centrally arranged orifice providing a combustion connection between the chambers, said partition also being constructed to provide a passage for the flow of air downwardly from said upper combustion chamber into the fuel feed chamber below said partition and within said imperforate side wall portion, said passage being located outwardly of said centrally arranged orifice.

18. 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 air inlet apertures, a baffle member in said pot, said baffle member having a centrally located aperture, means for supporting said baffle member below the lowest of said air inlet apertures, said parts being constructed to provide a passage outwardly of said centrally located aperture to provide air-flow interconnection between the spaces in the pot above and below said baffle, and means effective upon the air within said upper space to cause flow of air therefrom into the space beneath said baffle member.

19. 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 air inlet apertures, a centrally and peripherally apertured baffle member, means for supporting said baffle member below the lowest of said air inlet apertures to provide an imperforate walled space below said baffle member, and means spaced from said baffle member for directing air from said air apertures to flow downwardly through said peripheral aperture into the imperforate walled space beneath said baffle member.

20. 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 air inlet apertures located at various levels, a centrally apertured baffle member, means for supporting said baffle member below the lowest of said air inlet apertures to provide an imperforate walled space below said baffle member, said baffle member having an upwardly extending part adjacent and defining said central aperture, and means spaced from said baffle member for acting upon air entering said upper space to direct air from air apertures in the lowermost level to flow downwardly into the space beneath said baffle member.

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