Oct. 11, 1932. S. A. KRAFT ET AL 1,881,687

OIL BURNER

Filed Aug. 16, 1929 4 Sheets-Sheet 1

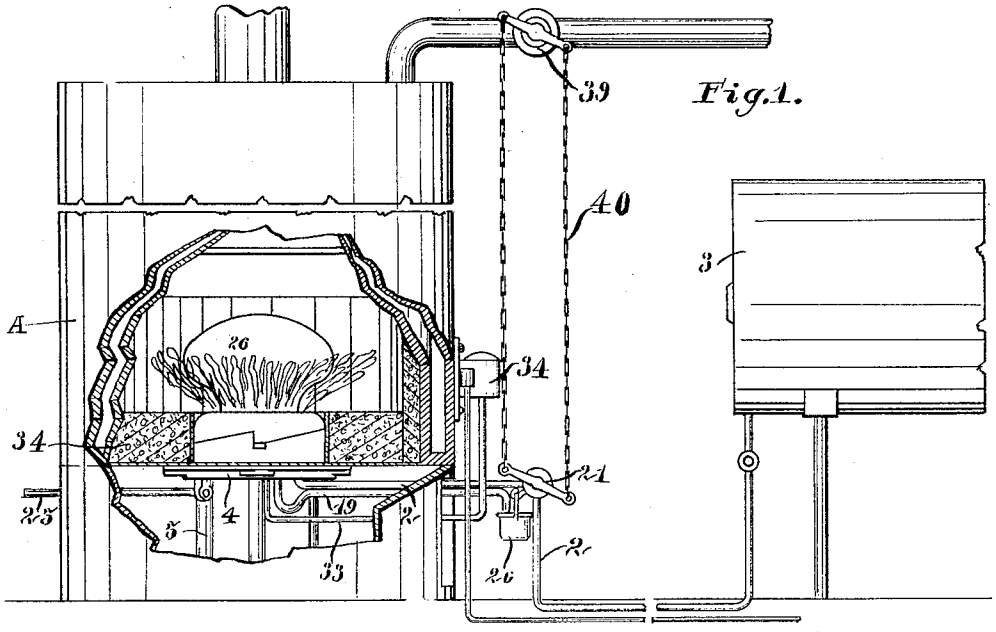

Fig. 1.

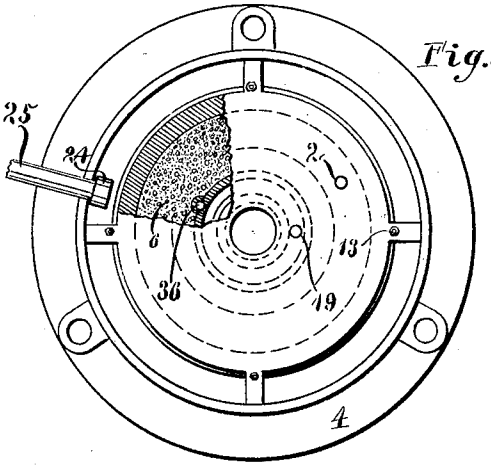

Fig. 3.

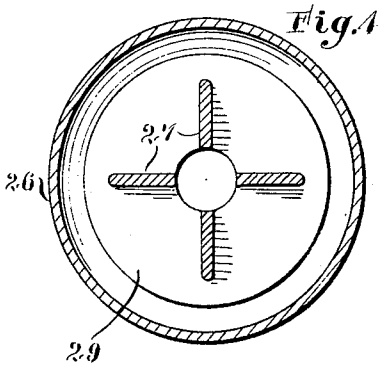

Fig. 4.

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OIL BURNER

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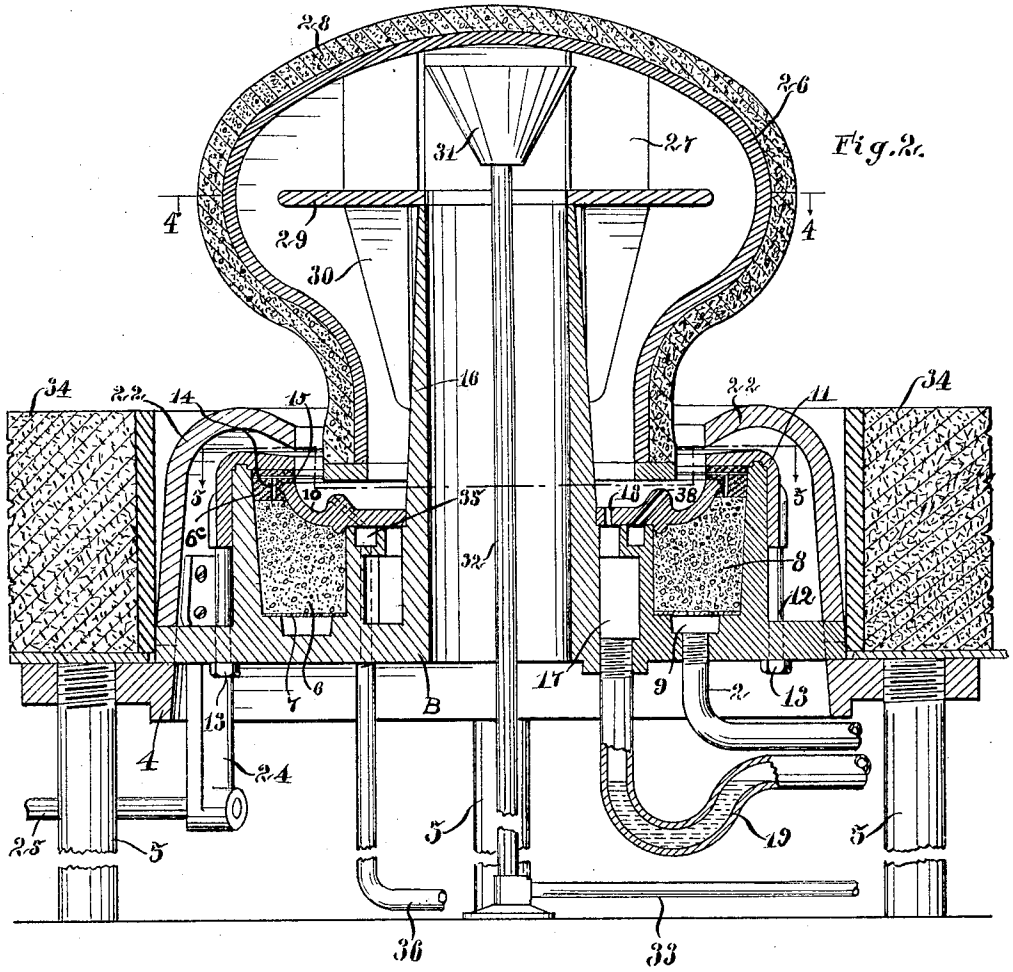

Fig. 2.

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Fig. 5.

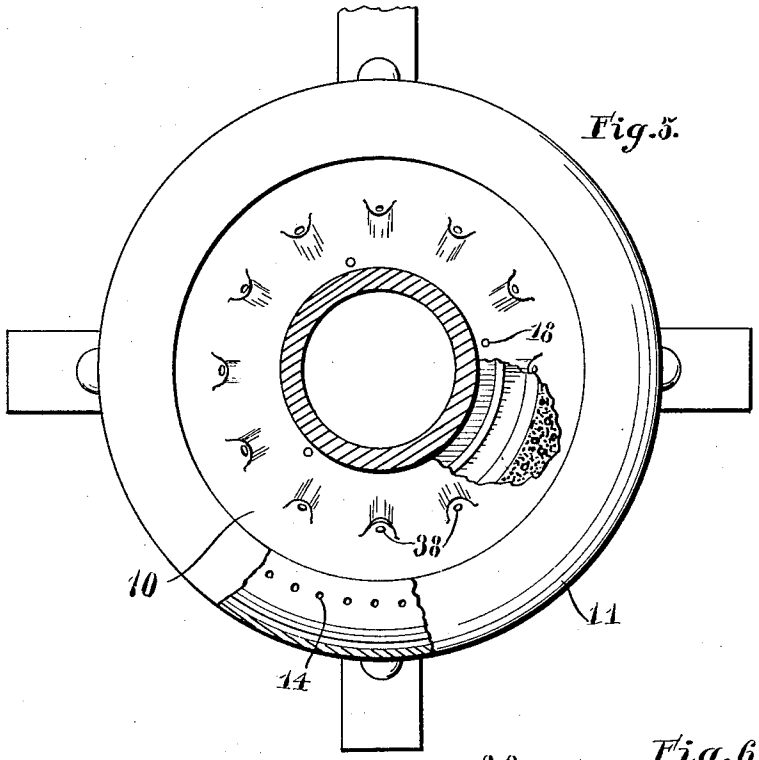
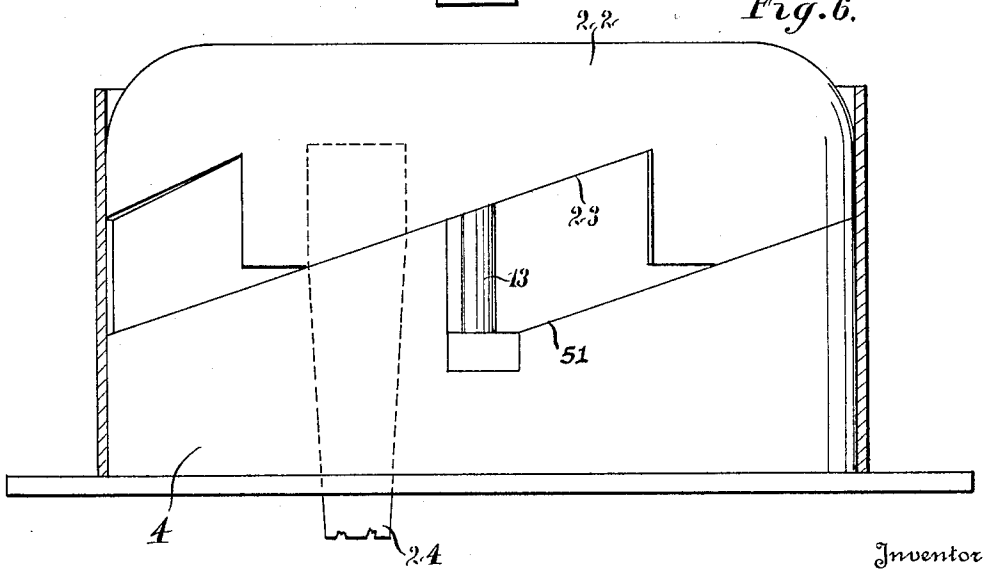


Fig. 6.



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OIL BURNER

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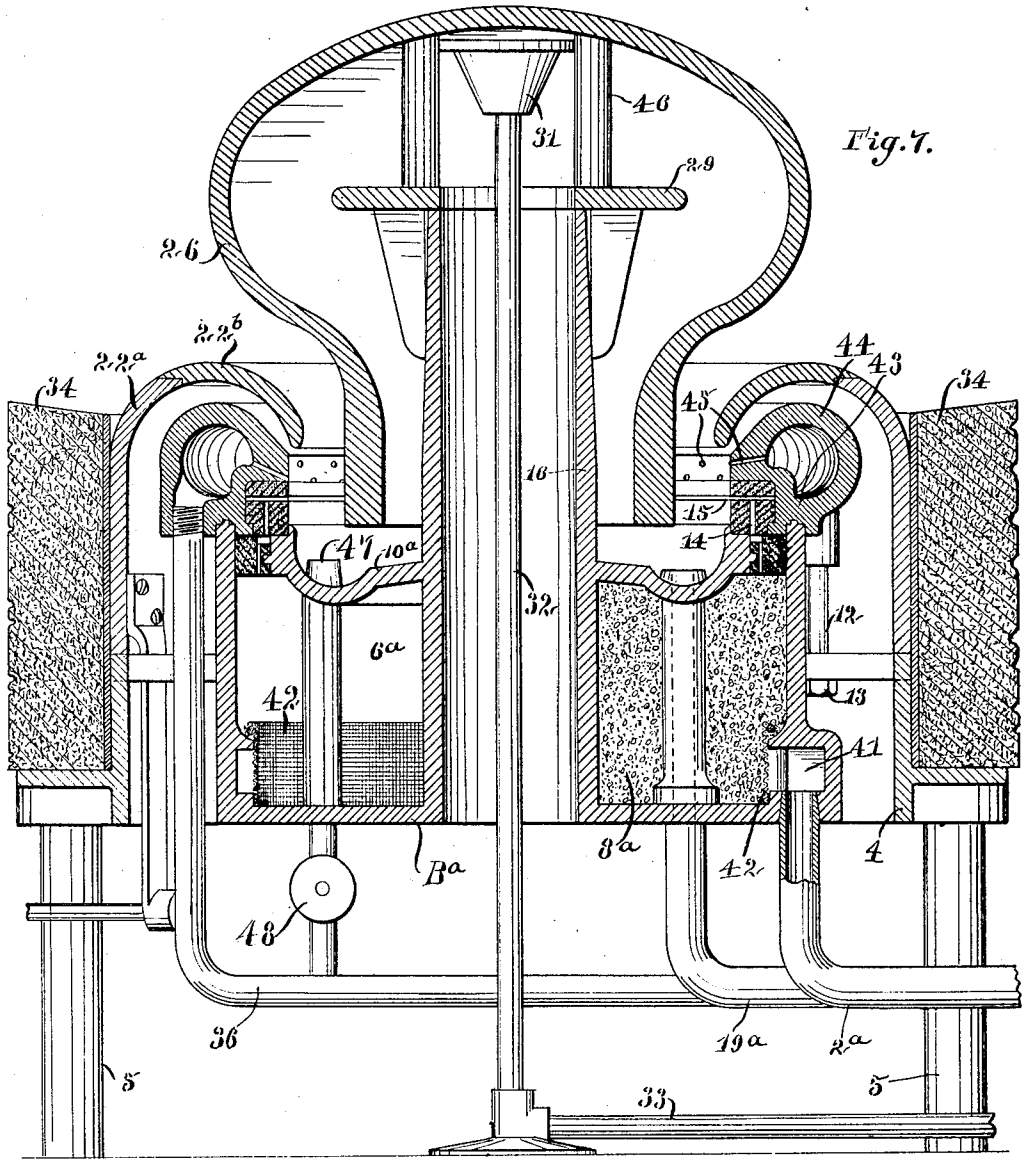
Fig. 7.



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UNITED STATES PATENT OFFICE

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OIL BURNER

Application filed August 16, 1929. Serial No. 386,251.

Our invention relates to oil burners, particularly adapted for use in connection with furnaces to supply hot water, hot air, or steam plant.

Among the objects of our invention, is the providing of improved means for the thorough mixing of air, and particularly heated and moistened air, with the burning oil jet. A further object is to provide improved means in connection with the vaporizing and oil jet openings to bring about the maximum of vaporization and to keep the oil out of contact with metal parts; and a still further object is to provide improved simple means for regulating the flame, and in other ways to provide improvements to bring about the maximum heating effect from the burning oil jets with the minimum expenditure of oil.

These and other features of the invention will be more specifically set forth in the following description and the accompanying drawings, wherein:

Figure 1 is a view in side elevation of a furnace fitted with our improved burner, with the walls of the furnace shown broken away to better illustrate the burner.

Figure 2 is a vertical sectional view through the burner mechanism.

Figure 3 is a bottom view of the burner mechanism.

Figure 4 is a sectional view on line 4—4 of Figure 2.

Figure 5 is a sectional view on line 5—5 of Figure 2, looking down, and with the dome removed.

Figure 6 is a side elevation of an air gap adjusting mechanism; and

Figure 7 is a view similar to Figure 2, showing a slightly modified construction, fire brick packing material which is employed to fill an annular chamber in the lower portion thereof being omitted from the left hand sectional view of this chamber to more clearly illustrate the construction thereof.

In carrying out my invention, the burner mechanism is supported within the firepot in the furnace A and connected as by a pipe 2 to a source 3 of oil supply. The burner mechanism includes a central base B supported upon a surrounding base ring section 4, which, in turn, is supported upon standards 5 resting upon the furnace foundation. The central base section B is formed with a circumferential chamber 6, which chamber at one side of the burner, is connected at its lower end to the oil inlet tube 2, a suitable screen 7 being positioned in the bottom of the chamber to support the chamber filling 8, as of crushed fire brick. The chamber 6 is formed with a channel 9 below the screen 7 to act as an entrance for the oil being fed from the pipe 2.

To provide the chamber 6, the base B is formed with an annular channel, the sides of which constitute the side walls of the chamber, the top wall of the chamber being formed by a curved plate 10 which rests upon the top of the base B and, by a hood 11 which extends upwardly outside of and inwardly over the outer wall of the base B, as shown particularly in Figure 2, said hood member being clamped in position by bolts 12 clamped under the bottom of the base, as by nuts 13.

The inwardly projecting end of the hood 11 stands above and is spaced from the outer, upwardly projecting end of the plate 10 and the space between the plate 10 and hood 11 and above the filling chamber 6, is filled with a ring of suitable non-metallic material 6c, as asbestos, through which extends the vertical ports 14 connecting with horizontal jet delivery ports 15. The base B is formed with a central, upwardly projecting tubular member 16, a circumferential channel 17 being formed around the bottom of the tubular portion 16. A port opening 18 passes through the plate 10, connects the space above said plate with the channel 17, the channel 17 being connected at its lower end with the elbowed pipe 19, which pipe 19 leads to a drip cup 20 of usual construction, which drip cup in the usual way is connected with a shut off valve 21 positioned in the oil pipe 2. Any collection of oil, therefore, upon the plate 10 will pass through the port opening 18 and channel 17 to the pipe 19 and to the drip cup 20, and, in the usual manner, as the drip cup becomes filled thereby, it will drop, closing off the oil supply through the pipe 2, stopping the operation of the burner, necessitating the emptying of the drip cup and restor-

ing it to normal position to permit the resumption of burner operation.

The member 4 of the annular base portion has the upper edge 51 of its wall serrated as shown particularly in Figure 6. Supported upon the base section 4 is a hood 22, the side walls of the hood 22 having serrated bottom edge 23 corresponding to the edge 21 of the base portion, the wall 23 of the hood 22 resting upon the wall 21 of the base portion. The hood 22 at its upper end curves inwardly over the top of the central base portion B and is spaced therefrom, as shown in Figure 2. The hood 22 is rotatably movable upon the base portion 4 causing a relative movement between the cam surfaces provided by the superposed serrated surfaces 23 and 51 to raise and lower the member 22 to regulate the opening between it and the top of the central base portion B by means of arms 24 operated through a suitable handle portion 25. The angle of the sloping faces of the serrations 23 and 51 is less than the limiting angle of friction so that when adjusted the parts will remain in an adjusted position until moved by means of the handle 25. In this manner the hood 22 may be rotated in either direction to raise or lower it upon its supporting base section 4. This adjustment is provided to permit regulation of the amount of air supplied to the burner as the incoming air passes through the gap between the inner edge of the curved upper portion of the hood 22 and the inner edge of the inwardly flanged upper portion of the member 11. This adjustable feature is not, however, material to the invention, as the device may be constructed with a fixed opening of proper width between these two members at the factory and no further adjustment will be required within the normal range of operation of the burner. The upper portion of the base section B and of the hood 22 is formed with a central opening in which is adapted to be positioned the dome 26, the dome being supported upon the fins 27 projecting upwardly above the central tube 16. The dome may be covered by suitable material, as fire resisting brick 28. The lower end of the dome is, as shown in Figure 2, laterally spaced from the central tube 16 and also spaced from the upper portion of the base section B and the hood 22. The central tube 16 at its upper end supports a horizontal baffle ring 29, the baffle ring carrying the upwardly projecting fins 27 and the downwardly projecting fins 30 bearing against the sides of the tube 16. The baffle ring may be an integral part of the dome unit resting upon the tube 16. An outwardly flaring spreader cone 31 is supported above the central opening in the baffle ring 27 by means of a vertical pipe 32 positioned centrally in the tube 16 and supported upon the furnace foundation, the pipe 32 at its lower end being connected by a pipe 33 with an outside source of water supply.

The water supply is controlled by a conventional float valve not shown, mounted in chamber 34 to maintain the water at all times at a desired height in the pipe 32.

For the purpose of preliminary and auxiliary heating, as hereinafter more particularly pointed out, the casing B is formed with an annular chamber 35 which is connected with a source of gas supply, as by the pipe 36. The plate 10 above the chamber 35 is formed with jet openings 38 extending through the plate and directed outwardly. 39 indicates a thermo-control connected as by chains 40 with valve mechanism positioned in connection with the oil supply pipe 2. This thermo-control forms no novel part of our invention and is, therefore, not specifically shown and described.

The burner mechanism above described is, as shown, surrounded by a filling 34, as of fire brick, filling the space between it and the inner side of the wall of the furnace.

Figure 7 shows a slightly modified construction of burner. In the construction shown in Figure 7 a chamber 6*a* is formed at its lower end with a lateral recess 41 around its lower outer edge separated from the filling of the chamber 6*a* by a suitable screen 42. An oil pipe 2*a* feeds into this recess 41 so that the oil passes laterally into the filling 8*a* of the chamber 6*a* instead of through the bottom of the chamber 6, as shown in Figure 2. Furthermore, in the construction shown in Figure 7, the casing B*a* is not formed with a chamber such as the chamber 17 communicating with drainage openings 18 through the plate 10 in Figure 2, but a pipe 19*a* extends through the chamber 6*a* and projects above the plate 10*a* to receive the oil overflow. Also, in this modified form, in substitution for the hood 11 of the previously described construction, we support upon the top of the casing B, a chambered ring 44, a gas pipe 36 connecting with the internal chamber 43 of said ring. Jet openings 45 are directed from the chamber 43 through the inner wall of the ring 44 toward the dome 26. A filling of asbestos is fitted between the ring 44 and the chamber 6*a* and has outlet oil openings 14*a* and 15*a* corresponding to the openings 14 and 15 shown in the previously described construction of Figure 2. We, also, in Figure 7, show posts 46 extending upwardly from the baffle plate 29*a* and corresponding in function to the fins 27 in the construction shown in Figure 2. We may provide a gas pilot light jet 47 regulated by a hand valve 48 if this method of ignition is desired. Aside from the structural differences noted, the construction shown in Figure 7 is essentially the same as that shown in Figure 2.

For the purpose of ignition, we may use any ordinary methods of ignition, as a pilot

light, electrical ignition, etc. Such ignition may be arranged in connection with the oil feed and may be arranged in connection with the gas jets, and the oil and gas jets may be thermostatically and otherwise controlled in any desired manner. Such methods of ignition and thermostatic control are well known to the art, and, since they form no part of the present invention, it is not deemed necessary to illustrate and describe them in detail.

Before the oil supply is turned on, the heating effect of the burning gas jets from the jet openings 38 or 45, as the case may be, will be to preliminarily heat the parts, and the moistened air passing from inside the dome around the bottom of the dome and outwardly through the outlet passage around the dome. As will be apparent, air from below the burner will pass upwardly through the tube 16 and take up moisture from the evaporated water through the open top of the spreader cone 31. As the oil then passes from the outlet jet openings 15, the oil vapor will be ignited forming a burning jet to continue the heating operation and furnish the flame that heats up the water or other medium in the furnace from which the heat is supplied. By suitable means the gas such as a thermostatic valve of an ordinary type, not shown, may be turned off when the burning oil jets get into operation.

There are many advantages in our construction over the ordinary types of oil burners. The introduction of water vapor into the air supplied to the burner produces a cleaner and more efficient flame than is the case where no water vapor is supplied. The gas feed arrangement described brings about a particularly efficient preliminary heating of the dome and connected parts, increasing the efficiency of the apparatus. The filled chamber 8, with the adjacent non-metallic substance, as asbestos, through which the oil outlet openings pass, brings about a very complete vaporization of the oil, as well as keeping the oil vapor out of contact with metal, keeping the oil outlet openings from becoming clogged. A particularly efficient method of adjusting the air supply passing upward within the hood 22 is secured by the mechanism shown particularly in Figure 6. In furnishing the oxygen to the oil feed, there is first the moistened air which passes from inside the dome around the bottom of the dome, and, second, the dry air which passes upwardly inside the hood 22 and out above the oil jet openings. We have found that in this way we bring about a most complete and efficient combustion and high efficiency of heating, and avoiding the collecting of unconsumed oil which might drain back and shut off the burner.

Such thermostatic, or other means as are required, for controlling the gas and oil supply, constitute no part of the novelty of our invention and may be of any desired usual construction. These devices are well known to the art and are, therefore, merely indicated conventionally and not specifically shown and described.

The baffle plate 29 within the dome, standing in the path, as it does, of the outflowing air and moisture, assists in properly baffling or co-mingling the moisture and air so that the air may pass out of the dome in a properly moistened condition being heated by flowing down the inside wall of the dome, and, striking plate 10 has a tendency to heat said plate to bring about a gasifying of the oil in the chamber 6. The parts surrounding the chamber 6, of Figure 2, or chamber 6*a* of Figure 7, are heated during the operation of the burner, so that the oil in said chambers is vaporized and emerges from said chambers through the apertures 15 as oil vapor, where it will be picked up by the air streams coming one from below the lower edge of the dome and one from the space between the members 11 and 22, or their corresponding parts in Figure 7. The oil vapor mixed with this air is carried up into the combustion area where it is burned. In the construction of the modified form, as shown in Figure 7, the dome 26*a* is not insulated as in Figure 2, but is made of high fire resisting metal and the hood 22*a* has a high fire resisting ring 22*b*, and as the flame moves outwardly around the dome it heats the lower part of the dome 26*a* and the uppermost part of the hood 22*a* to a high temperature.

We claim:

1. An oil burner comprising a base supported in raised position above a surface upon which the device is mounted, a tubular member extending upwardly from said base and in open communication at its lower end with the space beneath said base, a hood mounted over said tubular member and spaced upwardly from the upper end thereof, the lower edge of said hood terminating short of said base, and the lower end of said hood being of larger diameter than the exterior diameter of said tube, an annular, non-metallic ring supported on said base and of larger diameter than the base of said hood and having an aperture therein directed inwardly, an oil chamber in communication with said aperture, and an annular wall spaced outwardly from said non-metallic ring and having the upper portion thereof curved inwardly above said non-metallic ring and spaced upwardly therefrom, the space between said non-metallic ring and said annular wall being in open communication with the space beneath said base.

2. An oil burner having a bulbous hood, open at the lower end thereof only, air supply means having open communication with the interior of said hood, and an annular ring surrounding the open lower end of said hood,

spaced outwardly therefrom, said ring having an aperture directed inwardly toward the base of said hood and having a source of oil supply in open communication with said aperture.

3. An oil burner having a bulbous hood open at the lower end thereof, air supply means having open communication with the interior of said hood, an annular ring surrounding the open lower end of said hood spaced outwardly therefrom, said ring having an aperture directed inwardly toward the base of said hood and having a source of oil supply in communication with said aperture, and an annular wall spaced outwardly from said annular ring, the space between said annular ring and said annular wall being in open communication with a source of air supply.

4. An oil burner comprising a base, a bulbous hood open at the lower end thereof mounted above said base, a source of air supply in open communication with the interior of said hood, an annular ring spaced outwardly from the open lower end of said hood, said annular ring having an aperture therein directed inwardly, said aperture being in communication with a source of oil supply, and an annular wall surrounding said apertured annular ring and spaced outwardly therefrom, the upper portion of said wall being curved over said apertured annular ring and spaced upwardly therefrom, the space between said apertured annular ring and said annular wall being in open communication with a source of air supply.

5. An oil burner having a base element with a tubular upward extension and having an annular chamber therein in communication with a source of oil supply, a non-metallic ring mounted in the upper end of said chamber and having an aperture therethrough in communication with said oil chamber, an annular wall exteriorly of said chamber, having the upper portion thereof curved inwardly over said apertured ring, the space between said chamber and said annular wall being in open communication with a source of air supply, and a hood mounted over said tubular extension, the base of said hood being of smaller diameter than the apertured ring.

6. An oil burner having a hood, open at the lower end thereof, air supply means having open communication with the interior of said hood, an annular, non-metallic ring surrounding the open lower end of said hood, having an aperture directed inwardly toward said hood, the aperture being in communication with a source of oil supply, an annular wall surrounding said non-metallic member, being curved over the upper portion thereof and spaced upwardly therefrom, the space between the non-metallic member and said annular wall being in open communication with a source of air supply, and an open container for water mounted within said hood.

7. An oil burner having a base plate with an upwardly extending tubular air intake member, a bulbous hood mounted over said air intake member to have an air passage from said air intake member to the interior of said hood, said hood being supported to be spaced from said base plate, bevel means mounted interiorly of said hood to direct air from said air intake member toward the side walls of said hood, an apertured non-metallic ring around the base of said hood, spaced outwardly therefrom, the aperture therein being directed toward the base of said hood, and being in open communication with a source of oil supply, and an annular member above said non-metallic ring having an aperture directed inwardly toward the base of said hood, said aperture being in open communication at its outer end with a source of air supply.

8. An oil burner having a hood open at the lower end and closed at the upper end, a source of air supply arranged to discharge interiorly of said hood, an apertured, non-metallic ring exterior of the hood, said aperture of said ring being directed toward the outer surface of said hood, said aperture being in open communication with a source of oil supply, and a water compartment interior of said hood and having open communication above the water level therein with the interior of said hood.

In testimony whereof we affix our signatures.

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