July 12, 1938. M. H. KEATING ET AL 2,123,365

BURNER

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FIG. 1

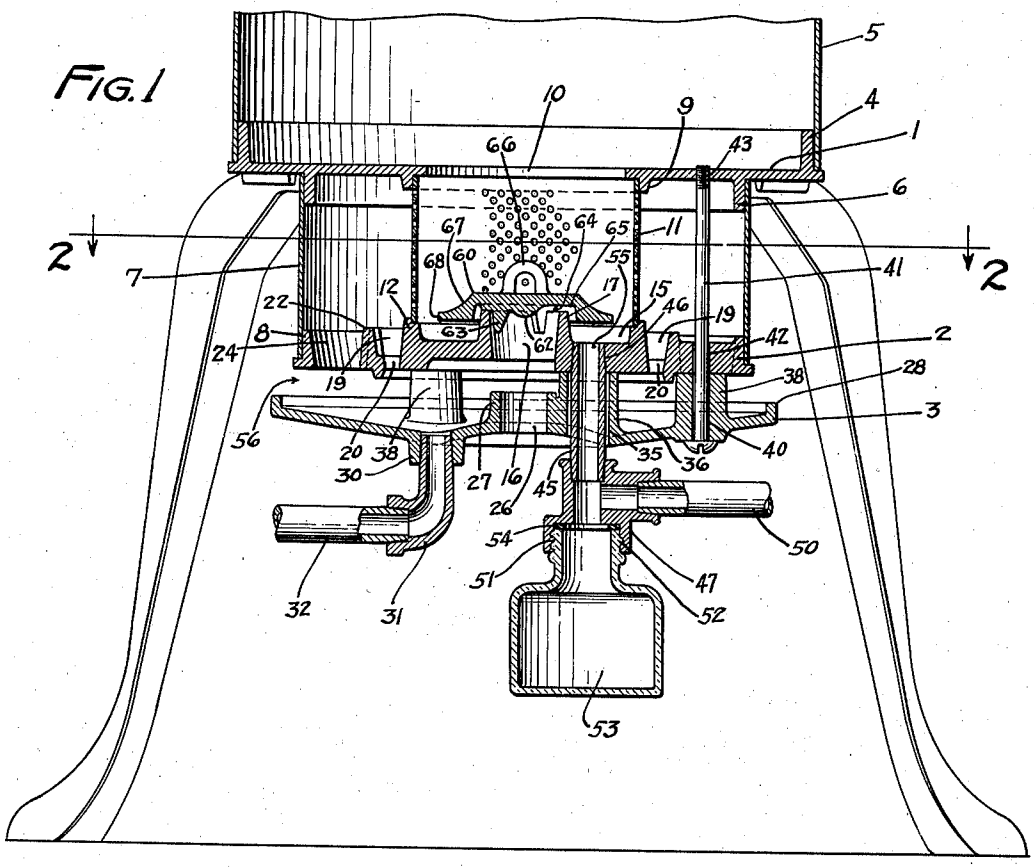
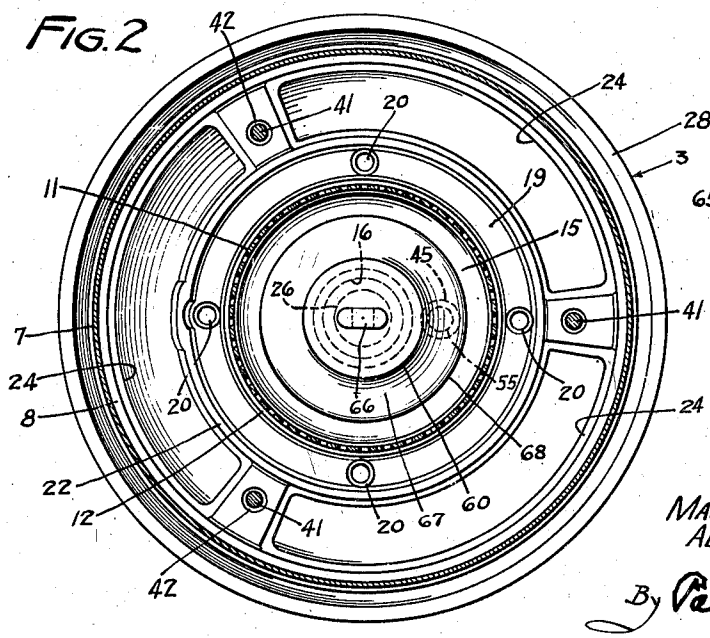


FIG. 2



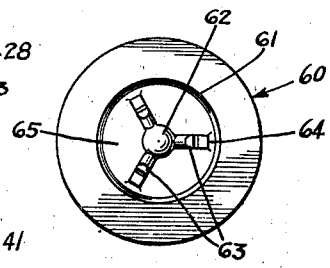


FIG. 3

Inventors
MAURICE H. KEATING
ALBERT T. LARSON
By Paul, Paul & Moore
ATTORNEYS

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FIG. 4

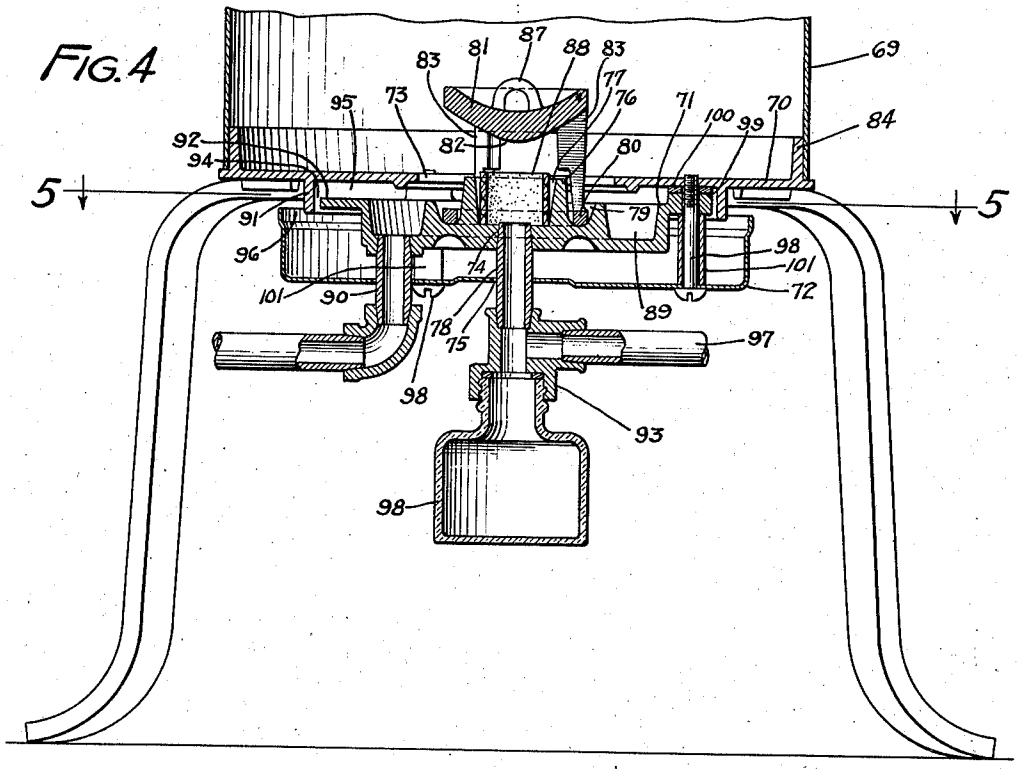
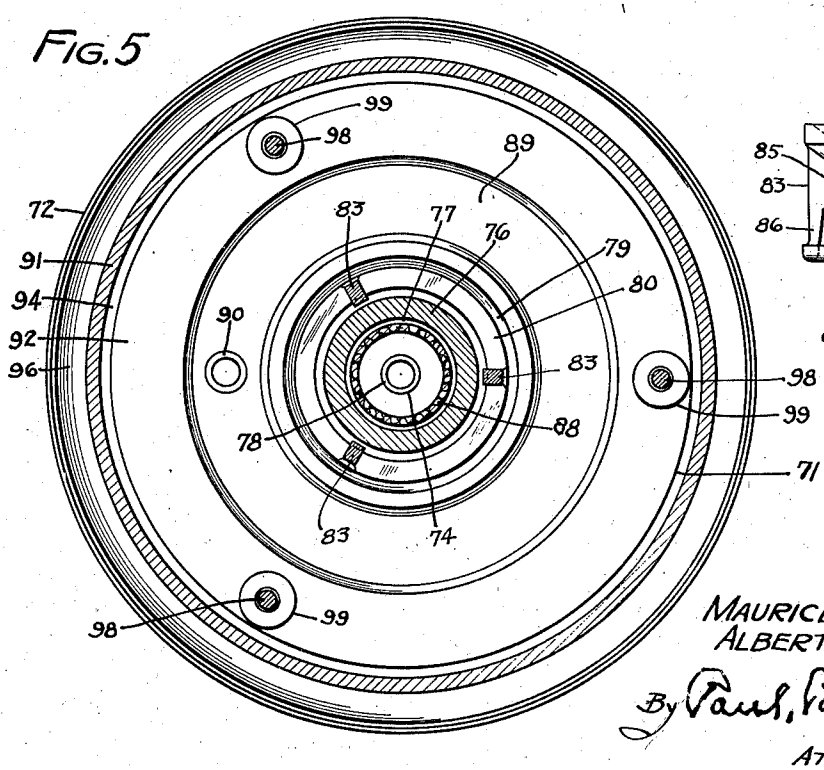


FIG. 5



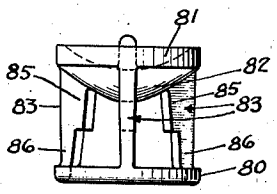


FIG. 6

Inventors
MAURICE H. KEATING
ALBERT T. LARSON
By Paul, Paul & Moore
ATTORNEYS

Patented July 12, 1938 2,123,365

UNITED STATES PATENT OFFICE

2,123,365

BURNER

Maurice H. Keating and Albert T. Larson, Minneapolis, Minn., assignors to H. D. Hudson Manufacturing Company, Chicago, Ill., a corporation of Minnesota

Application October 8, 1934, Serial No. 747,392

8 Claims. (Cl. 158—91)

This invention relates to improvements in oil burners and has, among its general objects, to provide a cheap and efficient burner construction.

Other objects are: to provide a burner, the parts of which can be cheaply made, and quickly and easily assembled; to provide a receptacle associated with the burner adapted to receive foreign substances separated from the oil; to provide means whereby soot, collecting in the burner cup and near the fuel delivery orifice of the burner cup, can be pushed into the receptacle; to provide an arrangement of parts whereby a better control of the air is obtained and therefore whereby substantially perfect combustion is obtained, giving a clean white flame which burns silently; and to provide a flame spreading construction in combination with an air feeding control construction which makes for economy in operation.

Features of the invention include all details of construction shown and/or described, along with the broader ideas of means inherent in the disclosure.

Objects, features and advantages of the invention will be set forth in the description of the drawings forming a part of this application, and in said drawings.

Figure 1 is a central vertical section of one type of burner constructed in accordance with the teachings of this invention;

Figure 2 is a plan section taken on line 2—2 of Figure 1;

Figure 3 is a detail bottom plan of the flame spreader and air control disk;

Figure 4 is a central vertical section of a modified form;

Figure 5 is a modified section on line 5—5 of Figure 4; and

Figure 6 is a detail elevation of the flame spreader, heat-conducting and air control disk.

Referring first to Figures 1, 2 and 3: The device has three superposed spaced plates, an upper heating-drum bottom-forming plate 1, an intermediately disposed burner plate 2, and a lower oil over-flow catch plate 3. The plate 1 has the greatest diameter, the plate 2 the smallest diameter. The plate 1 has an inwardly spaced upwardly directed flange 4, fitted on the outside of which is a heating drum 5. The plate 1 also has a depending flange 6 which receives and centers an imperforate outermost drum 7. Plate 1 has a second or inner depending flange 9 surrounding a central opening 10. The flange 9 has fitted therewithin an inner perforate drum 11 which is within and spaced from the drum 7. The drum 7 fits an outer flange 8 of the burner plate 2, as shown, and the drum 11 also is fitted within an upstanding flange 12 of this plate. Portions of the plates 1 and 2 and the drum 11 form a combustion or flame chamber.

The burner plate provides a central fuel-receiving cup or channel indicated at 15 and has a central opening 16 of considerably smaller diameter than the opening 10 of plate 1, arranged below the opening 10. This central opening is in part defined by an upstanding flange 17 which extends to a level above the level at which fuel is delivered into the fuel cup. The outer side of the cup is formed by the flange 12 in which the lower end of the perforate drum 11 is seated. The flange 17 extends a greater distance upwardly than the flange 12.

The burner plate also has an oil over-flow channel 19 circumscribing the oil cup, and this channel has drain openings 20 leading downwardly through its bottom, and delivering to the catch plate or saucer 3. This channel is adapted to catch any over-flow from the cup 15. The outer side of this over-flow channel is formed by a flange 22. The channel is so arranged that air passes over it on its way to the flame chamber. This air, from the outside, passes upwardly through a series of arcuate slots 24 of the burner plate, which slots are arranged between the outer flange 8 and the flange 22.

The saucer-shaped plate 3 has a central opening 26 defined in part by a flange 27 extending upwardly from its bottom. The plate has at its outer periphery an upstanding flange 28 and the bottom of the plate slants downwardly toward the center. The central opening 26 is vertically aligned with the central openings 16 and 10 of the burner and drum-bottom-forming plates.

Laterally of the opening 26, the over-flow catch plate has an opening through its bottom, in part defined by a depending flange 30, which flange is threaded and receives the threaded elbow 31 which, in turn, has threaded therein an over-flow return pipe 32. In addition to the openings 16 and 30, the catch plate has an opening 35 in part formed by an upwardly directed flange 36 which may act as a spacer. This opening is arranged adjacent and laterally of the flange 27. In this instance the upper edge of this flange 36 engages the lower side of the burner plate.

The plate 25 also has three upstanding spacing bosses 38 having openings 40 therethrough, and the plates 1, 2 and 3, as well as the drums 7 and 11 are held in operative relation by long screws 41 each passing through the openings 40, openings 42 in the burner plate, and threaded into

openings 43 of the drum-bottom-forming plate 1. This is a feature, making for ease and simplicity of assembly. The drums 7 and 11 are held in centered relation by the flanges of plates 1 and 2.

Passing loosely through the opening 35 is a nipple 45 threaded at one end into an opening 46 of the burner plate and at the opposite end into a T-fitting generally indicated at 47. Into the horizontal portion of the T is threaded an oil supply pipe 50. The bottom of the vertical portion of the T has a threaded socket 51 receiving the threads 52 of the neck of a glass receptacle generally indicated at 53. A gasket 54 is interposed to form a tight connection. The arrangement of the nipple 45 relatively to the burner cup, to the supply pipe and to the receptacle 53 is a feature. It is noted that the receptacle, part of the fitting, and the nipple are axially aligned and vertically arranged so that any carbon collecting in the neighborhood of the junction of delivery orifice 55 of the nipple with the burner cup, may be pushed downwardly into the bowl or receptacle 53, with a poker wire, or other suitable element.

The sediment bowl 53 is adapted to collect water or other foreign substances which occasionally find their way into the oil and which usually cause excessive carbon deposits in the burner. Such impurities can be seen through the transparent side of the bowl, and the bowl can be easily removed to dump its contents.

The top of the plate 3 is spaced from the bottom of the plate 4 as shown to form a horizontally circumferentially arranged air intake space 56. By this means, just the right amount of air is admitted under the burner plate, through opening 26 and slots 24. By this means, substantially perfect combustion is obtained, giving a clean white flame which burns silently. The saucer 3 also protects the floor from excessive heat, and prevents light from the burner shining downwardly and acts to pre-warm the air as it enters the burner. These are valuable functions of the element 3 in addition to its function for catching surplus or over-flow oil.

Another feature of the invention relates to the manner of introducing air to thoroughly oxidize the carbon and thus reduce the amount of its accumulation in the burner cup. To this end, a spreader cap or disk 60 is supported upon the central flange 17. This cap has in its under side a depression 61, the diameter of which is greater than the outer diameter of the flange 17. The upper part of the flange 17 lies within, but is spaced from the walls of the depression. This spacing provides a somewhat tortuous air passage by which air passes upwardly through the opening 16, then laterally and then downwardly to the cup 15. The disk 60 has a downwardly projecting central protuberance 62 and this is surrounded by three depending projections 63 which act as centering elements. Each of these centering elements has a shoulder 64 spaced from the bottom 65 of the depression 61, as shown. The top of the disk is provided with an upstanding centrally disposed loop 66 with which a wire hook can be engaged to remove the disk. The space between the bottom of the disk and the flange 17 is such that just the right amount of air is added to obtain substantially perfect combustion. The top of the spreader disk or cap, at the periphery is circumferentially beveled, the beveled surface 67 being upwardly concave. The outer periphery 68 of the disk is spaced from the inner surface of the perforate drum 11 and the disk over-hangs the burner orifice 55.

Figures 4, 5 and 6 illustrate a second form of the invention which is also composed of three superposed spaced plate-like elements respectively indicated at 70, 71, 72. The drum-bottom-forming plate 70 has a central opening 73. The burner plate 71 has a central opening 74, threaded to receive the fuel supply pipe and the bottom plate has a central opening 75 for the passage of the fuel supply pipe. The heating drum is indicated at 69, held by flange 84.

The burner plate 71 has an upstanding flange 76 surrounding the opening 74 and forming a burner cup and wick chamber 77, the wick being indicated at 88. In this instance the oil is delivered as in the other form of the invention, directly into the burner cup and also through the vertical nipple 78 threaded in the opening 74. Circumscribing the flange 76 is an over-flow channel 79 which receives the bottom ring 80 of a flame spreader, the downwardly convex flame spreading portion of which is indicated at 81, this portion being spaced above the flange and overhanging the cup 77. The downwardly convexed or conical surface is indicated at 82. The elements 80—81 are connected by three fin-like legs 83 radially arranged, as best shown in Figure 6, and thickened in their upper portions as shown at 85, and narrowed in their lower portions as shown at 86. These legs act to conduct heat downwardly to the oil which has over-flowed into the channel 79. The top surface of the element 81 is concave and is provided with the centrally disposed lifting loop 87. Circumscribing the channel 79 is a second larger and deeper channel 89, leading from the bottom of which is an over-flow return pipe 90.

The drum-supporting plate 70 has a depending flange 91 and the burner plate 71 has a horizontal flange 92 spaced downwardly from the under surface of the plate 70 and this flange lies within the cavity defined by the flange 91 and has its periphery spaced inwardly from the inner surface of said flange 91, to obtain a circumferential upwardly leading air intake passage which communicates with horizontal space or passage 95, in turn communicating with opening 73. This is a valuable feature of the invention.

In this form, the lower plate 72 acts as a heat shield, but the entering air is also pre-heated. Its diameter is greater than the diameter of the flange 91 and its uppermost edge lies above the lowermost edge of the flange, thus forming a circumferential air intake space 96, communicating with the air intake spaces 94 and 95. Screws 98 pass through plates 72, 71, 70 to clampingly secure the parts. Plate 71 has spacing bosses 99. Gaskets 100 are interposed between bosses 99 and plate 70. The screws pass through spacing sleeves 101 interposed between plates 71, 72.

In this form, as in the first, nipple 78 has attached thereto a T-fitting 93, with the horizontal portion of which is connected the oil supply pipe 97, and with the lower portion of which is detachably connected, by threading, a glass receptacle 98, adapted to receive foreign substances pushed through the delivery portion 78 of the oil line, or to receive foreign substances separated from the fuel oil.

In both forms of the invention, the air passes inwardly and circumferentially between the middle and lower plates, and thus passes first to a point below the burner ring to be heated thereby, and then passes upwardly and then inward-

ly toward the burner cup, or flame chamber. In the form of Figures 1 to 3, inclusive, additional air is introduced through the central opening, and beneath the flame spreader and then outwardly therefrom into the burner cup.

In both forms, oil is delivered by a vertical tube to the burner cup or flame chamber, and in both this vertical tube is aligned with the sediment receptacle. In both forms, the sediment receptacle catches the gravity delivered impurities either in the form of carbon deposit or in the form of water or other impurities from the oil line.

In both forms, the burner plate is below and spaced from the drum-supporting plate to form an air-pre-heating chamber and in both forms, it serves as a heat shield plate arranged below the burner plate. In the first form, this plate also acts as an over-flow oil receptacle. In both forms, the supply pipe passes upwardly through the lower plate.

In both forms of the invention, the cap acts as a flame spreader, and removably rests by gravity on the burner ring. This cap also acts as a generator or igniter conducting heat down to the oil in the desired amount, and conducting it in just the proper amount, and so as not to cause too rapid an evaporation.

We claim as our invention:

1. A burner comprising three superposed spaced plates, a top plate, a middle burner plate and a lower plate, each having a central opening, said openings being vertically aligned, said middle plate having on its upper side an oil-burning cup circumscribing the central opening, a perforate drum rising from and circumscribing the cup and forming therewith and with the upper plate a flame chamber, a second drum spaced outwardly from and surrounding the first and also held between said middle and top plates, said middle plate having an over-flow channel adjacent and circumscribing said cup and disposed outwardly from said perforate drum, said channel having openings leading downwardly through its bottom, said middle plate having elongated arcuate air intake openings leading downwardly therethrough and located between said over-flow channel and the outer drum, said bottom and middle plates being so spaced as to provide a circumferential air intake opening, said middle plate having an upstanding flange which in part defines the central opening, a cap supported by said flange, and spaced therefrom and from said cup to establish air communication between the opening and the cup, and an overflow pipe leading from the bottom plate.

2. A burner comprising three superposed spaced plates, a top plate, a middle burner plate, and a dished lower plate each having a central opening, the openings being vertically aligned, said middle plate having on its upper side an oil burning cup circumscribing the central opening, a cap associated with the central opening and cup in a manner to establish air communication between the opening and the cup, a perforate drum rising from the burner plate and circumscribing the cup and forming therewith and with the upper plate a flame chamber, a second drum spaced outwardly from and surrounding the first and also held between the middle and top plates, said middle plate having an over-flow channel adjacent and circumscribing said cup and disposed outwardly from said perforate drum, said over-flow channel having openings leading downwardly through its bottom, said burner plate having elongated arcuate air intake openings leading upwardly therethrough and located between said over-flow channel and the outer drum, said bottom and middle plates being so spaced as to provide a circumferential lateral air intake opening.

3. A burner comprising a burner plate having on its upper side a centrally located oil burning dish defined in part by first inner and second outer circumferential flanges, said plate having an overflow catch channel circumscribing the dish and defined in part by the outer flange of said dish and a third flange, said channel having downwardly leading openings, an overflow catch pan below and spaced from the burner plate to provide a horizontal air intake space into which air can enter radially from all directions, a spreader disk horizontally supported in heat-conducting relation with and upon the upper edge of said inner flange and slightly spaced upwardly from said flange and in part overhanging said dish, a perforate flue rising from said second flange, a plate resting upon said flue and having an opening in communication with the flue, said burner plate being provided with openings arranged outwardly from said overflow catch channel, and an imperforate drum connecting the burner plate and last mentioned plate and surrounding the channel and burner plate openings.

4. A burner composed of a top plate having a central opening, a bottom plate spaced from the top plate and having an oil dish a wall of which is defined by an upwardly extending flange forming a central air intake opening, a perforate drum forming with said plates a central flame chamber including therewithin said dish and central air intake opening, an imperforate drum circumscribing said perforate drum and forming therewith and with said plates a closed top chamber circumscribing the flame chamber, said bottom plate having air intake spaces leading upwardly into said circumscribing chamber and through which overflow oil can pass downwardly, a spreader disk removably supported in upwardly spaced relation to said flange and over-hanging said dish, and means for delivering oil into said dish.

5. A burner composed of a top plate having a central opening, a bottom plate spaced from the top plate and having an oil dish the inner wall of which is defined by an upwardly extending flange forming a central air intake opening, a perforate drum forming with said plates a central flame chamber including therewithin said dish and central air intake opening, an imperforate drum circumscribing said perforate drum and forming therewith and with said plates a closed top chamber circumscribing the flame chamber, said bottom plate having air intake spaces leading upwardly into said circumscribing chamber and through which overflow oil can pass downwardly, a spreader disk removably supported in upwardly spaced relation to said flange and overhanging said dish, and an oil supply pipe delivering through said bottom plate into the dish below said spreader disk.

6. A burner including a plate providing an oil dish portion having a central opening therein, oil feed means including a vertical oil feed line terminating in an orifice in the bottom of said burner dish, a spreader disk supported above said central opening and so as to shroud said orifice, and a perforate member extending upwardly from the periphery of said dish portion.

7. A burner including a plate providing an oil dish portion having a central upwardly flanged

opening, means for feeding oil to said dish, a perforate member extending upwardly from the periphery of said dish portion, and a spreader disk supported above said dish portion and in a position sufficiently close to the dish that burning does not normally occur under said disk.

8. An oil burner for the quiet combustion, at widely varying rates, of fuel oil which is substantially non-volatile at normal temperatures and which is capable of rapid change from a low to a high combustion rate, comprising a single vertically positioned perforated cylinder, a bottom plate for said cylinder formed with a basin for holding fuel oil, means for delivering oil substantially vertically to said basin, and a partitioning member of heat conducting material within said cylinder positioned so as to form the base of a combustion zone therein, said partition member being of lesser diameter than said cylinder, and supported above the bottom plate in heat conducting relation therewith and sufficiently close to the surface of the oil in said basin so as normally to inhibit combustion under said partitioning member of oil vaporized in said basin.

MAURICE H. KEATING.
ALBERT T. LARSON.