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N. R. THIBERT

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LIQUID FUEL BURNER

Filed Sept. 13, 1930

2 Sheets-Sheet 1

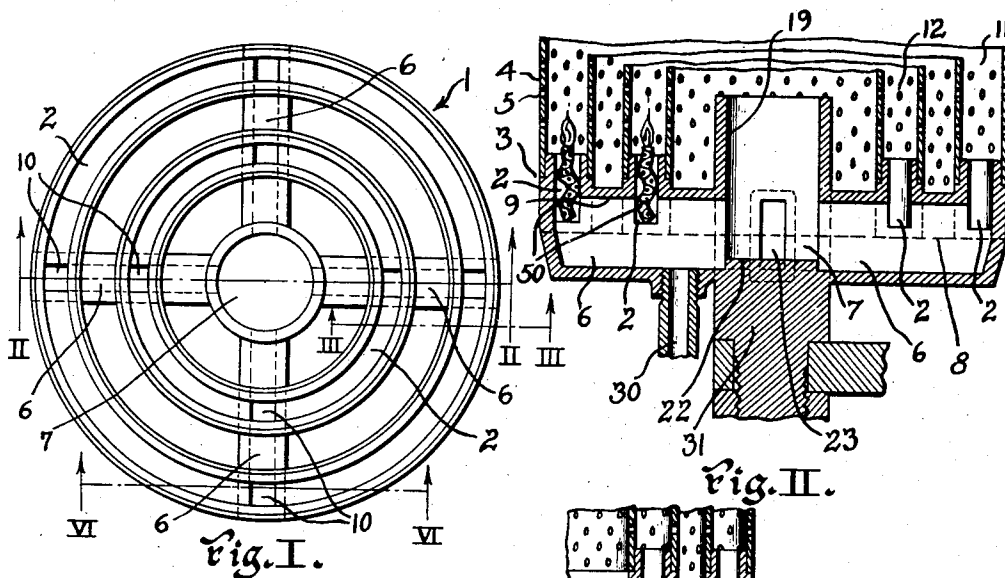
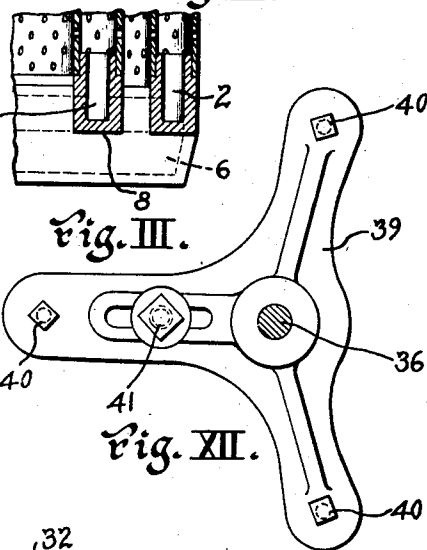
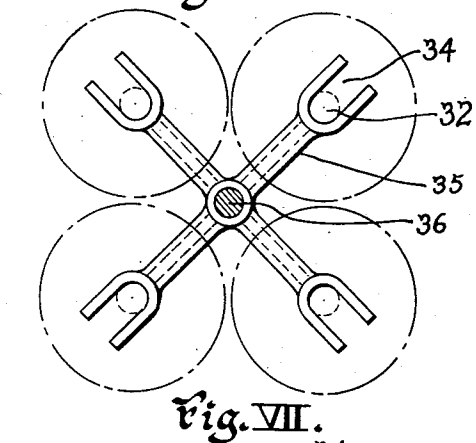
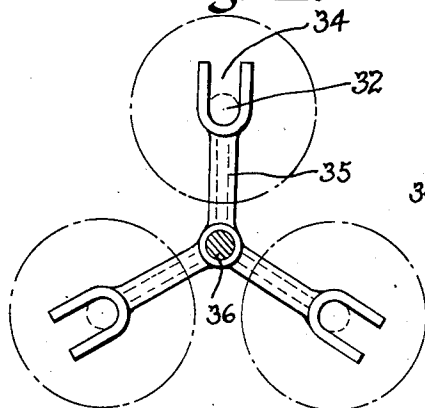


Fig. VIII.

Fig. IX.

Inventor
Napoleon R. Thibert.

By Harry H. Styll.

Attorney

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2 Sheets-Sheet 2

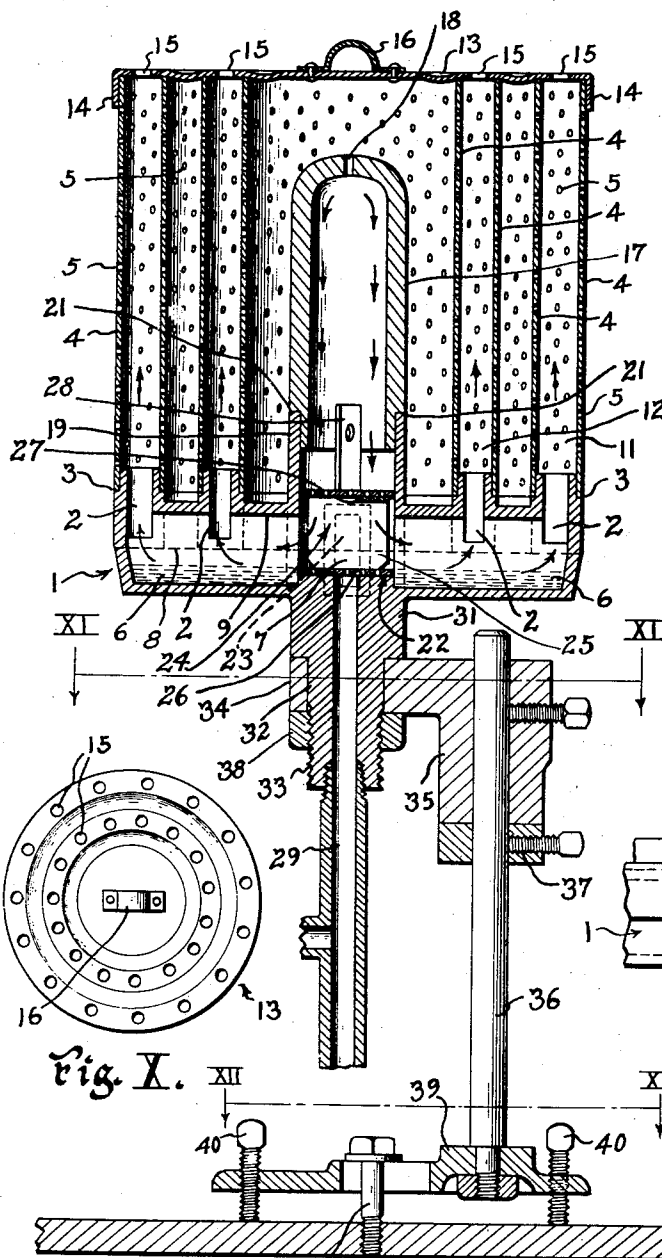


Fig. X.

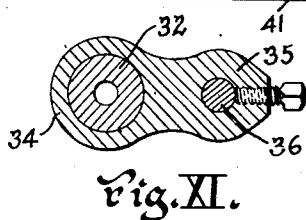


Fig. XI.

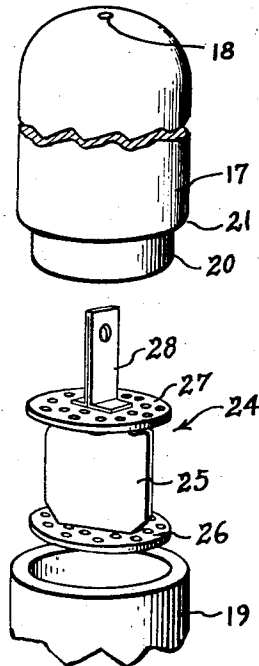


Fig. V.

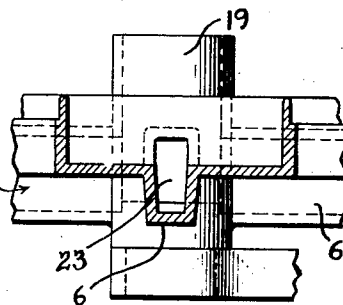


Fig. VI.

Fig. IV.

Inventor

Napoleon R. Thibert.

By Harry H. Styll

Attorney

UNITED STATES PATENT OFFICE

NAPOLEON R. THIBERT, OF WORCESTER, MASSACHUSETTS

LIQUID FUEL BURNER

Application filed September 13, 1930. Serial No. 481,695.

This invention relates to a liquid fuel burner adapted particularly to be set in domestic stoves and ranges without necessitating material changes therein whereby they may be operated by liquid fuel instead of other forms of fuel.

The invention further relates to improvements and additions in and to my liquid fuel burner set forth and described in my application for Letters Patent filed in the United States Patent Office September 12, 1929, and given the Serial Number 392,231, the present application being a continuation in part thereof.

The principal objects of the invention are to provide an efficient means for receiving the heat of burning products from a liquid fuel supply; preventing the escape of heat produced by the combustion of the fuel and utilizing this heat to vaporize the liquid fuel when the burner is started in operation; to provide this vaporizer in an extremely simple and convenient form which will also assist in raising the heat of the burner by the process of radiation; to provide ducts by which the vaporized fuel will be led by the shortest routes to the combustion spaces or chambers; to provide means by which these ducts can be cleaned in the simplest possible manner; and to provide a convenient support by which one, two, three, four or a multiple number of burners can be mounted in desired positions.

Other objects of the invention are to provide improved fuel conduits or passages extending below the main base of the burner whereby they may be surrounded by air or air currents tending to keep them cool; to provide improved baffling means to control the amount of heated currents coming in contact with the surface of the liquid fuel to vaporize the same; to provide means for introducing air into the heating chamber wherein the heated currents are produced for vaporizing the liquid fuel; to provide improved means of removing carbon and other deposits from the vaporizing chamber; to provide an improved vaporizing chamber, the bottom level of which is above the bottom level of the conduits or fuel passages; to provide improved means of introducing the fuel

supply to the conduits and vaporizing chamber; to provide improved covering means for the combustion chamber rings that will prevent the distortion of said rings by heat; to provide improved and simple burner couplings adapted to provide means for attaching any desired number of burners; and to provide simple and economical details of burner construction to carry out these objects and to obtain these and other advantages.

Other objects and advantages of the invention will become apparent from the following description taken in conjunction with the accompanying drawings. It will be apparent that many changes in the arrangement of parts and details of construction can be made without departing from the spirit of the invention as expressed in the accompanying claims. I, therefore, do not wish to be limited to the exact arrangements shown and described as the preferred forms only have been shown and described by way of illustration.

Referring to the drawings:

Fig. I is a top or plan view of a burner unit embodying the invention;

Fig. II is a cross section on line II—II of Fig. I;

Fig. III is a partial cross section on line III—III of Fig. I;

Fig. IV is a cross section similar to Fig. II showing a central fuel supply;

Fig. V is a perspective view showing the parts of the vaporizing chamber separated and aligned with each other;

Fig. VI is a cross section on line VI—VI of Fig. I;

Fig. VII is a plan view showing the attaching bracket for a four unit burner;

Fig. VIII is a plan view showing the attaching bracket for a three unit burner;

Fig. IX is a plan view showing the attaching bracket for a two unit burner;

Fig. X is a plan view on a reduced scale of the top cover for the combustion chamber rings;

Fig. XI is a cross section on line XI—XI of Fig. IV; and

Fig. XII is a plan view of the support base

shown in elevation and partly in section in Fig. IV.

Referring to the drawings, in which similar reference characters denote corresponding parts throughout: The burner base 1, which is preferably circular in shape, is provided with annular grooves 2, having the shouldered ledges 3 supporting the combustion rings 4 which are provided with the perforations or holes 5. The grooves 2 are connected with the fuel conduits or passageways 6 shown as diametrically arranged in Fig. I. These conduits 6 connect the outer grooves 2 with the central vaporizing chamber 7. While they are shown in Fig. I as four in number ninety degrees apart, a smaller or larger number may be employed if desired. These conduits 6 extend below the bottom 8 of the base of the burner 1. This allows the air to circulate around the outside of these conduits to keep them cool. The top 9 of the conduits is above the bottom 8 of the base so that part of the conduit is above the base 8 and a part below. The conduits 6 communicate with the grooves 2 by means of the openings 10 in the bottom of the grooves 2, see Fig. I.

The combustion rings 4 are annular in shape and fit the shouldered ledges 3 on the base 1. They form between them the combustion chambers 11 and 12, being in direct communication with the grooves 2. The walls of the rings 4 are perforated at 5 to provide inlets for combustion air. Over the top of the rings 4 is the cover plate 13. This is preferably a single plate fitting over the top of the rings 4, having the bounding flange 14, the openings 15 and the lifting handle 16. With this type of cover there is no tendency for the rings 4 to become distorted or to buckle under heat as in constructions having projections fitting between the rings 4 and/or secured thereto. The openings 15 are arranged in size and number to provide the necessary amount of air needed for the proper functioning of the burner. This cover plays an important part in the proper functioning of the burner.

In the central portion of the burner is the vaporizing chamber 7. This chamber comprises a chamber cap 17 having the breather opening or vent 18 in the top thereof. The cap 17 is preferably a cylindrical tube having a dome top thereover. The cap 17 fits on the annular wall or well 19 of the base 1, having a recessed flange 20 fitting within the well 19, the shoulders of the flange 20 resting on the well at 21. The bottom of the chamber 7 is at 22, the level of which is above the level of the bottom of the conduit 6 on the inside thereof. The conduits 6 communicate with the chamber 7 by means of the ports or openings 23, see Fig. VI. Within the well 19 is fitted the baffle or regulator 24, see Fig. V. This regulator comprises a supporting plate

25 having a perforated bottom plate or rest 26 and a top perforated plate 27 to which is secured the handle plate 28. This baffle plate limits the amount of heat passing from the vaporizing cap 17 to the surface of the fuel supply and also provides a simple and easy way of removing carbon or other deposits from the vaporizing chamber 7, as will be described hereinafter.

In Fig. IV the liquid fuel supply is led to the chamber 7 by means of the central supply pipe 29 which communicates with the fuel supply, while in Fig. II the fuel supply is led to the conduit 6 by means of the supply pipe 30 which communicates with the source of fuel supply. The supply pipe 30 is located adjacent to but removed from the chamber 7.

Extending below the base 1 is the attaching member 31 having a recessed part 32 and a threaded part 33. The recessed part 32 fits in an open fork 34 of the support 35 in Figs. VII, VIII and IX. In Fig. IV and Fig. XI the part 34 is not forked but has a circular opening therein for the part 32. The support 35 is slidably carried by the rod 36 being supported thereon by the slide stop 37. The part 32 is held in place in the fork 34 by means of a nut 38 screwed on the threaded part 33 of the member 31. The rod 36 is supported by a base 39 having the levelling screws 40 and the attaching screw 41. In the arrangement shown in Fig. IV there is only one fork 34 on the support 35. In Fig. IX there are two; in Fig. VIII there are three; and in Fig. VII there are four. Other numbers may be used. One burner may be supported or a multiple number, as desired, depending upon the number of forked supports utilized.

In order to pre-heat the liquid fuel to produce heat sufficient to vaporize the fuel for the continued operation of the burner, a wick or wicks 50 may be introduced, see Fig. II, in the grooves 2 and ignited. These wicks burn the fuel in the grooves 2 until sufficient heat is produced to vaporize the fuel. As the fuel vaporizes, the vapor ignites in the combustion chambers above the grooves and above the wicks 50 so that after the operation by means of the vapor takes place the wicks will be extinguished. These wicks consequently last for a long time. Fig. II illustrates the burning at a period just prior to the ignition of vapor above the wicks.

An electric heating unit may be also applied so as to heat the underside of the conduit 6, which heating unit may be coupled with a thermostat for controlling it and with means for making or breaking the electric current. The heating unit is turned off after the burner operates by means of the vaporized fuel. The same result may be obtained also by providing a cup under the conduit 6 in which alcohol or gasoline may be poured and ignited. Likewise, a gas jet may be also pro-

vided under the said conduit. Such preheating devices are illustrated in my prior application Serial No. 392,231, above mentioned, and as they are not a part of the present invention, they have not been illustrated in the drawings herein. In operation I prefer the use of wicks as described above.

The method of operation is as follows: Liquid fuel, preferably fuel oil, is admitted to the well 7 by the feed pipe 29, as shown in Fig. IV, or is admitted by the feed pipe 30 into the conduit 6, as shown in Fig. II. The fuel is then pre-heated to the point of ignition by means of the wicks 50 or a pre-heater as referred to above, the ignited fuel ascending from the conduits 6 through the grooves 2 into the combustion chambers 11 and 12 thereabove between the combustion rings 4. This combustion, especially the combustion in the inner combustion chamber 12, heats up the vaporizing cap 17 at times almost to a white heat. This heats the air within the vaporizing cap, said air being introduced into the cap through the vent or breather opening 18. The heated currents in the cap 17 descend as indicated by the arrows in Fig. IV through the well 19 and through the perforated baffle plate 27 into the vaporizing chamber 7 and through the openings or ports 23 into the conduits 6. These hot currents come in contact with the surface of the liquid fuel in the chamber 7 and in the conduits 6 and vaporize the fuel. This vapor rises through the grooves 2 into the combustion chambers 11 and 12 where it is ignited and consumed. This combustion of course continues to heat the vaporizing cap 17, as described, and the operation is continuously repeated. It will be observed that liquid fuel enters the fuel grooves 2, during early stages of operation of the burner, but after the burner has become heated and enters into normal operation, heat from the burner vaporizes the liquid fuel to a point below the bottoms of these circular grooves, as illustrated in Fig. 4, so that there will be no liquid fuel as such in these grooves. Vaporized fuel will, however, enter the grooves and pass therefrom into the upstanding perforated members 4 where it is vaporized.

As a portion of the conduits 6 are below the base of the burner the air is free to circulate around them to keep their temperature down, which cooling prevents carbonizing. The perforated plate 27 of the baffle member 24 can be so designed as to admit the required amount of the heated currents from the cap 17 to the chamber 7 and conduits 6 to provide the proper vaporization of the fuel and to cut down the accumulation of carbon which increases with the heat and also carbon, or other deposits in the chamber 7 may be easily removed by the lower baffle plate 26 by removing the baffle member and removing the deposit therefrom. The lower baffle

plate 26 catches most of the carbon which comes away with it when the baffle member is removed. The cover 13 is so designed as to prevent distortion of the combustion rings 4 and to provide the proper ventilation at the top. The bottom of the chamber 7 being above the level of the bottom of the conduits 6, insures a flow of the fuel from the chamber 7 into the conduits 6. This introduces a very great feed advantage. The fuel spreads out better, has a spiral motion, due to the fact that the grooves 2 and the combustion chambers 11 and 12 are annular, while the fuel is introduced at spaced points therein, and produces a natural element of a draft. There is more fuel spread for better vaporization and it keeps cooler and has less carbonization.

The burner is so designed that the fuel may be introduced either centrally into the vaporizing chamber 7 or into the conduits 6 as described, and the support for the burner is so arranged that by simple and inexpensive means either single or multiple burners may be employed in any given instance.

Attention is particularly invited to the height of the vaporizing cap 17 and its ease of application and separation, the height insuring a large heating surface for the vaporizing currents and its separable attachment making it easy to clean and giving easy access to the vaporizing chamber 7. This vaporizing chamber with its dome top and breather vent produces a vaporizing column of heated currents that descend to vaporize the fuel and force the vapor through the conduits into the grooves. The vent eliminates a vacuum and gives the heat a free chance to circulate. It permits the mixing of air with the heated currents.

From the foregoing description it will be seen that I have provided simple, economical and efficient means for obtaining all the objects and advantages of the invention.

Having described my invention, I claim:

1. In a device of the character described, a base member having a fuel groove therein, a combustion chamber above said groove, a relatively high vaporizing chamber adjacent the combustion chamber and positioned to be heated by the heat from said combustion chamber, said vaporizing chamber having a relatively small opening adjacent its upper end for the admission of air into said vaporizing chamber, a fuel conduit communicating with said fuel groove and with said vaporizing chamber, means for introducing liquid fuel into said conduit, the heated currents in said vaporizing chamber being in communication with the surface of the fuel to aid in vaporizing the same, and a perforated baffle plate in said vaporizing chamber and spaced from the bottom thereof to limit the amount of said heated currents proceeding from the vaporizing chamber to the surface of the fuel.

2. In a device of the character described, a base member having a fuel groove therein, a combustion chamber having perforated walls above said groove, a relatively high vaporizing chamber independent of, and adjacent the combustion chamber, positioned to be heated by the heat therefrom, a fuel conduit communicating with said fuel groove and with said vaporizing chamber, the bottom of said vaporizing chamber being at a higher level than the bottom of said conduit, and means for introducing liquid fuel into said conduit, said vaporizing chamber having an opening to atmosphere in the upper portion thereof and being in free communication at the bottom thereof with said conduit whereby combustion air will enter the vaporizing chamber and pass therethrough into said conduit.

3. In a device of the character described, a base member having fuel grooves, combustion chambers above said grooves, having perforated walls, and a vaporizing chamber centrally of said grooves, fuel conduits communicating with said grooves and with said vaporizing chamber, the bottom of said chamber being above the level of the bottoms of the channels in said conduits and means for introducing liquid fuel into one of said conduits, said conduits communicating with said chamber adjacent the bottom thereof, said vaporizing chamber having an opening to atmosphere in the upper portion thereof and being in free communication at the bottom thereof with said conduit whereby combustion air will enter the vaporizing chamber and pass therethrough into said conduit.

4. In a device of the character described, a base member having fuel grooves and a vaporizing chamber central of said grooves, fuel conduits communicating with said grooves and with said vaporizing chamber, the bottom of said chamber being above the level of the bottoms of the channels in said conduits, means for introducing liquid fuel into one of said conduits, said conduits communicating with said chamber adjacent the bottom thereof, said vaporizing chamber having an opening to atmosphere in the upper portion thereof and being in free communication at the bottom thereof with said conduit whereby combustion air will enter the vaporizing chamber and pass therethrough into said conduit, and a perforated baffle plate in said chamber adjacent to but spaced from the bottom thereof.

5. In a device of the character described, a base member having fuel grooves therein, upstanding tubes above said grooves and forming combustion chambers above said grooves and communicating therewith, a relatively high vaporizing chamber surrounded by the combustion chambers and heated therefrom, whereby vapor within said chamber will be heated, said vaporizing chamber

comprising a lower well portion and a removable dome capped portion having a vent adjacent its top, fuel conduits communicating with said grooves and with the lower well of said vaporizing chamber adjacent the bottom thereof, means for introducing liquid fuel into said conduits, for vaporization by heat in the vaporizing chamber, said conduits being in communication with the interior of the vaporizing chamber, and thereby effective to conduct the vaporized fuel to the fuel grooves and combustion chambers and fuel deflecting means in said vaporizing chamber adjacent to but spaced from the bottom thereof, and positioned in the path of heated vapors passing from the vaporizing chamber over the surface of the fuel, in the conduits.

6. In a device of the character described, a base member having fuel grooves, perforated combustion tubes mounted thereabove and forming combustion chambers, and a vaporizing chamber centrally of said tubes and heated therefrom whereby vapor within said chamber will be heated, said chamber comprising a lower well portion, an upper removable cap portion having a relatively small vent adjacent its top, means establishing communication between said fuel grooves and said vaporizing chamber and fuel deflecting means in the chamber adjacent to but spaced from the bottom thereof and positioned in the path of heated currents descending from the cap portion to the well portion, and to said fuel grooves.

7. In a device of the character described, a base member having fuel grooves perforated combustion tubes mounted thereabove and forming combustion chambers, and a vaporizing chamber centrally of said tubes and heated therefrom whereby vapor within said chamber will be heated, said chamber comprising a lower well portion, an upper removable cap portion having a relatively small vent adjacent its top, means establishing communication between said fuel grooves and said vaporizing chamber, fuel deflecting means in the chamber adjacent to but spaced from the bottom thereof and positioned in the path of heated currents descending from the cap portion to the well portion, and to said fuel grooves and means for removing the said deflecting means.

8. In a device of the character described, a base member having a fuel groove therein, a combustion chamber above said groove and in communication therewith comprising a plurality of upstanding perforated tubes forming extensions of the walls of said groove, a relatively high vaporizing chamber, independent of, and adjacent a wall of the combustion chamber and positioned to be heated by the heat from said combustion chamber, said vaporizing chamber having a relatively small opening adjacent its upper end for the admission of air into said vaporizing cham-

ber, a fuel conduit below said groove and communicating therewith and with said vaporizing chamber, means for introducing liquid fuel into said conduit whereby, the heated vapors in said vaporizing chamber will contact with the surface of the fuel, and will aid in vaporizing the same.

9. In a device of the character described, a base member having a fuel groove therein, a combustion chamber in communication with said groove, comprising upstanding perforated sheet members mounted above said groove, a fuel conduit means to supply liquid fuel thereto, said conduit having a relatively deep, channel portion below and communicating with said fuel groove and said combustion chamber, and forming a vaporizing chamber, the level of the bottom of the channel being below the level of the bottom of the fuel groove and the top of said channel being above the bottom of said fuel groove.

10. In a device of the character described, a base member having a fuel groove therein, a combustion chamber in communication with said groove, comprising a plurality of upstanding perforated tubes mounted above said groove, a fuel conduit means to supply liquid fuel thereto, said conduit having a relatively deep channel provided with top and bottom walls, said channel communicating with said fuel groove and said combustion chamber and forming a vaporizing chamber, the level of the bottom wall of the channel being below the level of the bottom of the fuel groove and the top wall of said channel being above the level of the bottom of the fuel groove.

11. In a device of the character described, a base member having a plurality of concentric annular fuel grooves therein, a combustion chamber for each of the fuel grooves comprising a plurality of upstanding perforated tubes above each of said grooves, a fuel conduit means to supply liquid fuel thereto, said conduit having a relatively deep channel portion below and communicating with said fuel grooves and said combustion chamber and forming a vaporizing chamber, the bottom level of the channel being below the bottom level of the fuel groove and the top of the channel being above the bottom level of the said fuel grooves, said conduit extending transversely across said fuel grooves and acting as a bracing and tying member for the base on the underside thereof.

12. In a device of the character described, a base member having a fuel groove therein, a combustion chamber in communication with said groove, comprising a plurality of upstanding perforated tubes mounted above said groove, a fuel conduit means to supply liquid fuel thereto, said conduit having a relatively deep channel provided with top and bottom walls, said channel communi-

cating with said fuel groove and said combustion chamber and forming a vaporizing chamber, the level of the bottom wall of the channel being below the level of the bottom of the fuel groove and below the level of the combustion chamber.

13. In a device of the character described, a base member having a plurality of concentric annular fuel grooves therein, a combustion chamber for each of the fuel grooves comprising a plurality of upstanding perforated tubes above each of said grooves, a fuel conduit means to supply liquid fuel thereto, said conduit having a relatively deep channel portion below and communicating with said fuel grooves and said combustion chambers and forming a vaporizing chamber, the level of the bottom of the channel being below the level of the bottom of the fuel groove and below the level of the combustion chamber, said conduit extending transversely across said fuel grooves and acting as a bracing and tying member for the base on the underside thereof.

14. In a device of the character described, a base member having fuel grooves and a central vaporizing chamber, a conduit connecting said grooves and said chamber, means to supply fuel to said vaporizing chamber and to said fuel grooves, means to conduct heat to said chamber to vaporize said fuel, whereby vapors may pass from the vaporizing chamber through the conduit and in contact with the fuel in said grooves to assist in vaporizing such fuel, and a combustion chamber above said grooves and in communication therewith and with said conduit; a movable member in the vaporizing chamber and in the path of circulation of the vapors, means for lifting said member from the vaporizing chamber, said member including a plate effective to collect carbon deposits to remove same when it is lifted from the chamber.

15. In a device of the character described, a base member having a fuel groove, a combustion chamber including upstanding perforated members, thereabove, and a vaporizing chamber; means to introduce liquid fuel to said chamber, and means establishing communication between said chamber and said groove, including a conduit forming an additional vaporizing chamber, the level of the bottom of said conduit being located below the level of the bottom of said first vaporizing chamber.

16. In a device of the character described, a base member having a fuel groove, a combustion chamber including upstanding perforated members, thereabove, and a vaporizing chamber; means to introduce liquid fuel to said chamber, and means establishing communication between said chamber and said groove, including a conduit forming an additional vaporizing chamber, the level of the

bottom portion of the conduit at its junction with said chamber, being located below the level of the bottom of said chamber.

17. In a device of the character described,
5 a base member having an annular fuel groove, a combustion chamber including upstanding perforated members, thereabove, and a vaporizing chamber, disposed centrally of said groove; means to introduce liquid fuel to
10 said chamber, and means establishing communication between said chamber and said groove, including a radially disposed conduit extending from said chamber to said groove and forming an additional vaporizing
15 chamber, the level of the bottom of said conduit being located below the level of the bottom of said first vaporizing chamber.

18. A fuel oil burner comprising a base, a fuel receiving depression formed in said
20 base, a combustion chamber including upstanding perforated members, thereabove, a source of oil supply, including a port in said base, a conduit between said port and said depression and forming a vaporizing chamber,
25 the level of the bottom wall of said conduit being located below the level of the base at the port.

19. A fuel oil burner comprising a base, a fuel receiving depression formed in said base,
30 a combustion chamber including upstanding perforated members, thereabove, a source of oil supply including a port in said base, a vaporizing chamber above said port, a conduit between said port and said depression
35 and forming a vaporizing chamber, the level of the bottom wall of said conduit being located below the level of the bottom of said vaporizing chamber.

NAPOLEON R. THIBERT.

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