March 26, 1940. L. KATZ 2,194,599

OIL BURNER

Filed Dec. 11, 1937 2 Sheets-Sheet 1

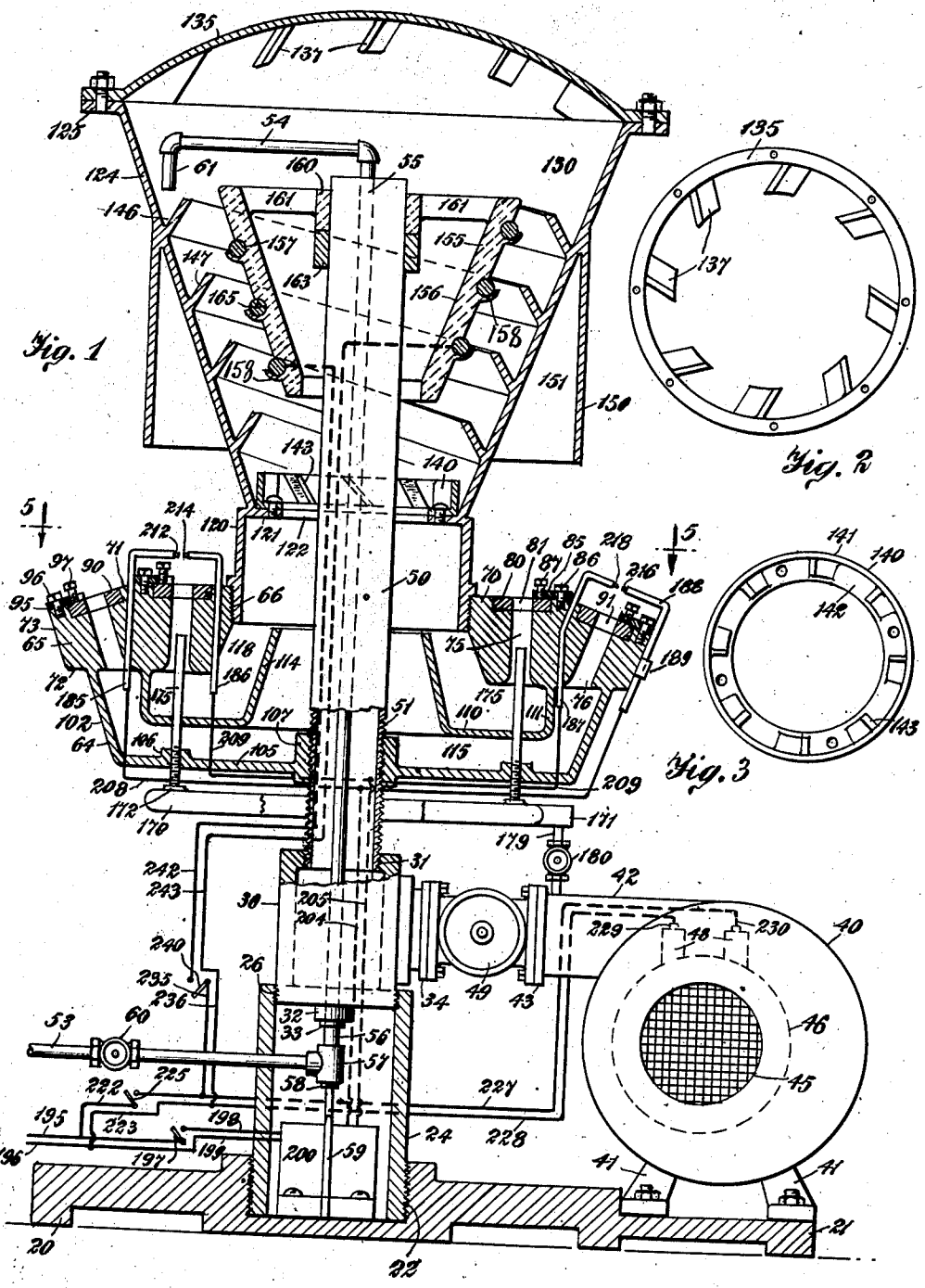


Fig. 1



Fig. 2



Fig. 3

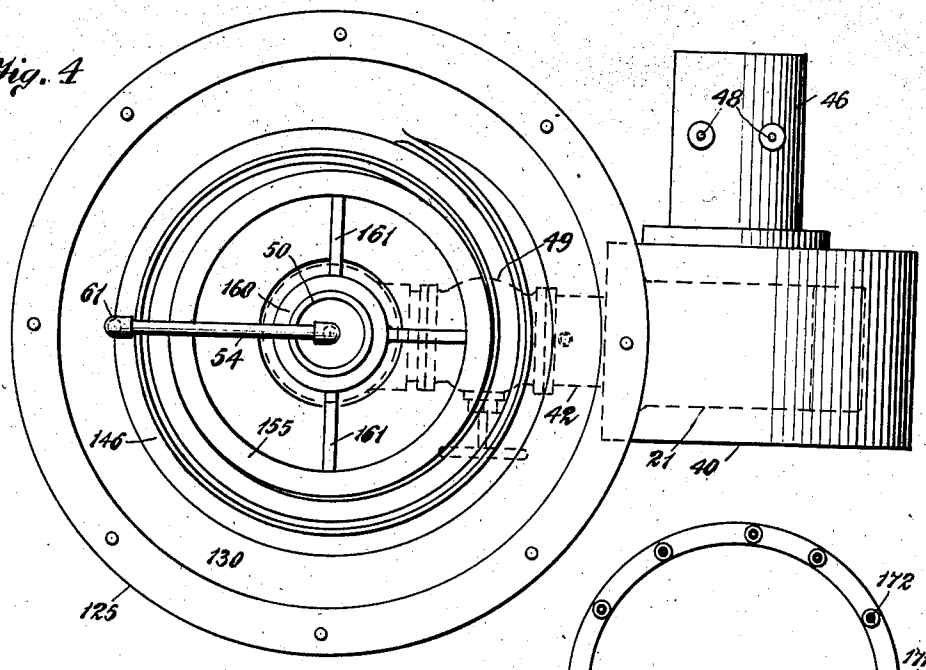
INVENTOR.
LOUIS KATZ
BY A. Ade Bonneville
ATTORNEY.

March 26, 1940. L. KATZ 2,194,599

OIL BURNER

Filed Dec. 11, 1937 2 Sheets-Sheet 2

Fig. 4



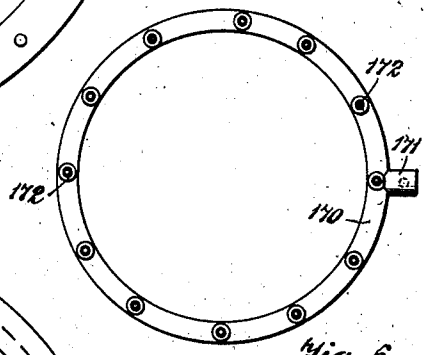




Fig. 6

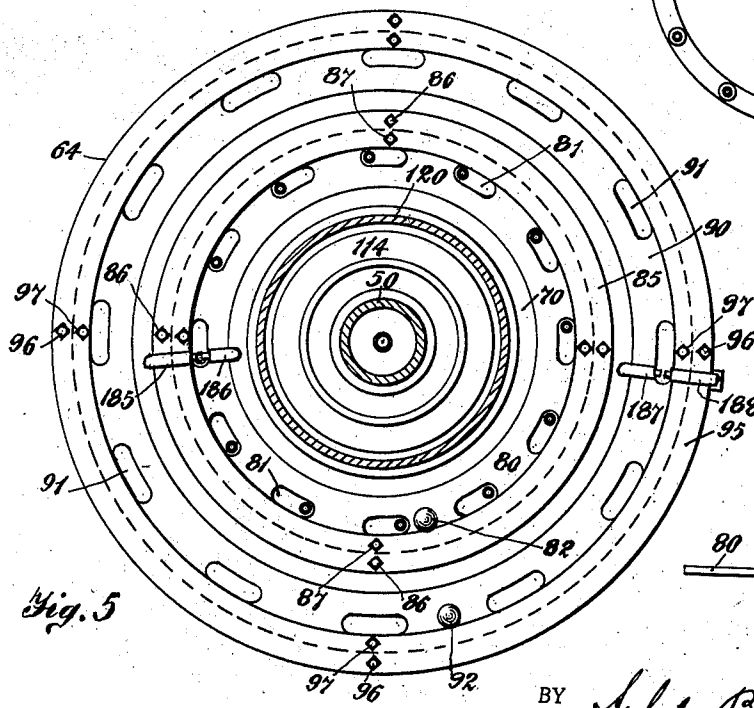



Fig. 5

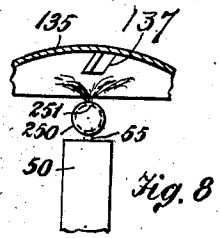



Fig. 8




Fig. 7

INVENTOR.
LOUIS KATZ
BY A. L. Bonneville
ATTORNEY.

Patented Mar. 26, 1940 2,194,599

# UNITED STATES PATENT OFFICE

2,194,599

## OIL BURNER

Louis Katz, Brooklyn, N. Y.

Application December 11, 1937, Serial No. 179,305

6 Claims. (Cl. 158—53)

This invention relates to oil burners.

One of the objects of the invention is the production of means whereby liquid fuel is thoroughly vaporized by heated air before being discharged from the burner, one of said means being located in the vaporizing chamber of the burner and a second means functions on the outer surface of said vaporizing chamber.

A second object comprises the production of means to control the means functioning with the outer surface of the burner.

A third object of the invention relates to controlling means for the heat generated in the vaporizing chamber.

A fourth object of the invention refers to controlling means to vary the amount of vaporized fuel discharged from the burner.

A fifth object of the invention relates to the means for controlling the volume of air supplied to the vaporizing chamber of burner.

A sixth object of the invention is to control the ignition of the vaporized fuel as it is discharged from the burner.

A seventh object of the invention relates to means for controlling the amount of liquid fuel delivered to the vaporizing chamber.

The eighth object of the invention refers to means to thoroughly mix the mixture of liquid fuel and air in the vaporizing chamber of the burner.

The ninth object of the invention relates to means to produce a blue flame of the mixture of air and fuel oil, which function with the outer surface of the vaporizing chamber of the burner.

In the drawings Fig. 1 represents a partial vertical longitudinal section of the oil burner with portions indicated in full lines; Fig. 2 shows a bottom view on a reduced scale of the cover of the vaporizing chamber burner; Fig. 3 indicates a top view on a reduced scale of the twirler shown in Fig. 1; Fig. 4 shows a partial top view of Fig. 1 with its cover removed; Fig. 5 indicates a section of Fig. 1 on the line 5, 5; Fig. 6 indicates a top view of the annular air supply chamber of the burner on a reduced scale; Fig. 7 shows an elevation on a reduced scale of a detail and Fig. 8 shows a modification of Fig. 1 on a reduced scale.

The oil burner is exemplified to comprise the cylindrical shaped foot 20 which has integral therewith the extension 21. A cavity having the thread 22 extends into the foot 20. A nipple 24 is indicated with the interior thread 26 at its upper end and an exterior thread at its lower end. The latter thread engages the thread 22. A T-shaped fitting 30 is indicated with an interior thread 31 at its upper end and an exterior thread at its lower end. The latter thread is in engagement with the thread 26. A boss 32 extends from the lower face of the fitting 30 and in an opening of the latter is secured a reducer 33. From the side of the T-shaped fitting 30 extends the fitting 34.

A fan blower is indicated in its entirety by the numeral 40 and is shown with the legs 41, which are supported upon and fastened to the extension 21. The outlet nozzle 42 of the blower is shown having the flange 43. The inlet opening of the blower is shown at 45. An electric motor 46 for the blower 40 extends from the latter. The electric motor 46 is shown with the extensions 48 for its electric terminals. An air controlling valve 49 connects the flange 43 and the flange of the fitting 34.

A vertical air supply conduit 50 open at its top and is indicated having the exterior thread 51 at its lower end, which latter engages the interior thread 31 of the T-shaped fitting 30.

Fuel supply piping is indicated having the bottom horizontal member 53, the top horizontal member 54 and the vertical member 55. The member 53 and a pipe 56 extending from the reducer 33 are connected by the T 57. The latter has connected thereto the threaded plug 58 from which extends the supporting rod 59. A controlling valve 60 is provided for the member 53. From the horizontal member 54 extends the outlet nozzle 61.

A controlling housing which with its appurtenances controls the volume of vaporized fuel discharged from the oil burner, is indicated in its entirety by the numeral 64. The housing 64 comprises the upper portion 65 with an opening having the thread 66. The portion 65 is indicated with the upper horizontal face 70 which connects with the inclined outer face 71. The bottom horizontal face of the portion 65 is shown at 72 and an inclined circular outer face is shown at 73. A series of vertical inner discharge openings are indicated at 75 and a series of inclined outer discharge openings are indicated at 76.

A controlling ring 80 is adjustably positioned in a recess extending from the face 70, and has a series of discharge openings 81 extending therethrough which coact with the openings 75.

A controlling knob 82 extends up from the ring 80. A clamping ring 85 is secured to the face 70, by means of the bolts 86 and bears upon the controlling ring 80. Bolts 87 are in threaded engagement with the clamping ring 85 and detachably pinch the controlling ring 80.

In a recess in the inclined face 71 is adjustably positioned a controlling ring 90 which has a series of discharge openings 91 extending therethrough, which coact with the openings 76. A controlling knob 92 similar to 82 extends from the ring 90. A clamping ring 95 is secured to the face 71 by means of the bolts 96 and bears upon the controlling ring 90. Bolts 97 are in threaded engagement with the clamping ring 95 and detachably pinch the controlling ring 90.

From the bottom face 72 of the upper portion 65 of the controlling housing 64 extends the tapering outer wall 102 which joins with the bottom wall 105.

The wall 105 has integral therewith the threaded bosses 106 which latter are axially in line with the discharge openings 75. A threaded sleeve 107 coaxial with the conduit 50 is integral with the wall 105 and said conduit is in threaded engagement with the sleeve 107. Above the wall 105 and parallel thereto is indicated the inner wall 110 which joins with the cylindrical wall 111, and the latter extends to the face 72 of the controlling housing 64. A tapered wall 114 extends upwardly from the wall 110.

Between the walls 102, 105 and the walls 110, 111 and 114 is formed the main outlet chamber 115, and with the walls 110, 111 and 114 is formed the second outlet chamber 118. The chamber 115 connects with the discharge openings 76 and the chamber 118 connects with the discharge openings 75.

In the opening having the thread 66 of the upper portion 65, of the housing 64, is secured the cylindrical hood 120 having the upper annular wall 121 which latter forms the opening 122. From the upper end of the hood 120 extends the conical wall 124 with the flange 125 at its upper end for the funnel shaped vaporizing chamber 130 of the oil burner.

To the flange 125 is bolted the head 135 for the chamber 130. From the inner face of the head 135 extend the plurality of inclined blades 137 functioning as twirlers.

To the annular wall 121 of the hood 120 is fastened the twirler 140 having the cylindrical wall 141 and the bottom flange 142. Inclined blades 143 are integral with the twirler 140, which are oppositely inclined to the blades 137.

From the inner face of the wall 124 extends the helical conical shaped gutter designated in its entirety by the numeral 146. The said gutter 146 is indicated having the inclined wall 147 which makes an angle with the inner face of the wall 124. The outlet nozzle 61 is positioned over the top of the upper portion of the gutter 146, so that the liquid fuel discharged from the nozzle drops into said gutter.

From the outer face of the wall 124 extends the cylindrical wall 150 which forms the annular pocket 151 with the outer face of the wall 124.

In the vaporizing chamber 130 is indicated the conical shaped porcelain support 155 having the conical wall 156 with the helical groove 157 having the cup shaped supporting flange 158. A collar 160 at the upper end of the support 155 has extending therefrom the radial members 161, which extend to the wall 156. A sleeve 163 is fastened to the conduit 50 and the collar 160 is supported on said sleeve 163. A Nichrome wire 165 is tightly positioned in the groove 157.

An annular air supply chamber 170 has connected thereto the projecting portion 171, and has extending from its top face the threaded bosses 172. The air supplied by the pipes 175, gives the fuel vapor discharged from the openings 81 a Bunsen effect. Air supply pipes 175 are in threaded engagement with the bosses 106 and 172 and lead to the discharge openings 75. Piping 179 with the air controlling valve 180 connects the projecting portion 171 and the outlet nozzle 42 of the fan blower 40.

A pair of cylindrical supports 185 and 186 extend through the upper portion 65 of the controlling housing 64 and are tightly secured in place. A third cylindrical support 187 extends through the said upper portion 65 and a fourth cylindrical support 188 is fastened to the inclined outer face 73 of said portion 65, by means of the clamp 189.

A pair of feed wires 195 and 196 extend from a source of electric current not shown. An electric switch 197 is connected to the wire 195 and to a wire 198. The wire 198 and a wire 199, which leads from the wire 196, extend to the transformer 200, located in the nipple 24.

Wires 204 and 205 extend from the transformer 200, and pass through the nipple 24. The wire 204 connects with the wire 208, and the wire 205 connects with the wire 209. One end of the wire 208 leads to the support 185 and enters the same and leads to ignition spark terminal 212, and one end of the wire 209 extends to the support 186 and enters the same and leads to ignition spark terminal 214.

The other end of the wire 208 leads to the support 188 and enters the same and leads to ignition spark terminal 216. The other end of the wire 209 leads to the support 187, enters the latter and leads to the ignition spark terminal 218.

From the wires 195 and 196 lead the wires 222 and 223. The wire 222 connects with one end of the electric switch 225. A wire 227 extends from the other end of the switch 225, and a wire 228 leads from the wire 223. The wires 227 and 228 lead to the terminals 229 and 230 of the electric motor 46. Wires 235 and 236 respectively extend from the wires 227 and 228. The wire 235 leads to one end of the electric switch 240. A wire 242 extends from the other end of the switch 240. A wire 243 extends from the wire 236. The wires 242 and 243 enter the conduit 50 and are connected to terminals of the Nichrome wire 165. The electric switches 197, 225 and 240 are supported by suitable means not shown.

Referring to Fig. 8, a fragmentary portion on a reduced scale of the head 135 with one of its blades 137 is indicated. The vertical air supply conduit is again indicated at 50 with the vertical member 55 of the fuel supply piping. A hollow sphere 250 having the outlet opening 251 extends from the vertical member 55.

In this modification when the liquid fuel flows up the vertical member 55 it enters the hollow sphere 250 and is discharged from the latter through the outlet opening 251 in a spray, which impinges against the inner face of the head 135 and small globules of liquid fuel will drop into the vaporizing chamber 130.

The function of the hollow sphere 250 is to supply a reservoir for the liquid fuel at the outlet end of the member 55, by means of which a fine spray of liquid fuel is produced when it flows from the sphere 250.

To operate the oil burner the operator starts the fan blower 40 by closing the electric switch 225. The air discharged from the fan blower flows up the conduit 50 into the vaporizing chamber 130 and strikes the inner face of the head 135 and is deflected therefrom into the chamber

130 and at the same time is twirled by the blades 137 and 143. The operator then closes the electric switch 240 by which the Nichrome wire 165 is energized. Next the valve 60 is opened and liquid fuel flows up the vertical pipe 55 and is discharged from the outlet nozzle 61 and enters the gutter 146 and flows down the latter, or the liquid fuel enters the sphere 250 and is discharged from the latter through its opening 251 in a spray and impinges against the inner face of the head 135.

The liquid fuel drops from the head 135 in the form of small globules which enter the vaporizing chamber 130 to mix with the air in the latter. The mixture of liquid fuel and air is thoroughly twirled and mixed in the vaporizing chamber 130, and are initially heated by the Nichrome wire 165, which is energized by closing the electric switch 240, to thoroughly vaporize the liquid fuel.

The vaporized liquid fuel leaves the vaporizing chamber 130 and simultaneously enters the main outlet chamber 115 and the second outlet chamber 118. The vaporized mixture leaves the chamber 115 through the openings 91, and enters the combustion chamber of the furnace for which the oil burner is used. The size of the openings 91 can be varied by moving the controlling ring 90 to different positions by its knob 92.

To move the controlling ring 90 the bolts 97 have to be unscrewed and afterward must be screwed down to pinch the ring to hold it in place. When the vaporized mixture is discharged from the openings 91 it is ignited by the ignition spark terminals 216 and 218 by closing the electric switch 197.

The vaporized fuel in the outlet chamber 118, leaves the latter through the openings 81, and enters the annular pocket 151 formed by the walls 124 and 150 to impinge against the outer face of the conical wall 124 of the vaporizing chamber 130, to thoroughly heat the mixture of liquid fuel and air therein. As soon as the mixture in the chamber 130 is heated by the mixture flowing from the openings 81, the current for the Nichrome wire may be shut off. The size of the openings 81 may be varied by moving the controlling ring 80 by the knob 82. To move the ring 80 the bolts 87 have to be loosened and afterward screwed down to pinch said ring 80. The vaporized mixture discharged from the openings 81 is ignited by the ignition spark terminals 212 and 214 when the switch 197 is closed.

Special attention is called to the wall 150, which forms the annular pocket 151, with the outer face of the wall 124, of the vaporing chamber 130. The purpose of the wall 150, is to form the pocket 151, which receives the vaporized fuel discharged from the openings 81 and said pocket assures the contact of said fuel with the wall 24, to thoroughly heat the mixture of liquid fuel and air in the chamber 130.

Various modifications may be made in the invention and the present exemplification is to be taken as illustration and not limitation thereof.

Having described my invention I claim:

1. In an oil burner the combination of an air supply conduit, a fan blower in connection with said conduit to supply air thereto, a controlling housing supported by said conduit and having a series of vertical discharge openings and a series of inclined discharge openings, a vaporizing chamber above said controlling housing and in connection therewith, the upper end of said conduit within the vaporizing chamber, liquid fuel supply piping leading into the vaporizing chamber, the liquid fuel vaporized in the vaporizing chamber and discharged through both the series of openings of the controlling housing and electric means to ignite the jets of vaporized fuel as they are discharged from said series of openings.

2. In an oil burner the combination of a funnel shaped vaporizing chamber, the wall of the vaporizing chamber having on its inner face a helical conical gutter extending from its upper to its lower portion, said gutter formed by an inclined wall extending from the inner face of said chamber, an air supply conduit extending into the vaporizing chamber, liquid fuel supply piping extending up through said conduit leading to the upper portion of the gutter and electric means in the vaporizing chamber to vaporize the liquid fuel.

3. In an oil burner the combination of a funnel shaped vaporizing chamber, the wall of the chamber having a helical conical gutter extending from its upper to its lower portion, a head having a plurality of inclined blades for the vaporizing chamber to function as a twirler for the contents of the vaporizing chamber, a twirler having inclined blades at the lower end of the vaporizing chamber, the latter blade inclined in a direction opposite the blades of said head, an air supply conduit extending into the vaporizing chamber, liquid fuel supply piping extending into the chamber leading to the upper portion of said gutter and electric means in the vaporizing chamber to vaporize the liquid fuel supplied by the liquid fuel supply piping.

4. In an oil burner the combination of a funnel shaped vaporizing chamber having a conical wall, a helical conical gutter extending from the inner face of the chamber from its upper to its lower end, a head for the chamber having inclined blades extending from its inner surface to function as a twirler for the contents of the chamber, a twirler having inclined blades at the lower end of the chamber, a cylindrical wall extending from the outer face of the conical wall of the chamber forming an annular pocket, an air supply conduit extending into the vaporizing chamber, liquid fuel supply piping extending into the chamber leading to the upper portion of said gutter, electric means in the chamber to vaporize the fuel and an electric switch to control said electric means.

5. In an oil burner the combination of a vaporizing chamber, a controlling housing below and in connection with said chamber and having a pair of outlet chambers each of the latter having a series of discharge openings, a ring with a series of discharge openings coacting with each series of discharge openings of the outlet chambers, means to clamp each of said rings in different positions to vary the effective openings of each ring, an air supply conduit open at its top end extending into the vaporizing chamber, a liquid fuel supply pipe extending into the vaporizing chamber, said vaporizing chamber and controlling housing constructed to lead the mixture of liquid vaporized fuel and air from the vaporizing chamber to the outlet chambers of the controlling housing and electric means to ignite the streams of vaporized fuel as they are discharged from the said outlet chambers.

6. In an oil burner the combination of a vaporizing chamber, a controlling housing below and in connection with said chamber and having a pair of outlet chambers, each of the latter having a series of discharge openings, an air supply

conduit extending into the vaporizing chamber, liquid fuel supply piping extending into the vaporizing chamber, a fan blower for the burner coacting with the air supply conduit, a valve between the conduit and the blower, an annular air supply chamber below the controlling housing, piping connecting the outlet nozzle of the fan blower and the annular air supply chamber, the latter piping having a valve connected thereto and supply pipes for air extending from the annular air supply chamber and leading into the series of discharge openings of one of the outlet chambers of the controlling housing.

LOUIS KATZ.