

May 12, 1936

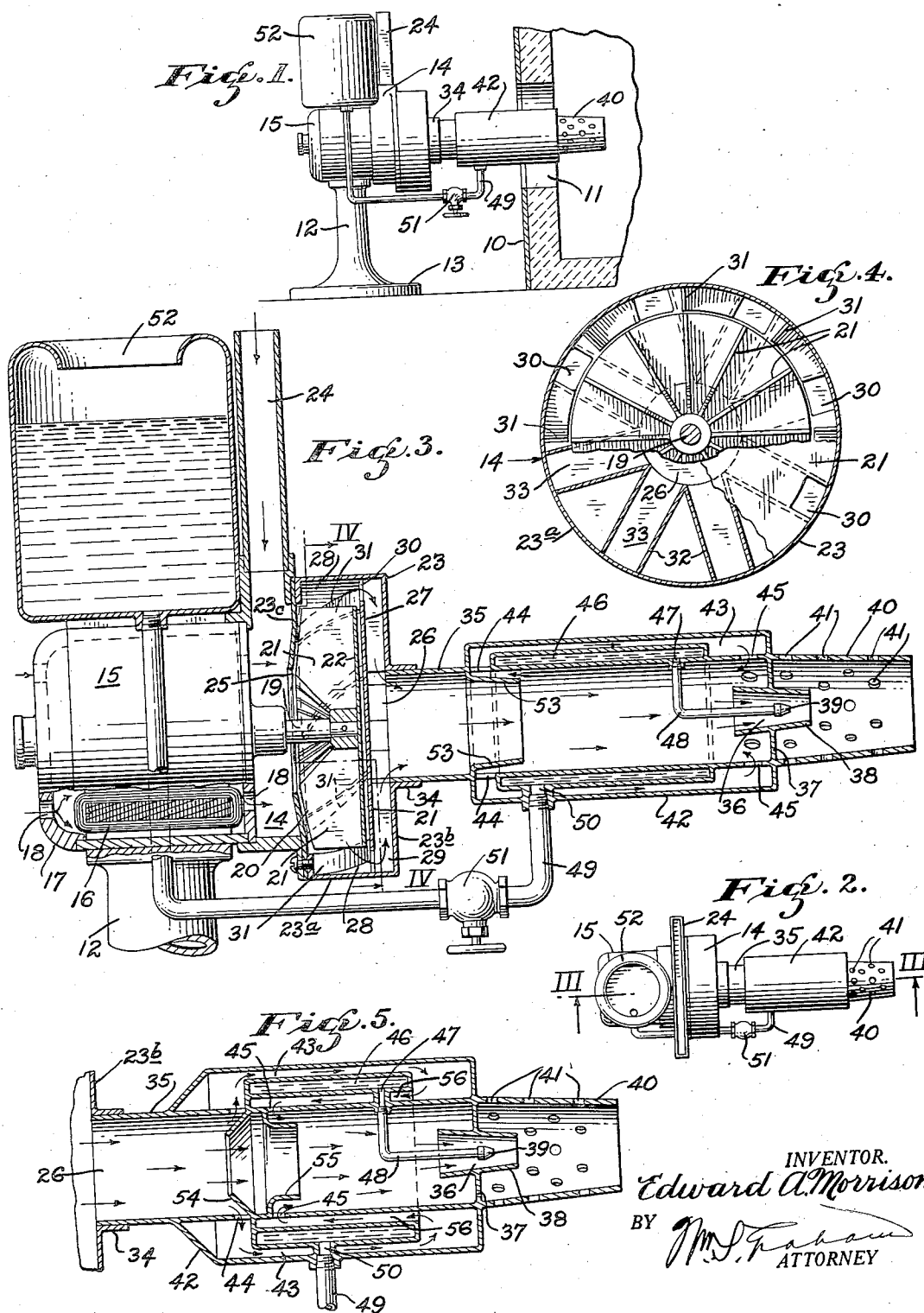
E. A. MORRISON

FLUID FUEL BURNER

Filed June 25, 1934

2,040,523

2 Sheets-Sheet 1



May 12, 1936.

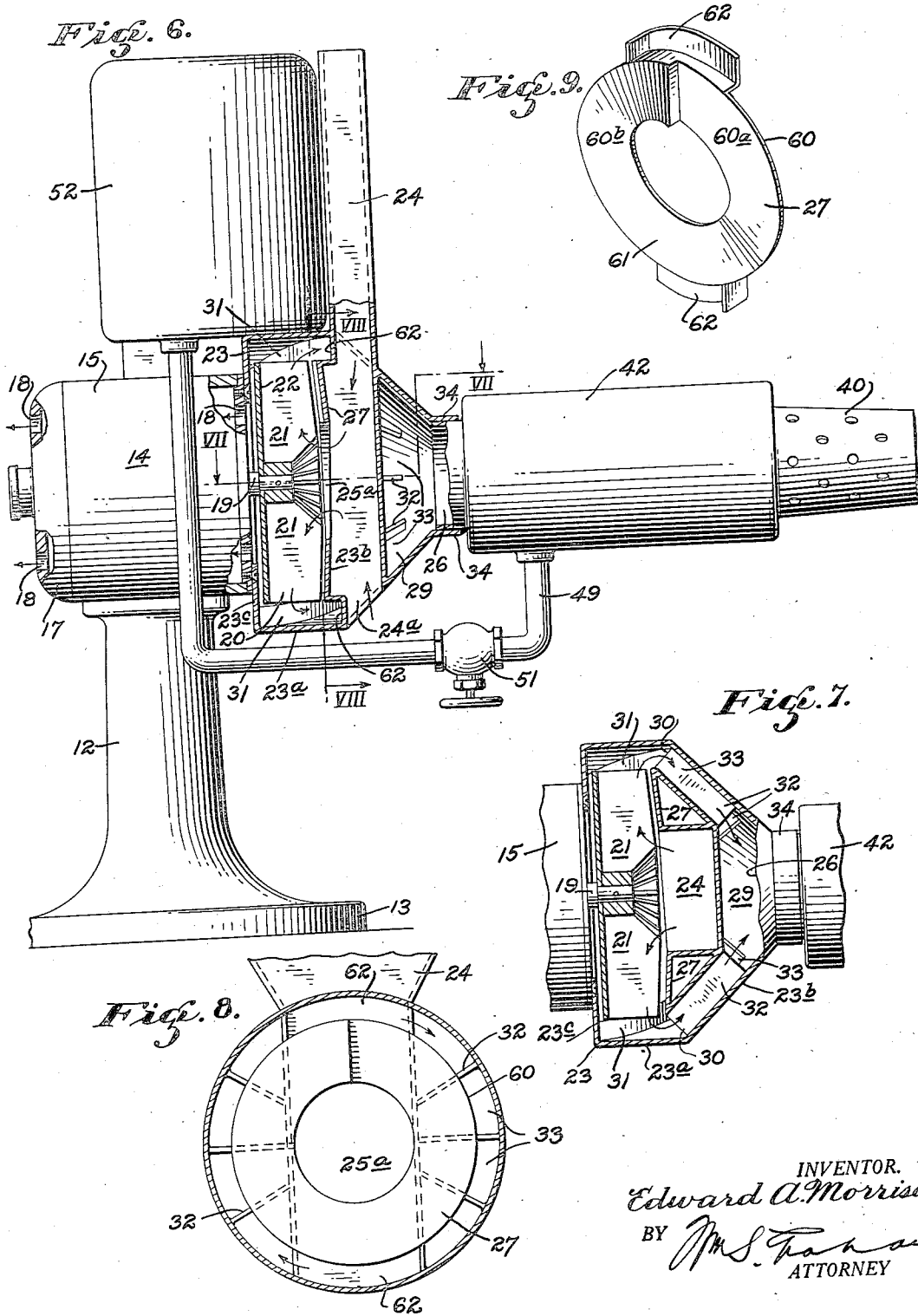
E. A. MORRISON

FLUID FUEL BURNER

Filed June 25, 1934

2,040,523

2 Sheets-Sheet 2



INVENTOR.

Edward A. Morrison.

BY

ATTORNEY

UNITED STATES PATENT OFFICE

2,040,523

FLUID FUEL BURNER

Edward A. Morrison, Fairfax, Calif.

Application June 25, 1934, Serial No. 732,220

7 Claims. (Cl. 158-76)

This invention relates to burners for fluid fuels and particularly to such a burner adapted for burning oil and the like. Among the objects of the invention are to provide a novel burner for fluid fuel which is simple in construction, efficient and economical in operation, and also economical in cost of production; to provide a burner for fluid fuel having the above advantages which may be manufactured of relatively small size so as to be readily portable, without diminishing the efficiency or simplicity of construction; to provide a burner for fluid fuel in which the fuel will be maintained sufficiently cool to prevent slow carbonization thereof in the reservoir and feed lines; to provide a burner for fluid fuel wherein novel means are provided to maintain the fuel supply at a moderate temperature by means of an induced flow of air thereabout; to provide a burner for fluid fuel wherein an induced flow of air through a portion of the burner induces a flow of air about an oil supply reservoir associated with the burner; to provide in combination with a burner of this type an especially adaptable blower which is simple, economical, and efficient for supplying air to the burner, and generally to improve upon apparatus of the type herein described.

With the foregoing and other objects in view, the invention consists of the herein described apparatus, it being understood that changes and variations from both description and drawings may be made therein within the scope of the appended claims without departing from the spirit or sacrificing any of the advantages of the invention.

To more clearly comprehend the invention, reference is directed to the accompanying drawings in connection with which the apparatus will also be described, and wherein:—

Fig. 1 is a longitudinal side elevation of the invention with fragmentary portion of a fire box in section.

Fig. 2 is a longitudinal plan view of the apparatus shown in Fig. 1.

Fig. 3 is an enlarged vertical longitudinal section on line III—III of Fig. 2.

Fig. 4 is a vertical laterally transverse section on line IV—IV of Fig. 3.

Fig. 5 is an enlarged vertical longitudinal section of a modified form of a tubular portion of the burner.

Fig. 6 is a longitudinal side elevation partly in section showing a modified form of blower device.

Fig. 7 is a fragmentary horizontal section on line VII—VII of Fig. 6.

Fig. 8 is a fragmentary vertical section on line VIII—VIII of Fig. 6.

Fig. 9 is a perspective of a hollow slightly spiralled member incorporated in the blower apparatus of Fig. 6.

Referring to the drawings wherein like characters of reference designate corresponding parts, 10 indicates generally a fire box of a heating device which may be of any suitable well-known type, such as a stove or boiler, having an opening 11 therein to receive a tubular discharge outlet of the burner of this invention, said opening preferably being of greater diameter than the tubular body to permit passage of air into the fire box around the circumference of the discharge orifice of the tubular body. The burner apparatus, as here exemplified, is provided with a supporting bracket or pedestal 12 preferably portable and having a base 13 of sufficient diameter to support the entire structure so that the entire structure is of a portable nature and may be moved from place to place wherever its use is desired, it being understood that the burner may be used in any suitable environment where a burner of this type is desired, and the invention is not limited to use in connection with an enclosed fire box. Referring to the exemplification illustrated in Figs. 1 to 5, inclusive, a pedestal 12 is provided upon which is mounted an air pump generally indicated 14, driven by an electric motor 15 having the usual rotatable field coils 16 therein, the casing 17 preferably having openings 18 therethrough for passage of a volume of air to prevent the over-heating of the motor. The motor has the usual rotatable driven motor shaft 19 upon which is mounted to rotate therewith an air blower fan 20, said fan being provided with blades 21 radial to shaft 19 and upstanding from the plane of a back plate 22, the blades 21 being preferably tapered at their free edge as shown best in Figs. 3 and 6. Substantially enclosing the fan is a casing 23, said casing comprising a circumferential wall 23^a and a forward face wall 23^b, and a rearward wall 23^c, and said casing being provided with an air intake 24 which preferably extends vertically upwardly from the casing. An opening 25 centrally of rear wall 23^c provides communication between air intake 24 and the interior of casing 23 and also with the openings 18 in the motor casing, said casing also including an outlet opening 26 centrally of the forward or face wall 23^b. The casing is divided into two compartments or sections by a laterally transverse wall 27 which divides the interior of the casing into a fan section

28 and a channeled section 29, said sections being in communication through openings 30 which are disposed at the radially outer portion of the wall 27. Within the section 28 of casing 23 and extending radially inwardly from the inner circumferential wall 23^a thereof are fins 31 which are angularly disposed relative to the axis of motor shaft 19 and are of sufficient height to permit clearance of the fan blades 21, upon rotation thereof. The fan 20 being partially enclosed, is capable of creating a sufficient air pressure to satisfactorily operate the burner apparatus. The channeled section 29 is provided with a plurality of radial ribs 32 which provide channels 33 extending between the openings 30 and the opening 26. Mounted at the opening 26 by suitable means such as flanges 34 is an elongated tubular member 35 which is adapted for receiving a draft of air from the air pump 14. The opposite end portion of tubular member 35 is provided with an outlet opening 36 of lesser diameter than the inlet opening at 26, said outlet opening being reduced in diameter by a transverse baffle 37. Mounted at the outlet opening 36 and centrally of the tube 35 there is a secondary elongated tubular member 38 which is spaced radially inwardly from the walls of tube 35 and supported by the baffles 37; the secondary tubular member 38 being of sufficient length to extend on both sides of the baffle 37 and serve in the nature of a venturi and also a hood for a discharge nozzle 39 which is mounted in the passageway therein. When the burner is used in connection with an enclosed fire box it has been found desirable to provide an exterior hood 40 extending beyond and spaced radially from the secondary tubular member or hood 38, the member 40 having openings 41 therein.

Circumferentially of the tubular member 35 is a casing 42 which provides a space 43 through which air may circulate from the interior of the tube 35 as at inlet 44 and be returned to said tube through the outlet 45, said inlet and outlet having reference to the space 43 in the casing 42. Within the space 43 and spaced from the wall of casing 42, a reservoir 46 for fluid fuel or oil is circumferentially disposed with relation to the tubular member 35, the reservoir 46 being elongated in a longitudinal cross-section as clearly indicated in Fig. 3 and Fig. 5.

In communication with the oil reservoir 46 and preferably at the upper portion thereof as at 47 is a feed conduit 48 which extends radially inwardly into and then longitudinally of the tubular member 35 and is adapted for feeding fuel to the discharge nozzle 39, thus being maintained at a relatively low temperature by the flow of air in tube 35. The reservoir 46 receives its supply of fuel from a feed conduit 49 which communicates with reservoir 46 at a lower portion thereof as at 50, said feed line having a control or cut-off valve 51 of any suitable type, and further communicating with a suitable exterior fuel supply 52. The object of having the lower fuel feed 50 and the upper fuel discharge 47 is to permit dirt, grit or other solid impurities to settle by gravity at the bottom of the reservoir 46 and thus prevent clogging of the relatively small opening of discharge conduit 48 and nozzle 39.

To this point the descriptions of the invention shown in Fig. 3 and Fig. 5 are similar in mechanism and operation. In the device of Fig. 3 the reservoir 46 circumferentially abuts the outer wall of tubular member 35 and the surrounding

air space of casing 42 receives air in transit from the tube 35 by reason of a lip or baffle 53 which overlies the inlet opening 44 into the air space 43, the air in transit passing through the space 43 and out of the space 43 through the openings 45 whence it is returned to the tube 35 by a suction or less than atmospheric pressure developed by the secondary tubular member or venturi 38.

In the modification of Fig. 5 a portion of the air passing through the opening 26 is deflected by a conical baffle 54 so that it passes out of tube 35 and into the space 43 and circulates around both sides of the reservoir 46 and reenters the tube 35 at the openings 45 by virtue of a lip or baffle 55 which overlies the openings 45, the reservoir in Fig. 5 being spaced from the wall of tube 35 to permit the circulation of air on both sides of the reservoir, it being preferred that said reservoir be spaced from tube 35 by open webs 56.

In the modification of Figs. 6 to 9, inclusive the tubular member 35 and its surrounding casing 42 may assume the type of either of the corresponding members of Fig. 3 or 5, the modification being in the type of blower assembly and conduits for air from the casing 23. In this modification, the air intake 24 is also open at the bottom as at 24^a so that air may be taken in from both top and bottom, and the air inlet is through opening 25^a in the forward wall 23^b, the fan 20 being reversed from the position shown in Fig. 3, and a small amount of air being blown out through the openings 18 sufficient to maintain a satisfactory temperature of the motor 15. Forwardly of the fan, and constituting the dividing wall 27 of the casing, is a spiral plate member 60 having its inner face 61 adjacent the tapered edge of the fan blades, the purpose of the spiral form of this face 61 being to provide one portion 60^a of the space within the casing wherein the fan may blow the air without building up appreciable pressure and thus supply a large volume of air to the tubular member to support combustion, while in another portion 60^b of the casing the fan may build up a small pressure of air so as to better project the fuel forwardly when it is discharged from nozzle 39. In other words, the casing 23 of Fig. 6 provides a space 60^b wherein the casing is in close proximity to the fan blades and another space 60^a in which there is greater distance between the fan and forward wall of the casing. At each of the respective terminations of these two spaces, 60^a and 60^b, the member 60 is provided at its outer or circumferential edge with a baffle 62 which separates the respective spaces 60^a and 60^b. The channels 33 in Figs. 6, 7, and 8 are formed by the ribs 32, as in Figs. 3 and 4, except that the channels 33 are provided around the air intake 24—24^a as best shown in Fig. 7.

One of the difficulties which has been encountered in the small portable type of oil burner now known is that the high temperature at the burner nozzle or torch cracks the oil in the fuel supply in the relatively small feed lines and clogs the feed lines with the heavier residues, whereas in this invention the same feed lines are maintained relatively cool directly up to the point of discharge from the burner nozzle 39, and the fuel is discharged into a superheated zone at the outlet mouth of the Venturi or secondary tube 38 so that it is readily subject to combustion. By the partial enclosing of the blower fan within a casing, a slight air pressure may be developed

in addition to a mere volumetric blowing of the air. From experiment it has been found that the angular disposal of the fins 31 directs the air from the fan more efficiently and evenly through the channels 33 and tends to eliminate a whistling or siren noise from the air pump. The ribs 31 being angularly disposed, correspond at their radially outward edge, to the curve of the casing 23 and therefore are shown as curved in Fig. 3. The arrows in Figs. 3, 5, 6, 7, and 8 serve to indicate the direction of air currents.

Having thus described my invention, what I claim and desire to secure by Letters Patent of the United States is:—

1. A burner for liquid fuel including a tubular member for passage of air therethrough and having an air inlet at one end and an air outlet at the opposite end, a reservoir for liquid fuel closely disposed circumferentially of said tubular member, said reservoir being elongated in cross-section along the axis of the tubular member, a casing enclosing and spaced from the reservoir providing an air conduit for passage of air about said fuel reservoir, the wall of said tubular member having longitudinally spaced openings into said conduit, adjacent respective end portions of said conduit, providing an air intake opening and an air outlet opening between the conduit and the interior of the tubular member, a discharge nozzle, and a fuel feed conduit connecting the nozzle with the reservoir, said nozzle being disposed adjacent said outlet end of the tubular member and forwardly relative to the said openings from the tubular member into the said air conduit.

2. A burner for liquid fuel including a tubular member for passage of air therethrough and having an air inlet at one end and an air outlet at the opposite end with the air inlet of greater area than the air outlet, a reservoir for liquid fuel closely disposed circumferentially of said tubular member, said reservoir being elongated in cross-section along the axis of the tubular member, a casing enclosing and spaced from the reservoir providing a conduit for passage of air about said fuel reservoir, the wall of said tubular member having an air intake opening and an air outlet opening communicating with the said conduit, a discharge nozzle, a conduit connecting the nozzle with the upper portion of the reservoir, said nozzle being disposed adjacent said outlet end of the tubular member, and a feed conduit for fluid fuel having communication with the bottom portion of said reservoir.

3. A burner for liquid fuel including a tubular member for passage of air therethrough and having an air inlet at one end and an air outlet at the opposite end with the air inlet of greater area than the air outlet, means for blowing air through said tubular member, a reservoir for liquid fuel closely disposed circumferentially of said tubular member, a casing enclosing and spaced from said reservoir providing a conduit for passage of air about said fuel reservoir, the wall of said tubular member having an air intake opening and an air outlet opening communicating with the said conduit, a discharge nozzle disposed adjacent said outlet end of the tubular member and a conduit connecting the nozzle with the reservoir.

4. A burner for liquid fuel including a tubular member for passage of air therethrough and having an air inlet at one end and an air outlet at the opposite end with the air inlet of greater area

than the air outlet, means at said inlet end of the tubular member for forcing air therethrough, a reservoir for liquid fuel closely disposed circumferentially of said tubular member, said reservoir being elongated in cross-section along the axis of the tubular member, a casing enclosing and spaced from said reservoir providing a conduit for passage of air about said fuel reservoir, the wall of said tubular member having an air intake opening and an air outlet opening communicating with the said conduit, a discharge nozzle disposed adjacent said outlet end of the tubular member and a conduit connecting the nozzle with the reservoir.

5. A burner for liquid fuel including a tubular member for passage of air therethrough and having an air inlet at one end and an air outlet at the opposite end with the air inlet of greater area than the air outlet, means at said inlet end of the tubular member for forcing air therethrough, a reservoir for liquid fuel closely disposed circumferentially of said tubular member, said reservoir being elongated in cross-section along the axis of the tubular member, a casing enclosing and spaced from said reservoir providing a conduit for passage of air about said fuel reservoir, the wall of said tubular member having an air intake opening and an air outlet opening communicating with the said conduit, a discharge nozzle, a conduit connecting the nozzle with the upper portion of the reservoir, said nozzle being disposed adjacent said outlet end of the tubular member, and a feed conduit for fluid fuel communicating with the bottom portion of said reservoir.

6. A burner for liquid fuel including a tubular member for passage of air therethrough and having an air inlet at one end and an air outlet at the opposite end with the air inlet of greater area than the air outlet, means at said inlet end of the tubular member for forcing air therethrough, a reservoir for liquid fuel closely disposed circumferentially of said tubular member, a casing enclosing and spaced from said reservoir providing a conduit for passage of air about said fuel reservoir, the wall of said tubular member having an air intake opening and an air outlet opening communicating with the said conduit, an axially elongated secondary tubular member mounted at said outlet opening of the first mentioned tubular member, a discharge nozzle disposed within the secondary tubular member and a conduit connecting the nozzle with the reservoir.

7. A burner for liquid fuel including a tubular member for passage of air therethrough and having an air inlet at one end and an air outlet at the opposite end, a casing circumferentially of and spaced from the tubular member providing a conduit for passage of air about said tubular member, a reservoir for liquid fuel in said conduit and closely disposed circumferentially of said tubular member, a discharge nozzle disposed adjacent said outlet end of the tubular member and a fuel feed conduit member connecting the nozzle with the reservoir, the wall of said tubular member having longitudinally spaced openings into said circumferential air conduit at respective end portions of the air conduit whereby air may pass from said tubular member through one of said openings into the air conduit and may pass through the other of said openings from the air conduit into the tubular member rearwardly of the discharge nozzle.

EDWARD A. MORRISON.