

April 7, 1931.

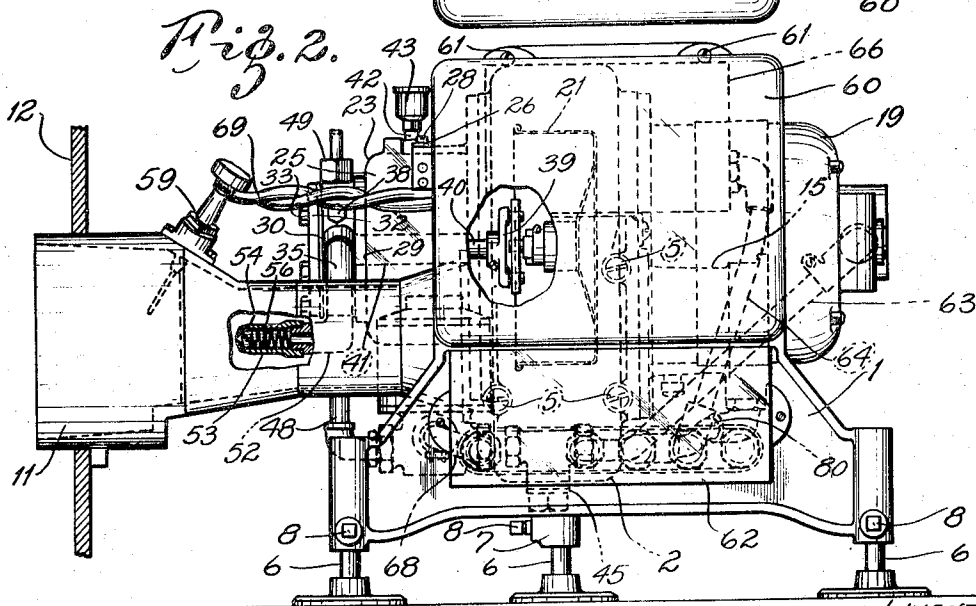
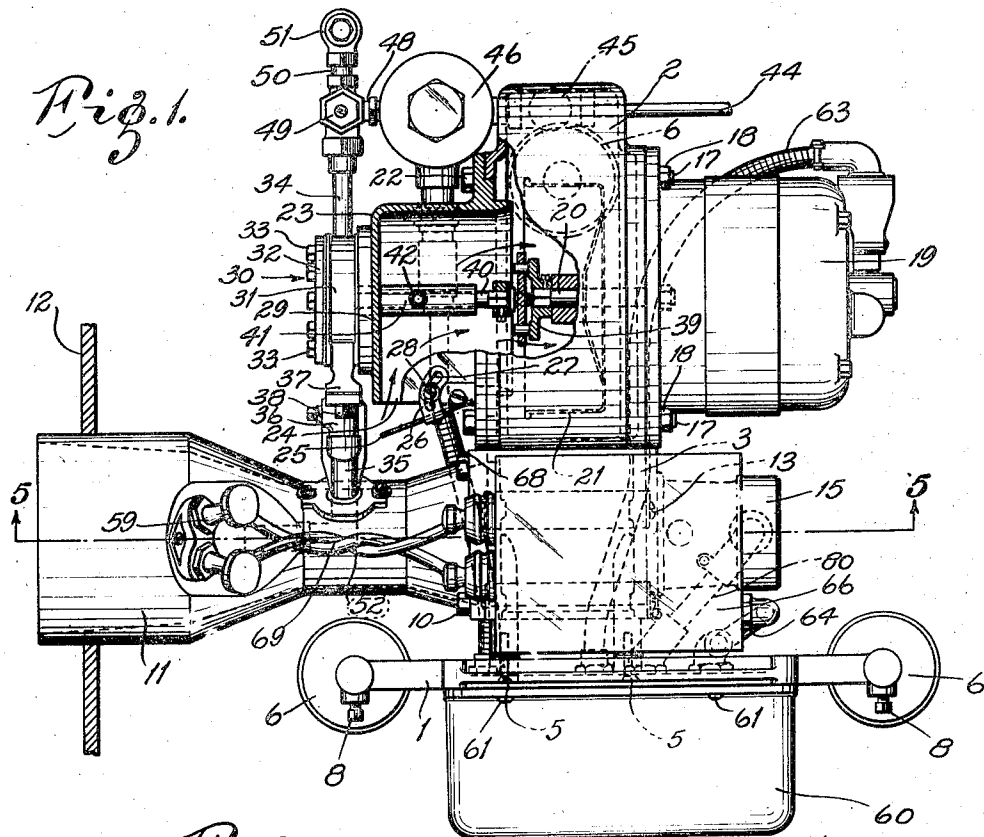
F. O. COLE

1,799,355

OIL BURNER

Filed Dec. 9, 1927

3 Sheets-Sheet 1



Frank O. Cole
by *Carroll & Carroll*
HIS ATTORNEYS.

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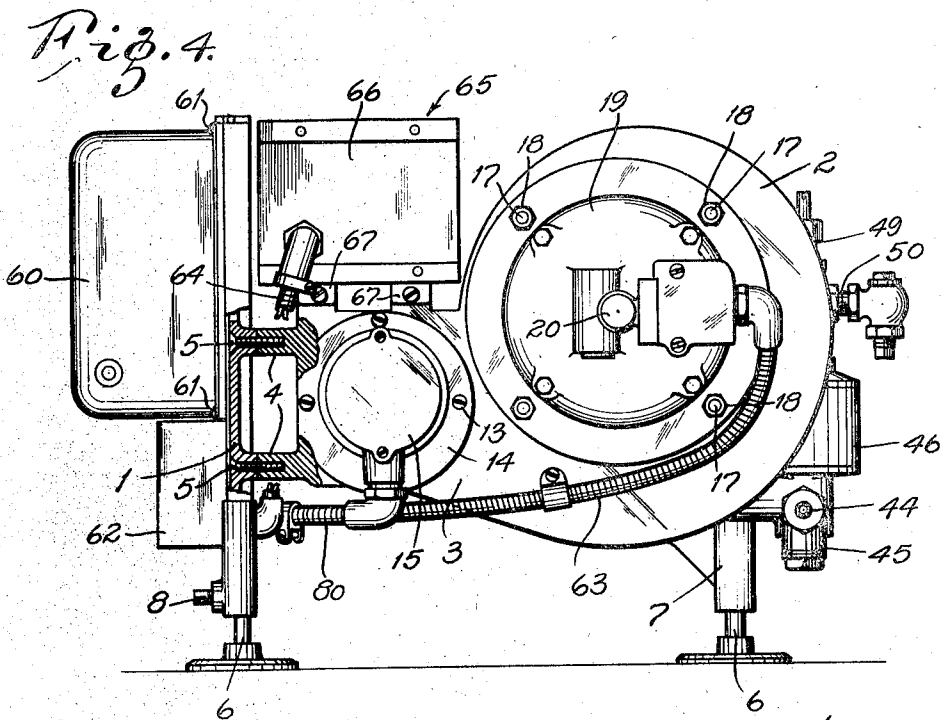
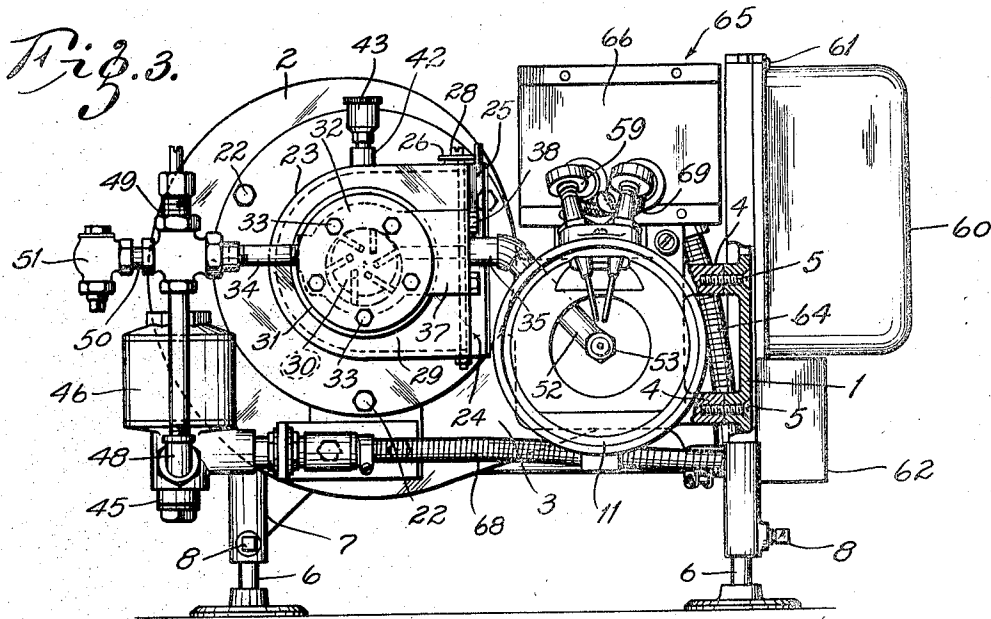
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OIL BURNER

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3 Sheets-Sheet 2



INVENTOR:
Frank O. Cole
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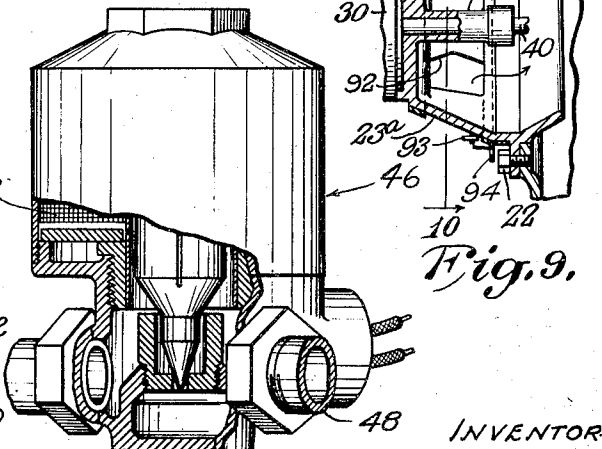
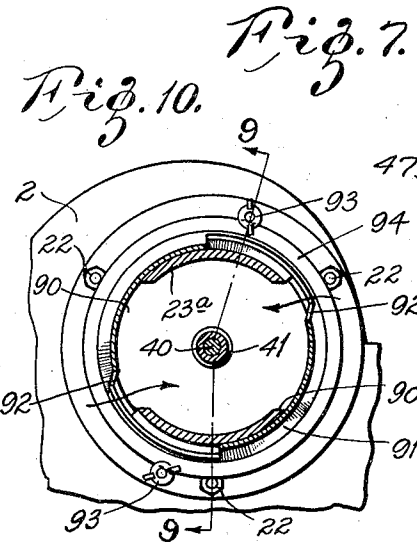
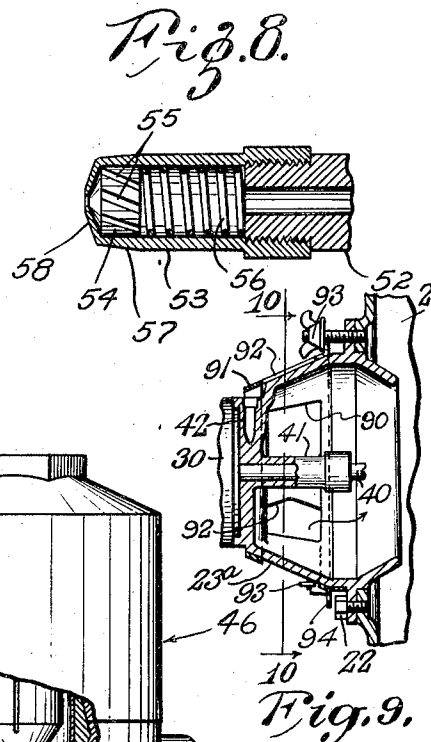
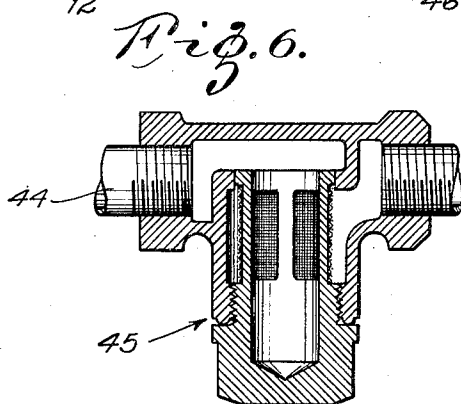
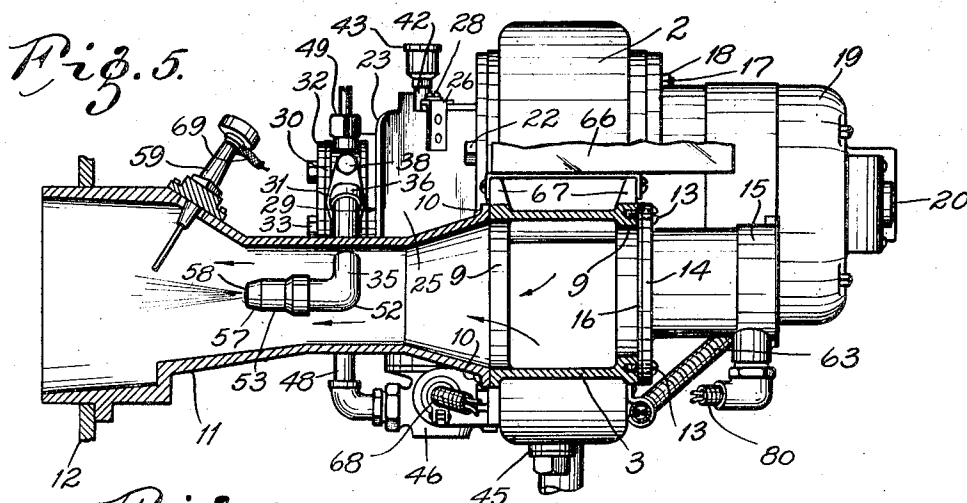
F. O. COLE

1,799,355

OIL BURNER

Filed Dec. 9, 1927

3 Sheets-Sheet 3



INVENTOR
Frank O. Cole
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UNITED STATES PATENT OFFICE

FRANK O. COLE, OF DETROIT, MICHIGAN, ASSIGNOR TO THE TIMKEN-DETROIT COMPANY, OF DETROIT, MICHIGAN, A CORPORATION OF MICHIGAN

OIL BURNER

Application filed December 9, 1927. Serial No. 238,869.

My invention relates to oil burners and has for its principal object a burner that is simple and compact in construction, in which the oil atomized in a mixing pump is delivered to the burner in thoroughly mixed condition and in which the device that shuts off the burner in case of non-ignition or combustion failure is entirely protected from excessive heat.

The invention consists principally in mounting the oil-air mixing pump alongside the burner pipe and delivering the fuel to the burner through a very short pipe, in mounting at the rear end of the burner tube the light or heat actuated device that shuts off the burner in case of non-ignition or failure of combustion, and in mounting the air blower so that air is blown past said device into the burner pipe, whereby said device is entirely protected from excessive heat. The invention further consists in the oil burner and in the parts and combinations and arrangements of parts hereinafter described and claimed.

In the accompanying drawing wherein like reference characters indicate like parts wherever they occur,

Fig. 1 is a top plan view of an oil burner embodying my invention, portions of the blower housing and air inlet housing therefor being broken away to show certain parts in section;

Fig. 2 is a side elevation thereof, certain parts being broken away and shown in section;

Fig. 3 is a front elevation, a portion of the wall bracket and fan nozzle housing being shown in section;

Fig. 4 is a rear elevation, portions of the wall bracket and fan nozzle being shown in section;

Fig. 5 is a vertical sectional view on the line 5—5 of Fig. 1;

Fig. 6 is a sectional view of the device for straining oil before it enters the fuel mixing pump;

Fig. 7 is a part elevation, part sectional view of the magnetic valve that controls the flow of oil to the burner;

Fig. 8 is a longitudinal sectional view of the front or discharge end of the burner tube;

Fig. 9 is a sectional view on the line 9—9 of Fig. 10, showing a modified form of inlet housing for the blower; and

Fig. 10 is a sectional view on the line 10—10 of Fig. 9.

The supporting base for the oil burner comprises a wall or bracket member 1 and a fan or blower housing 2 that has a projecting nozzle portion 3 provided with lugs 4 that are secured to said wall member 1, as by screws 5. Supporting lugs 6 are mounted in holes at each end of said wall bracket 1 and in a web 7 projecting from the under side of the fan housing 2 and are adjustably held by set screws 8. Thus the entire device is mounted on a tripod.

The nozzle 3 of said fan housing 2 has alining openings 9 in its front and back. Secured to the front of said nozzle 3 as by screws 10 and communicating with said front opening 9 of said nozzle 3 is a combustion tube 11. The air from the fan is thus caused to make a substantially 90° change of direction as it passes from the fan nozzle 3 into the combustion tube 11. Said combustion tube has its forward end mounted in the furnace wall 12.

Secured to the back of said fan nozzle 3 as by screws 13, and communicating with said rear opening 9 of said fan nozzle 3 is the flanged edge 14 of a housing 15 in which is mounted a suitable light or heat actuated device 16 that is responsive to flame conditions; so that if ignition does not take place within a predetermined period or if combustion fails at any time, said device shuts off the electric motor and the fuel supply. Any of the numerous well known light or heat responsive devices for accomplishing these results may be used; and the drawing diagrammatically indicates such a device without setting forth its details of construction. It is noted that said flame responsive device 16 is located at the rear of the combustion tube 11, some distance away from the furnace and that the blast of air from the fan continuously blows past the flame responsive device. Thus the flame responsive device is protected against heat of convection and heat of conduction and is responsive only to the radiant heat of the flame.

Secured to the back of the fan housing 2 as by bolts 17 and nuts 18, is an electric motor 19, to whose extended shaft 20 the fan 21 is secured. Secured to the front of the fan housing 2, as by screws 22, is a housing 23 that is cut away to provide an opening 24 that may be covered by a pivotally mounted cover 25 that is provided with a projecting portion 26 having an arcuate slot 27 in which is disposed a headed screw 28, whereby the cover may be held in any desired position, thus regulating the amount of air that may enter said housing 23. Said housing 23 opens into the interior of the fan housing 2 and supplies air thereto.

The front face 29 of said air inlet housing 23 constitutes part of the housing for a pump 30 that mixes oil and air. The hollow body 31 of said housing and a front cap 32 therefor are secured to the inlet housing as by screws 33. The hollow body 31 of the housing is provided with an opening into which extends an inlet pipe 34 that is connected with the oil supply and with an outlet opening that communicates with a pipe 35 whose end is mounted in a cap 36 that is secured to a projecting seat portion 37 of the pump housing by bolts 38.

The extended motor shaft 20 is secured by a universal joint 39 to the rotor shaft 40 of the mixing pump 30. Said rotor shaft 40 is supported in a tubular bearing portion 41 of the air inlet housing 23 and a lubricant pipe 42 and cup 43 are provided therefor.

Oil from a tank (not shown in the drawings) or other source of supply enters a pipe 44 that is provided with a suitable strainer 45 and with a magnetic oil valve 46. Said valve 46 is arranged to drop under the influence of gravity to close the oil pipe 44 whenever the motor 19 is shut off, and is raised due to the energization of a coil 47 when the motor current is turned on. A pipe 48 leads from the magnetic valve to the inlet pipe 34 of the atomizing pump. A manually operated valve 49 is arranged in the pipe 34 that delivers oil to the mixing pump, so that the supply of oil may be regulated. A pipe 50 opens into said oil pump supply pipe 34 and opens into the air, so that air is introduced into the oil supply pipe 34. A ball check valve 51 is provided in said air inlet pipe to prevent any danger of oil backing out therethrough.

The atomized oil enters the outlet pipe 55 of the pump which has a downwardly inclined portion 52 terminating in a burner tube 53 that extends longitudinally of the combustion tube. Said burner tube 53 is preferably provided with a plug 54 that has angular or spiral passageways 55 for the fuel and is held in the forward end of the burner tube by a spring 56. The front or tip portion 57 of said burner tube is tapered and the end 58 of the tube is conical. Supported in the combustion tube 11 in front of the burner tube 53

are the elements 59 of a spark plug by which the fuel is ignited.

Any suitable electric or other control system may be provided. The switches and other connections are mounted on said wall bracket 1 and enclosed in a casing 60 secured to said wall bracket as by screws 61. The wires leading to the various parts of the mechanism pass out through holes in the lower part of the bracket covered by a suitable casing 62 secured to said wall bracket. Preferably the wires are enclosed in tubular conduit members. A tube 63 leads from the wall to the motor 19. Another tube 64 leads from the wall 1 to a spark transformer 65 that is mounted in a housing 66 that is secured to lugs 67 on top of the projecting delivery portion of the fan housing. Another tube 68 extends from the wall bracket to the magnetic oil valve. Another tube 80 leads to the flame responsive device. The wires leading to and from the magnetic valve are connected to the same terminals as the motor wires. Wires 69 extend from the spark transformer 65 to the spark plug elements 59.

It will be understood that the operation of my flame responsive device 16 (except for special functions and advantages herein set forth) is similar to flame responsive devices now common in the art. If the burner fails to ignite when the burner is put into operation by the usual room thermostat, said flame responsive device 16 maintains an open circuit; thereby cutting off the motor current after the preliminary starting circuit ceases to function. If, after combustion has been established, the flame should be extinguished, said flame responsive device 16 reopens its circuit and stops the burner.

The fuel mixing pump 30 is located adjacent to the front end of the combustion tube 11; so that the distance from the pump 30 to the discharge end of the burner tube 53 is quite small. This means that the atomized fuel has only a short distance to travel after it leaves the mixing pump; so that there is very little tendency for the oil and air to separate.

In Figs. 9 and 10 is illustrated a modified air inlet housing 23a whose conical body portion is provided with openings 90. Mounted on said body is a conical sleeve 91 provided with openings 92 corresponding to the openings of said body. Said sleeve 91 is held in position by thumb screws 93 mounted in said body and engaging the flanged edge 94 of said sleeve. By adjusting said sleeve 91 the openings 90 and 92 may be caused to align wholly or in part or to be out of alignment entirely, whereby the amount of air entering the housing 23a may be regulated.

The above described burner has numerous advantages. It is very simple, compact and neat in arrangement. The wiring and control devices are easily accessible; but are con-

cealed from view so as not to be easily tampered with. The very short distance that the atomized fuel has to travel insures a supply of perfectly atomized fuel for the burner pipe. The tapered end portion and beveled end of the burner tube minimize the tendency of the air in the combustion tube to form eddies at the discharge end of the burner tube. The flame responsive device is perfectly protected against heat of conduction and heat of convection; but is perfectly responsive to the radiant heat of the flame. Any suitable light responsive device might be used instead of the heat responsive device illustrated. The arrangement of the motor, blower and mixing pump is simple and compact. Obviously numerous changes might be made without departing from the invention and I do not wish to be limited to the precise construction shown.

What I claim is:

1. An oil burner construction comprising a fan housing having a projecting nozzle portion, a wall bracket secured to said nozzle portion of said fan housing and extending transversely of the fan housing, a combustion tube secured to the front face of said nozzle portion of said fan housing and opening thereinto, a burner tube in said combustion tube, means for supplying fuel thereto, legs adjustably secured at the ends of said wall bracket, a leg adjustably secured to the underside of said fan housing, a housing secured to the rear of said nozzle portion of said fan housing and opening thereinto in alinement with the end of said combustion tube and a flame responsive device in said housing.
2. An oil burner comprising a wall member having legs at the front and back, a fan housing disposed transversely with respect to said wall member and having its nozzle portion secured thereto, said fan housing having a supporting leg, electric control devices mounted on said wall member, a casing therefor, an electric motor supported by said fan housing, a fuel pump supported by said fan housing, a combustion tube supported by said fan nozzle, a burner tube in said combustion tube and a fuel pipe leading from said fuel pump to said burner pipe.
3. An oil burner comprising a fan housing having a nozzle portion, a fan mounted therein, a combustion tube connected to said nozzle portion and communicating therewith, a burner tube in said combustion tube, an electric motor secured to one side of said fan housing, the rotor shaft of said motor extending into said fan housing and carrying said fan, a housing secured to said fan housing and communicating with the interior thereof, said second housing having an opening to permit air to enter thereinto and into said fan housing, a fuel pump housing secured to said air inlet housing, a pump in

said pump housing, a rotor shaft for said pump, said shaft being elongated to extend through said air inlet housing and being connected to said motor shaft, a pipe leading from said fuel pump to said burner tube, said fan nozzle having an opening in alinement with said combustion tube, a housing secured to said fan nozzle and covering said opening and a flame responsive device in said housing.

Signed at Detroit, Michigan, this 25th day of November, 1927.

FRANK O. COLE.