

Jan. 12, 1932.

L. L. SCOTT

1,840,744

COMBINED AUTOMATIC GAS AND OIL BURNER

Filed June 4, 1928

3 Sheets-Sheet 2

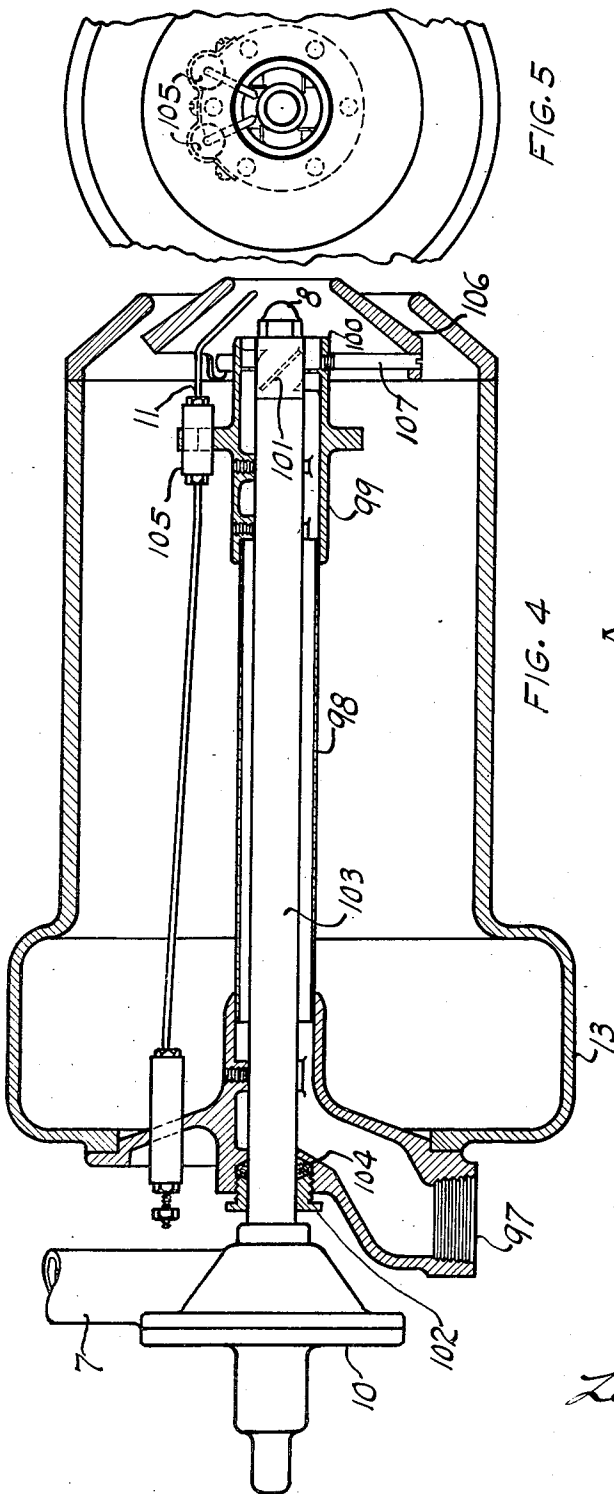


FIG. 4

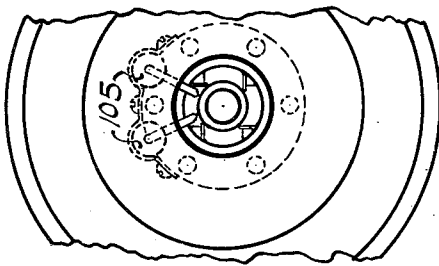


FIG. 5

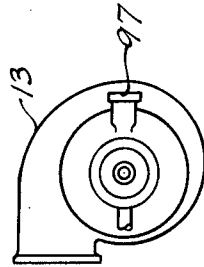


FIG. 6

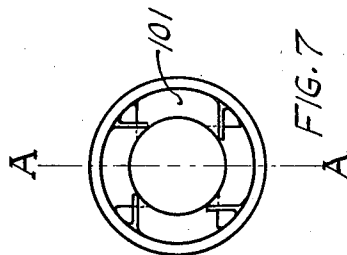


FIG. 7

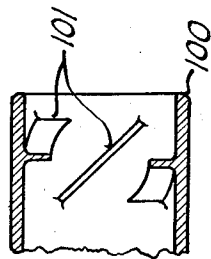


FIG. 8

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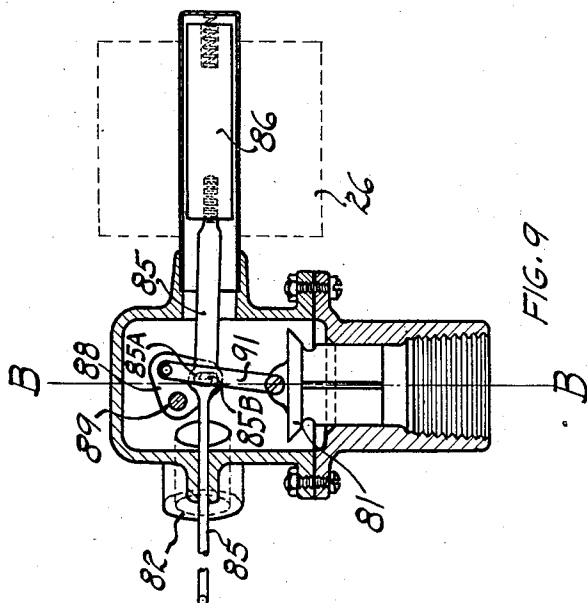


FIG. 9

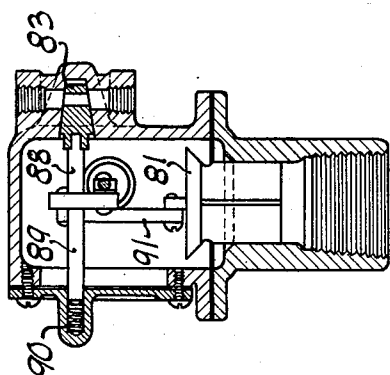


FIG. 10

INVENTOR
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UNITED STATES PATENT OFFICE

LEWIS L. SCOTT, OF ST. LOUIS, MISSOURI

COMBINED AUTOMATIC GAS AND OIL BURNER

Application filed June 4, 1928. Serial No. 282,645.

This invention relates to an automatic gas and oil burner that is capable of burning either gas or oil and igniting either fuel from a common igniter, and automatically shifting from one fuel to the other, due to a change in gas pressure, or a change in the temperature outside of the house, or the shifting from one fuel to the other may be caused by a time clock.

10 The object of my invention is to provide a burner mechanism and controls therefor, that will efficiently burn either gas or oil, and that can be automatically shifted from one fuel to the other.

15 In the accompanying drawings, Figure 1 is a diagrammatic drawing showing my invention.

Figure 2 is a side view, shown partly in section, of the relay switch and safety switch used in my burner.

20 Figure 3 is a plan view of a clock time switch.

Figure 4 is a plan view of my combined gas and oil burner head, shown in section.

25 Figure 5 is a front view of Figure 4, shown partly broken away.

Figure 6 is a back view of Figure 4, shown in reduced size.

30 Figure 7 is a front end view of the tube which conducts the gas—the oil tube being removed.

Figure 8 is a section of Figure 7 on the line A—A.

35 Figure 9 is a sectional view of an electrically operated oil and gas valve.

Figure 10 is a section on the line B—B of Figure 9.

Referring now to the drawings, the numeral 1 indicates (see Figure 1) an electric motor which operates the fan wheel 2 and the fuel pump 3. The intake pipe 4 of the fuel pump runs to a tank, not shown. Oil from the pump 3 is discharged through pipe 5 and runs through the pipe 6 to the nozzle head 7, and said oil is adapted to be sprayed through the spray nozzle 8. The numeral 10 indicates a conventional diaphragm valve which is adapted to open under fuel pressure and permit the fuel to flow through the nozzle 8. A valve of this type is shown in

section in my Patent No. 1,640,728, issued to me August 30th, 1927. An electric sparking device, indicated by the numeral 11, is used for igniting either oil or gas, as will be later described. The blower 2 is enclosed in the housing 12, and air passes to the air receiver 13 through the pipe 14, as is more fully described in my patent before referred to. The numeral 15 indicates the main power wires running to a source of electric power. 16 is a switch in the main power line. The wire 17, which is connected to one side of the switch 16, runs to one of the contact points on the mercury switch 18. The wire 19 is connected to 17 and runs to one side of primary coil of transformer 20, the purpose of which will be later described. The wire 21, which is connected to the switch 16, runs to transformer 20 by wire 22, to motor 1 by wire 23, to spark transformer 24 by wire 25, and to solenoid 26 by wire 27. The wire 28 connects to one of the terminals of the mercury switch 18 and runs to the terminal post 29, and then by wire 30 through a thermostatic heating coil 31, to terminal post 32. Wire 33 connects to post 29 and runs to the spark transformer 24 by wire 34, and to terminal 35 of the safety switch 36 by wire 37. Wires 38 and 39 connect to 33. The wire 39 runs through contacts 40 and 41 of a gas pressure operated switch 42, through the wire 43 to solenoid 26. The wire 38 runs through contacts 44 and 45 of the thermostatic switch 46, through wire 47, to wire 43, which connects with the solenoid 26, thereby forming a parallel circuit to the switch contacts 40 and 41. The wire 48 connects to the terminal post 32 and runs to the terminal 49 of the safety switch 36. The safety switch 36 consists of a piece of thermostatic metal 50, which, when heated, will rotate in one direction, and when cool, will rotate in the opposite direction. The function of the safety switch 36 will be later described, however, it may be said here that this switch is closed when the thermostatic metal 50 is heated, and open when said thermostatic metal is cool. The wire 51, which runs to motor 1, connects to terminal post 32 through the wire 48. The transformer 24 transforms

110 volts to about 10,000 volts, which is conducted to the spark plug terminals through the wires 52 and 53.

The transformer 20 transforms 110 volts to 18 volts for use in the room thermostatic circuit, which will now be described. The wire 54 runs to the solenoid 55 and then by wire 56 to terminal post 57, and then to contact 58 of the room thermostat 59. The wire 60 runs from the transformer 20 to the terminal 61, and then to contact 62 of the room thermostat 59. The wire 63 connects to the wire 60 and runs to contact 64. The contact 65 is in contact with 64 when the mercury switch is in the position shown. The wire 66 runs to the terminal post 67, and then by wire 68 to the thermostat 59. Contact 58 of the thermostat 59 closes slightly before contact 62, but current cannot flow to solenoid 55 until contacts 58 and 62 are both made, then the solenoid 55 is energized and the mercury switch 18 will assume the position shown in Figure 1, and when in this position, contacts 64 and 65 will be closed by action of the arm 69 pressing against the spring 70, so that when the room thermostat 59 starts moving away from contacts 58 and 62, it will break contact 62 first, but the solenoid 55 will not be de-energized until contact 58 is broken. This arrangement makes it possible to set the room thermostat so that the solenoid 55 will turn on, say, at 70°, and off at, say, 72°. When the solenoid 55 is energized, the contacts of the mercury switch 18 will be closed and current will be on the transformer 24, on motor 1, and may be on solenoid 26, depending on the condition of the automatic switches 42 and 46, the action of which will be later described. It will be noted that the thermostatic heating coil 31 is connected in series with the motor 1 as long as the contacts of the safety switch 36 are open, which is the case when there is no heat on the thermostat 50. When the burner starts normally, burning either gas or oil fuel, the pipe 71 is heated by the flame and hot air is sucked over the thermostat 50 through the pipe 72, which is connected to the suction side of the blower wheel 2, so that in about thirty seconds after the burner is started, the safety switch 36 will close its contacts and the coil 31 will be shunted out of the circuit so that it will not heat the thermostatic strip 73. Should the oil, or gas, fail to ignite, the thermostat 50 will not be heated, and the coil 31 will remain in the circuit with the motor. The thermostatic strip 73 is so set that its top end will move to the right, (see Figure 2), in about two minutes time, providing the current is flowing through the coil 31. The mercury tube 18 is carried by a clip 74, which normally has a pivot at 75. Should the thermostatic strip 73 move to the right, due to current remaining on the coil 31, the pin 76 will be withdrawn so that the arm 77 of the clip 74

will no longer be held as a pivot around the center of the pin 76 and the mercury tube will drop down until the arm 78 rests on the solenoid and the circuit through the mercury tube will be open, although there may still be current on the solenoid 55. When the mercury tube drops down, its pivot will be at 79. All circuits closed by the mercury tube 18 will remain open until it has been manually re-set. The timing of the thermal strip 73 may be changed by adjustment of the screw 80.

Referring to Figures 9 and 10, the valve 81 is adapted to control the flow of gas to the burner. The gas supply pipe is connected to the body of the valve at 82. The valve 83 is a fuel by-pass valve which is connected to the pressure side of the fuel pump 3 by the pipe 84, (see Figure 1). It will be noted that when the gas valve 81 is open, permitting the flow of gas to the burner, the fuel by-pass valve 83 is also open, which will permit the oil to by-pass back to the oil tank through a pipe, not shown, so that there will be no oil delivered to the spray nozzle at the time when the valves 81 and 83 are open. I have found that when switching from oil to gas, it is desirable to continue the operation of the blower wheel 2, but to adjust and cut down the quantity of air used when burning gas, and for this purpose, I provide the rod 85, which is connected to the armature 86, of the solenoid 26, and said rod 85 connects to an air regulating valve 87, located in the air pipe 14. The rod 85 is provided with an elongated slot 85A, which slot engages a pin 85B, mounted on the crank arm 88. The crank arm 88 is pivoted on the shaft 89, which shaft is adapted to operate the oil valve 83. The spring 90 is provided to press the shaft 89 so as to insure proper seating of the valve 83. The arm 91 is connected to the crank arm 88, and is also connected to the gas valve 81. It will be noted that when the armature 86, of the solenoid 26, (see Figures 9 and 10), is in the position shown, the gas valve 81 and the oil valve 83 will be open, and the rod 85, which connects with the air valve 87, (see Figure 1), will be raised so as to partly cut off the air from the blower wheel 2 to the air receiver 13.

It has been found that where homes are being heated by a gas fuel only, there are times during the day and during extremely cold weather that the demand for gas is so great that the gas pressure is reduced to a point where there is not enough gas to properly heat the home, and, under this condition, it is desirable to supply an auxiliary fuel, such as oil, that can be burned in the same burner where the gas is burned, and to provide automatic means that will switch the burner from one fuel to the other, depending on either a condition of gas pressure, or depending on outside temperature

conditions, or anticipating that there will be a large demand for gas at certain hours of the day, which can be taken care of by a time clock switch, such as shown in Figure 3, where the numeral 92 indicates a conventional time clock adapted to operate at certain hours of the day and open the contacts 40 and 41, and when said contacts are open, the solenoid 26 could not be energized, and, therefore, the gas valve 81 would be closed. The numeral 93 indicates a metal bellows connected to the gas line through the pipe 94, and when there is sufficient gas pressure, the bellows will remain in the expanded condition and maintain the contacts 40 and 41 closed. Should the gas pressure drop below a certain point, then the bellows 93 will contract, and the contacts 40 and 41 would be opened. The clock 92 is shown connected up to the arm 42 and operating contacts 40 and 41 in a similar manner as the bellows 93, except that the clock would be set so as to anticipate a heavy demand for gas at certain hours of the day, such as around breakfast time in the morning, and around the dinner hour at night, and would open contacts 40 and 41 during these periods. The thermostat 46 is adapted to be placed outside of the building and is subject to outside temperatures, and is usually set to have its contacts closed at any temperature above 20° Fahrenheit, so that when the outside temperature was below 20° Fahrenheit, the burner would operate on oil, providing that the thermostat 46 was used singly and not in conjunction with the gas pressure bellows 93. It is, of course, understood that any of these automatic controls for switching the burner from gas to oil may be used singly, or the thermostat 46 may be used in combination with the gas pressure bellows 93.

Assuming that the contacts 40 and 41 are open, due to conditions before described, and that the room thermostat 59 closes its contacts so as to call for heat, the motor 1 will be set in operation, as before described, and the oil will be pumped, under pressure, through the spray nozzle and ignited by the sparking device 11, and air will flow from the blower wheel 2 through the pipe 14 into the air receiver 13, and said air will be mixed with the oil spray to promote combustion. Should the contacts 40 and 41 close during the time that the burner is operating on oil, the solenoid 26 would be energized, thereby opening the gas valve 81 and the oil valve 83, causing the oil to be by-passed back to the tank, as before described, and thereby stopping the flow of oil from the spray nozzle 8 and permitting the gas to flow through the pipe 95 through the gas pressure regulating valve 96, (the construction of which is commonly known and will not be described here), to the intake 97, through the pipe 98, (see Figure 4), to the gas outlet 100 in the head 99. It will be noted that the gas is projected

around the spray nozzle and has its outlet very close to the outlet of the oil spray, and, therefore, both fuels can be ignited by the sparking device 11, which is located in close proximity to said outlet. I have found that it is highly desirable to cause the gas to issue from the gas outlet 100 in a rotating stream, so as to properly mix with the air and so as to cause a short flame. In order to rotate the gas, I provide the veins 101 close to the gas outlet 100 so as to cause the gas to rapidly rotate when issuing from the outlet 100. I provide a packing nut 102 around the oil pipe 103 so as to compress the packing 104 and prevent the escape of gas around said oil pipe. The head 99 forms a support for the electric spark insulators 105, and also forms a support for the combustion cone 106 through the screws 107, which construction is shown in more detail in my Patent No. 1,656,711, dated January 17th, 1928. By referring to Figure 6, it will be seen that the incoming air from the pipe 14 is caused to rotate, as is more fully described in my Patent No. 1,656,711, above referred to.

Should the room thermostat 59 call for heat, and should either gas or oil fuel be projected to be burned, and should there be a failure of ignition, it will be seen that the burner will be shut down so as to shut off either the gas or the oil fuel, should there be a failure to ignite.

I claim:—

1. In a burner of the class described the combination of a burner nozzle, means for supplying fuel in the liquid phase to said nozzle, means for supplying fuel in the gas phase to said nozzle, automatic means for selectively controlling each of said supply means, a common air blower for supplying air for admixture with either of said fuel supplies, and automatic means operable incident to the operation of said automatic means for regulating the air supply.

2. In a burner of the class described the combination with a spray nozzle, a gas supply, and an oil supply for said spray nozzle, of automatic means for selectively delivering said oil and gas supply, an air blower, an electric motor for operating the oil supply and said blower, and an automatic means for regulating the air supply incident to the feed of gas.

3. In a burner of the class described the combination with a burner nozzle, a gas supply to said nozzle, an oil supply to said nozzle, and a forced feed for said oil supply, of automatic means for selectively controlling the delivery of gas or oil to said nozzle, a common air blower for delivering air to the nozzle for mixture with either fuel supply, an electric motor for operating said blower and said forced feed for said oil supply, an electrically operated device operable incident to the operation of said automatic means for by-

passing the oil from the nozzle and opening the gas supply to said nozzle.

4. A burner of the class described including in combination, a gas supply, an oil supply, with means for selectively controlling said supplies, of a spray nozzle for spraying the oil, a forced feed for the oil supplied to said spray nozzle, an air blower for delivering air to promote combustion of said fuels, a motor for operating said blower and said forced oil feeding means, and an electrically operated device operable incident to the operation of said automatic means, whereby the oil supply is by-passed from the spray nozzle, the gas supply opened and the air supply to said burner regulated.

5. In a burner of the class described the combination with a spray nozzle, of an oil supply to said spray nozzle, a pump in said oil supply, a gas supply discharging adjacent to said spray nozzle adapted to discharge the gas around said spray nozzle, a common air supply, means for regulating said air supply, and automatic means for selectively controlling the oil, gas and air supply.

6. In a burner of the class described the combination with a spray nozzle, of an oil supply to said spray nozzle, a pump in said oil supply, a gas supply discharging adjacent to said spray nozzle adapted to discharge the gas around said spray nozzle, a common air supply, means for regulating said air supply, and automatic means operable by temperature condition for selectively controlling the oil and gas supply.

7. In a burner of the class described the combination with a spray nozzle, of an oil supply to said spray nozzle, a pump in said oil supply, a gas supply discharging adjacent to said spray nozzle adapted to discharge the gas around said spray nozzle, a common air supply, means for regulating said air supply, automatic means operable by temperature conditions for selectively controlling the oil and gas supply, and a safety device operable upon the failure of said gas and oil supplies to ignite to discontinue both of said supplies.

8. In a burner of the class described, a spray nozzle, an oil supply pipe for delivering oil to said spray nozzle, a gas pipe located around the oil pipe for delivering gas directly around the spray nozzle, a mixing cone located about the nozzle, and ignition means located between the nozzle and the cone adapted to ignite the fuel from either source.

In testimony whereof, I have hereunto set my hand.

LEWIS L. SCOTT.