Nov. 10, 1959 G. ROUDANEZ 2,912,696

COMBINATION OIL AND GAS BURNER

Filed Nov. 23, 1953 2 Sheets-Sheet 1

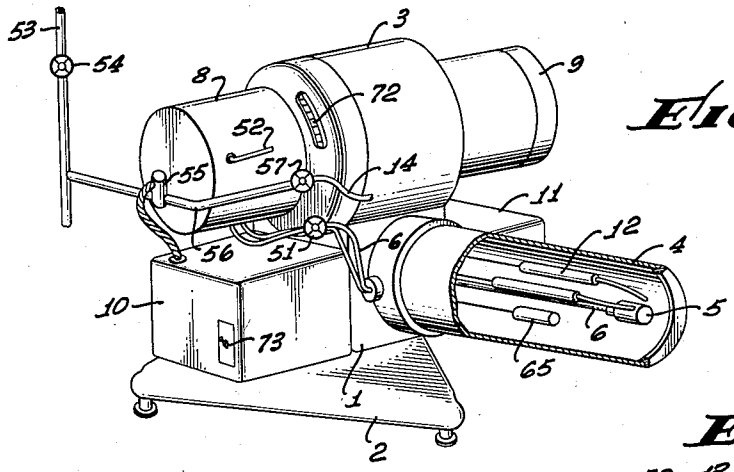
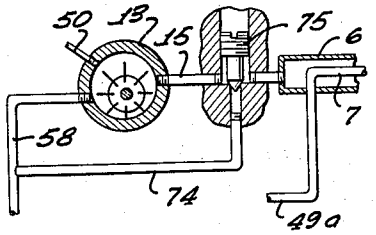


FIG. 1.

FIG. 4.



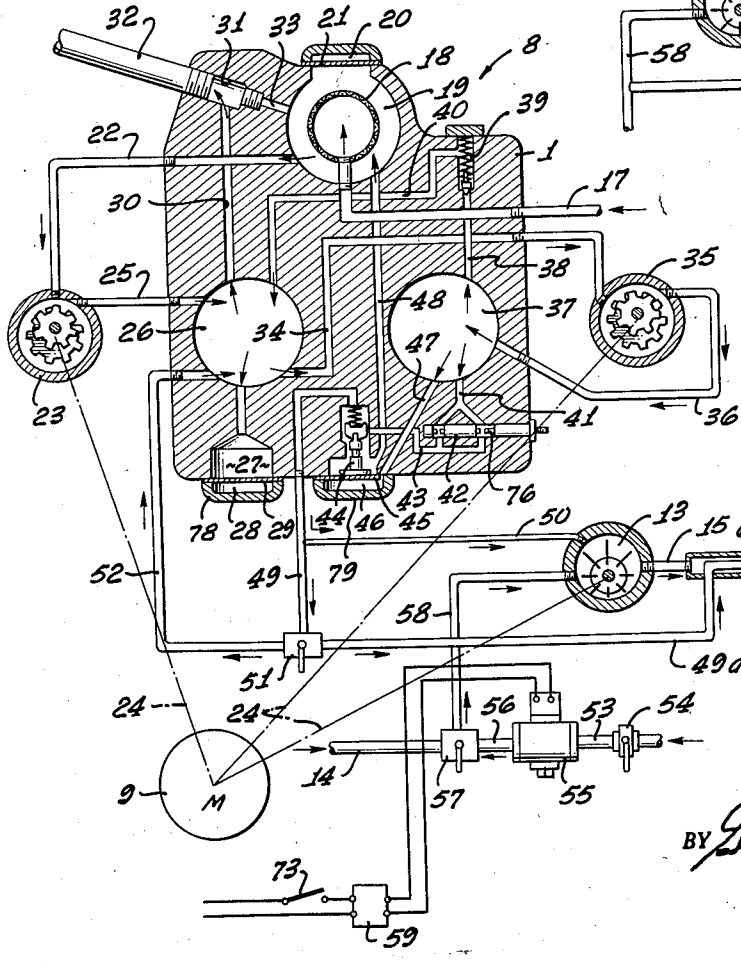


FIG. 2.

INVENTOR.

BY

Nov. 10, 1959 G. ROUDANEZ 2,912,696

COMBINATION OIL AND GAS BURNER

Filed Nov. 23, 1953 2 Sheets-Sheet 2

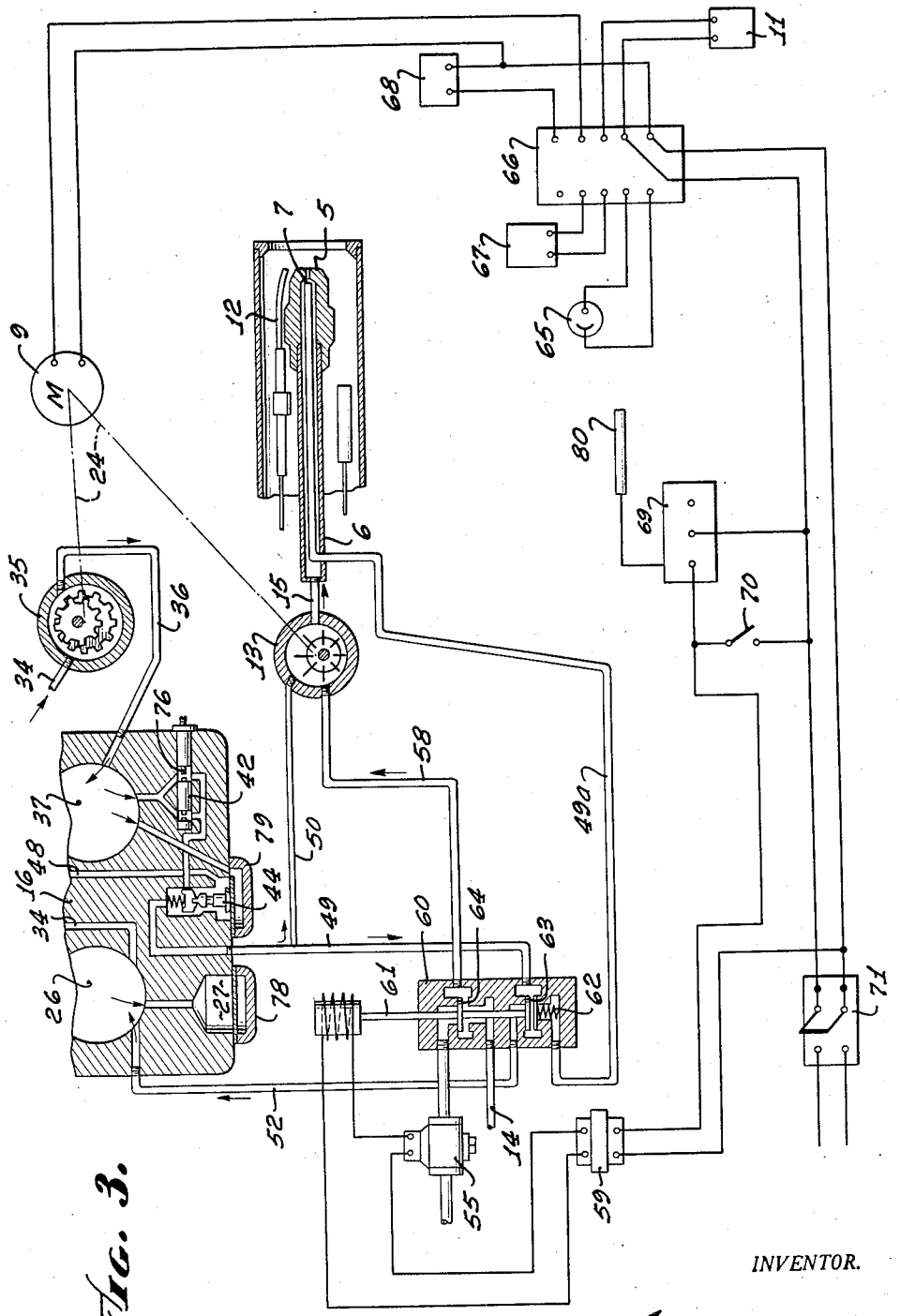


FIG. 3.

INVENTOR.

BY Georges Roudanez

United States Patent Office 2,912,696 Patented Nov. 10, 1959

2,912,696

COMBINATION OIL AND GAS BURNER

Georges Roudanez, Manhattan Beach, Calif.

Application November 23, 1953, Serial No. 393,547

2 Claims. (Cl. 158—11)

This invention relates to burners of liquid and gaseous fuels for heating purposes and the like.

The invention has special relation to the provision of a burner unit which is capable of utilizing either gas or oil as its fuel and which is thus particularly well adapted for use under weather or supply conditions such that sufficient gas for normal operation may not be available during severely cold weather. For example, a burner unit constructed in accordance with the invention will operate effectively and efficiently with gas as its fuel, but if it is desired instead to utilize oil for the fuel, as when the gas pressure drops during cold weather or for any other reasons, the unit can be converted to operation with oil without loss of time or efficiency, and such back and forth shifting of the fuels can be by manual or automatic control as desired.

A primary object of the present invention is to provide a burner for uses such as in a conversion burner unit or an oil fired or gas fired unit for domestic heating purposes which embodies a single spray nozzle capable of operation with either oil or gas as fuel and which incorporates simple controls for substantially instantaneously shifting the burner back and forth for operation on either oil or gas as desired.

More specifically it is an object of the present invention to provide a conventional type burner consisting of fan housing upon which is mounted in combination a motor, a fan, an ignition transformer, spark electrodes, a combination oil and air pump, a blast tube, a combustion head which includes a single nozzle having separate oil and primary air lines thereto and which also includes control valves constructed and arranged in such manner as to deliver oil and primary air to said supply lines or to disconnect the oil supply and to connect the air supply line to a source of fuel gas, with these control valves being shiftable as desired to set the burner for operation alternatively with either gas or oil. The arrangement can burn oil and gas simultaneously, if desired, through this said single nozzle.

A further object of the invention is to provide a burner having the above operating characteristics which could utilize in conjunction therewith automatic controls already known to the art and which are responsive to the outdoor temperature to shift the burner for operation for either gas or oil depending upon whether the outdoor temperature is above or below a desired temperature, thereby making possible operation of the burner on gas when the outdoor temperature is relatively mild but shifting the burner on oil operation when the outdoor temperature drops to a lower range.

It is also an object of the invention to provide for modification of any standard low pressure oil burner by the addition of simple connections such as connecting and disconnecting the oil supply, the valving of the atmospheric air inlet line to the primary air pump so that either air or gas may be supplied to the air pump, and the providing of means to prevent a pressure control of the gas on the outlet side of the air-gas pump such as

is required when burning oil, and controls in such manner as to enable the burner to operate with gas instead of oil at the will of the user and without effecting the ability of the burner to operate on oil when its controls are shifted accordingly.

Other objects and advantages of the invention will be apparent from the following description, the accompanying drawings and the appended claims.

In the drawings—

Fig. 1 is a somewhat diagrammatic perspective view of a combination oil and gas burner constructed in accordance with the invention, with portions broken away to illustrate details of internal construction and arrangement; and

Fig. 2 is a schematic diagram illustrating the principles and operation of the burner of Fig. 1; and

Fig. 3 is a schematic diagram further illustrating the principles and operation of the burner as well as the construction of the invention; and

Fig. 4 is a somewhat sectional diagrammatic illustration of the method of closing the air by-pass return line to the inlet side of the air-gas pump.

Referring to the drawings, which illustrate preferred embodiments of the invention, Fig. 1 shows an oil burner of the low pressure type adapted for use in domestic installations which has been modified in accordance with the invention to operate alternatively with oil or gas as its fuel. This burner is generally of the construction of a known type of low pressure principle which utilizes air and oil within a nozzle to obtain atomization. The burner includes a main housing 1 provided with a pedestal type supporting base 2 and the upper portion 3 of the housing forms a blower chamber in which is mounted the blower fan 72 for supplying secondary air to the combustion zone at the outer end of the blast tube 4. The nozzle 5 is located at about the outer end of the blast tube 4, and it is mounted on the outer end of the primary air tube 6, which encloses the oil tube 7.

The air-oil-gas pump assembly 8 for supplying oil at a metered rate and primary air or gas to the nozzle and combustion zone is mounted at one side of the housing 1, and it is operated by a drive motor 9 mounted at the opposite side of said housing. The primary electrical control unit 10 and the ignition transformer 11 for the electrodes 12 are similarly mounted at opposite sides of the housing below the pump assembly and drive motor. The pump assembly 8 includes an atomizing air pump 13 from which primary air is supplied to the air tube 6 by a line 15 (Fig. 2), and the intake line 14 for the air pump 13 (Fig. 2).

Fig. 2 illustrates schematically an arrangement in accordance with the invention in which the pump assembly 1 is shown as including a main housing 16. The supply line 17 from the oil supply tank leads into a screen 18 then into a screen chamber 19 in housing 16 having at its upper end an air cushion chamber 20 separated therefrom by an anti-hum diaphragm 21. A passage 22 leads from the screen chamber 19 to the suction side of the first stage gear pump 23, and is driven by a motor 9 as indicated diagrammatically at 24. The pump 23 is in turn connected on the pressure side by a passage 25 with the upper portion of a purging chamber 26 as located within the housing 16 and having a lower end extension 27 provided with an air cushion 28 and an anti-hum diaphragm 29.

The purging chamber 26 is provided at its upper end with a venting or overflow passage 30 leading to a bore 31 in the outer surface of the housing 16 which is either connected with the return line 32 of a two-line oil supply system or is plugged if the burner is utilized with a single-line system of supply. At its inner end, the bore 31 has a connecting passage 33 with screen chamber 19 which

can be used as a vent in conjunction with a single-line supply system, but this passage is plugged or preferably provided with a suitable air vent when the burner is operating as a two-line system.

A passage 34 leads from the lower end of chamber 26 to the suction side of the second-stage gear pump 35, which is shown as of the type of the pump 23 and as similarly driven by motor 9. The pressure side of pump 35 is connected by a passage 36 with a pressure chamber 37 within the housing 16, and the chamber 37 is connected through passage 38 with an adjustable pressure relief valve 39 arranged to connect chamber 37 back to the purging chamber 26 through a passage 40 when the pressure in chamber 37 exceeds a desired value. A passage 41 leads from passage chamber 37 to a fuel metering device 42, consisting of a hydraulically motivated reciprocal mechanism whose length of travel is controlled by the adjustable stop 76 and which determines and meters the desired flow of oil from the chamber 37 to the line 43 to the outlet shutoff valve 44 controlling oil flow to the nozzle.

The valve 44 is shown as hydraulically operated against a spring by a diaphragm 45 provided with a fluid pressure chamber 46 connected with pressure chamber 37 by a passage 47, and a vent passage 48 leads from the low pressure side of diaphragm 45 to the screen chamber 19. A line 49 leads from the shutoff valve 44 to the oil tube 7 then to nozzle 5, and Fig. 2 also illustrates a restricted bleed line 50 leading from line 49 to the atomizing air pump 13 for lubricating purposes. A three-way valve 51, shown as manually controlled, is connected in the line 49 at a point downstream from the line 50 and a return line 52 leads from valve 51 to the purging chamber 26. Thus, in one position of valve 51 the oil will be supplied under pressure from pressure chamber 37 directly to the nozzle through lines 49 and 49*a*, and in the outer position of this valve the oil under pressure from oil pump 35 will be returned to the purging chamber 26 for recirculation, except for the small amount of oil for lubrication of the air pump which will continue to be supplied thereto by the bleed line 50.

Modification of the burner for alternative operation with gas instead of oil as a fuel is also illustrated in Figs. 1 and 2. A gas supply pipe is provided with a small shut-off valve 54 which is manually operated and a solenoid valve 55, and a connecting line 56 leads from the solenoid valve 55 to a manually operated three-way valve 57 connected with the intake line 14 for the air pump 13. The valve 57 is so arranged that in one position, it closes the line 56 and connects the line 14 through a line 58 directly with the suction side of the air pump, while in the other position of this valve, it closes the intake line 14 and instead connects the gas line 56 with the intake line of the air pump.

In operation with the alternative oil-gas system, when the valves 51 and 57 are in their first position described, the burner will operate with oil as its fuel, and the gas supply system will remain closed. When it is desired to operate the burner with gas instead of oil, it is merely necessary to shift the two valves 51 and 57 to their other positions, thereby discontinuing the supply of oil and primary air to the nozzle, and to close the primary air by-pass line 74 (Fig. 4) by adjusting the air pressure control screw 75 (Fig. 4), and instead supplying gas to the nozzle by way of the air pump 13 and the air supply tube 6.

In order to modify the basic construction of the oil burner for this oil-gas operation, it is only necessary to connect the two valves 51 and 57 in the oil and air lines as described and to provide the gas supply line and its solenoid valve. The only necessary additional control is to provide a suitable connection for the solenoid valve 55 to the operating circuits actuated by the conventional room thermostat. This is readily done by means of a transformer 59 (Fig. 3) connected with the control system through means such as a toggle switch 73 (Fig. 2) which will be placed in the off position for operation of the burner with oil and it will be shifted to its on position when it is desired to operate the burner with gas.

Fig. 3 illustrates an application of the basic system described in connection with Figs. 1 and 2 to a burner system in which shifting of the burner for operation with gas or oil is effected automatically in accordance with the prevailing outdoor temperature. Thus, for example, it may be desired to regulate the burner system in such manner that when the outdoor temperature is relatively mild, for example above 25 to 30 degrees F., the burner will operate on gas, but when the outdoor temperature drops below this preset temperature, the burner will automatically be shifted over to operation with oil as its fuel. As noted above, such an automatic control arrangement may be very desirable in areas where severe winters are customary and where the gas pressure or supply may not be sufficient for normal operation of the burner at such severe temperatures.

Many of the component parts in the system of Fig. 3 are the same as those in Figs. 1 and 2 and have been provided with the corresponding reference characters. It will be noted, however, that the functions of the valves 51 and 57 are shown as incorporated in a single solenoid operated valve 60 which includes a rod 61 operating against a spring 62 and carrying one disc 63 which controls the flow of oil and second disc 64 which selectively controls the supply of gas or air to the air pump 13. This valve 60 is shown as such construction and arrangement that it is de-energized on normal position, it connects the output of the oil metering device 42 to the nozzle and opens the air intake to the air pump 13. In addition, Fig. 3 shows a photo cell 65 which is also indicated in Fig. 2 and forms a part of the safety ignition system in combination with the safety ignition relay 66, which may, for example be a Minneapolis-Honeywell control model R–187–A.

In Fig. 3, the room thermostat 67 for actuating relay 66 and the limit control 68 may be of conventional type. If the limit is in its closed position when thermostat 67 calls for heat, current is supplied to the burner motor 9, placing the burner in operation, and also to the ignition transformer 11 to produce a high voltage ignition spark in the electrodes 12. If the flame is made and supported, the photocell 65 opens the ignition position of the safety relay 66, which in turn discontinues the voltage through the ignition transformers and electrodes. If the flame is not made and supported within a predetermined time interval, the photocell 65 does not open the ignition relay, but instead it operates through a time delay switch in the relay to break both the ignition and burner circuits, thereby placing the unit in its safety position requiring manual resetting for further operation.

The part 69 represents an indoor-outdoor control, such as the Minneapolis-Honeywell model L–680–B, which determines whether the unit will operate on oil or gas. This control may be set so that when the outdoor temperature as determined by the outdoor temperature responsive bulb 80 is above a predetermined value such as 25 or 30 degrees F., the circuit therethrough is open, but if the temperature drops below the preset value, this control will close an energizing circuit through the transformer 59 to the solenoid gas valve 55 and the selector valve 60. Thus the control 69 operates only to determine the fuel to be used by the burner, and otherwise operation of the burner is as previously described under the control of the room thermostat 67. A manual switch 70 is shown as connected in parallel with the control 69 for optional manual selection of the fuel and corresponds to switch 73 in Figs. 1 and 2, and the usual fused line switch is shown at 71.

It will accordingly be seen that when the adjustment

of the controls for either of the installations is such that the unit is to operate with oil as the fuel, its operation will be entirely independent of the gas supply. When, however, the controls shift to cause operation of the unit on gas, then instead of primary air, the pump 13 supplies gas through the air line 6 to the nozzle. During operation of the unit on gas, the oil will be continuously recirculated through the pump portions of the burner, but at the same time, there will be a small amount of oil continuously supplied by the line 50 to the air pump for lubricating purposes, and such of this oil as is in excess of the lubricating requirements will simply be atomized and burned with the gas.

The specification and drawings herein show a known type of oil burner and is of the low pressure design for illustrative purposes therefore, it is to be understood any other type of low pressure oil burner utilizing primary air to atomize fuel oil through a single spray nozzle may be similarly converted to a combination oil and gas burner by valving the primary air line so that either air or gas may be fed through the primary air pump in conjunction with the opening or closing of the fuel oil supply line to the nozzle.

While the forms of apparatus herein described constitute preferred embodiments of the invention, it is to be understood that the invention is not limited to these precise forms of apparatus, and that changes may be made therein without departing from the scope of the invention which is defined in the appended claims.

What is claimed is:

1. A burner of the character described adapted for alternative operation with both oil and gas, comprising in combination an oil-air and gas nozzle, an oil line for delivering liquid oil to said nozzle, an air line for delivering primary air to said nozzle, an oil pump connected with said oil line for delivering oil thereto under pressure, an air pump having its discharge side connected to said air line, a restricted lubricating line connecting said oil line with said air pump for delivering oil to said air pump for lubrication thereof, a gas supply line adapted for connection to a source of gas, valve means for connecting the suction side of said air pump alternatively to said gas line and the atmosphere for operation of said burner with gas or oil respectfully, and additional valve means controlling said oil line and shiftable to disconnect said oil line from said nozzle and to connect said oil line to the suction side of said oil pump for recirculation during operation of said burner on gas, said additional valve means being located down-stream in said oil line from said restricted lubricating line to maintain the supply of lubricating oil to said air pump during operation of said burner on gas.

2. A burner of the character described adapted for alternative operation for both gas and oil, comprising in combination an oil-air and gas burning nozzle, an air tube for delivering primary air to said nozzle, an oil tube supported within said air tube for delivering oil to said nozzle for mixture and discharge with said primary air for combustion, an oil pump connected with said oil tube for delivering oil under pressure thereto, an air pump having its discharge side connected to said air tube, a gas supply line adapted for connection to a source of gas, means for connecting the suction side of said air pump alternatively to the atmosphere for operation of said burner with oil and to said gas line to provide gas to said nozzle instead of primary air for operation of said burner with gas, and means operating in conjunction with said last named means and disconnecting said oil pump from said oil tube upon connection of said gas line to said air pump and vice versa.

References Cited in the file of this patent

UNITED STATES PATENTS

1,516,029	Sturtevant	Nov. 18, 1924
1,546,997	Reschke	July 21, 1925
2,393,887	Clements	Jan. 29, 1946
2,552,302	Young	May 8, 1951
2,658,567	Witherell	Nov. 10, 1953