

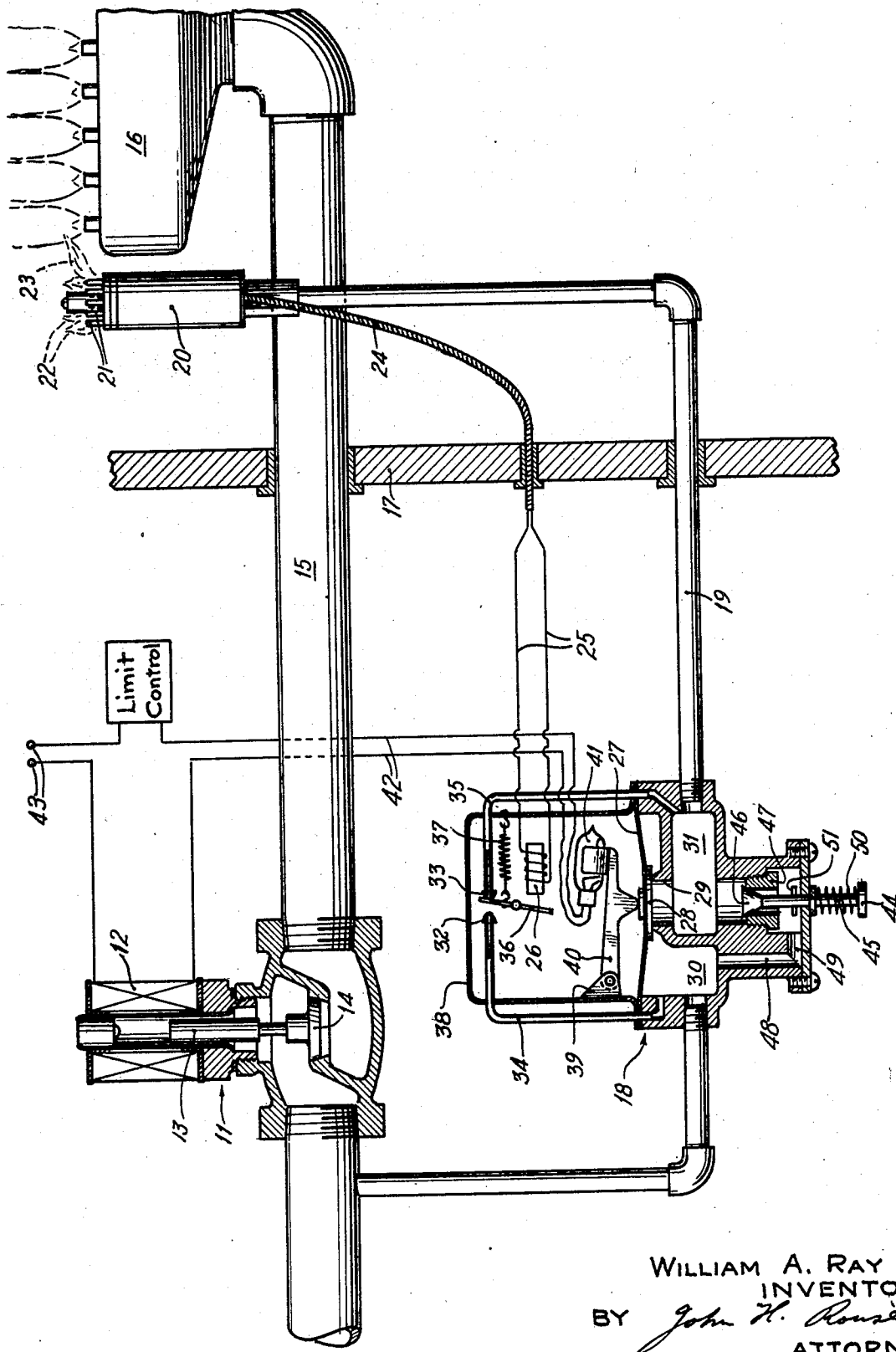
Jan. 6, 1942.

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2,268,959

BURNER CONTROL SYSTEM

Filed Aug. 28, 1939



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2,268,959

BURNER CONTROL SYSTEM

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Application August 28, 1939, Serial No. 292,322

4 Claims. (Cl. 158—117.1)

My present invention relates to a control system for a main burner and for a pilot burner therefor.

It is an object of my invention to provide, in such a system, an electrically operated valve for controlling fuel supply to the pilot burner and a separate electrically operated valve for the main burner, the latter valve being conditioned for operation by switching means actuated by the opening movement of the pilot burner valve.

Another object is to provide means controlled by the pilot burner flame for energizing the pilot burner valve, whereby, when the pilot burner flame is extinguished, the pilot burner valve closes and, in so doing, actuates the switching means to render the main valve inoperable.

Other objects and advantages of my invention will be found in the description, the drawing and the appended claims.

For complete understanding of the invention, reference may be had to the following detailed description and accompanying drawing, wherein the single figure is a mainly diagrammatic view of apparatus embodying my invention.

In the drawing, the numeral 11 generally indicates a solenoid valve provided with a coil 12 for energizing a plunger 13 to which is connected a valve member 14. The valve 11 controls flow through a fuel supply conduit 15 to a main burner 16 located within a furnace, a wall of which is indicated at 17.

Connected to the conduit 15 ahead of valve 11 is another valve 18 for controlling fuel supply through pipe 19 to a combination pilot burner and thermoelectric generating device 20. This device is fully described in the copending application of William A. Ray, Serial No. 225,075, filed August 15, 1938, and comprises thermocouple elements 21 heated by flames 22. Flame 23 serves to ignite the main burner. Current generated by the device is conducted by a cable 24 and wires 25 to the coil of an electromagnet 26 in valve 18.

The valve 18 is of the fluid pressure operated type and is provided with a flexible diaphragm 27 to which is secured a valve member 28 co-operable with a valve port 29 to control fluid flow from the inlet 30 to the outlet 31 of the valve. Within a housing 38, provided above the diaphragm, is a pilot valve for controlling the operation of the diaphragm and comprising jet members 32 and 33 connected respectively by pipes 34 and 35 to the inlet 30 and the outlet 31. Cooperable with the jets 32 and 33 is a pivoted armature 36, normally biased by spring 37 into engagement with jet 33, and movable, when at-

tracted by the electromagnet 26, into engagement with jet 32.

When the armature 36 is in its normal or unattracted position as shown in the drawing, the pressure of the fluid from the inlet 30 is applied through the open jet 32 to the area within the housing above the diaphragm. The outlet jet 33 being closed, the pressure above and below the diaphragm is equalized and the valve member 28 remains seated. When the electromagnet 26 is sufficiently energized to attract the armature 36, the fluid pressure above the diaphragm is relieved through the open jet 33 and the inlet pressure below the diaphragm forces it upward to open the valve.

Pivoted in a bracket 39, secured to the housing, is a lever 40 engaging the diaphragm 27 and carrying at its free end a mercury tube switch 41. When the diaphragm is raised, the switch is tilted to complete the circuit through its electrodes. The switch 41 is connected by wires 42 through a limit control, designated, and the coil of valve 11 to terminals 43, to which any convenient source of power may be supplied.

Valve 18 is provided with manually operable valve means for by-passing fuel to the pilot burner when valve 18 is closed. This means comprises a push-button 44 connected by stem 45 to a valve member 46 co-operable with a port member 47. When the push-button is moved upwardly, fluid can then flow from the inlet 30 through passageways 48 and 49 and the port member 47 to the outlet 31. A compression spring, 50 biases the valve member to closed position and a pin 51 limits the upward movement of the valve stem.

To initiate operation of the burner control system, push-button 44 is actuated, permitting flow of fuel to the pilot burner and thermoelectric generator 20, where it is lighted. The button is retained in its actuated position until the thermoelectric device is generating sufficient current to energize electromagnet 26 to attract its armature. When this occurs, pilot burner valve 18 opens, as has been described above. The push-button may now be released.

The limit control shown may, by way of example, be a thermostat responsive to the temperature of a space heated by the main burner. Should this thermostat now be in heat-demand condition, the circuit through the main burner valve 11 will be complete through the switch 41 and the thermostat, and fuel will flow to the main burner where it will be ignited by the flame of the pilot burner. Valve 11 will continue to

function automatically under the control of the thermostat while switch 41 remains tilted to closed position.

Should the flame of the device 20 become extinguished, upon subsequent cooling of the thermoelectric device current flow through the electromagnet 26 ceases, permitting the armature to drop out to effect closure of valve 18. Valve 18, in closing, drops switch 41, opening the circuit through the main burner valve 11. The system thus remains inoperative until the pilot burner is relighted.

While I have herein shown and described, by way of illustration, a specific embodiment of my invention, it is to be understood that modifications may be made without departing from the spirit of the invention. I intend therefore that my invention be limited only by the scope of the appended claims.

I claim as my invention:

1. In a burner control system: a main burner; a conduit for supplying fuel to the main burner; an electrically operated valve in the conduit; a pilot burner; a pipe for supplying fuel to the pilot burner and connected to the conduit ahead of said main valve; a thermoelectric device heated by the flame of the pilot burner; and mechanism connected in said pipe comprising a valve body, a diaphragm forming in the body a pressure chamber, a valve closure member connected to the diaphragm for controlling the passage of the fuel to the pilot burner, said diaphragm being operated by fuel pressure in the pressure chamber, means operable by power from the thermoelectric device for controlling the pressure in said chamber, and an enclosed tiltable mercury switch in said chamber for controlling said main valve and operated in response to movement of said diaphragm to valve opening position.

2. In a burner control system: a main burner; a conduit for supplying fuel to the main burner; an electrically operated valve in the conduit; a pilot burner; a pipe for supplying fuel to the pilot burner and connected to the conduit ahead of said main valve; a thermoelectric device heated by the flame of the pilot burner; and mechanism connected in said pipe comprising a valve body, a diaphragm forming in the body a pressure chamber, a valve closure member connected to the diaphragm for controlling the passage of the fuel to the pilot burner, said diaphragm being operated by fuel pressure in the pressure chamber, means operable by power from the thermoelectric device for controlling the pressure in said chamber, an enclosed tiltable mercury switch in said chamber for controlling said main valve and operated in response to move-

ment of said diaphragm to valve opening position, and a manually operable by-pass valve incorporated in said valve body for manually controlling the passage of fuel to the pilot burner.

3. In a burner control system, in combination: a main burner, a conduit connecting said main burner with a source of gaseous fuel, a normally closed electrically operated main valve in said conduit, a pilot burner for said main burner, a thermoelectric device arranged to be heated by the flame of said pilot burner, a pipe for supplying fuel to said pilot burner and connected to said main conduit ahead of said main valve, manually operable means for establishing communication through said pipe for the passage of fuel to the pilot burner, a valve mechanism for independently controlling the passage of fuel through said pipe, said mechanism comprising a casing connected in said pipe, a diaphragm, a closure member carried by said diaphragm for controlling fuel flow through the casing, means defining with said diaphragm a fuel pressure chamber, means energized by said thermoelectric device for so controlling the pressure of the fuel in said chamber that said closure member is opened when the thermoelectric device is heated, and an enclosed mercury switch in said chamber and controlling said main valve, said switch being so mounted that it is rocked to closed position by the movement of said diaphragm in the opening of said closure member.

4. In a burner control system, in combination: a main burner, a conduit connecting said main burner with a source of gaseous fuel, a normally closed electrically operated main valve in said conduit, a pilot burner for said main burner, a pipe for supplying fuel to said pilot burner and connected to said main conduit ahead of said main valve, manually operable means for establishing communication through said pipe for the passage of fuel to the pilot burner, a valve mechanism for independently controlling the passage of fuel through said pipe, thermoelectric means heated by the flame of the pilot burner to cause said valve mechanism to open, said valve mechanism including a fuel pressure operated diaphragm, a closure member carried by the diaphragm, as well as a pressure chamber, the pressure of the fuel in which may be controlled to operate said diaphragm, an enclosed mercury switch in said chamber and controlling said main valve, and means supporting said switch so that the closing of the switch is dependent upon the opening movement of said diaphragm.

WILLIAM A. RAY.