

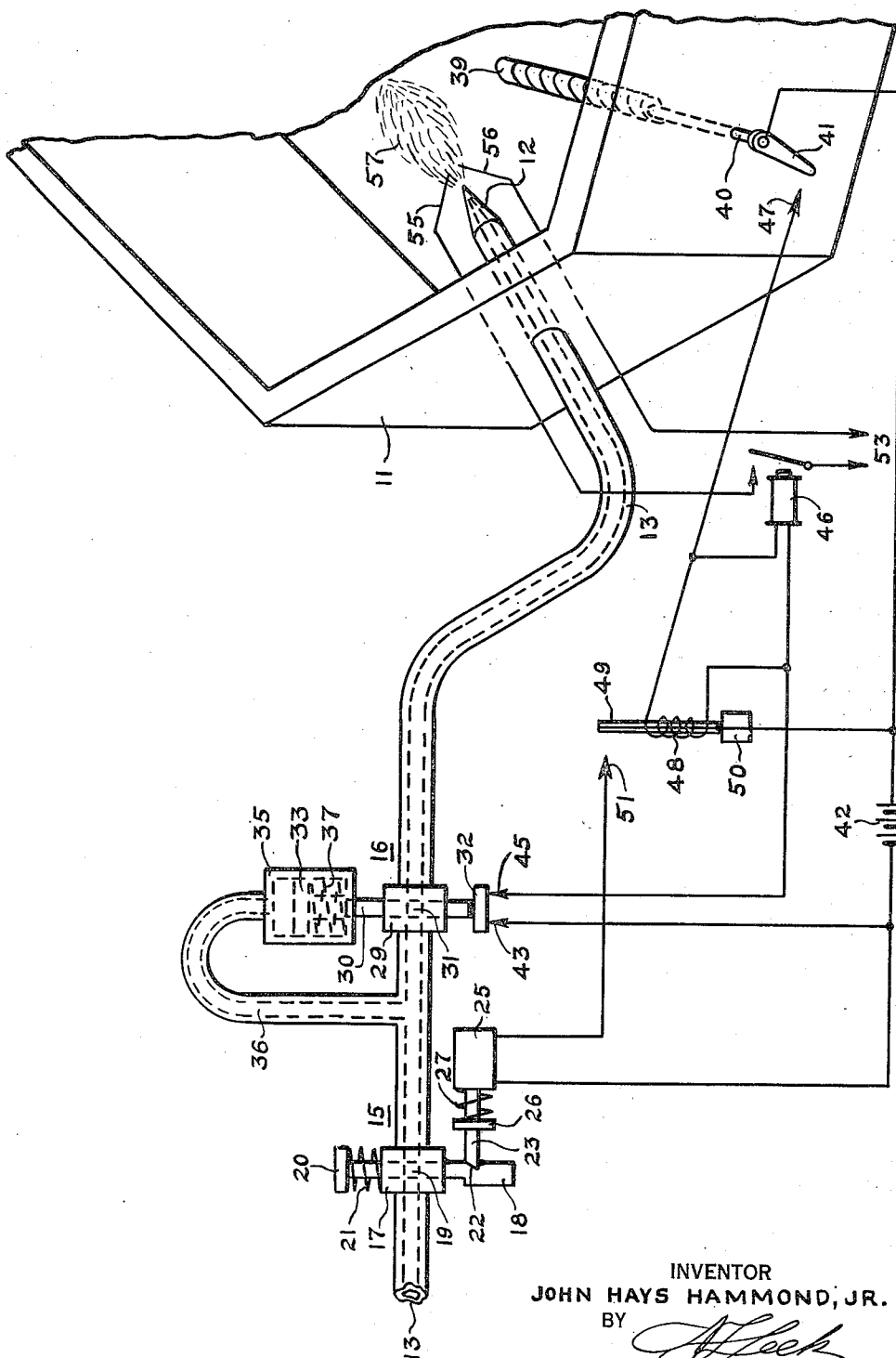
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AUTOMATIC IGNITION AND GAS SHUT-OFF MECHANISM

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AUTOMATIC IGNITION AND GAS SHUTOFF
MECHANISM

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1 Claim. (Cl. 158—28)

This invention relates to ignition systems for burners and more particularly to an improved system for automatically igniting a gas or oil flame when the supply of fuel is turned on or for reigniting the flame should the same become extinguished while the supply of fuel is continued.

The invention further relates to means for shutting off the supply of fuel if the flame is accidentally extinguished or if the fuel fails to ignite after it has been turned on.

The invention also consists in certain new and original features of construction and combinations of parts hereinafter set forth and claimed.

Although the novel features which are believed to be characteristic of this invention will be particularly pointed out in the claim appended hereto, the invention itself, as to its objects and advantages, the mode of its operation and the manner of its organization may be better understood by referring to the following description, taken in connection with the accompanying drawing forming a part thereof, in which

The single figure illustrates diagrammatically the invention as applied to a gas firing system.

In the following description and in the claim parts will be identified by specific names for convenience, but they are intended to be as generic in their application to similar parts as the art will permit.

Referring to the embodiment of the invention shown in the drawing, a combustion chamber 11 is provided with a fuel jet 12 secured to the end of a supply pipe 13 which passes through the wall of the combustion chamber and is connected to any suitable fuel supply not shown. It is to be understood that the combustion chamber 11 and jet 12 are illustrative of any fluid fuel burner such as a range, furnace, refrigerator or the like supplied by gaseous or liquid fuel.

Connected in the supply pipe 13 are two valves 15 and 16 for controlling the supply of fuel to the jet 12. The valve 15 comprises a casing 17 in which reciprocates a valve stem 18 provided with an aperture 19 which permits the free flow of fuel when the valve stem 18 is in its operative position as shown in the figure. Secured to the upper end of the valve stem 18 is a cap 20 between which and the valve casing 17 is a compression spring 21. The lower end of the valve stem 18 is provided with a notch 22 which is normally engaged by plunger 23 which forms the core of a solenoid 25. Secured to the plunger 23 is a collar 26 between which and the solenoid 25 is a compression spring 27.

The valve 16 comprises a casing 29 in which re-

ciprocates a valve stem 30 provided with an aperture 31 which permits the free flow of fuel when the valve stem is in its operative position as shown in the figure. Secured to but insulated from the lower end of the valve stem 30 is a contact block 32. Secured to the upper end of the valve stem 30 is a piston 33 which reciprocates in a cylinder 35, the upper end of which communicates by means of a pipe 36 with the pipe 13. Mounted between the piston 33 and the lower end of the cylinder 35 is a compression spring 37.

Mounted in the retort 11 is a thermostatic element 39 of standard and well known construction, which is provided with a shaft 40 extending through the wall of the retort 11 and is so constructed that when heated the shaft 40 will be rotated in a counterclockwise direction and when cooled it will be rotated clockwise. Secured to but insulated from the shaft 40 is a contact arm 41 which is connected to one side of a battery 42, the other side of which is connected to a fixed contact 43 which engages the contact block 32. A second fixed contact 45 also engages contact block 32 and is connected through the winding of a relay 46 to a fixed contact 47 which engages the contact arm 41 when the thermostatic device 39 is not receiving heat. Shunted across the winding of the relay 46 is a coil 48 which surrounds a bi-metallic element 49 which is mounted in a bracket 50 and which is electrically connected to one side of the battery 42. The element 49 is so constructed that when it is heated by the passage of an electric current through the winding 48, it will gradually bend to the left until it engages a fixed contact 51 which is connected thru the winding of the solenoid 25 to the battery 42. The relay 46 controls the circuit from a high potential source 53 to two electrodes 55 and 56 which are located adjacent to the jet 12 and function to ignite the flame 57.

Operation

The mechanism is shown in the figure as in full operation with fuel from a source not shown being supplied by the pipe 13 to the jet 12 where it is burned to produce a flame 57. The valve 15 is held in the open position by means of the plunger 23 which engages the notch 22, and the valve 16 is held in the open position by the fuel pressure on the top of the piston 33. The thermostatic device 39, receiving heat from the flame 57, has rotated the contact arm 41 so that it does not engage the contact 47.

If for any reason the supply of fuel to the pipe 13 should be cut off or should drop below a pre-

determined pressure the piston 33 will be moved upward under the action of the spring 37 so as to close the valve 16, open contacts 43 and 45 and extinguish the flame 57 completely. As soon as the flame 57 has been extinguished, the thermostatic device 39 will cool causing the contact arm 41 to be rotated in a clockwise direction to engage the contact 47. The circuit is not completed by the contact 47, however, while the contact block 32 remains elevated. The mechanism remains in this position with the fuel cut off by the valve 16 until the fuel pressure again becomes sufficient to open the valve 16.

When the supply of fuel is resumed, the piston 33 will be moved downward due to the pressure of the gas in cylinder 35 thus opening valve 16 and engaging contacts 43 and 45. This closes the circuit from the battery 42, contact arm 41, contact 47, relay 46 and coil 48 in parallel, contact 45, contact block 32 and contact 43 back to battery 42. The energization of the relay 46 closes the circuit from the high potential source 53 to the electrodes 55 and 56 forming an arc at these electrodes which ignites the fuel issuing from the jet 12 to form the flame 57. The heat from the flame 57 causes the contact arm 41 to be rotated in a counter-clockwise direction, thus opening the circuit at the contact 47. This breaks the circuit thru the relay 46 and coil 48, thus extinguishing the arc between the electrodes 55 and 56, and rendering the control circuit ineffective until the flame 57 is again extinguished. The mechanism is then in its normal operating condition as shown in the figure.

If for some reason the fuel should fail to ignite the thermostatic device 39 holds the contact arm 41 in engagement with the contact 47, thus allowing current to continue to flow thru the coil 48, for heating the same. The heat from the coil 48 will be transmitted to the bi-metallic element 49 causing it to bend to the left until, after a predetermined interval of time, it will engage the contact 51, thus closing a circuit from the battery 42, element 49, contact 51 and solenoid 25 back to battery 42. The energization of the solenoid 25 will cause the plunger 23 to be moved to the right thus releasing the valve stem 18 which will be moved upward under the action of the spring 21 to close the valve 15 and shut off the supply of fuel. The thermostatic elements 39 and 49 are designed to allow the normal time for ignition before the contact 51 is closed so that in normal operation the flame becomes ignited and the contact 47 is opened before the contact 51 has time to close.

When the supply of fuel is shut off by the valve 15, the valve 16 automatically closes thus opening the contacts 43 and 45 which will break the circuit thru the relay 46 and the coil 48, thus extinguishing the ignition arc and de-energizing

the element 49 which then turns to its normal position and opens the contact 51. The valve 15 will remain in the closed position until it is manually opened by depressing cap 20. The cycle of operations previously described will then be repeated.

If, while the mechanism is in operation, the flame 57 should be accidentally extinguished or blown out the thermostatic device 39 will cool off, closing contact 47 to reignite the flame 57, and if this should not be accomplished in a predetermined time the valve 15 is closed in a manner already described.

If it is desired to extinguish the flame 57 the plunger 25 is manually moved to the right thus closing valve 15 and putting the entire mechanism into an inoperative condition. When it is desired to relight the flame 57, the cap 20 is depressed manually, thus opening valve 20, which as previously described will open valve 16 and energize the ignition circuit.

Although only a specific form in which this invention may be embodied has been shown herein, it is to be understood that the invention is not limited to any specific construction but may be embodied in various forms without departing from the spirit of the invention or the scope of the appended claim.

What is claimed is:

A system of the class described comprising a fluid fuel burner, a fuel supply pipe supplying fuel thereto for combustion, ignition means for said burner including an energizing circuit, a thermostatic switch exposed to the heat of the burner and connected to close said energizing circuit when said burner is cold, a normally open valve in said fuel supply pipe, electro-magnetic trip means to close said valve and a delay action relay connected to be energized with said ignition means and to actuate said trip means after a predetermined interval, said thermostatic switch being connected to de-energize said delay action relay and said energizing circuit when the burner becomes hot, a pressure controlled valve in said fuel supply pipe between said first valve and said burner actuated by fuel pressure to close in response to failure of said pressure and to open when said pressure exceeds a predetermined value, means associated with said last valve to open the energizing circuit for said ignition means and the circuit to said delay action relay when said last valve is closed and to close said circuits when said last valve is open, whereby the ignition means is automatically rendered operative whenever the flame is extinguished with the fuel supply open, the fuel supply is automatically cut off if the burner fails to ignite, and the ignition means is again rendered operative when the first valve is reopened.

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