

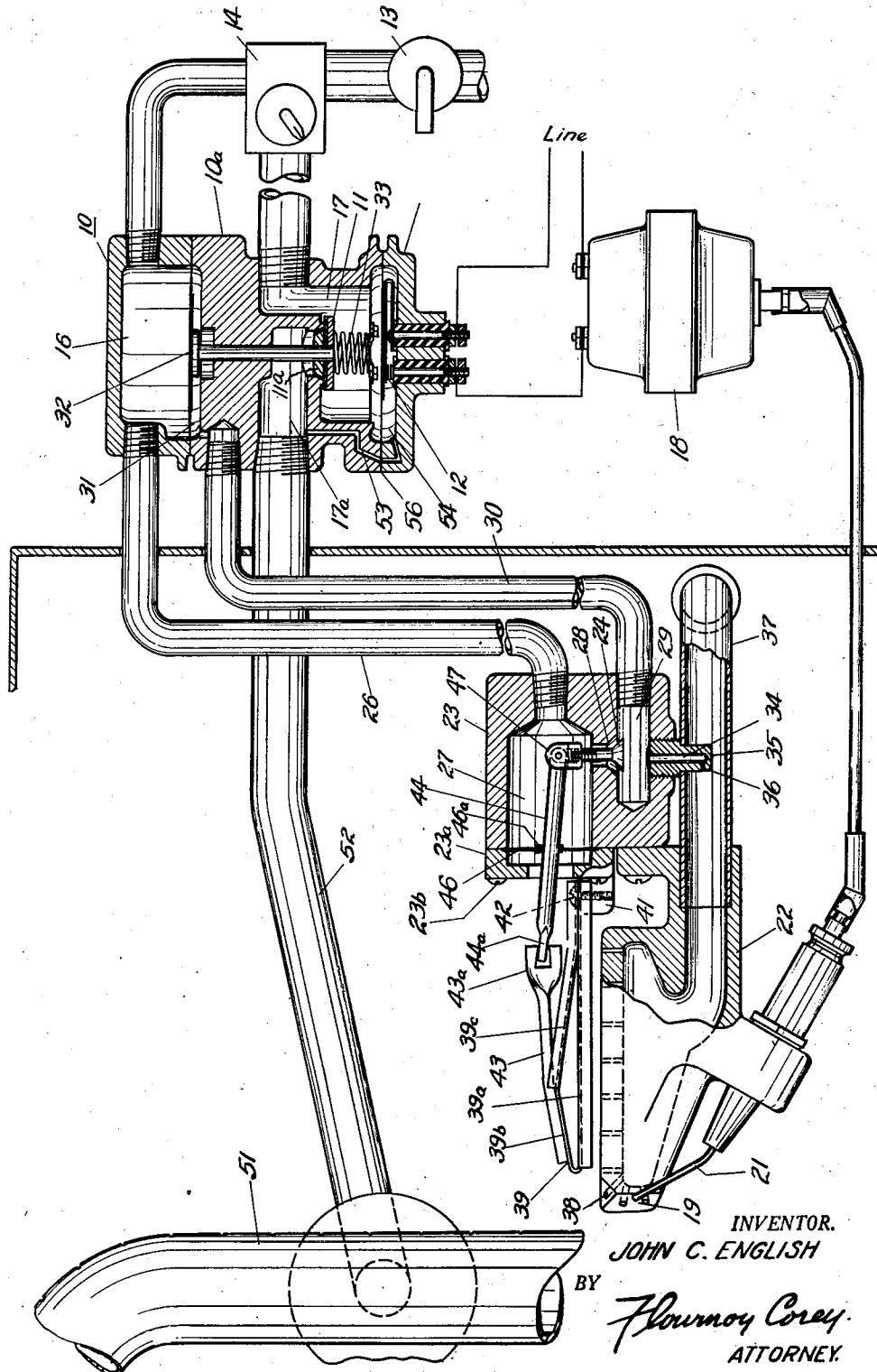
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THERMOSTATIC CONTROL MEANS

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THERMOSTATIC CONTROL MEANS

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1 Claim. (Cl. 158—117.1)

This invention relates to fluid fuel burners and has particular relation to an ignition and control means for such burners.

One of the main or general objects of my invention is to provide an ignition and control system for fluid fuel burners such as gas burners, which will ignite the gas every time the gas is turned on, regardless of how long the unit has been in operation previously or how long the gas has been off.

Another general object of my invention is to provide a control or safety system operative by small differences of fuel pressure for preventing opening of the main fuel supply valve until ignition is assured, for furnishing ignition to a pilot burner, for regulating the supply of fuel to the pilot burner, and for turning off the main fuel supply valve in the event of failure of the pilot burner.

More specifically, one of the main objects of my invention is to provide means whereby oxidation, fouling and the like of the parts of such a system will not hinder or otherwise affect its operation.

Another object of my invention is to provide, in a control system of the above character, a new and improved throttling valve, thermostat, and pilot burner structure.

Another important object of my invention is to provide a packless valve suitable for controlling the flow of fluids in a system from outside the system without leakage and without interference by corrosion, fouling and the like.

Other and further features and objects of the invention will be more apparent to those skilled in the art upon a consideration of the accompanying drawing and following specifications, wherein is disclosed a single exemplary embodiment of the invention, with the understanding, however, that such changes may be made therein as fall within the scope of the appended claims, without departing from the spirit of the invention.

The single figure of the drawing is a schematic diagram of one embodiment of the invention with portions of the devices shown in plan view and other portions in section, and illustrating a preferred embodiment of my invention.

Referring now to the drawing:

The mechanism illustrated generally at 10 is a combination, in the same housing 10a, of a diaphragm-actuated main valve 11, 11a and diaphragm-actuated control switch 12.

Fuel admitted to the system through the shut-off valve 13 and oven temperature control valve

14 fills the chambers 16 and 17. The gas in chamber 17 closes the switch 12 to energize the transformer 18 and provide a spark at the spark gap 19 between the electrode 21 and the body of the pilot burner 22.

The pilot burner is mounted upon or comprises part of a throttle valve housing 23 which houses the throttle valve 24. Gas admitted to the chamber 16 of the main valve housing 10a flows through the conduit 26 into chamber 27 of the throttle valve housing, through the port 28 controlled by the throttle valve 24, into chamber 29, and back through a conduit 30 to a chamber 31 beneath the diaphragm 32 of the control valve. This immediately equalizes the pressure on the opposite sides of the diaphragm 32 and prevents the main control valve 11 from opening. The spring 33 ordinarily holds the valve 11 in the closed position if there is no difference in pressure on the opposite sides of the diaphragm.

Gas may pass from the chamber 29 on the output side of the throttle valve 24, through the bore 34 in the jet 35, and out through the orifice 36. Gas issuing from this orifice 36 sucks air in from outside the oven or other enclosure through the secondary air conduit 37, and the mixture of air and gas passes through the pilot burner ports 38 and is ignited by the spark at gap 19.

A thermal element 39, which may be approximately triangular in shape, is supported in front of the flame of the pilot burner by means of a lug 41 on the throttle valve housing. This thermostatic element is preferably of a single strip of metal, such as stainless steel, bent back upon itself and having the ends of the strip fastened to each other and to the lug 41 by means of a screw 42. The straight portions forming the sides of the triangle are preferably flanged for stiffness, but the corners of the strip may bend and flex readily so that, when the element is unequally heated, as by means of the flame from the pilot burner striking the long leg 39a, the short legs 39b and 39c move inwardly and the corners of the triangular shaped element flex to cause inward movement of the lever arm 43, which is a continuation of the side 39b.

The lever arm 43 has a yoke-like end portion 43a which is adapted to engage the flattened portion 44a of a toggle pin or rod 44. This toggle rod or valve stem is fastened securely to the diaphragm 46, as by ring 46a, to prevent sliding of the stem through the diaphragm, but permits free rocking or sidewise movement of the ends of the toggle arm about the junction of the arm and diaphragm as a fulcrum. The dia-

phragm is held in place on the throttle valve housing 23 by means of a cap 23a and screws 23b. The inner end of the toggle arm 44 is pivotally secured to a small clevis member 47 which is threaded to receive the threaded stem of the throttle valve 24.

The diaphragm and toggle rod structure is unaffected by grease and the like, and the connection between the valve and the thermostat is practically frictionless so that an adjustment of the parts, once secured, is not thereafter affected by oxidation or change in the metal structure or the like. The diaphragm affords a complete seal for the chamber 27 and no unburned gas can escape from this chamber nor any foreign impurities enter.

The inward movement of the free end of the lever arm 43 produces outward movement of the inner end of the toggle arm 44, and thus causes the throttle valve 24 to move in the port 28 to partially close off the port and throttle the gas passing through the port. This throttling of the gas reduces the pressure beyond the throttle valve, thereby reducing the amount of gas issuing from the orifice 36 and pilot burner ports 38, and also reduces the pressure in the chamber 31 beneath the main valve diaphragm 32 and permits the pressure of the gas in the chamber 16 to overcome the pressure of the spring 33 and open the main control valve 11 to permit gas to flow into the chamber 17a and into the main burner 51 through the conduit 52. The gas now present in the output port 17a of the control valve 11 and in the conduit 52 passes through a small conduit 53 to the chamber 54 beneath the switch actuating diaphragm 56, to thus equalize the pressure on opposite sides of the diaphragm to open the switch 12 and thus de-energize the ignition transformer.

If, for any reason, the pilot burner goes out, the long leg 33a of the thermostat 39 contracts and the lever arm moves outwardly to open the throttling port 28 to again equalize the pressure on the opposite sides of the diaphragm 32 and permit the spring 33 to close the control valve.

The same action occurs if the shut-off valve 13 is closed—that is, the pressure on the opposite sides of the diaphragm 32 is almost instantly equalized by bleeding of the gas through the throttling valve, and the control valve 11 is closed and made ready for the next cycle of operation.

It is apparent that the opening of the shut-

off valve 13 will always cause ignition to be furnished to the pilot burner, and that if the pilot burner is not ignited, gas cannot flow to the main burner. If the pilot burner is ignited and then is extinguished through accident or because of low pressure or the like, the flow of gas to the main burner is shut off.

It is apparent that I have devised a new and improved control means including a "packless" valve particularly suitable for controlling the flow of fluid in a system by actuating means outside the system so that no leakage of the fluid occurs and operation of the valve is not affected by oxidation, fouling and the like. The valve may be used in controls for radiators, poisonous gases, liquids and the like, without danger through leakage.

Although I have described a specific embodiment of my invention, it is apparent that modifications thereof may be made by those skilled in the art. Such modifications may be made without departing from the spirit and scope of my invention as set forth in the appended claim.

I claim as my invention:

In a fluid fuel control means, the combination of a main burner, a diaphragm actuated fuel flow control valve, a supply line for the valve, a first conduit for conducting fluid fuel under pressure direct from the supply line independent of said control valve to one side of the diaphragm of the valve, a pilot burner connected to receive fuel from the supply line a normally open throttle valve, a housing therefor connected on one side with the supply line and on its other side with the pilot burner and the other side of said diaphragm, whereby pressure of the fluid fuel on said other side of the diaphragm of the control valve may be relieved by throttling of said throttle valve to permit the control valve to open, and the fuel supply to the pilot burner to be reduced, means for operating the throttle valve comprising a thermal element disposed adjacent the pilot burner so as to be actuated by heat therefrom, a lever arm operatively connecting the throttle valve and the thermal element, said lever arm extending through an opening in the throttle valve housing, and a sealing diaphragm disposed across the opening for sealing the opening and providing a fulcrum for the lever arm.

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