

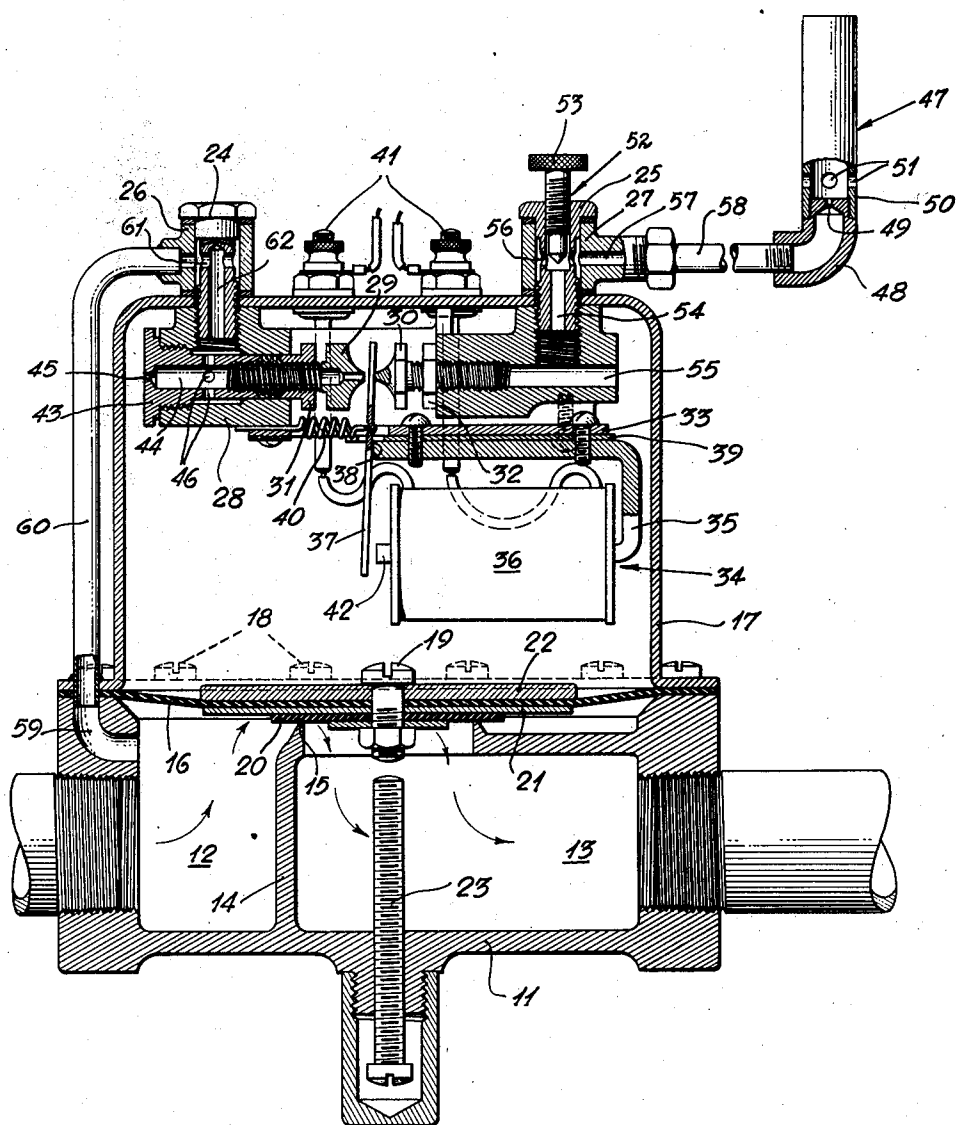
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FUEL CONTROL VALVE

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FUEL CONTROL VALVE

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2 Claims. (Cl. 158-115)

My present invention relates to fuel control valves for heating devices and has for its chief object the provision of a novel control system for a fluid fuel pressure motor operated valve, and which includes means for supplying fuel to a pilot burner.

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

For a complete understanding of the invention, reference may be had to the following detailed description and accompanying drawing in which the single figure is a sectional view of a valve embodying my invention.

Referring particularly to the drawing, the numeral 11 denotes a valve body or casing having an inlet 12 and an outlet 13 separated by a ported partition 14 having a valve seat 15. Covering an opening in an upper wall of the casing 11 is a diaphragm member 16 secured between the flange of a housing 17 and said casing, as by screws 18. Secured to the diaphragm member 16 by a screw 19 is a valve member 20 cooperable with seat 15, a stiffening member 21 and a weight biasing and stiffening member 22. A screw 23 affords means for manually opening the valve, if desired.

Secured to the upper inner wall of the housing 17 by hollow screws 24 and 25 extending through hollow sleeve members 26 and 27 is a member 28 supporting a hollow jet or port member 29 and a stop member 30 which may be locked in position after adjustment by a packing nut 31 and a nut 32, respectively.

Secured to the member 28 by means of a plate 33 is an electromagnetic device generally indicated by the numeral 34 and comprising a U-shaped core 35 supporting a coil member 36, a flat armature member of magnetic material 37 fulcrumed on the edge 38 of the core 35, an armature retaining member 39 and a compression spring 40 biasing the upper end portion of the armature to contact with the stop member 30. Binding posts 41, insulatively mounted in the upper wall of housing 17, provide means for externally connecting to the coil 36.

Upon energization of the electromagnetic device, the lower end portion of the armature member 37 is attracted toward the pole 42 of the core, the upper end portion of the armature coming into contact with the port member 29 to close the port thereof, thus forming a one-way pilot valve.

The end portion of the jet or port member 29, with which the flat armature member 37 co-

operates, may be made as small as 0.030 inch in diameter so that the contact pressure may be great enough to form a gas-tight junction with minimum expenditure of electrical power. For maximum sensitivity, the members 29 and 30 may be adjusted so as to limit the armature movement to as little as 0.005 inch.

The jet 29 limits the movement of the armature in its attracted position so that contact of the pole 42 with the armature is prevented, thus eliminating the possibility of magnetic "sticking." For maximum sensitivity, this clearance may be as small as 0.002 inch.

The port member 29 is threadedly secured in a hollow member 43 which, in turn, is threaded into the member 28. Communicating with the central passageway 44 of the member 43 is an orifice 45 and lateral openings 46.

Generally indicated by the numeral 47 is a pilot burner comprising a body 48 having an orifice 49 and a burner tube 50 provided with air mixing openings 51. A manual valve 52, comprising a needle valve screw 53 cooperable with a valve seat formed by the upper end of passageway 54, provides means for turning the pilot burner on and off. When said valve 52 is open, it will be seen that gas can flow from the interior of the housing 17 to the pilot burner through passageways 55, 54, 56 and 57 and pipe 58.

Communication between the inlet 12 of the main valve and the port member 29 is provided by passageway 59, pipe 60 and passageways 61, 62, 46 and 44.

The operation of the valve is as follows: Assuming that the inlet of the main valve is connected to a source of fluid fuel such as ordinary gas and that the pilot valve is in the position shown, the electromagnetic device being unenergized, gas will flow through the open port of the member 29 and the orifice 45 to the interior of the housing 17 from whence it may pass to the pilot burner orifice 49. The port of member 29 is conveniently formed by a No. 66 drill and the orifices 45 and 49 by a No. 76 drill. The ratio of the areas of the openings formed by such drills is about 2.7:1, so gas is admitted to the interior of the housing faster than it can escape at the pilot burner, with the result that fluid pressure is built up above the diaphragm member substantially equal to that below it and the main valve remains closed on account of the weight bias of the diaphragm member.

Should the electromagnetic device now be energized by completion of a circuit through coil 36

to a source of current, the armature member 37 will be moved to close jet 29 with the result that the fluid pressure in the interior of the housing will drop, permitting the pressure below the diaphragm member to force that member upward to open the main valve. It will be seen that the continuous flow of gas through the orifice 45 is substantially only sufficient for the consumption of the pilot burner, the orifice of that burner being made approximately the same size as orifice 45.

Upon deenergization of the electromagnetic device, the port of member 29 will be again opened with the result that pressure above and below the diaphragm member will become substantially equal, permitting the main valve to close.

Should the flow of gas to the pilot burner be stopped by manual closing of the valve 52, the main valve will be closed and maintained in that position regardless of the condition of the pilot valve.

Apparent advantages of the novel control system of my invention include the following:

Only a one-way pilot valve is required, the single port of which may be made relatively large, and hence unlikely to become obstructed, under the conditions of the fluid circuits employed. Requirement of a vent line for the valve is eliminated. Turning off the pilot burner effects closing of the main valve. The general structure of the valve herein disclosed is claimed in my copending application, Serial No. 222,673, filed August 2, 1938. In case that a thermoelectric generator, such as that disclosed in the copending application of William R. Ray, Serial No. 225,075, filed August 15, 1938, is employed in lieu of the pilot burner shown as a source of power for the electromagnetic device, more fuel is supplied to the generator when the pilot valve is unenergized on account of the higher pressure then existing within the housing than when it is energized, the thermoelectric power thus being increased in readiness for use and decreased when less is required.

Other means than that of the orifice 45 may be employed for supplying the pilot burner in the closed position of the pilot valve without

departing from the spirit of my invention. For example, the pilot valve might be so arranged that there would be sufficient leakage therefrom in its closed position to supply the pilot burner.

It is to be understood that the specific embodiment of my invention shown and described is for the purpose of illustration only and my invention therefore is to be limited only by the scope of the appended claims.

I claim as my invention:

1. In a burner control system, a fluid pressure operated main valve comprising a valve body, a movable partition dividing said body into a first and a second pressure chamber, said first chamber being constantly subjected to the inlet pressure of the fuel controlled by the valve, a pilot burner connected only to said second chamber and having a restricted orifice, means defining a restricted passageway interconnecting said chambers and adapted to constantly pass fuel from said first chamber into said second chamber in an amount only sufficient to supply said pilot burner, and a pilot valve for said main valve connected to said first chamber and mounted in said second chamber so as to control fuel flow directly therein in an amount only sufficient to vary the fluid pressure therein to operate said movable partition.

2. In a burner control system, a fluid pressure operated main valve comprising a valve body, a movable partition dividing said body into a first and a second pressure chamber, said first chamber being constantly subjected to the inlet pressure of the fuel controlled by the valve, a pilot burner connected only to said second chamber and having a restricted orifice, means defining a passageway interconnecting said chambers, said passageway having an outlet so restricted as to constantly pass fuel from said first chamber into said second chamber in an amount only sufficient to supply said pilot burner, and a pilot valve for said main valve connected to said passageway and mounted in said second chamber so as to control fuel flow directly therein in an amount only sufficient to vary the fluid pressure therein to operate said movable partition.

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