Jan. 19, 1937. J. F. MUSTEE 2,068,429

FUEL CONTROL VALVE

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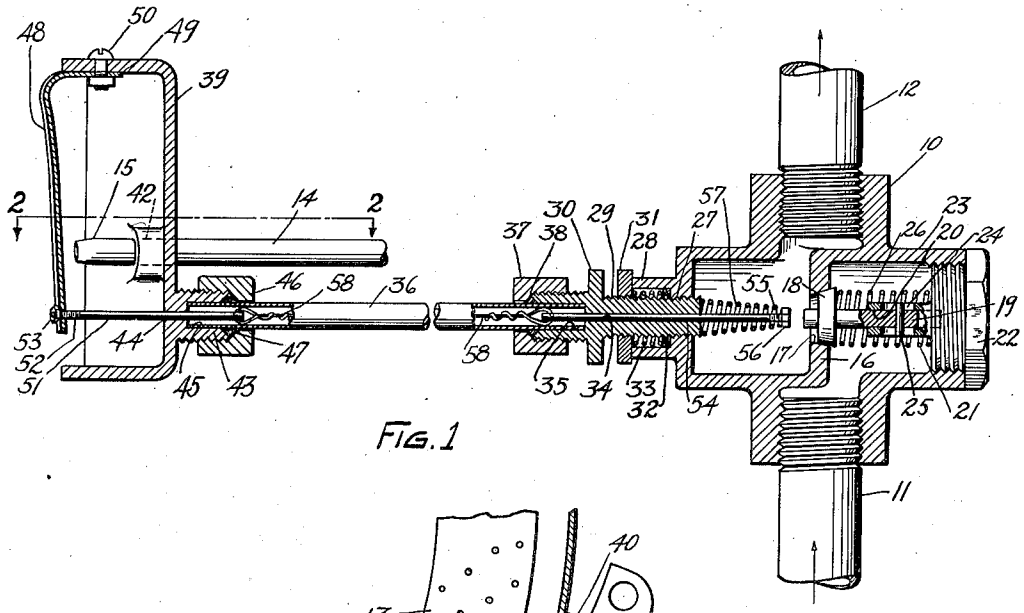


FIG. 1

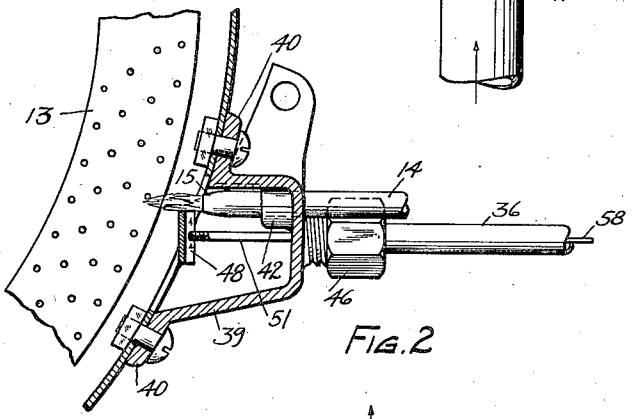


FIG. 2

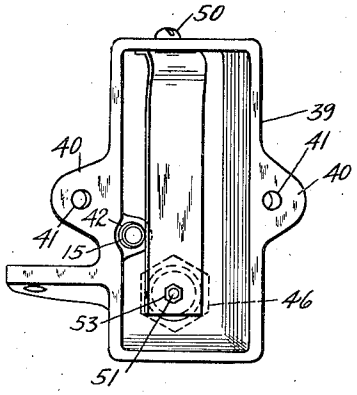


FIG. 3

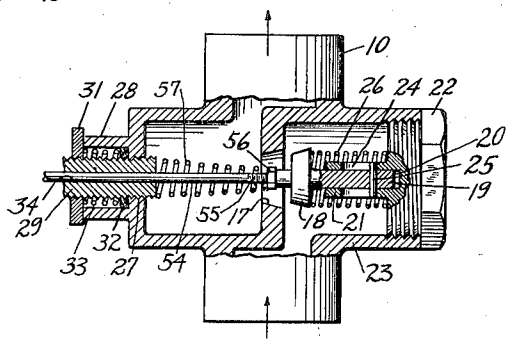


FIG. 4

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FUEL CONTROL VALVE

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1 Claim. (Cl. 158—117.1)

This invention relates to a fuel-burning apparatus and more particularly to an automatic shut-off of the main supply to the main burner in the event the flame of the pilot burner becomes extinguished from any cause whatsoever.

An object of the present invention is to provide a shut-off device of this character which can be employed with the various types of fuel-burning apparatus now available and usually equipped with automatic controls, without interfering with their operation, thereby increasing the efficiency and safety of such apparatus.

A further object of the invention is to provide a mechanically operating device for controlling the actuation of a valve disposed in the main supply line, whereby upon extinguishment of the flame of the pilot burner said valve is closed thereby cutting off the flow of fuel to the main burner as well as to the pilot burner.

A still further object of the invention resides in employing the flame of the pilot burner as the controlling means for maintaining the valve in the main supply line in open position to thereby permit the flow of fuel to the main burner.

With the objects above indicated and other objects hereinafter explained in view, my invention consists in the construction and combination of elements hereinafter described and claimed.

Referring to the drawing:

Figure 1 is a longitudinal sectional view of a device embodying the present invention, showing the valve in closed position.

Fig. 2 is a fragmentary sectional view taken on line 2—2 of Fig. 1.

Fig. 3 is an end elevational view looking towards the right in Fig. 1, and

Fig. 4 is a fragmentary view partially in section and showing the open position of the valve.

In the drawing a control apparatus embodying the present invention is illustrated which is adapted for installation upon various types of fuel-burning apparatus embodying a pilot burner in which no provision is ordinarily made to cut off the fuel supply to the main burner in the event of the extinguishment of the flame of the pilot burner. Considerable danger arises in connection with fuel-burning apparatus where no provision is made to cut off the flow of fuel to the main burner in the event of the flame of the pilot burner becoming extinguished from any cause whatsoever and the present device efficiently takes care of this condition in a positive and inexpensive manner.

The preferred construction of the device is shown in Fig. 1 of the drawing, wherein 10 indicates a valve body having screw-threaded openings to receive an inlet pipe 11 connected to any suitable source of fuel supply, and an outlet pipe 12 connected to a main burner 13 in the usual manner and also connected to a pipe 14 adapted to supply fuel to a pilot burner 15 located in the well known manner in proximity to the main burner 13.

The valve body 10 has a wall or partition 16 formed integral therewith which is provided with a tapered opening forming a valve seat 17 through which the fuel is adapted to pass. A movable valve member 18 having a tapered peripheral portion is adapted to engage the valve seat 17 to thereby control the flow of fuel through the valve body. The valve member 10 has an axial extension 19 which is reciprocally mounted in a bore 20 provided in an axial extension 21 formed integral with a screw-threaded plug 22. The valve body 10 has a hollow extension 23 interiorly screw-threaded with which the plug 22 is engageable. The extension 21 is provided with aligned slots 24 within which the opposite ends of a pin 25 secured to the extension 19 are disposed, the extremities of the slots limiting the reciprocable movement of the movable valve member 18. A coil spring 26 encircles the extensions 19 and 21 and has its opposite ends abutting the movable valve member 18 and the inner end of the plug 22 respectively, so as to maintain said valve member 18 normally in engagement with the valve seat 17 to thereby prevent the flow of fuel through the valve body 10 to the burners.

Axially of the valve member 18 the valve body 10 is provided with a screw-threaded opening 27 and a hollow extension 28 formed integral therewith. An exteriorly screw-threaded plug 29 is adapted to cooperate with the screw-threaded opening 27 and is provided with a laterally extending flange or collar 30 about midway thereof by which the plug may be turned. A lock nut 31 is mounted upon the plug 29 and is adapted to be securely turned into engagement with the end of the hollow extension 28, so as to securely lock the plug in any desired position. A packing member 32 of suitable material is disposed within the hollow extension 28 and encircles the plug 29, while a coiled spring 33 is likewise disposed within the hollow extension 28 encircling the plug 29 and has its opposite ends bearing against the lock nut 31 and the packing 32, so as to constantly exert a pressure upon the packing to insure a fluid-tight joint between the plug and the screw-threaded opening 27.

The plug 29 has an axial opening 34 in one end thereof which communicates with an axial bore 35 of larger diameter at the opposite end thereof. A tubular member 36 preferably of material which may be readily bent, such as copper, has one of its ends disposed in the bore 35 and slidably mounted on the tubular member 36 is an interiorly screw-threaded nut 37 adapted to engage the adjacent screw-threaded end of the plug 29, a suitable packing 38 being provided between the end of the plug and the nut 37, so as to securely clamp the tubular member 36 against accidental disengagement.

A so-called housing 39 is provided with wings 40 having openings 41 by which the housing may be attached to a portion of the fuel-burning apparatus, preferably adjacent the burner 13, as more clearly shown in Fig. 2. This housing has an opening 42 through which the end of the pilot burner 15 may be inserted. The housing also is provided with an exteriorly screw-threaded extension 43 having an axial opening 44 at one end communicating with an axial bore 45 of larger diameter at the other end thereof. The opposite end of the tubular member 36 is disposed within the bore 45 and slidably mounted upon the tubular member is an interiorly screw-threaded nut 46 which is adapted to engage the screw-threaded end of the extension 43. A suitable packing 47 is positioned between the end of the extension 43 and the nut 46, so as to secure the end of the tubular member 36 against accidental disengagement.

A heat reactive member in the form of a bimetallic thermostat 48 is bent at one end to provide a lateral flange 49 having an opening therein and is secured to the upper end portion of the housing 39 by means of a bolt and nut connection 50. The heat reactive member 48 has a portion positioned in proximity to the end of the pilot burner 15 so that a portion of the flame of the pilot burner impinges upon this member. When the pilot flame is lit this heat reactive member 48 has a tendency to move towards the end of the pilot burner 15, while upon extinguishment of the flame of the pilot burner the heat reactive member has a tendency to move away from the end of the pilot burner 15. It is the movement of this member 48 in one direction or the other, depending upon whether the flame of the pilot burner is extinguished or not, that controls the operation of the movable valve member 18 to maintain the valve member in open or closed position so as to permit or prevent the flow of fuel to the main burner 13 and pilot burner 15.

A rod 51 is slidably mounted in the opening 44 of the extension 43 and has its outer end screw-threaded at 52 and extends through an opening in the lower portion of the member 48. A nut 53 engages the projecting screw-threaded end of the rod to maintain the end of the rod and the end of the heat reactive member in assembled relation. A similar rod 54 is slidably mounted in the opening 34 provided in the plug 29 and has its outer end screw-threaded at 55 to receive a nut 56. A helical spring 57 encircles the free end of the rod 54 and has one of its ends in engagement with the nut 56, while the opposite end engages the adjacent end of the plug 29. This spring 57 tends to normally urge the nut 56 toward the movable valve member 18, so that upon movement of the heat reactive member 48 toward the right, as viewed in Fig. 1, the nut 56 will be positively moved into engagement with the movable valve member 18 to remove the latter from the valve seat 17, as shown more clearly in Fig. 4. The adjacent ends of the rods 51 and 54 are provided with transverse openings through which are looped the opposite ends of a wire 58 which secures the rods in assembled relation for movement as a unitary member. This may be termed a composite or sectional member and the primary purpose is to produce a mechanically actuated member which will be certain to operate irrespective of the shape in which the tubular member 36 may be bent to adapt the device for different conditions of attachment.

In the operation of the device the valve body 10 is connected in the main fuel supply line between the source of fuel and the main burner 13 and pilot burner 15, preferably ahead of all other automatic instrumentalities, such as room temperature controls, etc. When the flame of the pilot burner 15 is extinguished the parts assume a relationship as shown in Fig. 1, in which the main control valve 18 is maintained upon the valve seat 17, so as to prevent the flow of fuel to the main burner 13 and pilot burner 15. However, when the flame of the pilot burner is burning it impinges upon the heat reactive member 48 causing the same to contract or to move in a direction toward the end of the pilot burner 15, as shown in Fig. 1. Upon this movement the pressure of the end of the rod 51 to which the heat reactive member is connected is released and the spring 57, exerting a pressure upon the nut 56, causes the latter to move into engagement with the movable valve member 18, as shown in Fig. 4, removing the latter from the valve seat 17 and thereby permitting the flow of fuel through the valve 10 to the main burner 13 and pilot burner 15. So long as the flame of the pilot burner continues to burn the movable valve member 18 is maintained out of engagement with the valve seat 17 or in open position and fuel is permitted to flow through the valve body 10. It will at once be observed, therefore, that this control device does not in any manner whatsoever interfere with the other automatic control devices embodied in a fuel-burning system of this character. In other words the flow of the fuel to the main burner 13 may still be controlled through the room thermostat, boiler pressure regulator or what not, the operation of which is not in any manner dependent upon the operation of the pilot burner 15. It is only when the flame of the pilot burner has become extinguished that this control device is brought into operation to cut off the flow of fuel from the source to the main burner 13 and pilot burner 15. While only a single main burner and pilot burner have herein been referred to, it is to be understood, of course, that the invention is applicable to a plurality of such burners.

While I have described the preferred embodiment of the invention, it is to be understood that I am not to be limited thereto, inasmuch as changes and modifications may be resorted to without departing from the spirit of the invention or the scope of the appended claim.

Having thus described my invention, I claim:

In a device of the character referred to, the combination of a burner, a fuel supply line connected to said burner, a valve in said fuel supply line, said valve comprising a valve body and a movable member positioned therein adapted to control the flow of fuel therethrough, a spring within said valve body continuously urging

said movable member towards a closed position, a second spring within said valve body adapted to move said movable member against the resistance of the first mentioned spring in a direction to open said valve, and means for controlling the actuation of said second spring, said means comprising a bi-metallic thermostat positioned in proximity to the plane of said burner having means to hold said second spring in inoperative position when said thermostat is cold, said means comprising a flexible member for operatively connecting said second spring and said thermostat.

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