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E. T. VINCENT

VALVE CONTROL APPARATUS

Filed May 15, 1926

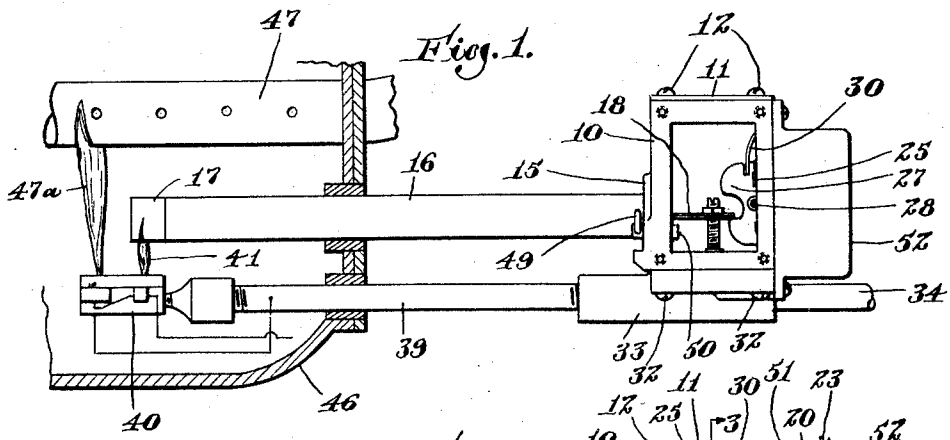


Fig. 1.

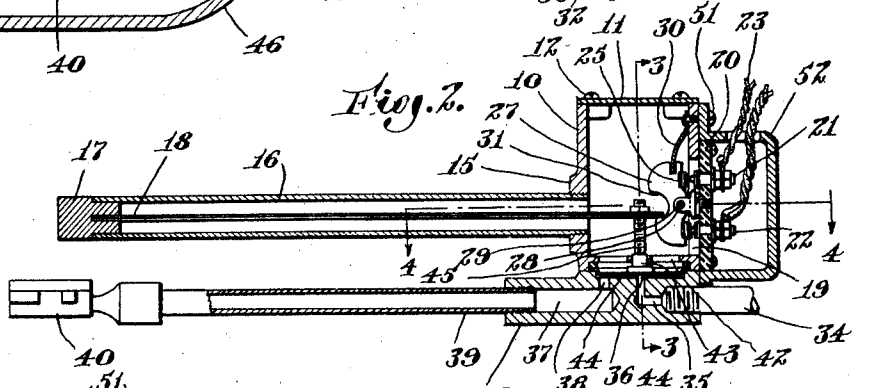


Fig. 2.

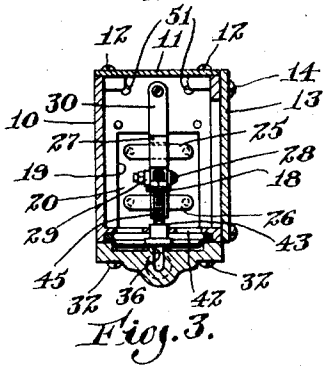


Fig. 3.

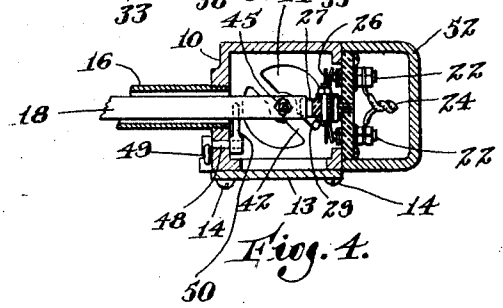


Fig. 4.

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# UNITED STATES PATENT OFFICE.

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## VALVE CONTROL APPARATUS.

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My present invention relates to an improved control apparatus for gas or other fluid.

In thermostatically controlled heating apparatus where the heating element is gas or other heating fluid, a source of danger is the pilot burner ordinarily associated with the main burner. As ordinarily employed, the fuel at the pilot burner is ignited and afterwards the fuel at the main burner is ignited. Then the main and pilot burners are operating at one and the same time, the main burner being controlled by a valve, which, in turn, is controlled by a thermostatic arrangement located in a room or building it is desired to heat. It may sometimes happen that if the main burner is adjusted so that very little fuel is being consumed thereat, that the main burner will be extinguished and also the pilot light will be extinguished. Under such circumstances, while the flow of fuel through the main burner is arrested at the control valve beyond, the pilot burner will have fuel fed continuously thereto, with the result that a large amount of unconsumed fuel collects in the fire or ignition chamber of the burner. Afterwards, should it be attempted to light the pilot burner, an explosion will result and possibly damage occur. Various attempts have been made to devise apparatus for preventing such accidents and as far as I am aware, none of these attempts have been successful.

In my present invention, I have devised an improved control apparatus for controlling the main supply fuel valve of an apparatus of the kind referred to and have associated with such apparatus a thermostatic control of the pilot light, such control consisting essentially in means for automatically shutting off the flow of fuel to the pilot burner, should, for any reason, the pilot light be extinguished for a predetermined length of time.

The object of my invention, therefore, is an improved valve control apparatus for heating plants and the like.

In the accompanying drawings illustrating the preferred embodiment of my invention,

Fig. 1 is a side elevation shown attached to a heating plant and with the cover plate removed;

Fig. 2 is a vertical sectional elevation of Fig. 1;

Fig. 3 is a vertical end elevation on the line 3—3 of Fig. 2, and

Fig. 4 is a sectional plan view on the line 4—4 of Fig. 2.

Referring to the drawings, 10 designates a rectangular box structure provided on its open upper end with a cover plate 11 secured thereto by screws 12 and on its front face with a cover plate 13, secured thereto by screws 14. Screwed into a boss 15 formed on one side of the rectangular box 10, is a threaded end of a tube 16 of any convenient length and diameter. This tube 16 has secured therein at its outer end in any convenient manner a plug 17, the inner end of this plug being slotted to receive and hold securely one end of a bi-metallic thermostatic element 18, such thermostatic element extending forwardly through the tube 16 and into the interior of the rectangular box 10. The side of the box 10 opposite the boss 15 is cut away, as indicated at 19, and secured to the outer face of the box 10 and covering the opening 19 is a plate 20 of insulating material. Secured to said plate 20 are pairs of terminals 21 and 22 respectively and secured to said terminals on the exterior face of the insulating plate 20 are pairs of conductors 23 and 24 respectively. The inner ends of the pairs of terminals 21 extend inward beyond the face of the insulating plate 20 and are adapted to be engaged by contact plates 25 and 26 respectively, that is, the pair of contacts 21 are adapted to be engaged by the contact plate 25, while the pair of contacts 22 are adapted to be engaged by the contact plate 26. The contact plates 25 and 26 are mounted on a member 27 of insulating material that is pivotally mounted on a horizontal shaft 28 carried by a member 29 secured to and extending inwardly from the inner face of the insulating plate 20 as clearly shown in Fig. 2. The upper end of the member 27 is slotted to receive the lower end of a spring 30 that is secured to the inner rectangular box 10, this spring normally tending to hold the contact plate 26 in engagement with the pair of contacts 22. The rear end or edge of the member 27 is cut away, as indicated at 31, to receive the forward end of the thermostatic element 18, the thermostatic element in its oscillating movement engaging with one side or the other of such cut-away portion. The pair of conductors 23 form part of a circuit leading to a solenoid con-

trol means for controlling the main supply valve and feed current to such solenoid in a manner as to cause the solenoid to operate the valve to open the source of fuel supply, while the pair of conductors 24 lead to the same solenoid control means and feed current thereto in such a manner as to cause a closing of the main supply valve. As the plate 26 is normally in engagement with the pair of conductors 22, it will be obvious that such main control valve is normally closed. As the details of the construction and arrangement of the solenoid and main supply valve form no part of my present invention, they have not been illustrated and will not be further described.

The lower end of the rectangular box 10 is open and secured thereto by screws 32 is a member 33, into one end of which is screwed one end of a by-pass pipe 34 leading from the main source of fuel supply. The pipe 34 connects with a passage 35 formed in the member 33, this passage extending upwardly and terminating in a valve seat 36, on the upper surface of the member 33. On the end of the member 33 remote from the pipe 34 is a recess 37, which communicates by means of a passage 38 with the upper surface of the member 33 and this passage 37 has screwed into its open end one end of a pipe 39. On the outer end of the pipe 39 is screwed a burner 40, which is provided with an orifice through which will pass fluid which, when ignited, as indicated at 41, bears against the plug 17 carrying the thermostatic element 18. In the lower open end of the rectangular box 10 is formed a bar 42, perforated centrally to receive as a sliding fit a cylindrical member 43, which engages with a diaphragm valve 44 secured between the upper face of the member 33 and the lower face of the rectangular box 10. The diaphragm valve 44 is such that the fuel, under pressure, passing through the pipe 34 and through the passage 35 will force the diaphragm valve 44 off the seat 36 and will allow such fuel to pass through the perforation 38 into the recess 37, through the pipe 39, and through the burner 40. Adjustably mounted in the free end of the thermostatic element 18 is a screw 45, which engages with the upper end of the cylindrical member 43 and when the outer end of the thermostatic element 18 moves downward, as viewed in Figs. 1 and 2, will cause the cylindrical member to engage with the diaphragm valve 44 and force the same against the valve seat 36, thereby shutting off the flow of fuel.

The device as above described is adapted to be secured in the walls 46 of a heater.

Associated with the frame 46 is a main burner 47 and the pilot burner 40 is provided with orifices through which the fuel will pass and, when ignited, will impinge on the burner 47, as indicated by the reference numeral 47a in Fig. 1, thus effecting, it being assumed that the fuel passes out through the orifices in the main burner 47, the igniting of such fuel.

Rotatably mounted in the wall of the rectangular box 10 is a shaft 48, provided on its outer end with a handle 49 and by means of which it may be rotated, and on its inner end with an arm 50, adapted to engage with and lift upwardly the free end of the thermostatic element 18.

Enclosing the outer end of the pairs of terminals 21 and 22 and the connecting ends of the conductors 23 and 24, and secured to the rectangular box 10 by screws 51 is a cover box or plate 52. The operation of my improved device is as follows, it being assumed that the device has been constructed and arranged as above described and that such device has been arranged on the framework 46 of a heating apparatus. The device is assumed to be cold and, therefore, it will be assumed that the free end of the thermostatic element 18 is in its lowermost position with the lower end of the member 45 engaging with and forcing the cylindrical member 43 into engagement with the valve seat 36, and therefore shutting off the flow of fuel through the pipe 34. Also, the plate 26 being in engagement with the pair of contacts 22, the solenoid referred to above will be assumed to have been operating in such a manner as to close the main supply valve. The operator, therefore, by manipulating the handle 49 will lift, by means of the member 50, the free end of the thermostatic element 18 upwardly and allow the fuel to pass from the pipe 34 through the passages 35 and 38 to and through the pipe 39 and through the pilot burner 40. He will then cause ignition of the fuel at the pilot burner 40 in the usual manner and the flaming jets 41 and 47a will result. Within a comparatively short time, the heat from the jet 41 on the plug 17 will have affected the thermostatic element 18 sufficiently to hold its free end and the element 45 carried thereby away from the cylindrical element 43 and, therefore, the flow of fuel from the pipe 34 will not be interrupted and the pilot will remain lit. When the plug 17 becomes sufficiently heated, it will affect the thermostatic element in a manner to bring the free end of the thermostatic element 18 in engagement with the upper portion of the cut-out 31 in the element 27 and such element 27 will be rotated on the shaft 28, so as to bring the plate 25 into engagement with the pair of contacts 21 and against tension of the spring 30. The closing of the circuit between the pair of contacts 21 will cause the above referred to solenoid to operate and open the main supply valve and, therefore, fuel will be fed to the main burner 47, where it will

be ignited by the flaming jet 47ª. This condition of affairs will continue until the room thermostatic device above referred to is affected by the heat in the room to regulate the amount of fuel flowing from the source of fuel supply to the main burner 47. If, through an accident or for any other reason, the flow of fuel is temporarily shut off by the thermostatic element located in the room, and above referred to, there will be no fuel flowing through the main burner 47. If, while the flow of fuel through the burner 47 is thus temporarily shut off, and for any reason the pilot burners 41 and 47ª, are extinguished, the plug 17 and associated thermostatic element 18 will be rapidly cooled and the free end of the thermostatic element 18 will move the member 45 into engagement with the cylindrical member 43 and will force the same and the diaphragm valve 44 into engagement with the valve 36 and thereby shut off the flow of fuel to the pilot burner 40. In cooling, the free end of the thermostatic element 18 will also engage with the lower portion of the cut-out 31 and will rotate the member 27 on the shaft 28, opening the valve opening control circuit 23 at the contact points 21 and will close the valve closing circuit at the contact points 22. Therefore both the main supply valve and the pilot supply valve will be closed and fuel will be prevented from passing through either the pilot burner 40 or the main burner 47 into the firing box. Under these circumstances, it will be necessary in order to restart the apparatus, to perform the sequence of operations described above.

While I have necessarily described the preferred embodiment of my invention somewhat in detail, it is to be understood that I may vary the size, shape, and arrangement of parts within wide limits without departing from the spirit of the invention.

Having thus described my invention, what I claim as new is:

In an apparatus of the kind described, the combination of a main burner, a pilot burner, a source of fuel supply for said burners, a thermostatic arrangement actuated by the influence of heat from the pilot burner and operating to shut off the flow of fuel to the pilot burner upon the extinguishment of the pilot light for a predetermined length of time and control means for a main fuel supply operable simultaneously with the operation of the pilot control means.

In testimony whereof, I have signed my name to this specification.

EUGENE T. VINCENT.