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AUTOMATIC BURNER

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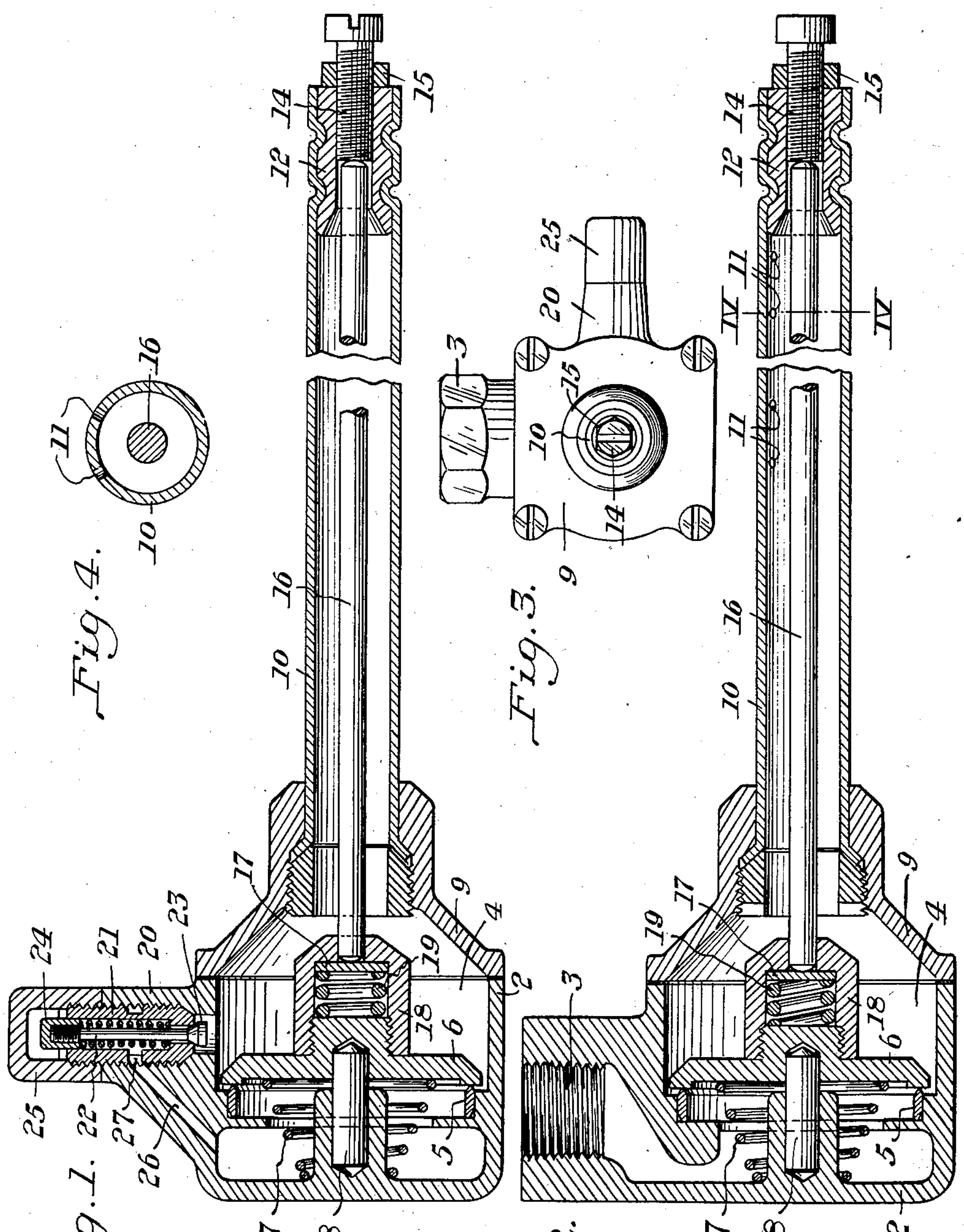

INVENTOR

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AUTOMATIC BURNER

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4 Claims. (Cl. 158—117.1)

The present invention relates broadly to the art of liquid and gaseous fuel burners, and more particularly to an improved burner of the thermostatic type having a heat responsive valve associated therewith.

It is customary in the art to which the present invention relates to provide burners of the type adapted for use with a thermostatic valve by means of which the quantity of fluid passed by the valve to the burner is automatically regulated in accordance with temperature conditions. Such valves, while satisfactorily serving to control the temperature of the medium being heated, are open to certain objections. Such a system, for example, being responsive to temperature conditions only, is not capable of making any correction for variation in pressure conditions of the combustible ingredient. It not infrequently happens, therefore, that an increase in gas pressure, for example, with the valve wide open or substantially wide open, will result in extinguishing the flame unless the burner is of special construction capable of operating under widely different conditions of pressure.

It is one of the objects of the present invention to provide a combined thermostatic valve and burner in which the burner itself performs not only the usual function of a burner, but also the function of an actuating means for the valve, the combined structure being usable with a thermostatic valve of standard construction. When used with a thermostatic valve of standard construction, the standard thermostatic valve will function in the usual way by controlling the flow of gas to the combined thermostatic valve and burner in accordance with the temperature conditions of the medium being controlled. Thus in the case of a hot water heater, for example, the standard thermostatic valve will be responsive only to the temperature of the water. The combined thermostatic valve and burner structure, however, will be responsive only to burner temperature. Thus in case of flame extinguishment with the water below the desired temperature, in which case the standard thermostatic valve would permit the flow of gas to the combined valve and burner structure, such structure will itself become effective for shutting off the flow of gas and thereby prevent continued escape with possibility of an explosion.

Other advantages of the invention will appear as the same becomes better understood by reference to the accompanying specification and drawing forming a part thereof, and in which Figure 1 is a longitudinal sectional view through a valve constructed in accordance with the present invention;

Figure 2 is a view similar to Figure 1, but taken at right angles thereto;

Figure 3 is an end elevational view, on smaller scale, of the valve structure of Figures 1 and 2; and

Figure 4 is a transverse sectional view, on an enlarged scale, along the line IV—IV of Figure 2.

In carrying out the present invention there is provided a valve casing 2 having an inlet opening 3 and an outlet opening 4. Intermediate these openings is a seat 5 with which cooperates a controlling member in the form of a valve 6. The valve is normally urged in one direction by a spring 7 and is guided during its operating movements by a guide pin 8.

Cooperating with the outlet opening 4 is a closure 9 from which projects a burner tube 10. This tube is provided with a suitably shaped opening or openings 11, herein illustrated as of circular contour, and constituting the burner orifices.

Carried by the free end of the tube 10 is a plug 12 within which is threaded an adjusting screw 14 adapted to be held in adjusted relationship by means of a lock nut 15. Abutting against the inner end of the screw 14 is a valve operating rod 16, one end of which cooperates with a pressure disk 17 within a detachable housing 18 carried by the valve 6. Within this housing is a spring 19 which is normally effective for maintaining the disk 17 in the position illustrated in the drawing and sufficiently stiffer than the spring 7 so that pressure transmitted to the disk 17 will be effective in opposition to such spring 17 for closing the valve.

The tube 10 constituting the burner tube, is preferably constructed of metal having a relatively high coefficient of expansion, and constitutes the relatively expansile member of the heat responsive member for actuating the valve. The rod 16 on the contrary is preferably constructed of material either having a negligible or relatively low coefficient of expansion, whereby the difference between changes in the lengths of the tube and rod may be utilized for operating the valve as well understood in the art.

Since the tube 10 not only constitutes a heat responsive mechanism, but also a burner tube, it is preferably constructed with respect to the dual function which it performs. I have found that aluminum is highly desirable for this purpose since it not only quickly responds, dimensionally, to temperature changes, but since ori-

fices formed therein remain relatively free from deposit and thereby effectively serve their intended functions.

Carried by one side of the casing **2** is an extension **20** internally threaded to receive a valve seat forming member **21**. This valve seat forming member is conveniently in the form of an externally threaded tube shaped to receive therein a plunger valve, the stem **22** of which projects through the body of the tube, and the valve portion **23** of which cooperates with the lower end thereof. Threaded onto the upper end of the stem **22** is a button **24** adapted to be engaged when the cap **25** is removed for unseating the valve. When unseated, the fluid being controlled may pass from the inlet side of the valve through a passageway **26** and port **27** into the interior of the tube **21** and thence past the valve **23** into the burner tube **10**. This construction therefore provides means for by-passing the valve **6** at the pleasure of the operator for reasons which will hereinafter be more fully understood.

In using an automatic burner of the character described, the operator desiring to place the burner in operation, removes the cap **25** and unseats the valve **23**. This delivers such a quantity of gas to the burner tube **10** as to permit the same to be lighted. The flame burning adjacent the tube **10** quickly heats the same and produces appreciable expansion thereof. This expansion permits the rod **16** to travel to the right as viewed in Figures 1 and 2 under the influence of the spring **7**, whereby the valve **6** is unseated. At this time gas will flow directly from the inlet **3** to the outlet **4** and thence to the tube **10**, whereupon the valve **23** may be released, and the cap **25** re-applied.

If for any reason the pressure of the gas should unduly increase with the valve **6** away from its seat, the flame will be blown away from the tube **10** in such manner that the tube will tend to cool, this cooling resulting in contraction of the tube and consequent partial closing of the valve **6**. This closing movement will continue until the gas pressure is restricted to such a point that the flames return to the desired position adjacent the tube. The tube **10** thus constitutes means for automatically regulating the quantity of combustible fluid passed in accordance with the pressure under which such fluid is delivered. In this manner there is incorporated an automatic safety feature such that flame extinguishment by reason of pressure variations is prevented.

Should the gas be shut off for any reason, the flames will be extinguished, thereby permitting the tube **10** to contract and close the valve **6**. In this manner the continued escape of gas in the event the pressure is re-established, is prevented, it being necessary for an operator to manually operate the by-pass valve and light the burner before the flow of gas through the valve itself is permitted. Since the starting valve immediately tends to seat itself, through the medium of the spring surrounding the valve stem **22**, the escape of any gas when the burner is extinguished, is prevented. The same operation is obtained, as before referred to, in case of extinguishment of the flame from any cause whatever, regardless of the position of the standard thermostatic valve. Thus with such a standard valve wide open, by reason of low temperature conditions in the medium being controlled, if the flame is extinguished at the burner, the combined structure will be effective for closing the valve **6** and preventing gas from escaping. It is thus apparent that the structure disclosed constitutes a safety feature combined with a burner, whereby there is obtained a safe operation of a character not possible with a standard burner in combination with a thermostatic valve of the usual type which is not responsive in any way to flame temperature, but only to temperature conditions in the medium which the flame is intended to heat.

From the foregoing it will be apparent that I have provided a combined burner and thermostat in which the relatively expansible member of the heat responsive mechanism serves not only in the capacity indicated, but also in the capacity of a burner tube. This makes it possible to incorporate in a single structure both a heat responsive mechanism and a burner structure.

To those skilled in the art, it will be apparent that a burner of the character described produces, with ordinary illuminating gas, a yellow flame, and therefore one having a wide range of capacity but in which excessive pressure with any setting of the controlling valve is precluded from extinguishing the flame itself.

While I have herein illustrated and described the preferred embodiment of the invention, it will be understood that changes in the construction and operation of the parts may be made without departing either from the spirit of the present invention or the scope of my broader claims.

I claim:

1. A burner device of the class described comprising a valve casing having a port therethrough, a valve disk seating over the port, a spring for urging the disk away from the port, a burner tube opening into the valve casing and receiving fuel therefrom under the control of said valve disc, said tube being alined with said disc and provided with at least one opening effective for projecting a flame at a variable distance from the tube in accordance with the pressure in the tube, a rod within the burner tube and cooperating therewith to constitute a thermostat, an adjustable contact for said rod in the free end of the burner tube, said valve having an effective port whose diameter is substantially larger than the inner diameter of said burner tube, and a cushion at the opposite end of the rod on the valve disk through which movement of the rod is transmitted to the valve disk.

2. The combination with a valve, of a burner supplied thereby and effective for controlling the position of said valve, said burner including a tube susceptible to dimensional changes upon different temperatures and provided with at least one burner opening, and a rod mounted in said tube and cooperating therewith to function as a thermostat and push said valve toward closed position with one of its ends upon cooling of said tube, said valve having a seat whose diameter is substantially larger than the inner diameter of said tube.

3. The combination with a valve, of a burner supplied thereby and effective for controlling the rate of flow through said valve, said burner comprising a burner tube susceptible to dimensional changes under different temperatures, said burner tube being provided with at least one opening effective for projecting a flame at a variable distance from the tube in accordance with the pressure in the tube, and a rod within said

tube to push said valve toward closed position with one of its ends, said valve having an effective opening whose diameter is substantially larger than the inner diameter of said tube.

4. In combination, a valve casing having an inlet opening, an outlet opening and a valve seat functionally interposed between said openings, a disc valve cooperating with said seat to control flow between said openings, means for by-passing said valve at the will of the operator, and a burner supplied both by said valve and said by-pass, said burner being effective for controlling the position of said valve in response both to temperature and pressure variations, said burner comprising a burner tube and means within said tube acting in cooperation with said tube for actuating said valve to close the same upon occurrence of excessive pressure and/or cooling of the burner tube, the diameter of said valve seat being substantially larger than the inner diameter of said tube and said tube being provided with at least one burner opening effective for projecting a flame at a variable distance from the tube in accordance with the pressure in the tube.

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