OIL HEATER CONTROL

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OIL-HEATER CONTROL

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There has developed a demand for factory produced and adjusted, fully automatic oil burning devices that will continuously function correctly without attention. There is also a demand that oil burning devices function at a higher point of efficiency. The main thing that prevents obtaining the high efficiencies that can be obtained in laboratory tests in combustion apparatus is the inability to make a factory adjustment that will properly balance the air and fuel supply when the apparatus is installed in the field. If the fuel supply is too great there is not only waste but the deadly carbon monoxide gas is formed. If the fuel supply is deficient, there is low efficiency due to excess air. In these automatic devices there is also the chance for serious difficulty in case the pilot or igniting fire fails to function.

To overcome the above difficulties, to control the flow of the fuel to a standard amount balanced with the standard air flow, and to secure a pilot flame which can be maintained at a low or economical point without danger of expiring, constitute primary objects of the present invention.

In order that the invention may be readily understood, a preferred embodiment of the invention is hereinafter described and illustrated in the accompanying drawings by way of example.

In the drawings:

Fig. 1 is a fragmentary view of a heater and control mechanism, partly in elevation and partly in section; and

Fig. 2 is a horizontal vertical section of the control mechanism on an enlarged scale.

Having reference to the drawings, there is shown at 11 a water heater comprising inner and outer casings 12 with interposed insulating material 13 enclosing a water chamber 14 and a combustion chamber 15, the latter being in communication below with the neck 16 of a burner 17 provided with spaced air inlet apertures 18. The burner has an inwardly concave bottom 19 for the pool of fuel oil and a slight depression forming a pan 20 for holding the oil to maintain a pilot at that point. Both the pilot flame and the burner flame proper are supplied with oil through the pipe 21 leading from the main supply pipe 22 by way of a float chamber interposed in the path of the fuel.

The float mechanism comprises a casing 23 enclosing the chamber 24 the entry to which, from the pipe 22, is by way of an inlet port controlled by the point of a needle valve. The stem 25 of the needle valve has adjustably mounted thereon a collar 26 with which engages one end of a lever 27, the opposite end of the lever carrying a float member 28 which is buoyed up by the oil within the chamber so as to maintain a constant level therein. The outlet from the float chamber to the pipe 21 is governed by two valves having perpendicular stems 29 and 30. The valve 29 supplies oil for the burner flame proper while the valve 30 supplies oil, in reduced amount, for the pilot flame. Both valves are normally held in open position by compression springs 31 and 32 respectively, while the valve 29 is provided with manually operable means 33 for closing the valve against the tension of the spring where no burner flame is required.

Disposed within the burner 17 directly above the location of the pilot at 20 is a thermostatic device here shown, by way of example only, as a thermostatic tube 34 containing a bimetallic bar 35, the elements of which have unequal coefficients of expansion. Under the heat of the pilot flame the bar 35 tends to bend upwardly and upon cooling to bend downwardly. A lever fulcrumed at 36 has a spring arm 37 the end of which adjacent the burner carries a set screw 38 which bears at its lower end upon the thermostatic bar 35 while the other arm 39 of the lever engages a collar 40 adjustably mounted upon the valve stem 30. Mounted upon the neck 16 of the
burner is a second thermostatic tube 41 containing a bimetallic bar 42. A second lever fulcrumed at 43 carries at that end adjacent the burner a set screw 44, the lower end of which bears upon the thermostatic bar 43. The other end of the lever engages a collar 45 adjustably carried by the valve stem 29.

The burner, in this illustrative embodiment, is of the pre-mixing carburetor type and its functioning is that set forth in my Patents Nos. 1,280,596, 1,512,869 and 1,539,202. Generally speaking, that portion of the burner below the neck is a pre-mixing chamber wherein the carbon vapors from the oil at 19 are supplied with air from the inlets 18 at an amount insufficient to maintain complete combustion. During the initial stages before the burner becomes fully heated there is some flame within the pre-mixing chamber but complete combustion takes place only in and above the neck 16 above the gap 46 through which an additional supply of air enters sufficient to effect complete combustion. As the burner becomes more heated, substantially all of the flame leaves the premixing chamber 17 and combustion is confined to a location above the gap 46.

Assuming a pilot flame to be burning at 20, the thermostatic bar 35 acted upon by the flame will control the pilot valve 30 to maintain a temperature in the pilot flame for which the set screw 38 is adjusted. If, by reason of decrease in heat or impurity in the oil or obstruction of the port controlled by the valve 30, the pilot flame loses its intensity, the action of the thermostatic bar 35 will open the valve 30 to a larger extent whereas, if the pilot flame becomes too intense, the valve will be partially closed by the reverse bending of the thermostatic bar 35.

The thermostatic bar 42 is unaffected by the pilot flame and, in the absence of the main burner flame, the valve 29 will be maintained in an open position under the action of the spring 31 except when held to its seat by the manual means 33. If the valve 29 be released so as to open under the influence of its spring 31, oil will flow in increased amount through the pipe 21 into the pilot flame and spread forming a pool at 19, the surface being ignited from the pilot and burning as fed with air through the apertures 18. As combustion progresses into the neck 16 the bar 42 becomes heated and will move upwardly into contact with the set screw 44. If the continued supply of oil through the valve 29 and the pipe 21 increases the flame to an intensity beyond that for which the mechanism is adjusted by the set screw 44, the bending of the bar 42 upwardly will cause the lever to partially close the valve 29 thus reducing the flow of oil so as to maintain the flame within at the burner at the predetermined desired stage. The spring character of the lever arm 37 permits the same to bend under increased heat in the burner proper during its initial stages without injury.

When the flow through the valve 29 is cut off entirely by the hand wheel 33 the flame within the burner will drop and gradually disappear as the pool of oil at 19 is consumed, leaving only a pilot flame at 20.

I claim:

1. The combination with a fluid fuel burner and a fuel supply thereto, of means to control the flow to the burner for maintaining the burner flame and pilot flame at uniform intensity, said means comprising a thermostatic device subject to the heat of the pilot flame and another thermostatic device subject directly to the heat of the burner flame, independently acting valves in the fuel supply passage controlling the flow to the pilot and to the burner respectively, a connection between each of the thermostatic devices and the respective valves whereby to open and close said valves to a greater or less extent as the heat of the respective flames varies to maintain a uniform heat regardless of variations in heat value of fuel supplied.

2. The combination with a fluid fuel burner and a fuel supply thereto, of means to control the flow to the burner for maintaining the burner flame and pilot flame at uniform intensity, said means comprising a thermostatic device subject to the heat of the pilot flame and another thermostatic device subject directly to the heat of the burner flame, independently acting valves in the fuel supply passage controlling the flow to the pilot and to the burner respectively, levers adjustably connected at their ends to each of the thermostatic devices and the respective valves whereby to open and close said valves to a greater or less extent as the heat of the respective flames varies to maintain a uniform heat regardless of variations in heat value of fuel supplied.

3. The combination with a fluid fuel burner and a fuel supply thereto, of means to control the flow to the burner for maintaining the burner flame and pilot flame at uniform intensity, said means comprising a thermostatic device including a bimetallic bar subject to the heat of the pilot flame and another similar thermostatic device subject to the heat of the burner flame, independently acting valves arranged in tandem in the fuel supply passage, a connection between each of the thermostatic devices and the respective valves whereby to open and close said valves to a greater or less extent as the heat of the respective flames varies to maintain a uniform heat regardless of variations in heat value of fuel supplied.

4. The combination with a fluid fuel burner and a fuel supply thereto, of means to control the flow to the burner for maintaining the burner flame and pilot flame at uniform intensity, said means comprising a thermo-
static device including a bimetallic bar subject to the heat of the pilot flame and another similar thermostatic device subject to the heat of the burner flame, independently acting valves arranged in tandem in the fuel supply passage, levers adjustably connected at their ends to each of the thermostatic devices and the respective valves whereby to open and close said valves to a greater or less extent as the heat of the respective flames varies to maintain a uniform heat regardless of variations in heat value of fuel supplied.

In testimony whereof I have hereunto subscribed my name.

BEN VALJEAN.