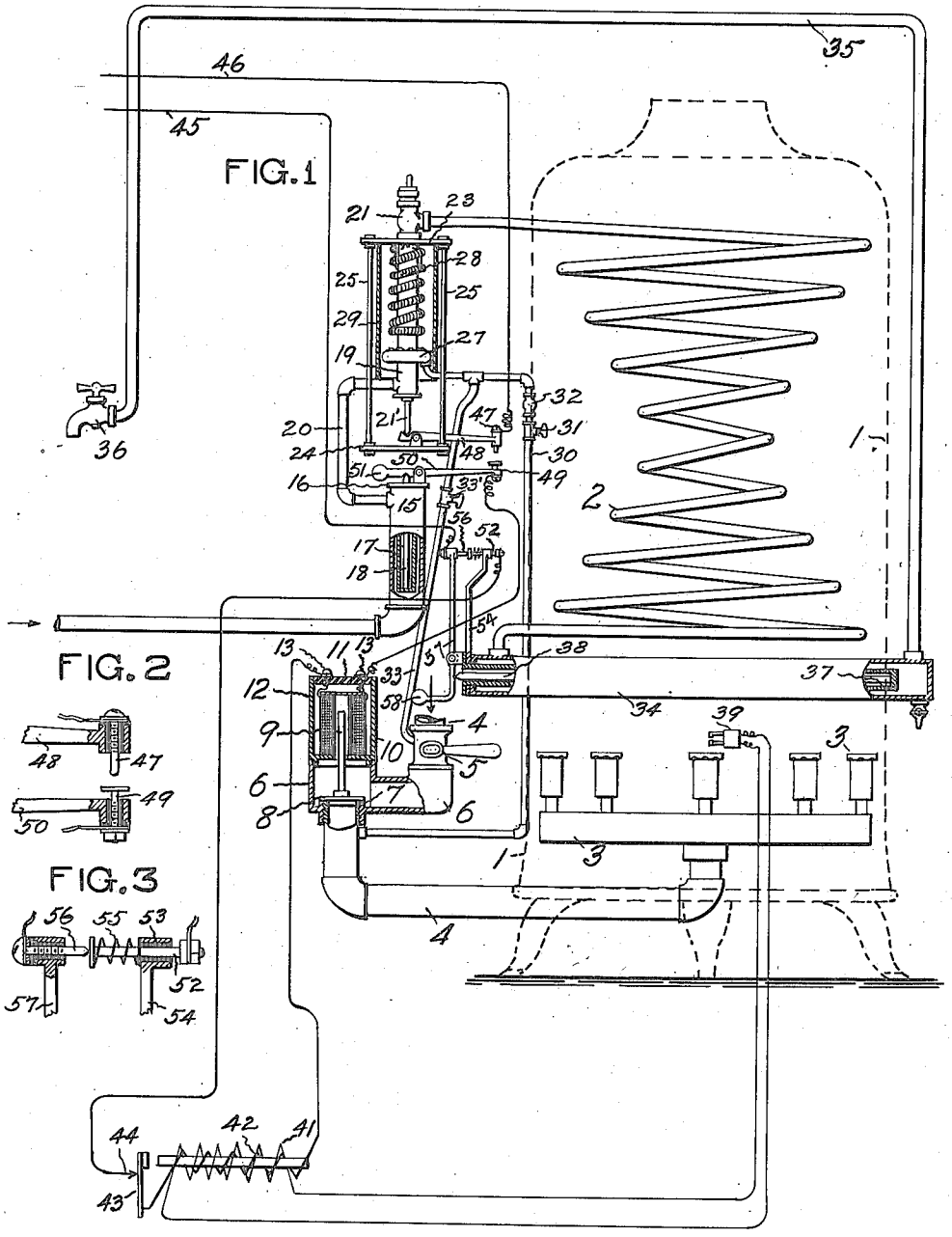
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AUTOMATIC WATER HEATER.

APPLICATION FILED OCT. 28, 1915.

1,194,398. Patented Aug. 15, 1916.




WITNESS

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# UNITED STATES PATENT OFFICE.

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## AUTOMATIC WATER-HEATER.

1,194,398. Specification of Letters Patent. Patented Aug. 15, 1916.

Application filed October 28, 1915. Serial No. 58,332.

*To all whom it may concern:*

Be it known that I, HAY LANGENHEIM, a citizen of the United States, residing at Pittsburgh, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Automatic Water-Heaters, of which improvement the following is a specification.

My invention relates to water heaters of the so-called instantaneous type.

My invention has for its principal object to provide an instantaneous automatic gas water heater capable of operating under any conditions of water pressure at all times.

Another object is to provide a water heater which at all times and under all conditions is absolutely safe.

With the above and other objects in view, the invention consists in certain features of construction, arrangement and combination of parts as will be hereinafter fully set forth and particularly pointed out in the appended claims.

In the accompanying drawings, which form a part of this specification, I have shown one embodiment of my invention wherein—

Figure 1 is a side elevation of a heater, partly shown in section and diagrammatically. Fig. 2 is a side elevation of one pair of the electric contacts, and Fig. 3 is a side elevation of another pair of contacts.

Referring to said drawings for the construction and general arrangement, the numeral 1 designates the shell of the heater, 2, a water heating coil located therein, and 3 a gas burner disposed in the base of the shell, all or any of which may be of any suitable form.

Located in the gas line 4, adjacent the gas cock 5, is a gas valve mechanism for controlling the gas supplied to the burner, comprising a gas chamber 6 having a gas orifice 7 therein, controlled by a gravity seating valve 8 having a stem 9 extending therefrom. This chamber has attached thereto a cylindrical chamber 10 having a removable head 11, preferably formed of fiber, the lower head thereof having an opening formed therethrough through which extends the stem of the gas valve. Within this chamber is secured a solenoid magnet 12, surrounding the stem of the gas valve, the terminal wires of which are connected to binding posts 13—13 in the insulated head 11.

Connected to the cold water intake line 14 is a thermostat device, comprising a casing 15 having secured therein, by its head, 16, a thermostat tube 17, having a high coefficient of expansion and contraction, and within which is arranged a rod 18 having a very low coefficient of expansion and contraction. This rod rests at its lower end on the head at the lower end of the thermostat tube and the upper end thereof extends up through the head 16 and terminates in a point. The casing 15 is connected to the lower end of a second thermostat tube being connected to the cold water inlet of the heater coil, a regulating cock 21 being interposed between the coil and thermostat tube for regulating the quantity of water admitted to the coil, and a pointed stem 21′ fixed to the lower end of the tube. This thermostat device is supported on a frame suitably connected to the heater shell, said frame comprising the two horizontally disposed heads 23 and 24, connected together by the vertically disposed rods 25. The said thermostat tube is surrounded near its lower end by a gas burner 27, and above the burner by a spirally wound wire coil 28, to confine the heat about the tube, and inclosed within the casing 29 surrounding the same. To the gas burner 27 is attached a small gas supply line 30 which leads from the main gas supply line 4 at a point below the gas valve 8, said supply line 30 having included therein a gas cock 31 and a check valve 32 thereabove. Connected in this line, between the burner and check valve, is another small gas line 33, which leads from the main gas supply line at a point above the gas cock 5, said small gas line being provided with a gas cock 33′. A third thermostatic device is employed in connection with the heater, comprising a tubular casing 34, closed at its rear end extending through the heater shell above the burner 3 and beneath the heater coil, the forward end thereof being connected to the outlet end of the heater coils and the rear end connected to the hot water supply line 35 having a spigot 36. This casing has secured in the forward end a thermostat tube 37 which is closed at its rear end and has arranged therein a thermostat rod 38, said rod engaging the rear of the tube and the forward pointed end extending therefrom.

A suitable spark device 39 is provided for igniting the gas issuing from the gas burn-

ers, the terminals of which sparking device are connected in series with the secondary winding 41 of a suitable induction or spark coil, the primary winding 42 of which is provided with a make and break connection 43 and 44. The primary winding of the spark coil and the solenoid of the gas valve are both connected up in series with a suitable source of current supply, as are also certain make and break contacts controlled by the thermostats for operating said magnetic coil. This circuit and contacts comprise the two wires 45 and 46, the wire 45 leading to the make and break contact of the primary winding of the spark coil, and the wire 46 to the opposite end of said primary winding. Included in this circuit are the two sets of thermostatic controlled contacts, comprising an insulated contact 47 on the end of a lever 48, which is pivoted to the lower head 24 of the upper thermostat frame, the short end of said lever being in engagement with the end of the thermostat stem 21'. The companion contact 49, in this side of the circuit is insulatedly arranged in the end of a lever 50, which is pivoted to the head 16 of the thermostat tube 17, and is engaged by the thermostat rod 18. This pair of contacts are normally separated. The lever 50 has a weight 51 at the short end thereof to maintain the same in contact with the thermo rod. The other set of contacts in the opposite side of the circuit, comprise an adjustable contact 52 slidably fitted into an insulated sleeve 53, in the end of an arm 54 which is rigidly fixed to the end of the heater thermostat, said contact being provided with a spiral spring 55. The companion contact of this set comprises an insulated contact 56 arranged in one end of a lever 57, pivotally arranged at the end of the thermostat, and having a balance weight 58 at the short end thereof. These contacts are normally in engagement with one another. The contacts 47 and 49 are set to engage and close the circuit at a predetermined temperature and the contacts 52 and 56 are set to separate at a predetermined temperature.

In practice, gas fed from the pipe 33 to and issuing from the burner 27 of the upper thermostat device is kept burning low, or sufficient to normally maintain a slight increase of temperature over that of the incoming cold-water. This difference in temperature normally maintains separation of the contacts 47 and 49.

In Fig. 1, the heater is shown as having its operating parts in normal position. When water is to be drawn, the operation will be as follows: Opening the spigot 36 causes the water to flow from the service line through the heater. The incoming cold water passing through the thermostat casing 15 and the connecting tube 20 and through the thermostat tube 19, cools the tube 19 to the temperature of the incoming water, the contraction of which raises the stem 21 and allows the electric contact point 47 to drop and engage with its opposite contact point 49. The bringing of these contacts together closes the electric circuit and the current passes around the magnetic coil 12. This magnetic coil 12, by means of its core, in this case being the stem 9 of the disk valve 8, raises the valve from its seat 7 and allows the gas to flow through the gas line 4 to the burner 3. The closing of this circuit also operates the spark coil, causing a jump spark at the igniter 39. This spark ignites the gas which plays on the coil and heats the water passing therethrough. As the hot water passes out over the thermostat tube 37, the tube expands until at a predetermined temperature the rod 38 recedes into the tube 37 sufficiently to allow the weight 58 to break the circuit at the contact points 56 and 52. This breaking of the electric circuit allows the gas valve 8 to return to its seat cutting off the gas from the burner and the jump spark at the igniter 39 ceases. When the water passing over the thermostat tube 37 is slightly lower in temperature than the point at which the contact is broken, the tube 37 contracts and pushes the rod 38 against the lever 57 and again closes the electric circuit, causing the magnetic coil to again lift the gas valve from its seat, and allowing the gas to flow to the burners, where it is again ignited by the igniter 39. When the faucet 36 is closed, circulation of the water ceases and the thermostat tube 19 which is still heated from the burner expands and breaks the contact between points 47 and 49, thus closing the gas valve and cutting off the gas to the burner. When the gas valve disk 8 is seated, the flame at burner 27 is regulated by the cock 33' in the line 33, to such an extent as to just supply enough heat to keep the contact points 47 and 49 separated. When the valve disk 8 is raised an additional supply of gas to the burner 27 through the line 30 takes place, causing the flame at the burner 27 to be considerably increased and to burn full at all times when the main gas line 4 is open to the burners 3. When the gas valve is closed the flame at the burner 27 is cut down to its original low condition. Due to the fact that the temperature of the incoming water varies at different seasons of the year, the motion of the lever 48 and contact point 47, due to expansion and contraction of the thermostat tube 19, will necessarily vary accordingly. However, as the cold water operates both tube 17 and tube 19, the lever 50 is so arranged as to normally keep the distance between points 47 and 49 the same at all seasons of the year.

Having thus shown and described my invention, what I claim and desire to secure by Letters Patent, is:—

1. In a water heater, a water heating coil having a cold water inlet and a hot water outlet, a gas burner, a gas conduit leading to said burner, a gas valve in said conduit, an electric circuit, means in said circuit for operating said valve, thermostatic operated means in the cold water inlet side of said coil, contact means in said circuit operated by said thermostatic operated means, a second thermostatic means connected to the hot water outlet of the coil, and contact means also in said circuit and operated by said second thermostatic means.

2. In a water heater, a water heating coil having a cold water inlet and a hot water outlet, a gas burner, a gas conduit leading to said burner, a gas valve in said conduit, an electric circuit, means in said circuit for operating said valve, thermostatic operated means in the cold water inlet side of the coil, contact means in the electric circuit operated by said thermostat, thermostatic means connected to the hot water outlet of the coil, contact means also in said circuit operated by said thermostat, and sparking means operated from said circuit for igniting the gas from said burner.

3. In a water heater, a water heating coil having a cold water inlet and a hot water outlet, a gas burner, a gas conduit leading to said burner, a gas valve in said conduit, an electric circuit, means in said circuit for operating said valve, a pair of thermostats located in the cold water intake to said coil, each being provided with and operating an electric contact connected in said circuit, a thermostat located in the hot water outlet of the coil above the burner, and contacts operated by said thermostat and included in said circuit.

4. In a water heater, a water heating coil having a cold water inlet and a hot water outlet, a gas burner, a gas conduit leading to said burner, a gas valve in said conduit, an electric circuit, means in said circuit for operating said valve, a pair of thermostats located in the cold water intake to said coil, each being provided with and operating an electric contact connected in said circuit, a thermostat located in the hot water outlet of the coil above the burner, contacts operated by said thermostat and included in said circuit, and sparking means operated from said circuit for igniting the gas from said burner.

5. In a water heater, a water heating coil having a cold water inlet and a hot water outlet, a gas burner, a gas conduit leading to said burner, a gas valve in said conduit, an electric circuit, means in said circuit for operating said valve, a pair of thermostats located in the cold water intake to said coil, each being provided with and operating an electric contact connected in said circuit, a thermostat located in the hot water outlet of the coil above the burner, contacts operated by said thermostat and included in said circuit, and sparking means operated from said circuit for igniting the gas from said burner, one of said thermostats in the cold water inlet being provided with a gas burner connected to said conduit.

6. In a water heater, a water heating coil having a cold water inlet and a hot water outlet, a gas burner, a gas conduit leading to said burner, a gas valve in said conduit, an electric circuit, means in said circuit for operating said valve, thermostatic operated means in the cold water inlet side of said coil, normally open contact means in said circuit operated by said thermostatic operated means, a second thermostatic means connected to the hot water outlet of the coil, and normally closed contact means also in said circuit and operated by said second thermostatic means.

In testimony whereof, I have hereunto signed my name in the presence of two subscribing witnesses.

HAY LANGENHEIM.

In the presence of—
JAMES HAY,
JNO. P. REINECKE.