

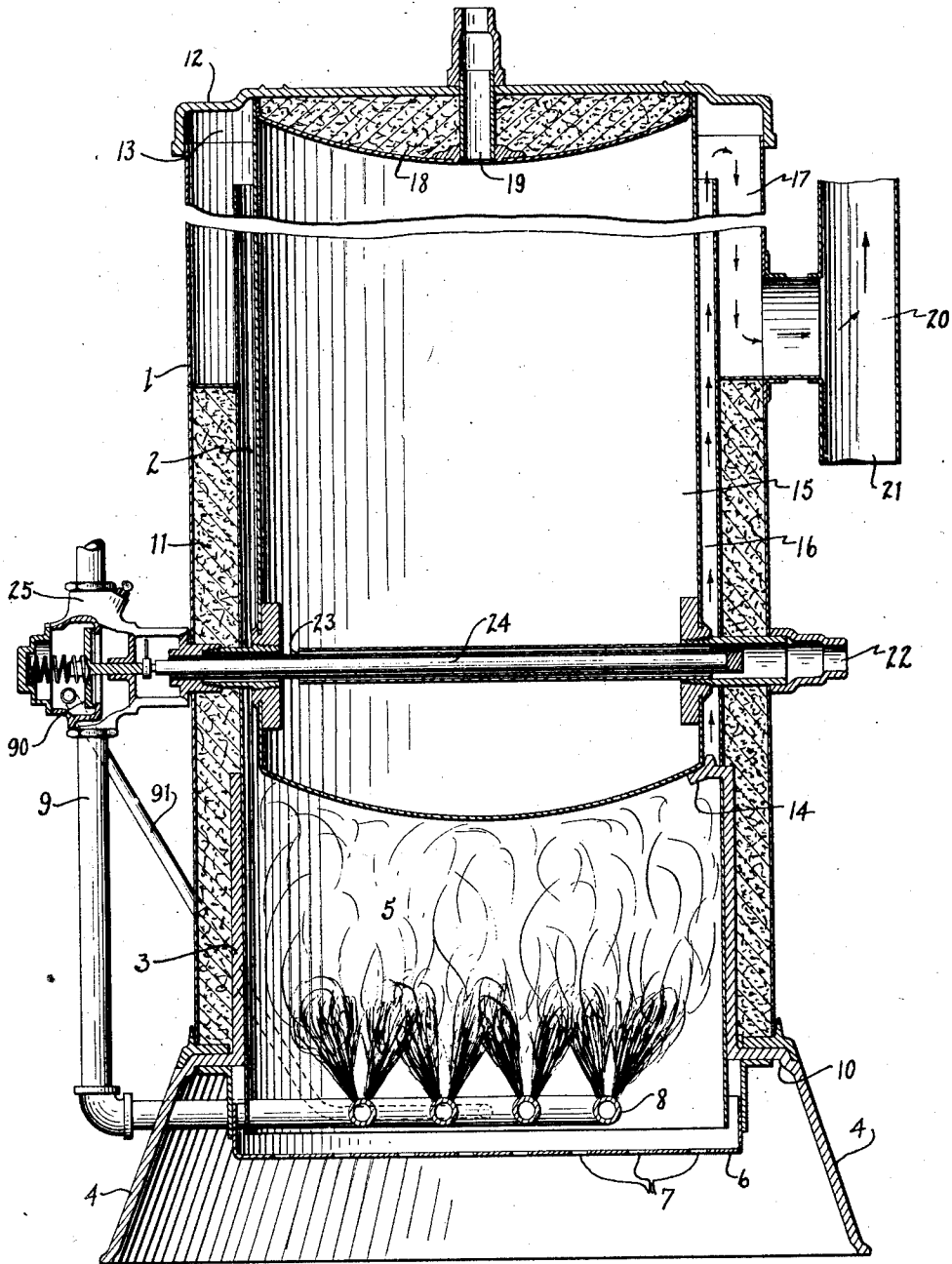
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WATER HEATER

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WATER HEATER.

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This invention relates to water heaters, and the primary object is to provide a heater of comparatively simple and inexpensive construction whereby a maximum percentage of heat units evolved are absorbed in the water of the heater and in which the water compartment of the heater is shielded from loss of heat by an outer envelope providing a space for the heated gases of the burner, and this envelope is again shielded by an exterior circumferential shell providing an exhaust conduit for the heated gases which serve as a protection and shield for the first named shell. By the arrangement of the parts as herein described a very efficient water heater is provided that may be formed of three concentric members in spaced relation, and a feature of the invention is involved in the means whereby the heated gases are made to pass from the heater through the influence of heat rather than being drawn therefrom by means of an exhaust flue as is the usual practice. My improved heater is of the type adapted to maintain a body of water at a constant temperature in which a thermostatically controlled valve is utilized to decrease or increase the heat of the burner through variation in temperature of the body of water to be controlled. A feature of my heater is involved in the construction whereby a portion of the thermostatically controlled device is introduced into the water inlet conduit of the heater in which it is to a considerable extent shielded from direct influence of the temperature of the water in the heating chamber delaying the action of the thermostatic valve in decreasing the heat of the burner or cutting off the gas supply thereof and of securing an immediate opening of the valve on introduction of the water into the heating chamber. These and other objects and the various novel features of construction of a water heater embodying my invention are hereinafter more fully described and claimed, and the preferred character of construction of my improved water heater is shown in the accompanying drawing which is a vertical longitudinal section thereof.

In my improved structure I provide an exterior cylindrical shell 1 and an interior cylindrical shell 2 in spaced relation therewith. This interior shell in the preferable construction shown is supported by a cast iron base 3 having several leg members 4 therefor. This base 3 extends upward from the bottom of the shell for a distance and

provides the combustion chamber 5 for the heater and the base is provided with a bottom enclosure 6 having apertures 7 therein for an ingress of air. In this chamber 5 is located a gas burner 8 supplied by a conduit 9. The outer shell 1 is supported by this base member 3 which is provided with a shoulder 10 for the purpose and for a distance above the base the space between the shells 1 and 2 is insulated with any character of heat insulating material as for instance mineral wool indicated at 11. The shell 2 terminates short of the shell 1 at the upper end, as will be seen in the drawing, and a cover 12 is provided enclosing the upper end of the outer shell and providing a passageway 13 at the top from the interior of the inner shell to the outer shell. The cast iron base member 3 at its upper edge is provided with a series of turned lugs 14 adapted to support the inner water chamber 15 which is preferably cylindrical in form and is positioned within the shell 2 in spaced relation therewith and preferably the space 16 between the shell 2 and wall of the water chamber 15 is less in width than the space 17 between the outer shell 1 and inner shell 2. The water chamber at the upper end is covered with an insulating material 18 and has an outlet conduit 19 for egress of water. The cover member 12 extends over the outer shell 1 and the top of the water chamber 15 as shown, and this water chamber, by the arrangement stated, is shielded from direct loss of heat by this insulation 18 at the top and further, by reason of the heated gases from the burner 8 passing directly upward from the burner in the space 16. These gases, after passing upward about the water chamber, flow through the passageway 13 and downward about the inner shell 2 through the space 17 to an exhaust flue 20 opening to the space 17 near the upper end of the water chamber and just above the heat insulating material 11 in the space 17. This exhaust flue 20 has an opening 21 to atmosphere at a point below the connection of the member 20 with the space 17. This opening 21 is practically the full capacity of the flue 20 so that air may flow upward through the flue 20 without directly affecting discharge of the heated gases from the heater.

It is to be understood, as hereinafter more fully described, that the burner (which is here shown as a gas burner) is controlled by a thermostat which may be of any approved

type that cuts off the flame of the burner when the water has attained a predetermined temperature and opens the gas conduit and lights the burner upon a fall in temperature, the object being to maintain the body of water at a practically constant predetermined temperature and, by arranging the exhaust conduit 20 so that no draft is directly applied to withdraw the heated gases of the heater, these gases remain in the spaces 16 and 17 which shield the inner water chamber to a large extent. Upon the flame being increased or upon the burner being ignited the heated gases will be forced upward in the channel 16 and thence downward and the only gases exhausted are those that are forced from the heater through influence of the heat of the burner. Therefore, the heated gases are utilized and heat is absorbed to the fullest extent.

The intake conduit for the water chamber is indicated at 22 extending through the insulating material and walls 1, 2 and 15 into the interior of the water chamber near the bottom. This conduit 22 extends diametrically across the water chamber having an open end 23 within the chamber.

The thermostat is preferably of the well known type in which a carbon rod is carried in a copper tube indicated at 24 which in my construction extends into the open end 23 of the inlet conduit 22. The tube 24 is thus practically entirely surrounded and subject to the influence of the temperature, the water in this inlet conduit and is shielded from the main body of water in the heater by the wall of the conduit 22. As will be readily understood by those familiar with this art, the fuel line 9 for the burner is controlled by a valve 90 within the housing 25 on the exterior of the heater. A pilot light 91 of any approved form is provided to ignite the gas at the burner. With this apparatus the gas line valve is opened upon a certain fall in degree of temperature of the water in the water chamber and is closed upon a certain increase in temperature of the water in the water chamber. It has heretofore been the practice to place the thermostat tube 24 in position directly subject to influence of the temperature of the water in the water chamber and with such former device the valve gradually closes as the temperature of the water increases and the flame at the burner is thus decreased to some extent before the desired temperature is attained. By shielding the tube in the manner here shown within the inlet conduit the water in the conduit itself surrounding this tube 24 does not increase in temperature as rapidly as in the water chamber proper. As the body of water becomes heated it expands causing a back flow into the inlet conduit 22 and thus suddenly increases the temperature of the tube 24 expanding the same and, due to its

connection with the rod at the inner end, causes a comparatively quick closing of the valve cutting off the gas supply to the burner. The valve therefore controlled by the carbon rod in the conduit 24 remains open for a somewhat longer period than with previous constructions and is closed more rapidly when the closing movement begins. The opening movement of the valve is also more sudden and complete due to the fact that upon any withdrawal of water from the water chamber through the outlet conduit 19, water will flow through the conduit 22 to replace the same. This is cold water which directly influences the tube 24 causing it to contract and open the valve. Heretofore, with such a conduit 24 immersed directly in the body of water in the heater, the valve is not opened until the whole body of the water in the water chamber has reached the critical low temperature. Although I have described and shown a gas burner and a pilot light in conjunction herewith as a heating device it is also to be understood that an electrical heating device may be utilized controlled substantially in the same manner through expansion and contraction of the tubular member such as is shown at 24, all of which will be readily understood by those familiar with the art.

With the water of the chamber heated to a predetermined degree, the expansion of the water due to the heat thereof will cause a flow backward in the inlet tube bringing water of the higher temperature about the copper tube of the thermostat device. This copper tube is therefore practically suddenly caused to expand and by reason of the copper tube being attached to the carbon rod the gas valve is closed (if the heating element be gas burner) or if other type of burner, the means of producing the heat is cut off from the heating element. If now water is withdrawn from the water chamber through the outlet as by the opening of the valve in the outlet line, cold water flows through the inlet and about the copper tube of the thermostatic device practically with the first flow of water. This tends to contract the copper tube to move the carbon rod outward and open the valve permitting flow of gas to the burner which is ignited by the pilot light in such instance and thereby applying the heat immediately to the water chamber to overcome the reduction in temperature caused by the inflow of cool water. The efficiency in operation of the device is occasioned largely by positioning the device sensitive to temperature change in the inlet conduit rather than directly in the body of the water in the chamber as has heretofore been the practice. This arrangement results in a more sudden operation of the device controlling the heating element, the arrangement tending to restrain cutting off of the means of supplying heat

until the whole body of water has reached the critical temperature and also tends to suddenly actuate the thermostatic device to cause an increase of heat immediately upon even a small flow of colder water into the water chamber. By this arrangement the water is maintained at substantially a constant temperature at all times.

Having thus fully described my invention, what I claim is—

1. A water heater comprising an outer casing, an inner casing in spaced relation therewith, a base consisting of a cylindrical shell supporting the said inner and outer casings, a cylindrical shell providing a water chamber within the inner casing, the said water chamber shell being spaced from the inner casing and supported directly by the cylindrical base, the structure providing a combustion chamber below the water chamber and a space between the inner shell and water chamber opening directly to the combustion chamber, a cover member for the outer casing, the inner casing terminating short of the cover providing for an egress of gases from the inner to the outer shells at the top, the upper end of the water chamber having a heat insulated cover, insulating material in the space between the outer and inner shells extending from the bottom thereof to above the lower end of the water chamber, an exhaust flue opening through the outer shell just above the insulating material therebetween, said exhaust flue having an opening to atmosphere below the point of connection of the flue with the shell of a diameter prac-

tically equal to that of the flue, an outlet conduit for the water chamber at the top, an inlet conduit therefor near the bottom, and a thermostatically controlled heater member in the combustion chamber.

2. A water chamber comprising a cylindrical outer casing, a cylindrical inner casing in spaced relation therewith less in length than the outer casing, a cover member enclosing the upper end of the outer casing, a base supporting the said casings, a cylindrical water chamber in spaced relation with the inner casing extending to the cover at the top and terminating short of the bottom thereof providing a combustion chamber therebeneath, insulating material covering the top of the water chamber and insulating material between the inner and outer casings extending from the bottom to a point above the lower end of the water chamber, an exhaust flue in communication with the space between the inner and outer chambers at a point just above the insulating material therebetween, the said base supporting the said water chamber, a thermostatically controlled heater member in the combustion chamber, the control device including a tubular member extending into the water chamber, an outlet conduit for the water chamber at the top, an inlet conduit extending into the water chamber at the bottom in which the tubular member of the thermostatic device is positioned.

In testimony whereof, I sign this specification.

FRANK W. SHUELL.