July 19, 1932. A. ACKRON 1,868,186

WATER HEATER

Filed Oct. 17, 1930

Fig. 1.

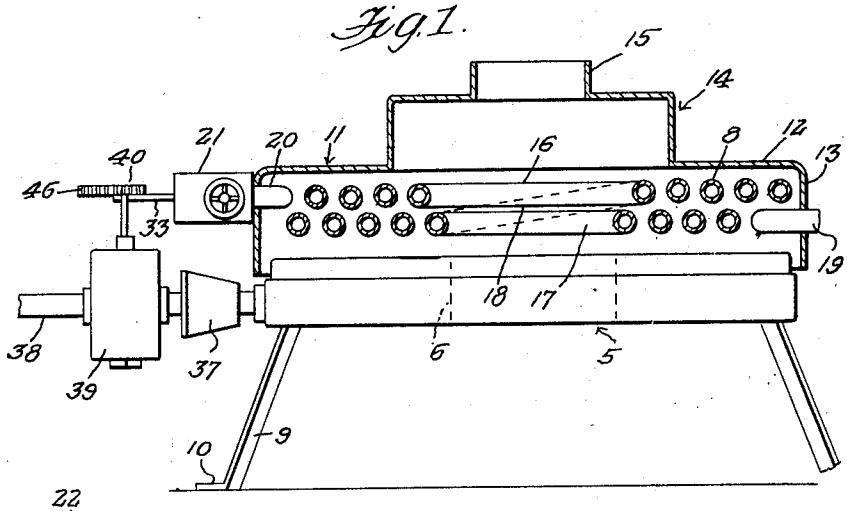


Fig. 4

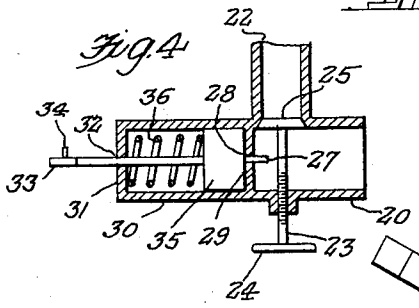
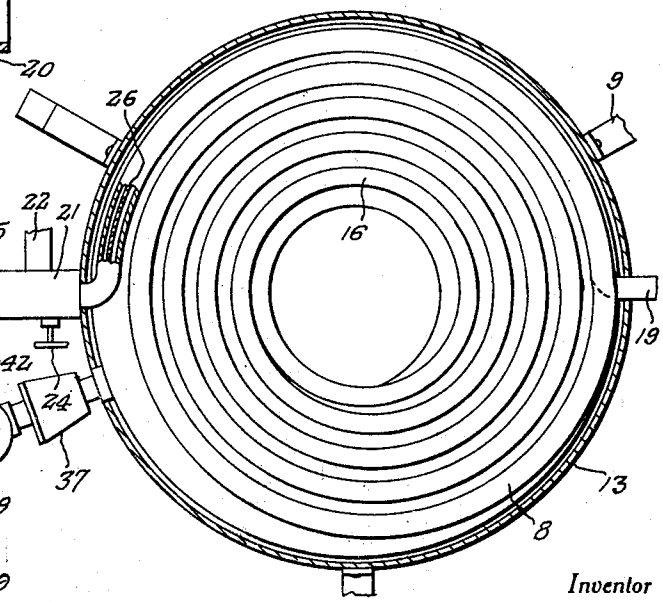


Fig. 2.



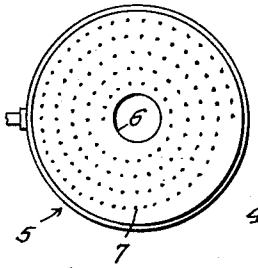
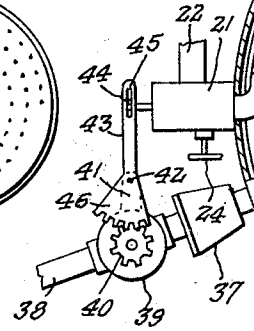


Fig. 3.



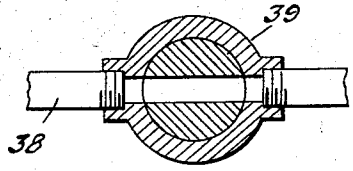


Fig. 5.

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UNITED STATES PATENT OFFICE

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WATER HEATER

Application filed October 17, 1930. Serial No. 489,446.

This invention relates generally to water heaters and particularly to a gas water heater employing a short flame burner, and thermostatic and steam pressure means associated with the heater for controlling the supply of gas to the burner.

It is an object of this invention to provide a short flame burner in an improved water heater embodying convolutions of heater tubes in layer formation having the convolutions vertically staggered, and the burner plate apertures arranged to follow the contour of the convolutions of the water tubes, and thermostatic means associated with water tubes for operating a lever engaging the gas cut off valve in the gas supply, when the temperature of the water reaches a predetermined point, at which time the gas supply will be diminished or shut off, and steam pressure responsive means for operating said valve in event of failure of the thermostatic means to act.

It is also an object of this invention to provide a short flame gas burner water heater which is adapted to extraordinarily quickly heat water circulated therethrough and which has the novelty and advantages which will be better understood as the specification proceeds, and which in addition is simple and cheap to operate and manufacture and is otherwise admirably adapted for the purpose for which it is designed.

These and other objects, the nature of the invention, its composition and arrangement and combination of parts will be readily understood by anyone acquainted with the art to which this invention relates by consulting the following descriptions of the drawing in which:

Figure 1 is a general elevational view partly in cross section of my improved gas water heater disclosing the arrangement and disposition of parts thereof, and

Figure 2 is a plan view of Figure 1 the upper portion of the casing removed and showing details of my improved water heater partially in cross section and

Figure 3 is a top view of the burner showing the jets or apertures arranged to follow the convolutions of the water tubes,

Figure 4 is a detail horizontal cross sectional view of the supply valve and thermostatic and steam actuated mechanism,

Figure 5 is an enlarged horizontal cross sectional view through the gas shut off valve.

Referring in detail to the drawing it will be seen that I provide a flat circular burner 5 provided with a central aperture 6 for accommodating an uprushing air draft and provided on its upper surface with a multiplicity of apertures 7 disposed and arranged to follow the contour of the water tubes generally designated 8.

Legs 9 are provided for supporting the water heater upon a surface, and these consist of angularly disposed straps having laterally projecting feet portions, the upper ends of the straps being suitably secured to the under side of the heater structure. Supported by the burner is a casing generally designated 11 which is in the form of a shallow open bottomed cylinder formed by an annular ring being provided with a depending annular flange 13 which is spaced laterally and vertically with relation to the upper portion of the burner, and in close proximity thereto so as to include within it the water tubes 8. Rising centrally from the inner edges of the ring 12 is another short cylindrical formation 14, similarly formed to the cylindrical formation 11, and this is provided centrally of its upper wall with a rising flange 15 which may form a pipe connection for a pipe arranged to convey away the products of combustion of the burner.

Water pipes or tubes 8 are arranged in two or more superposed layers and arranged in concentric convolution in each layer connected by a portion which reaches from the upper to the lower and center convolutions thereof. The convolutions just referred to are designated 16 and 17 respectively and the connecting tube therebetween 18.

The convolutions of each layer are arranged so that the convolutions of the next lower layer are disposed underneath the space between the upper adjacent convolutions, so that the flames from the burner are closely impinged upon all of the tubes, and the greatest advantage secured from the heat-

ing power of the burner. An outlet section of tubing is passed through the wall of the housing or casing at one side thereof preferably opposite to the inlet section 20.

The inlet section of tubing 20 is provided with a T-shaped fitting 21 which connects with a water supply pipe 22 at right angles thereto. A mushroom valve 23 operated by a hand wheel 24 closes the opening of the supply pipe 22 as at 25 when it is desired to shut off the supply of water to the heating tubes. A strip of preferably perforated aluminum, perforated to offer the least resistance to the passage of the water, is arranged as indicated at 26 for a suitable length in the section 20 of the convolutions of the tube, so as to be quickly and readily affected by the heat of the water.

The outer end of the thermostatic strip 26 is indicated at 27 and it passes through, as shown in Figure 4, the section 20, loosely through an aperture 28 in a wall 29 at the rear end of the portion 30 forming a chamber and having a closed end 31 apertured at 32 to receive a slidable rod 33 provided with a projecting pin 34, the rod 33 being provided at its inner end with a piston 35 which is normally maintained against the wall 29 by a coiled spring 36 engaging against the end 31 and the said piston 35. The portion 27 of the thermostatic strip moves through the aperture 28, upon expansion of the strip and displaces the piston against the spring 36 and causes the outward movement of the rod 33 with the consequent effect as described below.

In case of failure of the thermostatic means, the pressure of the steam will develop sufficiently to move the piston 35 and actuate the gas valve, the steam passing through the aperture 28 in the wall 29 to build up pressure behind the piston. The end of the thermostatic strip freely contacts with the piston, and it is not secured to the piston.

The numeral 37 designates generally an air gas mixing valve associated with the burner 5 and between the gas supply pipe 38 and said mixing valve is a cut off valve 39, which has instead of the usual hand wheel or hand lever, a gear wheel 40 on the upper end of the valve.

Supported on a bracket 41 and pivoted on a pin 42 is a lever 43 having a rearwardly extended straight portion 44 slotted as at 45 longitudinally thereof at the end for receiving slidably the pin 34 described above. The lever 43 is provided with a segmental gear 46 which engages with the gear 40.

It is thought to be obvious that as the thermostatic strip projects itself against the piston 35 to actuate the rod 33 outwardly that it will actuate the cut off valve 39, to affect the flow of gas from the supply pipe 38 to the gas mixing valve 37. The same effect is achieved by an over pressure of steam on the piston 35.

Obviously the preferable arrangement is that the gas supply shall be gradually and partly or wholly diminished by the expanding action of the thermostatic strip. Therefore, I have provided means for quickly cutting off the supply of gas to the extent necessary to properly control the heating temperature of the burner, for supplying a uniform properly heated supply of hot water. The burner is especially constructed for quick heating by means of short flames, directly in contact with each of the convolutions of the water heating tubes.

It is thought to be obvious that as the temperature in the water heating tubes rises above a certain point, the control device provides that the gas supply be gradually diminished until the desired temperature of water is reached, or if below the desired temperature a contraction of the thermostatic strip would result in an increased supply of gas. Thus control for the burner in relation to the temperature in the heating tubes eliminates all waste of fuel in connection with the use of the burner.

The conforming of the jets to the convolutions of the tubes is provided for high efficiency of heating. Thus it will be understood that my invention provides for a remarkable saving of fuel, is compact and efficient, very cheap to manufacture, and composed of few and readily replaceable, and durable parts.

The provision of the perforated and preferably aluminum thermostatic strip 36 is calculated to provide a very sensitive and responsive mechanism. It is obvious that the inner end of the strip 26 is suitably fastened within the tube.

It is to be definitely understood that I do not desire to limit the application of this invention to the particular modification set out herein to illustrate the principles thereof and any change or changes may be made in material and structure and arrangement of parts consistent with the spirit and scope of the invention.

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

1. In a gas water heater of the type described, a water heating element comprising a plurality of closely spaced superposed spiral pancake coils each having a plurality of convolutions, the convolutions of each coil being disposed between adjacent convolutions of the next lower coil, a short flame type gas burner beneath said element, said burner having spirally positioned jets formed and positioned to impinge against the convolutions of the lowest coil the hottest portion of their gas flames, the remaining portion of the flames being permitted to pass around the convolutions of the said lowest coil to

directly heat the convolutions of the superposed coils.

2. In a water heater of the type described, a heating coil composed of a plurality of superposed, continuous spiral pancake coils, and a gas burner of the short flame type having a multitude of jets arranged so as to impinge the hot tip of the flame against said convolutions individually, said jets being arranged so as to follow the curvatures of said convolutions, the convolutions of any superposed pancake coil being arranged above the spaces between and separating adjacent convolutions of the next lower pancake.

In testimony whereof I affix my signature.

ALBERT ACKRON.