

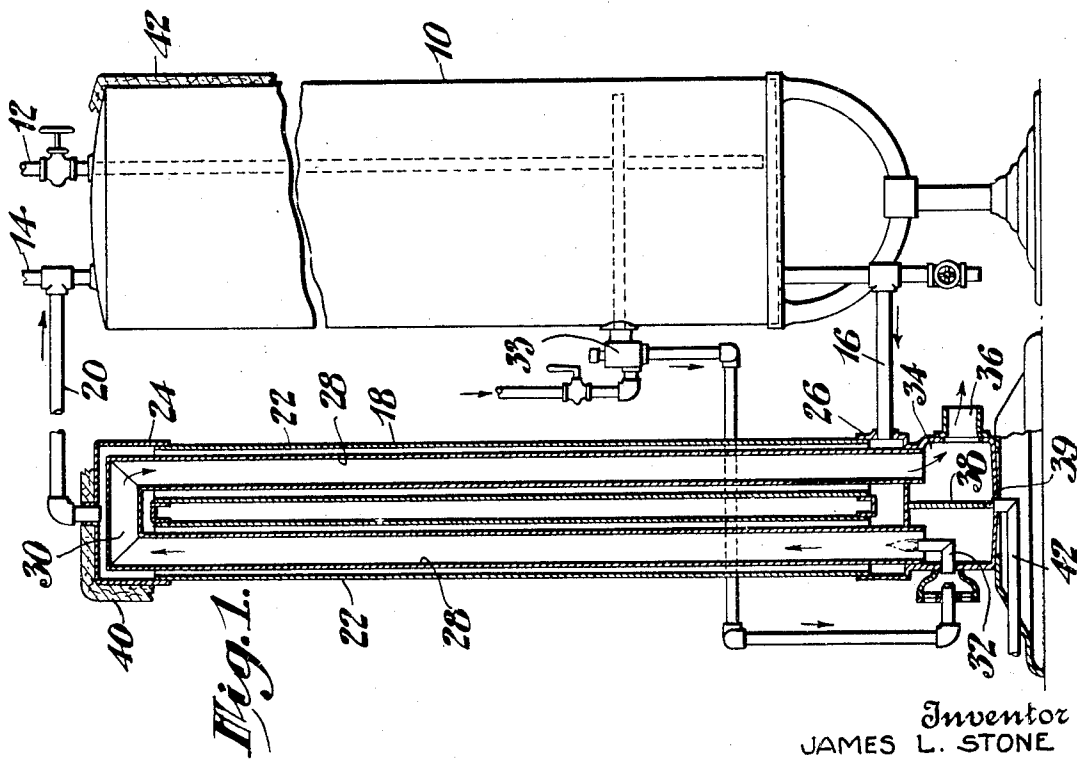
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HOT TOP WATER HEATER

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UNITED STATES PATENT OFFICE

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HOT TOP WATER HEATER

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The present invention relates to gas-fired domestic water heaters. A water heater capable of satisfactory and profitable operation on a low flat or fixed rate, regardless of the gas consumed, has been desired for some time by the managers of gas plants, in order to meet competition from electric and coal fired heaters.

Gas fired flat rate water heaters, however, are at present used in only a limited number of places. The problem of providing an apparatus of this character satisfactory in more than a limited area has proved a difficult one. The apparatus must be cheap to manufacture and adapted for use in either old or newly installed stand boilers under a wide variety of conditions. Also, the burner must operate at low rates of gas flow while maintaining a high rate of thermal efficiency or amount of water heated per unit of gas consumed. This is for the reason that a high gas flow, even for a short time, requires a correspondingly high investment in gas-making apparatus. It is desirable, moreover, that the apparatus shall cause a minimum difficulty when used to heat hard water. It should also be simple, durable and not easily put out of order.

It is one object of the present invention to provide a gas-fired water heater which shall meet the above-mentioned requirements.

Another object of the present invention is to provide an improved arrangement for catching the condensation drip from the tubes of a flat rate domestic water heater.

Further objects and advantages of the apparatus according to the present invention will be apparent to those skilled in the art from the following description taken in connection with the accompanying drawing in which:

The figure is an elevation illustrating the gas-fired water heating apparatus according to the present invention attached to a stand-boiler or hot water tank, parts being shown in section for purposes of illustration.

Referring to the drawing more in detail, 10 indicates the ordinary domestic stand boiler, or hot water boiler, 12 indicates the usual connection to the cold water supply and 14 the pipe connecting the stand boiler 10 to the piping of the house. Pipe 16 connects the lower portion of the boiler 10 with the lower portion of water chamber 18. Water to be heated is taken from the lower portion of stand boiler 10 by means of pipe 16, heated in the water chamber 18 and returned to the pipe 14 by means of pipe 20. If a faucet is opened, of course, the hot water runs directly toward the faucet after entering pipe 14, otherwise it turns into the tank 10 where it is stored. In the apparatus illustrated in the drawing the water chamber 18 is formed of two lengths 22, 22 of large pipe forming parallel legs and having a cap 24 at the top and a cap 26 at the bottom. The cap 24 forms a water connection at the top between the pipe lengths 22.

The pipe 20 for taking hot water from the chamber 18 is connected through the top of the cap 24. The lower cap 26 closes the chamber 18 at the lower ends of both the pipe lengths 22. Cap 26 has two apertures through which extend two fire-tubes 28, 28. The tubes 28 are smaller than the pipes 22 and extend upwardly through the center of the tubes 22. Preferably tubes 28 are about one inch smaller in diameter than tubes 22 so that only a relatively small amount of water is held in the chamber 18 and this amount can be quickly heated even by a gas flame using a small amount of gas. Tubes 28 project beyond the upper ends of the tubes 22 into the cap 24 and the upper ends of tubes 28 are connected within the cap 24 by a length 30 of tubing, parts 28, 28 and 30 being welded together as illustrated and thereby forming an inner fire-tube of inverted U-shape within the heating chamber 18.

Tubes 28 open at their lower ends to receive and discharge hot gases for heating the

water in chamber 18. In the arrangement illustrated, a gas burner 32 is arranged to discharge upwardly into the lower end of one of the tubes 28. In the majority of household installations the burner 32 is set to consume approximately five cubic feet of gas per hour. Gas for burner 32 is controlled preferably by a thermostat valve 33, so that the gas to burner 32 is reduced whenever the hot water line in tank 10 has advanced downwardly to near the bottom of the tank. The hot products of combustion from burner 32 pass upwardly through one tube 28 across tube 30 and down through the other tube 28. Suitable arrangements are provided which will be described more in detail hereinbelow for conducting off the gases which have passed through the fire tubes 28 and 30. It has been found that sufficient condensation occurs within the tubes 28 to require some provision for carrying it away. It is preferred, according to the present invention, to combine the means for handling the condensation with the means for carrying off the gases of combustion. In the arrangement illustrated, the means for the purposes just mentioned include a box or chamber 34 the top of which is formed by the bottom cap of the box 26 and the side walls of which enclose the lower ends of the fire-tubes 28. The gas pipe for the burner 32 passes through one side wall of the chamber 34 and the products of combustion discharged from one of the tubes 28 pass out from the chamber 34 through its opposite side wall at the point 36 at which point a connection may be made to the flue or chimney. In order to prevent hot gases of combustion discharged from one of the pipes 28 from passing across through the box 34 and entering the other pipe 28 to partially smother the flame of the burner 32 a partition 38 is placed in chamber 34 intermediate the lower ends of the tubes 28 and extending from the lower surface of the cap 26 downwardly to near the bottom of the chamber 34. The two parts of chamber 34 on opposite sides of partition 38 are, however, connected by a passage 39 through the lower edge of the partition 38. Condensate from the tubes 28 may therefore be drained out of the bottom of the chamber 34 as fast as it is formed through a single pipe 42 leading downwardly through the bottom of chamber 34, but without danger of mixing any of the products of combustion with the air for burner 32. The caps 24 and 26 are preferably of boiler tubing hammered to fit the ends of pipes 22.

Chamber 18 is covered by heat insulating lagging 40 and tank 10 is covered by heat insulating lagging 42.

It will be understood that in the operation of the device above described the water circulates by thermo-siphonic action from the stand tank 10 through the heating chamber

18, the hot water accumulating in the upper part of tank 10. If no water is used by the household for a considerable length of time, or if the amount used is inconsiderable, the amount of hot water in tank 10 increases and the lower edge of the hot water works downward until it reaches the thermostat 33 which thereupon operates to reduce the amount of gas passing to burner 32. If one or more faucets in the house are opened, the hot water coming from chamber 18, passes directly to the house piping instead of into tank 10. Owing to the small amount of water in chambers 18, the water passing therefrom to the house piping is at a high temperature for domestic uses. A draft of hot water through the house faucets in excess of the amount that can be supplied directly from chamber 18, is supplied from hot water stored in tank 10, within reasonable limits. The burner is designed to consume only slightly more gas per hour than that estimated to be required for the average consumption of hot water of the household. The demand on the gas main and on the gas making equipment therefore never rises above a very limited amount and it is therefore profitable for the gas company to supply gas to water heaters within the present invention at a relatively low flat rate or rate per month.

While I have described above and illustrated in the accompanying drawing specific forms of apparatus according to the present invention, it will be understood that I do not limit myself to details of the disclosure, it being the intention to claim herein all novelty occurring in the present disclosure as broadly as the state of the art will permit. It has been found, moreover, that the water heating arrangement disclosed herein is very effective in preventing trouble from scale in districts where the public water supply is hard water.

Having thus described my invention, I claim:

1. In a water heater, a water heating chamber substantially O-shaped in vertical elevation comprising two spaced upright legs joined to each other at top and bottom by water connection cap closures, a fire tube of inverted U-shape mounted within said chamber, each leg of said fire tube being mounted coaxially within one leg of said chamber with its open end sealed in an aperture in the bottom cap closure, and a burner arranged to discharge upwardly into one leg of said fire tube.

2. The combination as set out in claim 1 in which the legs of the fire tube are of substantially one inch smaller diameter than the legs of the water chamber.

3. In a water heater, a water heating chamber substantially O-shaped in vertical elevation comprising two spaced upright parallel legs joined to each other at top and bottom

by water connection cap closures, and a fire
tube of inverted U-shape supported within
said chamber by said bottom cap closure with
the lower open end of each of its legs extend-
5 ing through and sealed in an aperture in said
bottom cap closure in position such that each
fire tube leg extends coaxially within one leg
of said chamber throughout the full length of
said chamber leg, the U-bend of said fire tube
10 being located coaxially within the top cap
closure of said chamber.

In testimony whereof I affix my signature.
JAS. L. STONE.

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