

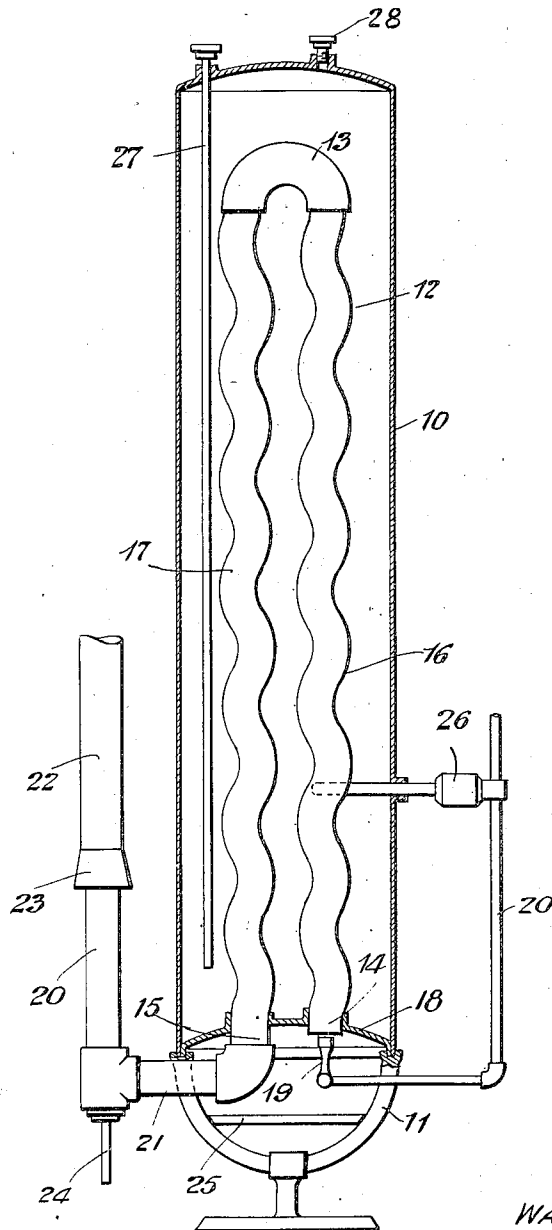
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WATER HEATER

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WATER HEATER

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This invention relates to improvements in water heaters of the stand-boiler type and has for its object to provide a water heater which shall have a simple and efficient heating element in the nature of a conduit through which hot gases may be passed, the conduit being so arranged within the tank that the gases after traveling its entire length pass out of the conduit at the bottom of the tank. The heating element or conduit is essentially an inverted U-shaped member which extends longitudinally of the tank, the free ends of the conduit opening on and being suitably connected in a water-tight manner to the bottom of the tank.

The present invention provides a storage type water heater of an extremely simple, compact and inexpensive construction, such heater being operable to supply hot water at the desired temperature at all times and to operate with a relatively small consumption of gas or fuel at a relatively low and approximately constant rate of consumption. Use of a low consumption burner of this type solves one of the major problems of the gas company in that it permits a material reduction in size of gas service mains and also tends to eliminate peak loads at certain times of the day. A burner having a consumption capacity of 15 cu. ft. per hour of a gas of say 1000 B. t. u. per cu. ft. calorific value, will give measurably good results and be a low consumption burner.

For a fuller understanding of the invention, reference is made to the detailed description taken in connection with the accompanying drawing forming part of the specification and in which the single figure of the drawing illustrates a preferred form of the invention the view being a vertical longitudinal section through the water heater, parts being in elevation.

In the drawing, numeral 10 indicates the tank or boiler which is of ordinary or usual construction. The boiler is supported on a suitable stand 11 in any approved manner. The improved heating element is generally indicated at 12 and consists essentially of an inverted U-shaped conduit, the bend 13 of which is preferably not far removed from

the top of the tank. The extremities 14 and 15 of the limbs 16 and 17 of the U-shaped member are passed through and suitably secured to the bottom 18 of the tank in such a manner that water-tight joints are secured.

Arranged below the terminal 14 of the conduit is a gas burner 19 which is connected by a suitable pipe 20 to a source of gas supply. The terminal 15 of the conduit connects with a vent pipe 20 by means of a lateral extension 21.

The operation of the improved water heater is extremely simple. Hot gases from the burner 19 pass upwardly into the limb 16 of the heating element, around the bend 13 at the top thereof, down along the other limb 17, through the lateral extension 21 and out through the vent pipe 20. The vent pipe 20 may lead directly to the atmosphere or may be connected with another vent pipe 22 having a draft hood 23 extending over the former.

The bottom of the vent pipe 20 is preferably provided with a drain 24. It is also desirable to provide a condensation pan 25 below the burner 19, the pan being suitably supported by the stand 11.

A gas-throttling thermostat 26 of any suitable form may be provided if desired between the interior of the tank and the gas pipe 20. The water to be heated is supplied to the tank through a pipe 27 which passes through the top of the tank and extends to a point near the bottom thereof. The hot water outlet is indicated at 28.

The limbs of the heating element are preferably made from pipe which has been bent into a sinuous form of more or less pronounced curvature. A construction of this kind provides a somewhat interrupted path to the flow of the gases and with the result that a maximum amount of heat is extracted from the gases as they pass through the conduit. It will be readily appreciated, however, that it is within the scope of the invention to make the limbs of the conduit perfectly straight. The principal feature of the invention is the idea of providing a heating element in the form of an inverted U-shaped conduit having its terminals passing through the bottom of

the tank whereby the hot gases enter into the conduit at the bottom of the tank and are likewise discharged from the conduit at the bottom of the tank.

5 A water heater made according to the present invention is extremely efficient in use and can be constructed very cheaply. The fact that the conduit has both of its ends extending through the bottom of the tank makes for
10 a very simple and easy construction of the heater and by causing the hot gases to travel up one limb and down the other insures that the maximum amount of heat may be extracted from the gases. It will be apparent
15 from the foregoing description and from the drawing that the gas burner used with the present storage heater, with its balanced draft type of immersed heating flue, is one having a relatively small fuel burning capacity as
20 compared with standard practice for heaters such as those of the center flue storage and flash types. Certain modifications in the construction may obviously be had without departing from the spirit of the invention.

25 What is claimed as new is:

1. A water heating apparatus of the storage continuous supply type, comprising in combination a storage container designed to hold a relatively large constant supply of
30 water compared to the heat units available, a conduit for conducting heated gases having intake and exhaust legs extending approximately the full length of the container and positioned interiorly thereof, said exhaust leg
35 extending through the bottom of the container to a position below the intake to retard the flow of gases through the conduit, a burner for said intake leg having a relatively low fuel consumption compared to standard
40 practice and an inlet conduit extending longitudinally from the top of the container in close heat exchange relation with one leg of the conduit for discharging liquid to be heated at a point adjacent the bottom of the
45 container.

2. A water heating apparatus of the type described, comprising in combination a storage container designed to hold a relatively large constant supply of water compared to the
50 heat units available, a conduit for conducting heated gases having intake and exhaust legs extending approximately the full length of the container and positioned centrally thereof, said exhaust leg extending through the
55 bottom of the container to a position below the intake to retard the flow of gases through the conduit, an inlet conduit for discharging liquid to be heated at a point adjacent the bottom of the container, and a burner for
60 said intake leg having a relatively low fuel consumption compared to standard practice, said exhaust leg being adapted to discharge the exhaust gases directly to the atmosphere.

3. A water heating apparatus of the storage continuous supply type, comprising a

storage container of relatively small cross section compared to its height, and designed to hold a relatively large constant supply of water, inlet and outlet connections on said container for supplying and drawing off
70 water for current use, a conduit within the container for conducting heated gases having intake and exhaust legs extending approximately the length of the container, and a fluid fuel consuming heating element positioned adjacent the intake leg of said conduit,
75 said heating element having a relatively low rate of fuel consumption compared to standard practice.

4. A water heating apparatus of the storage continuous supply type comprising, in combination, a storage container designed to hold a relatively large supply of water compared to the heat units available, a heating
80 unit mounted interiorly of the said container comprising a heating flue having its mid-section extending to a point adjacent the top of the container and its intake and exhaust ends adjacent the bottom of the container, and a gas burner of small capacity compared
85 to standard practice mounted at the inlet end of the said flue.

5. The method of heating liquids in storage tanks which comprises, confining a relatively large amount of liquid to an upright
95 body, burning fluid fuel at a low rate of consumption compared to standard practice and to the volume of liquid in the body, and passing the heating gases derived therefrom upwardly and then downwardly through substantially the length of said body of liquid,
100 withdrawing heated liquid from the top of said body, and maintaining the volume of liquid substantially constant by passing the liquid supply in heat exchange relation with the liquid in the top of said body and with
105 the downward path of heated gases and introducing the liquid supply at a point near the bottom of said body of liquid.

6. A water heating apparatus of the storage continuous supply type comprising an upright storage container designed to hold a relatively large constant supply of water compared to the heat units available, a conduit within the container for conducting
110 heating gases having intake and exhaust legs extending approximately the length of the container, a burner of relatively low fuel burning capacity compared to standard practice arranged to introduce hot combustion
115 gases into the intake leg of said conduit, said conduit having a relatively small cross section substantially throughout and being of such capacity relative to the container and burner that the heat units from the gases
120 passed therethrough are gradually and substantially completely transferred to the water and the gases have a relatively slow rate of movement.

7. A water heating apparatus of the stor- 130

age continuous supply type comprising, in combination, a storage container adapted to hold a relatively large constant supply of water, a water heating element disposed within the tank so as to be entirely surrounded by water comprising a conduit having intake and exhaust legs extending approximately the length of the container, said exhaust leg extending through the bottom of the container to a position below the intake, a gas burner having a low rate of fuel consumption compared to standard practice mounted at the bottom of said inlet leg in position to deliver hot combustion gases upwardly into said leg, a water inlet pipe extending longitudinally through the container from the top thereof and arranged to discharge adjacent the bottom of the container in close heat exchange relation with the exhaust leg of the conduit, and a thermostat element for controlling the supply of fuel to the burner.

8. A water heating apparatus of the storage continuous supply type comprising, a storage container designed to hold a relatively large supply of water compared to the heat units available, a conduit within the container extending approximately the length of the container and having a relatively small cross section substantially throughout, and a burner for the intake of the said conduit having a relatively low rate of fuel consumption compared to standard practice, the relation of the conduit length and cross section to the capacity of the burner being such that the burner gases transported through the conduit have relatively slow rate of movement and the heat units thereof are gradually and substantially completely transferred to the water.

9. A water heating apparatus comprising in combination a storage container designed to hold a relatively large supply of water, a conduit of relatively small cross section for conducting heated gases having intake and exhaust legs extending substantially the length of the container, and a fuel burner having a relatively low fuel burning capacity compared to standard practice mounted at the inlet end of the intake leg of said conduit, the cross section and length of the conduit bearing such relation to the burner capacity as to enable the heat of the burner gases to be efficiently transferred to the water in the container.

10. In a water heating apparatus of the storage continuous supply type, a storage container designed to hold a relatively large constant supply of water compared to the heat units available, a conduit within the container for conducting heated gases having intake and exhaust legs extending substantially the length of the container, a water inlet pipe extending longitudinally of the container in close heat exchange relation with the exhaust leg of said conduit and terminating adjacent

the bottom of the container, and a fluid fuel consuming heating element of small capacity compared to standard practice mounted so as to deliver heating gases into said intake leg.

In testimony whereof I affix my signature. 70

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