Jan. 3, 1939. R. PONTREMOLI 2,142,409

WATER HEATER

Filed Jan. 25, 1936

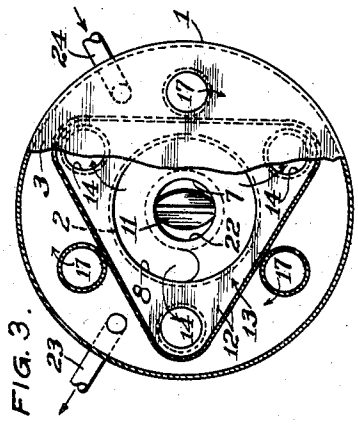


FIG. 3.

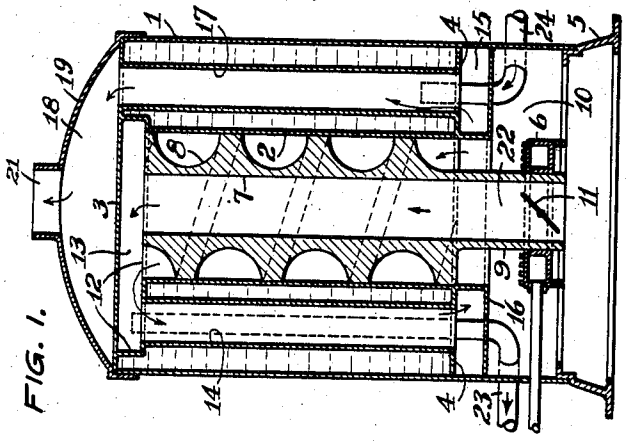


FIG. 1.

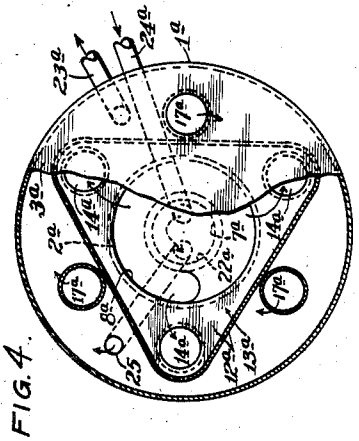


FIG. 4.

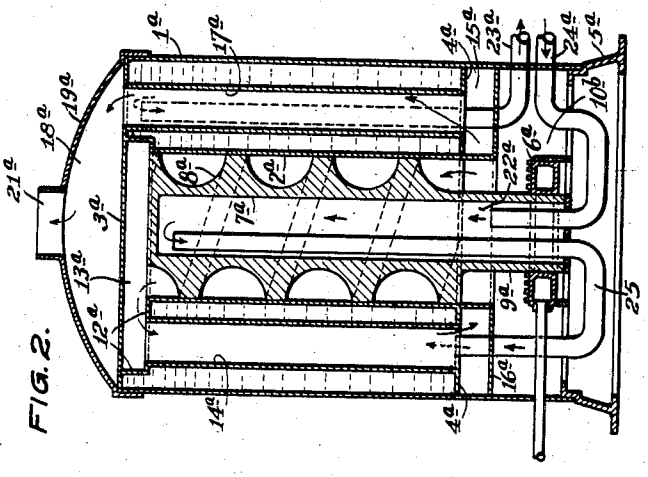


FIG. 2.

INVENTOR.
Raymond Pontremoli
BY Brown, Critchlow & Flick
ATTORNEYS.

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WATER HEATER

Raymond Pontremoli, New Kensington, Pa.

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5 Claims. (Cl. 122—182)

This invention relates to a water heater and more particularly to a hot water heater of the storage type devised for household service.

The general object of my invention is to provide an improved heat transfer apparatus for a water or like heater.

This and various other objects as well as the various other novel features and advantages of the invention will be apparent when the following detailed description is read in conjunction with the accompanying drawing of which Figs. 1 and 2 are vertical sectional views of two different embodiments of the invention and Figs. 3 and 4 top plan views respectively of the same, the latter showing a portion of the cover plates removed to more clearly illustrate the gas flue construction employed.

Referring in detail to the embodiment of the invention illustrated in Figs. 1 and 3 the numeral 1 designates the outer shell of a cylindrical shaped tank within which the water being heated is stored. As shown this tank is provided with a centrally disposed inner tubular wall 2 which forms a vertical opening through the center of the tank and the customary end walls 3 and 4. For convenience in construction the outer shell 1 of the tank is continued downwardly in a single piece below its bottom wall 4 to provide a fire chamber 10 and is mounted on a suitable base 5.

While various kinds of fuel and burners may be used in the present embodiment a gas burner 6 is employed, being of ring shape and disposed directly below the vertical opening in the tank formed by the inner tubular wall 2 and around an extension 9 on the lower end of a hollow flue core 7 which is fitted in such opening. This core, which may be made in any suitable manner, such as by casting, has on its periphery a helically disposed groove 8 around which the hot gases from the burner 6 must travel in contact with it and the wall 2 of the tank to reach the top of the heater. In its lower end the extension 9 of the core 7 is provided with a butterfly valve 11 which is utilized to permit a controlled amount of air to pass upwardly through the core and mix with the hot gases at the top of the tank for a purpose to be presently described.

At the top of the tank and below the upper wall 3 thereof there is formed by a triangular pan shaped false upper wall 12 a flue chamber 13 into which the hot gases and air discharged from the top of the core 7 are emptied. Communicating with this chamber is a plurality of evenly spaced vertically arranged tubular shaped down draft flues 14 which are extended downwardly through the water tank and open into a lower ring shaped flue chamber 15 formed by a false bottom 16 located directly below the bottom wall 4 of the tank. Also communicating with this latter flue chamber 15 is a plurality of evenly spaced vertically arranged up draft flues 17 which are extended upwardly through the water tank and empty into a compartment 18 provided by a curved dome 19 which is mounted over the top of the upper wall 3 of the tank, and from which the spent gases are discharged by way of a stack connection 21.

In accordance with such an arrangement the heating gases are caused to flow in a circuitous path upwardly around the groove 7 in the core mounted in the center of the tank and thence to the upper flue chamber 13 from which they flow downwardly through the tank by way of the down draft flues 14 to the lower flue compartment 15. From there they flow back up through the tank by way of the up draft flues 17 to the dome of the heater and into the atmosphere by way of the dome stack connection 21. Among the advantages of this construction in addition to simplicity and sturdiness which makes for durability and low cost of manufacture, an exceedingly large heat exchange surface area is provided and the hot gases are caused to travel a long circuitous path in contact therewith which makes for the effective removal of the heat contained in them. In addition through the provision of the opening 22 in the center of the core 7 and the valve 11 at the lower end thereof it is possible to provide a higher pressure in the flue gases by admitting air to the upper flue chamber and thereby insure the gases being maintained in intimate heat exchange contact with the surfaces of the flue passages as they pass through the heater and hence effect a more effective removal of the contained heat.

In order to also insure the highest possible temperature of the water at the heater outlet and to decrease the time required to obtain heated water the outlet pipe 23 of the heater is carried upwardly through the heater to a point adjacent the top of the tank where, by gravity, the water is the hottest, and becomes heated first. To also aid in this objective the inlet pipe 24 by which the water is supplied to the tank is terminated at the bottom of the tank where it will least lower the temperature of the discharge water.

Referring to the embodiment of the invention shown in Fig. 2, this differs but slightly from that described in connection with Figs. 1 and 3 and without going into further detail it will suffice to

say that the parts thereof which are identical with those of the former are designated by the same reference characters except for the use of the suffix *a*.

The main distinction between this embodiment and that previously described is found in the change in the construction of the core **7***a* and the change in the circuit of flow of the water through the heater. In this embodiment the ends of the opening **22***a* in the core **7***a* are closed and the water supply pipe **24***a* connected to the bottom thereof instead of to the bottom of the storage tank. From the top of auxiliary chamber **22***a* in which a primary heating of the inlet water takes place a pipe **25** is connected to the bottom of the water tank proper where the inlet hole is first communicated to the storage tank.

Through this construction, as stated, the inlet water is afforded a preheating treatment in intimate relation with the primary hot gases before it is delivered to the tank proper. This has the advantage of speeding up the heating of the water to a usable temperature.

It will be further readily appreciated that various kinds of fuels and forms of burners may be used in heaters embodying this invention, as well as various forms of thermostats, although not shown, for automatically controlling the operation of the burner.

According to the provisions of the patent statutes, I have explained the principle and mode of operation of my invention and have illustrated and described what I now consider to represent its best embodiment. However, I desire to have it understood that, within the scope of the appended claims, the invention may be practiced otherwise than as specifically illustrated and described.

I claim:

1. A hot water heater comprising a storage tank enclosed by end walls at its upper and lower ends, a substantially centrally disposed main flue opening extending upwardly through said tank, a heater unit disposed below and communicating with said flue opening, an upper flue chamber at the upper end of said opening, one or more flue passages extending from said flue chamber downwardly through said tank, a lower flue chamber into which said latter flue passages open, one or more other flue passages extending upwardly through said tank from said lower flue chamber and communicating with the atmosphere, means for conducting the inlet water upwardly within said main flue passage and thence downwardly and into the storage tank at a point adjacent its lower end, and means for discharging water from said storage tank from a point adjacent its upper end.

2. A water heater according to claim 1 in which a core provided with helically disposed peripheral grooves and having a hollow center extending to a point adjacent its upper end is arranged in the centrally disposed flue opening, the peripheral grooves constituting the main flue for the heating gases and the centrally disposed opening in said core, a preheating chamber for the entering water.

3. A hot water heater comprising a storage tank having a vertical flue-opening in its interior, a heating unit disposed below but communicating with said flue-opening, a core element having a hollow enclosed center and a spirally disposed groove in its periphery through which the heating gases from the heating unit pass mounted in said flue-opening, means for supplying water under pressure to the interior of said core, and other means connecting the top of said core interior with said storage tank adjacent the bottom thereof.

4. A hot water heater comprising a storage tank having a vertical flue-opening in its interior, a heating unit disposed below but communicating with said flue-opening, an upper flue chamber at the upper end of said flue-opening, one or more flue passages extending from said flue chamber downwardly through said tank, a lower flue chamber into which said flue passages open, one or more other flue passages extending upwardly through said tank from said lower flue chamber and communicating with the atmosphere, a core element having a hollow enclosed center and a spirally disposed groove in its periphery through which the heating gases from the heating unit pass mounted in said flue-opening, means for supplying water under pressure to the interior of said core, and other means connecting the top of said core interior with said storage tank.

5. A hot water heater comprising a storage tank having a wall defining a vertical flue in its interior, a core element having a hollow center and a spiral groove in its periphery mounted in said flue, said core element and said wall combining to form a spiral opening through said flue, a heating unit disposed below said core element, means for directing the hot gases from said heating unit into the spiral opening in said flue, means for exhausting the gases from the spiral opening to the atmosphere, means for introducing fluid into one end of the hollow center of said core element, and means for removing the fluid from the other end of said core element.

RAYMOND PONTREMOLI.