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COMBINED HOT WATER AND STEAM BOILER

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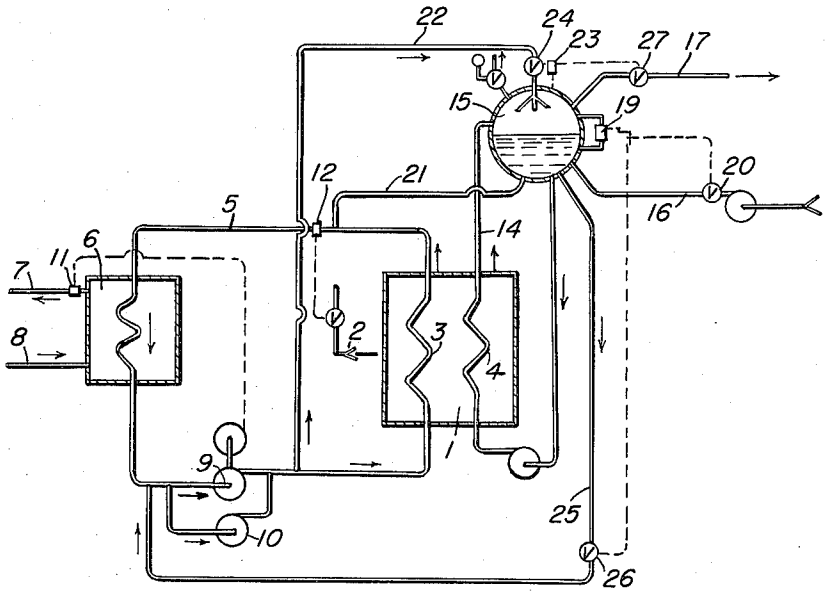

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COMBINED HOT WATER AND STEAM BOILER

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2 Claims. (Cl. 122—1)

This invention relates to a hot water boiler of the kind in which a high pressure is maintained in order to prevent steam generation, notwithstanding the temperature of the circulating water being higher than 100° C. In such boilers there is often a need simultaneously to produce a certain quantity of steam, either for use in apparatuses which are driven by steam or have available a medium of higher temperature than that of the water. In the hot water circuit it is necessary to have an expansion vessel, and varying demands for hot water and steam, respectively, very often result in separate furnaces for the different circuits.

One object of the present invention is to provide a simple combined hot water and steam boiler without any special expansion vessel for the hot water circuit.

One object of the invention is to provide a boiler in which the heat absorption portions are balanced in such a manner that the steam generation in the water circuit is prevented.

One object of the invention is to provide a combined boiler in which steam generation in excess of the momentary demand may be quenched by the transfer of water for the colder part of the water circuit to the steam circuit.

A further object of the invention is to provide automatic means to quench the excess steam in response to the conditions in the steam generation circuit.

A further object is to provide the boiler with means for returning water to the hot water circuit in a quantity corresponding to that withdrawn from the steam circuit for quenching.

A still further object is to provide means in the live steam pipe to prevent withdrawal of such quantities of steam that the steam pressure in the circuit cannot be maintained.

With these objects in view the invention is mainly characterised by a first hot water circuit having heat absorption portions in the furnace, a second steam generation circuit having heat absorption portions in the same furnace and a first constantly open connection between said first and second circuits.

The novel features which are characteristic for the invention are shown on the accompanying drawing by way of example as applied to a boiler which is mainly intended indirectly to heat a large central heating system and which also comprises a small circuit for steam generation.

The boiler is schematically shown at numeral 1 and is provided with a burner 2 of an arbitrary kind, in a manner known per se. The boiler comprises heat absorption surfaces 3 and 4, respectively. The first mentioned heating surface is included in a primary hot water circuit 5, which in a heat exchanger 6 indirectly heats water for a large domestic central heating unit, here only shown by inlet and outlet conduits 7 and 8, respectively. The hot water circuit is intended for forced circulation of the working medium and the same comprises a first pump 9 and an emergency pump 10 which, in a manner known per se, are provided with shut-off valves so that any of them can be brought into function. In the outlet conduit 7 there is a member 11 actuated by a thermostat, which dependent on the water temperature, regulates the speed of the driving motor for the pumps. The hot water

temperature determines by the aid of impulses from a member 12 the fuel supply to the burner 2.

The second heat absorption surface 4 is included in a steam generation pipe 14 which comprises a steam dome 15 and circulation pump arranged in a return conduit leading from the dome. A feed water conduit 16 and a live steam pipe 17 are connected to the steam dome. The dome is in the usual manner provided with a member 19 actuated by the water level, which controls the feed water supply via the valve 20 in proportion to the lowering of the water level caused by the withdrawal of generated steam through the pipe 17. Between these two circuits there is a first, constantly open connection conduit 21, by which the steam dome in the second circuit can be used as an expansion vessel for the hot water circuit. The steam generation circuit can for instance be determined for a pressure of, say, 25 atmospheres gauge, which corresponds to a temperature of 225° C. in the steam dome.

The pressure in this will determine the pressure in the hot water circuit, and the heat absorption surface 3 thereof is so dimensioned that the temperature in any part of the hot water circuit will not be so high that steam generation occurs during normal operative conditions. The temperature after the heat absorption part can be, say, 174° C., and the temperature of the return water 130° C., which is sufficient to guarantee a temperature of 90° C. on the water leaving the heat exchanger. In the embodiment here described, steam is in the first hand taken for atomizing oil in the burner 2. This steam quantity will vary with the load of the boiler but steam will also intermittently be required for the soot blowing apparatuses used for cleaning the heat surfaces. The steam may of course also be used for other purposes.

If the steam consumption falls below the normal, measures must be adopted in order to withdraw heat from this circuit. This is possible by means of a second connection conduit 22, which extends from the colder part of the hot water circuit, just after the pump 9, to the upper part of the steam dome.

A pressure sensitive member 23 arranged closely to the steam dome controls a valve 24 in the conduit 22. If the pressure in the steam dome rises above a permissible value, the valve 24 opens, and water is sprayed into the steam space in the dome and the steam therein will be cooled. A quantity of water corresponding to that supplied in this manner to the steam circuit, is led back to the hot water circuit through return conduit 25 connected to the suction side of the pumps. The returned quantity is controlled by a valve 26, which is dependent on a sensitive member in the water gauge 19. As the pressure in the steam circuit determines the operative conditions in the hot water circuit, it is necessary to prevent a pressure reduction in the steam circuit by too great steam consumption. If the pressure in the two systems is not maintained the risk for steam generation arises in the hot water circuit. A sensitive member 23 therefore controls a valve 27 in the live steam pipe 17, so that the possibility for the consumption will be limited in a required degree.

What I claim is:

1. In a combined hot water and steam boiler having a furnace and means for automatically regulating combustion therein;

a first circuit having heat absorption portions in said furnace for generating hot water;

a second circuit having a steam dome and heat absorption portions parallel to those of the first circuit in said furnace for generating steam;

a first, constantly open connection conduit between said first and said second circuits;

a second connection conduit between a point in said hot water circuit ahead of its heat absorption portions and the steam dome of said steam generation circuit;

and means temporarily to open said second connection conduit in response to an unpermissible high pressure in the steam generation circuit for transferring water from the cooler part of the first circuit to the steam done.

2. In a combined hot water and steam boiler having a furnace and means for automatically regulating combustion therein;

a first circuit having heat absorption portions in said furnace for generating hot water;

a second circuit having heat absorption portions parallel to those of the first circuit in said furnace for generating steam;

a first constantly open connection between said first and said second circuits;

a second connection conduit between said first and said second circuits;

first means temporarily to open and close said second connection conduit in response to an unpermissible high pressure in the steam generation circuit for transferring water from the first to the second circuit;

a third connection conduit between said first and second circuits;

and second means to open and close said third connection conduit in response to the variations of the water level in said steam generation circuit for transferring water from the second to the first circuit.

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