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WATER HEATER AND SOFTENER

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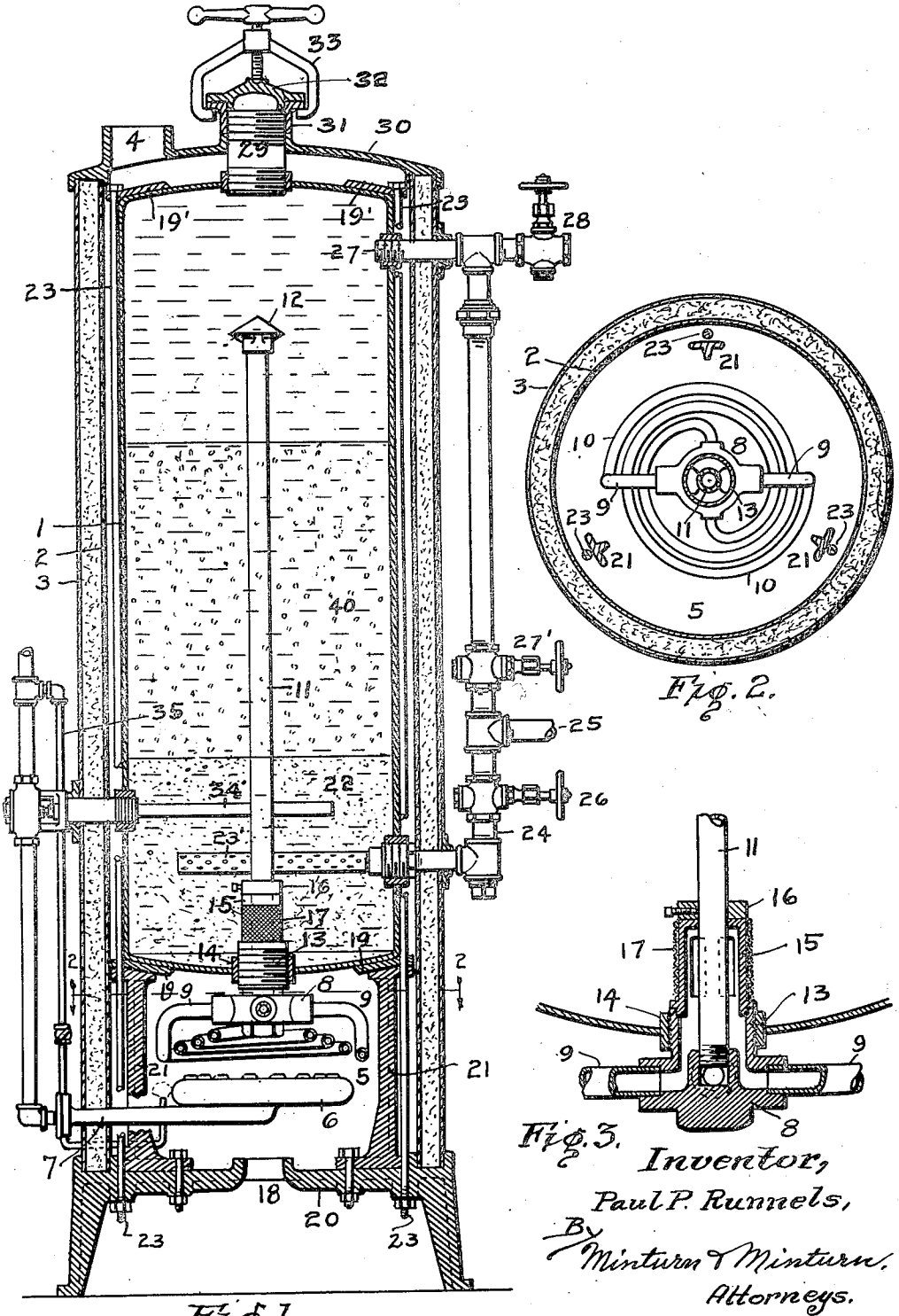


Fig. 1.

Fig. 2.

Fig. 3.

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UNITED STATES PATENT OFFICE

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WATER HEATER AND SOFTENER

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The object of this invention is to provide, in a water heater for domestic use particularly, but not necessarily so connected, means for chemically removing the derivatives of lime, magnesia, and the like which make the water known commonly as hard.

Another object is to provide means for utilizing the heat stored in the water softener, for heating a considerable quantity of cold water as fast as the latter can be drawn through the tank, after the tank full of water heated from the coils has been used, and before the additional quantity could be heated by passing through the coils.

I accomplish the above and other objects which will hereinafter appear, by the means illustrated in the accompanying drawing, in which—

Fig. 1, is a vertical section of a boiler and heater embodying my invention;

Fig. 2, is a cross section on the line 2—2 of Fig. 1; and

Fig. 3, is a detail in vertical section on a larger scale, of the coil heater and water conduits thereto adjacent.

Like characters of reference indicate like parts throughout the several views of the drawing.

The boiler 1 is surrounded by two concentric shells 2 and 3, with a space between the shells 2 and 3 which is filled with rock wool or other good insulating material. There is also a space between boiler 1 and the inner shell 2 through which the waste products of combustion from the burner escape out through a top flue 4. At the bottom of the boiler 1 is a combustion chamber 5, near the bottom of which is a gas burner 6 which is supplied through a mixer tube 7, in the usual manner.

Located above the burner 6 is a cast metal header 8, with a four-way passage, from two of which lead pipes 9 that continue below the header in two coils 10 that discharge into the header through the other two passages, above mentioned. The last two passages communicate with the lower end of a percolating tube 11. The tube 11 has a top discharge into boiler 1, which discharge is protected by a cap 12.

Cast as a part of the header 8 is an upper sleeve extension 13, which screws into a sleeve 14 sweated to the bottom of the tank. Surrounding the tube 11 is a collar 15 having three legs which rest upon the top of sleeve extension 13. The collar 15 is held against the sleeve by a second collar 16 forced down against the first one and locked there by a set screw.

The purpose of the collar with its legs is to support a wire screen 17 which acts as a strainer to prevent the entrance of granular matter into the header and its connected coils 10.

Below the burner in the bottom of the combustion chamber is an air inlet 18, with a surrounding upper flange to prevent water of condensation dropping from the coils from escaping at the air inlet.

The bottom of tank 1 is reinforced by a steel disk 19 which is brazed to the tank bottom, and the tank is supported from a cast base 20 on three cast standards 21.

The top of the tank 1 has a like reinforcing disk 19′. Both disks 19 and 19′ have marginal projections through which tie-bolts 23, here shown as three in number, extend from top to bottom of the tank and tie the assembly securely together. In this connection it will be noted that the standards 21 have similar extensions through which the bolts also pass, thereby holding the assembly from spreading.

In the bottom of the tank is a filter-bed of sea-gravel 22, as shown, and above that is a considerable deposit of commercial synthetic mineral, or green sand 40 the function of which is to soften the water passing through it by the removal of chemical derivatives of lime, magnesia and the like, and above this deposit is a water space.

The water is discharged into the tank through a pipe 23′, having numerous perforations through which the water is sprayed. The pipe 23′ connects with the lower end of a manifold pipe 24 which connects through a branch 25 with the main. The manifold has a valve 26 between the pipe 23′ and the tank, and a valve 27′ in an extension of said manifold above the pipe 25. The tank 1 has a water outlet through a top pipe 27,

which takes the water to wherever it is to be used; and such source is controlled by a valve 28.

The manifold pipe 24 is extended and communicates with pipe 27 between the valve 28 and the boiler.

When it is desired to recondition the water softener chemicals of the boiler, that is done by adding salt at the top of the boiler, through an opening provided for that purpose. Salt is only added after the mineral and sand in the boiler have been thoroughly washed by discharging water from the main through the manifold pipe by properly regulating the valves.

A sleeve 29 is screwed into a collar sweated into the hand-hole in the boiler-top. There is a cast cap 30 extending across the boiler and insulating walls and closing the latter and defining a space across the boiler top for the passage of the waste products of combustion to the flue. A cast sleeve 31 is screwed on the outer end of sleeve 29, and on the flanged end of sleeve 31 is seated a cover 32 which is retained by a screw clamp 33.

The supply of gas to the burner is automatically controlled by a thermostat comprising a pipe 34 which extends into the boiler 1. A pilot pipe 35 provides a constant flame at the burner to ignite the gas.

By my construction, when a boiler full of soft hot water has been used, a continued supply of cold water passed through my device will not only be softened in the usual manner, but, because of the great heat retaining qualities of the sand and synthetic minerals for softening purposes, the heat therein will heat the new water to a temperature high enough for bathing purposes and in sufficient quantity for several baths, without the delay of heating it with the heat from the gas burner.

While I have described my invention with more or less minuteness as regards details of construction and arrangement and as being embodied in certain precise forms, I do not desire to be limited thereto unduly or any more than is pointed out in the claims. On the contrary, I contemplate all proper changes in form, and arrangement, the omission of immaterial elements and the substitution of equivalents as circumstances may suggest or as necessity may render expedient.

I claim:

1. The combination of a water tight boiler partially filled with a water softening material loosely deposited therein, a water outlet near the top of the boiler, a water inlet near the bottom of the boiler, a water heating coil, and means for circulating the water of the boiler and heating the contents of the boiler by admitting the water to the coils from the lower end of the boiler and discharging it from the coils into the boiler near the upper end of the boiler.

2. The combination of an upright boiler, heating coils below the bottom of the boiler, means for heating the coils, a stand pipe receiving water from the coils at its lower end and discharging the water into the upper part of the boiler, a water conduit from the lower end of the boiler to the coils, a pipe supplying water from the main into the lower part of the boiler, a pipe discharge for the water near the upper end of the boiler and a water softening material unrestrained except by the boiler partially filling the boiler and through which the water circulates.

3. The combination of an upright boiler, heating coils below the bottom of the boiler, means for heating the coils, a stand pipe receiving water from the coils at its lower end and discharging the water into the upper part of the boiler, a water conduit from the lower end of the boiler to the coils, a pipe supplying water from the main into the lower part of the boiler, a pipe discharge for the water near the upper end of the boiler and a water softening material completely filling the boiler from the boiler bottom to a level higher than the inlet from the water main and the conduit to the coils through which softening material the water circulates.

4. The combination of an upright boiler, heating coils located below the boiler, a gas burner located below the coils, a thermostatic means for controlling the supply of gas to the burner, a stand pipe taking water from the coils and discharging it into the upper portion of the boiler, a discharge from the lower portion of the boiler to the coils, a strainer around said discharge, a pipe spraying water into the lower portion of the boiler, a pipe discharging water from the upper portion of the boiler, and a water softening material filling the boiler from the bottom of the latter to a level above the water inlet to the boiler and above the strainer.

5. The combination of an upright boiler, heating coils located below the boiler, a gas burner located below the coils, a thermostatic means for controlling the supply of gas to the burner, a stand pipe taking water from the coils and discharging it into the upper portion of the boiler, a discharge from the lower portion of the boiler to the coils, a strainer around said discharge, a pipe spraying water into the lower portion of the boiler, a pipe discharging water from the upper portion of the boiler, and a water softening material filling the boiler from the bottom of the latter to a level above the water inlet to the boiler and above the strainer, a heat insulating jacket forming a heat conducting passage around the boiler, and means for cleaning and reconditioning the softening material.

In testimony whereof I affix my signature.

PAUL P. RUNNELS.