C. P. WADLEY.

WATER HEATER.

APPLICATION FILED MAR. 22, 1918.

1,338,055. **Patented Apr. 27, 1920.**

Fig. 1

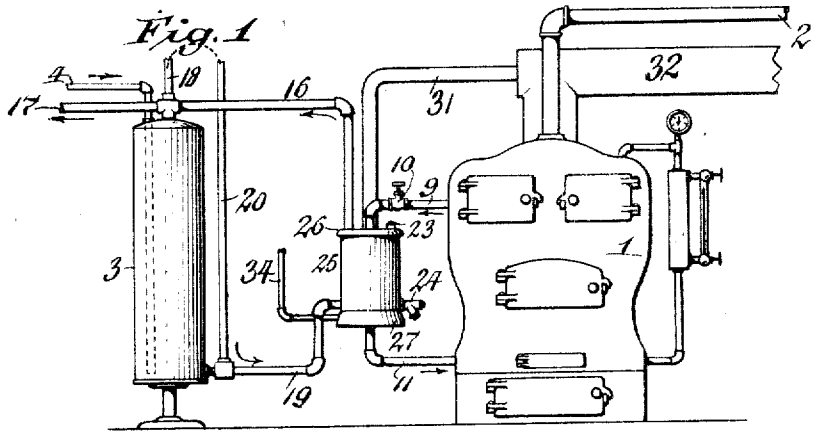


Fig. 2

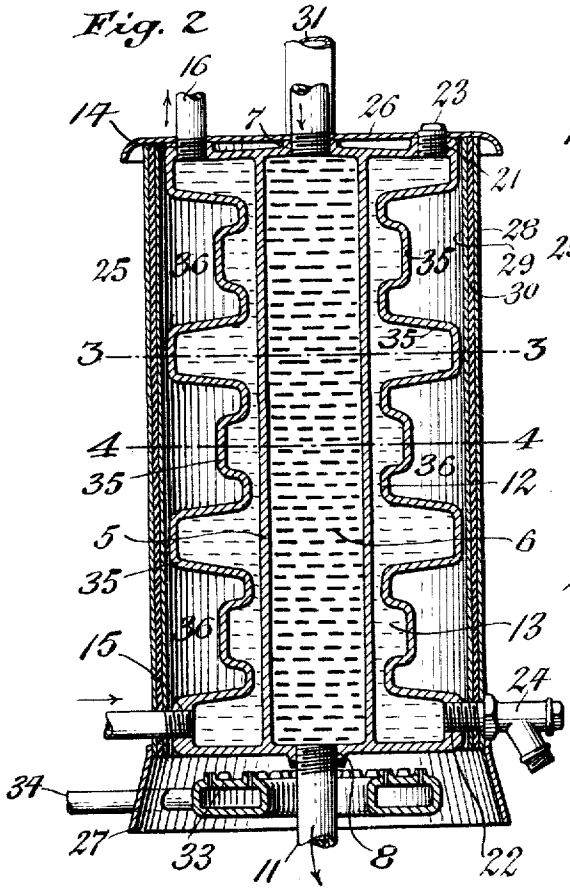


Fig. 3

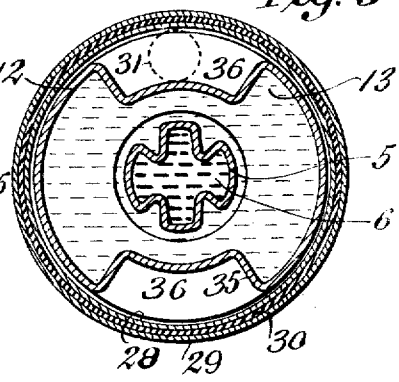
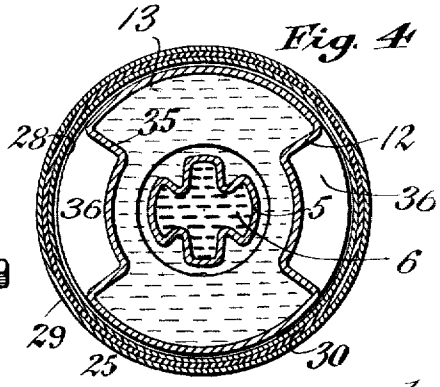


Fig. 4



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WATER-HEATER.

1,338,055. Specification of Letters Patent. Patented Apr. 27, 1920.

Application filed March 22, 1918. Serial No. 223,881.

To all whom it may concern:

Be it known that I, CALVIN P. WADLEY, a citizen of the United States, residing in Buffalo, in the county of Erie and State of New York, have invented new and useful Improvements in Water-Heaters, of which the following is a specification.

This invention relates to an auxiliary water heater which is adapted to be used in conjunction with an ordinary main or primary steam or hot water boiler and capable of indirectly using the heat of the water in the boiler for heating secondary water which is to be used for different purposes, and which also permits of heating the water which is to be used either directly by means of a gas or similar burner and also permits such secondary water to be heated directly and indirectly simultaneously by the combined effect of this burner and by the primary water of the boiler.

The purpose of this invention is to provide a heater capable of accomplishing this purpose which is simple in construction, efficient in operation and capable of being produced at comparatively low cost.

In the accompanying drawings:

Figure 1 is an elevation of a boiler and storage tank and associated parts connected with a water heater embodying my improvements. Fig. 2 is a vertical section of the water heater embodying my invention, on an enlarged scale. Figs. 3 and 4 are horizontal sections, taken on the correspondingly numbered lines in Fig. 2.

Similar characters of reference refer to like parts throughout the several views.

The boiler 1 shown in the drawings is merely an example of one suitable for use in connection with my improvements and the same may be either utilized for heating primary water or producing steam for which purpose the same is provided at its top with an outlet pipe 2 which is adapted to be connected with the different fixtures to which steam or primary hot water is to be supplied. Adjacent to the boiler is arranged a water storage tank 3 which may also be of any suitable construction and to which fresh water may be supplied in various ways, for instance, by means of a service or main supply pipe 4 extending downwardly through the top of this tank and terminating near the bottom thereof.

The water heater which is associated with this boiler and tank and which contains my invention is preferably constructed as follows:

5 represents an inner wall which incloses a space forming an inner heating chamber 6, this chamber being preferably arranged in an upright position and provided at its upper end with a water inlet 7 and at its lower end with a water outlet 8. The inlet of this inner heating chamber is connected with the upper part of the water space of the boiler by means of an upper supply pipe 9 which contains a valve 10 while the lower outlet thereof is connected with the lower part of the water space of the boiler by means of a lower or return pipe 11.

Around the inner wall of the auxiliary heater is arranged an outer wall 12, which forms between the same and said inner wall an outer heating chamber 13. The latter is provided at its upper end with an outlet 14 and at its lower end with an inlet 15, this outlet and inlet being preferably formed on one side of the outer wall. The outlet 14 is connected in any suitable manner with the different fixtures which are to be served with secondary hot water, for instance as shown in the drawings, this is accomplished by means of piping which comprises a pipe section 16 extending from the outlet 14 to the upper end of the water storage tank, a pipe section 17 extending from the water tank to the fixtures from which secondary hot water is to be withdrawn, and another section 18, extending to a radiator or similar device which is intended to heat the surrounding space by means of hot water. The inlet of the outer heating chamber may receive water from various sources, the piping shown in the drawings being designed to transfer water from the tank to this outer chamber and also return water from the outlet of the radiator to the outer heating chamber, this being preferably accomplished by connecting the lower end of the water tank with the water inlet of the outer heating chamber by means of a tank return pipe 19 and connecting this return pipe with a radiator return pipe 20 leading from the outlet of the radiator.

As the water in the boiler is heated a part thereof passes through the upper supply pipe 9 into the upper part of the inner heating chamber and as it becomes cooler it passes downwardly through the latter and

back through the lower return pipe 11 into the lower part of the boiler so as to again become raised in temperature, thereby maintaining a circulation of primary heating water through the inner heating chamber and cause the secondary water in the outer heating chamber to be heated indirectly. As the water in the outer heating chamber rises in temperature the same passes upwardly through the pipe section 16 and to the upper end of the water storage tank and also to the pipe branches or extensions 17, 18 leading to the discharge fixtures and the radiator. If no water is withdrawn from the pipe section 17, part of the water passes downwardly through the storage tank as it becomes cooler and returns through the tank return pipe 19 to the lower end of the outer heating chamber and the cooled water from the radiator also returns through the radiator return pipe 20 and tank pipe 19 to the outer heating chamber so that a constant secondary circulation of heated water is maintained through this outer chamber and water tank, and also through the radiator when the latter is in use.

The outer and inner chambers of the auxiliary heater are preferably constructed in one piece by forming the same of cast iron. For the purpose of facilitating the integral formation of these walls of these two chambers the core for the inner chamber is supported in the mold by prints which extend through the inlet 7 and the outlet 8 at opposite ends thereof while the core forming the outer chamber is supported on one side by prints extending through the inlet and outlet 15, 14 and the opposite side thereof is supported by means of two prints forming openings 21, 22 at the upper and lower ends of the outer heating chamber. The upper opening 21 in the completed form of this auxiliary heater is closed by means of a screw plug 23 while the lower opening 22 receives a blow-off cock 24 which upon being open permits of discharging any sediment from the lower end of this outer heating chamber whenever this is desirable.

In order to obtain the maximum heating effect from the primary water of the boiler which passes downwardly through the inner heating chamber the wall of the latter is preferably corrugated lengthwise, as shown in Figs. 3 and 4, thereby increasing the heating surface of this wall accordingly.

When the fire of the boiler is burning fairly strong or sufficient to cause the secondary water in the outer chamber to be raised to the required temperature the boiler may be utilized as the sole means of indirectly heating the secondary water in the outer heating chamber. When, however the boiler fire is incapable of furnishing sufficient heat to heat the secondary water in the outer heating chamber to the required extent the boiler heat may be supplemented by auxiliary heating means which are preferably constructed as follows:

Surrounding the outer and inner heating chambers is a casing 25 which preferably comprises an upright cylindrical body which is arranged adjacent to the outer wall of the outer heating chamber, a top 26 extending over the upper ends of the outer and inner chambers and connected with the upper end of the casing body, and a downwardly flaring flange 27 connected with the lower end of the casing body. The body of the casing is preferably composed of inner and outer shells of sheet metal 28, 29 and an intermediate layer 30 of asbestos or similar heat insulating material arranged between these shells and serving to reduce the radiation of the heat from the space within the casing to the surrounding atmosphere. At its lower end this casing body is provided with suitable openings for the passage of the return pipe 19 and the blow-off cock 24. The top of the casing is provided with suitable openings for the passage of the outlet pipe 16 and the screw plug 23, as shown in Fig. 2. The lower end of the casing body and its flange are open so that the same form an air inlet which places the external atmosphere in communication with the interior of the casing, while the upper end of this casing is provided with an outlet which is preferably formed in the top thereof and is connected with a vent pipe 31 which leads to the smoke pipe 32 of the boiler for the purpose of carrying away the products of combustion from the interior of the casing.

Means are arranged below the outer heating chamber which serve to directly heat the secondary water in this chamber, which means may consist of a burner 33 arranged below the outer chamber and adapted to deliver a flame upwardly against this chamber and to the space between the same and the casing. This burner may be of any suitable construction, that shown in the drawings being more particularly designed to burn gaseous fuel which is supplied thereto by means of a supply or feed pipe 34 extending through the flange of the casing.

As the flame of this burner strikes the outer wall of the outer heating chamber and passes upwardly between the same and the casing to the vent pipe, a heating effect is produced on the secondary water within this chamber which supplements that of the primary water in the inner heating chamber so that the secondary water is heated both indirectly by the boiler and directly by the flame of the burner.

In order to utilize the heat of the burner flame to the best advantage, the outer wall of the outer heating chamber is preferably

so constructed that the heat of this flame is compelled to take a tortuous course in passing from the burner through the space between the casing and the outer chamber wall to the vent pipe. This is preferably accomplished by constructing the outer chamber wall in the form of a plurality of superimposed compartments 35 which are elongated or of oblong form in horizontal compartment, each of these sections having its opposite narrow ends arranged close to the body of the casing while the opposite wide sides thereof are separated by intervening passages from said body, and the several compartments being arranged so that the narrow ends of one compartment are vertically in line with the passages 36 formed between the wide sides of adjacent compartments and the body of the casing, as shown in Figs. 2, 3 and 4. Due to this construction the heat from the burner is compelled to make a partial turn as it passes each of the outer wall compartments and thereby causes the heat to be utilized more effectively and the secondary water in the outer heating chamber to be heated more efficiently before the products of combustion escape through the vent pipe 31.

When the main boiler is not utilized in the summer time for heating purposes the secondary water in the outer heating chamber may be heated solely by means of the flame from the burner. It will therefore be apparent that by the use of this auxiliary heater it is possible to obtain hot water for domestic or other purposes at all times of the year inasmuch as the secondary water may be heated either by the burner 33, or by the main boiler, or by utilizing both of these heating means, thereby enabling hot water to be obtained for domestic or other purposes at a minimum cost during the entire year regardless of weather conditions.

This auxiliary heater can be installed in connection with an ordinary boiler, water storage tank and the fixtures which are to be supplied without requiring any radical change in the piping or connections and owing to the simplicity of the construction of this auxiliary heater the advantages obtained from the same can be realized at comparatively small cost.

I claim as my invention:

A water heater comprising an inner heating chamber adapted to be connected with the water space of a boiler, an outer heating chamber surrounding said inner chamber and adapted to be connected with the fixtures which are to be supplied with hot water, a burner arranged to deliver a flame against said outer chamber, and a casing inclosing said chambers and burner, and provided at its lower end with an inlet for air and an outlet at its upper end for the escape of products of combustion, said outer chamber having its wall constructed of a plurality of transversely elongated or oval compartments each of which is arranged with its narrow ends close to the body of said casing while the opposite wide sides thereof are separated by intervening passages from said body and the several compartments being arranged so that the narrow ends of one compartment are vertically in line with the passages between the casing body and the wide sides of adjacent compartments.

CALVIN P. WADLEY.

Correction in Letters Patent No. 1,338,055.

It is hereby certified that in Letters Patent No. 1,338,055, granted April 27, 1920, upon the application of Calvin P. Wadley, of Buffalo, New York, for an improvement in "Water-Heaters," an error appears in the printed specification requiring correction as follows: Page 3, line 10, for the words "compartment, each of these sections" read *section, each of these compartments;* and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 25th day of May, A. D., 1920.

[SEAL.]

M. H. COULSTON,

Acting Commissioner of Patents.

Cl. 122—37.