

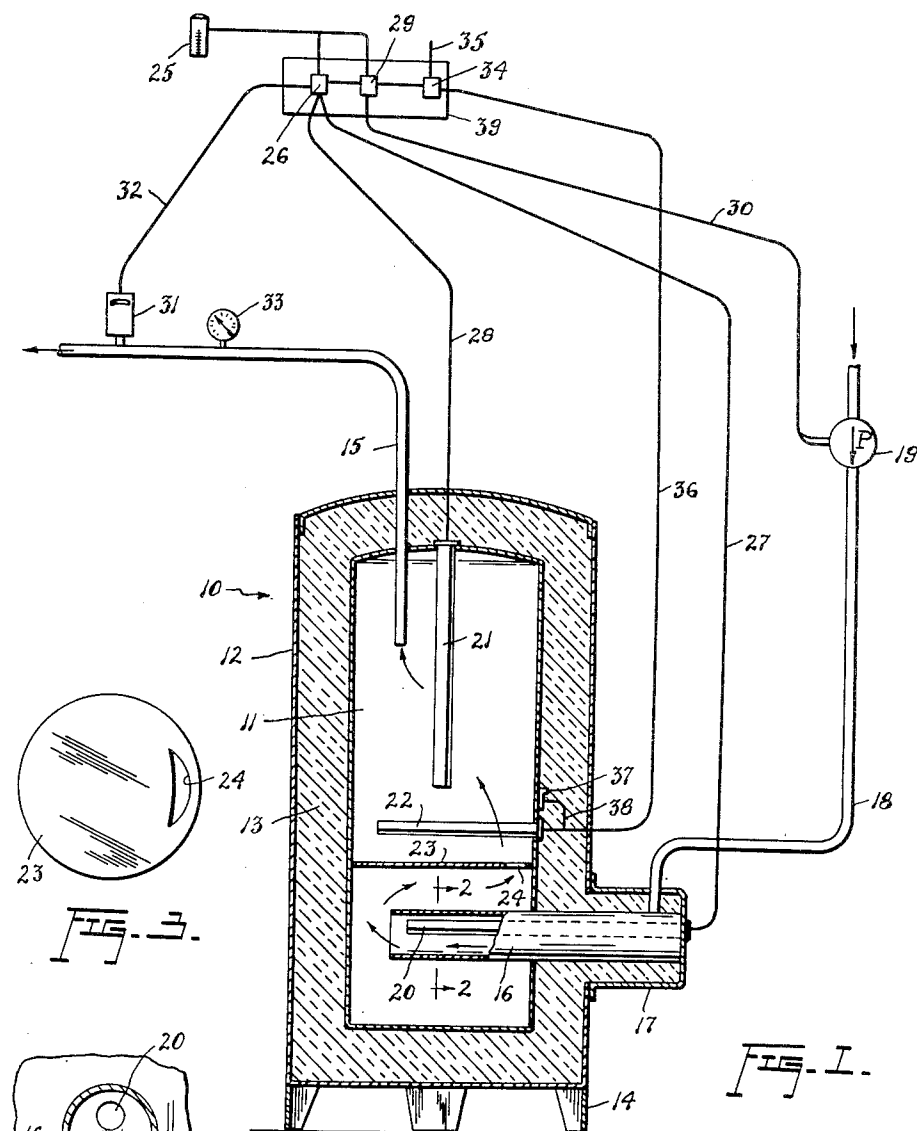
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B. F. SAWYER

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AUTOMATIC ELECTRICALLY OPERATED WATER HEATER

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Inventor:
Boyd F. Sawyer
By *M. M. M. M.*
Att'y.

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AUTOMATIC ELECTRICALLY OPERATED WATER HEATER

Boyd F. Sawyer, Bucyrus, Ohio

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2 Claims. (Cl. 219—39)

This invention relates to new and useful improvements and structural refinements in electric water heating systems, particularly of the type used for commercial or residential space heating purposes, and the principal object of the invention is to provide a compact heating unit which is extremely simple in construction, highly economical in operation, and adaptable to expeditious and simple installation, maintenance and repair.

An important feature of the invention resides in the provision of electric means for automatically controlling the operation of the heating unit, whereby to assure even, dependable heating at all times.

Another important feature of the invention involves the use of heating elements and controls of a standard variety, such as are readily available on the market and may be readily procured for installation and replacement purposes without undue expense and loss of time.

A further important feature of the invention resides in the construction of the boiler itself, the same being adapted to retard the flow of water therethrough and thus assure rapid and efficient heating.

With the foregoing more important objects and features in view and such other objects and features as may become apparent as this specification proceeds, the invention resides in the details of construction and arrangement of parts substantially as shown in the accompanying drawing, wherein like characters of reference are used to designate like parts and wherein:

Figure 1 is a vertical sectional view of the heating unit, also illustrating diagrammatically the associated controls;

Figure 2 is a cross-sectional detail, on an enlarged scale, taken substantially in the plane of the line 2—2 in Figure 1; and

Figure 3 is a plan view of the baffle plate used in the boiler.

Referring now to the accompanying drawing in detail, the heating unit is designated generally by the reference numeral 10 and comprises a vertically elongated boiler 11 disposed in a suitable casing 12 having insulating material 13 therein as shown, the casing being supported by a plurality of legs 14.

A hot water outlet pipe 15 extends from the upper end portion of the boiler 11 for connection to radiators, or the like (not shown). A tubular, horizontally disposed duct 16 extends laterally into the lower end portion of the boiler 11 and is open at its inner end so as to communicate with the interior of the boiler. The outer end portion of the duct 16 is accommodated in a lateral dome or extension 17 provided at one side of the casing 12.

A cold water inlet pipe 18, carrying the return from the aforementioned radiators, or the like, is connected to the outer end portion of the duct 16, so as to complete the water circuit through the system. A suitable electric pump 19 is provided on the inlet pipe 18 to effect water circulation.

A pair of primary electric heating elements 20, 21 are

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provided in the boiler 11, the former being disposed longitudinally in the duct 16 while the latter is disposed vertically in the upper end portion of the boiler adjacent the outlet pipe 15. In addition, a secondary electric heating element 22 is disposed horizontally in the intermediate portion of the boiler, as shown.

In order to facilitate rapid and efficient heating of water in the boiler, a transverse baffle plate 23 is provided between the duct 16 and the heating element 22, the plate 23 having a restricted water passage 24 therein, whereby to materially retard the flow of water through the boiler, that is, from the inlet pipe 18 to the outlet pipe 15.

The operation of the heating elements 20, 21, 22 as well as of the pump 19 is electrically automatically controlled, such control means comprising a room temperature responsive thermostat 25 in circuit with a relay 26 which, in turn, is in circuit with the primary heating elements 20, 21 as shown at 27, 28, respectively. The thermostat 25 is also connected to a second relay 29 which is in circuit with the pump 19 as indicated at 30. A water temperature responsive cut-out 31 is provided on the hot water outlet pipe 15 in circuit with the relay 26 as shown at 32, and the pipe 15 also carries a suitable water pressure gauge 33. The relays 26, 29 are connected to a transformer 34 having a connection 35 to a source of electric power, while the secondary heating element 22 is connected to this transformer, as indicated at 36. The element 22 is controlled by a boiler temperature responsive thermostat 37 mounted directly on the wall of the boiler, the connection of the element 22 and the thermostat 37 being illustrated at 38.

When the apparatus is placed in use, the automatic controls afford a continuous circulation of water through the system with the water temperature so regulated that the temperature at the outlet 15 somewhat more than equalizes the heat loss in the space being heated. Thus, a constant room or space temperature is maintained and intermittent over-heating or under-heating is eliminated.

The primary heating elements 20, 21 are energized through the relay 26 when additional heat is called for by the thermostat 25 and are similarly de-energized when a predetermined temperature in the room is reached. On the other hand, the element 22, acting in response to the boiler thermostat 37, operates independently of the elements 20, 21 and, in moderate weather, is sufficient to maintain the water temperature by itself at the desired degree. The pump 19, controlled through the relay 29 by the thermostat 25, operates simultaneously with the primary elements 20, 21 and when these elements and the pump are not in operation, the heating effect of the element 22 will produce a convection current for circulating water within the system without the use of the pump.

In the event that the thermostat 25 should become defective and fail to de-energize the elements 20, 21 upon reaching of a predetermined degree of temperature, the cut-out 31 on the outlet pipe 15 will automatically de-energize the elements 20, 21 while permitting operation of the pump 19 through the relay 29 of circulate the water through the system. As already noted, the cut-out 31 acts through the relay 26 to control the elements 20, 21, independently of the relay 29 controlling the pump 19.

As will be observed, the relays 26, 29 and the transformer 34 may be mounted in a suitable box or panel 39, already wired, so that the entire system may be readily installed by simply connecting the same to a source of electric power and completing the connections of the pipes 15, 18 to radiators, or the like.

While in the foregoing there has been described and shown the preferred embodiment of the invention, various modifications may become apparent to those skilled in the

art to which the invention relates. Accordingly, it is not desired to limit the invention to this disclosure and various modifications may be resorted to, such as may be lie within the spirit and scope of the appended claims.

What is claimed as new is:

1. In an electric water heating system, the combination of a vertically elongated boiler, a hot water outlet pipe extending from the upper portion of said boiler, a tubular duct extending laterally into the lower end portion of the boiler and open at its inner end, a cold water inlet pipe connected to the outer end of said duct, an electric heating element provided in said duct and connected to a source of electric power, a transverse baffle plate provided in the boiler above said duct, said baffle plate having a restricted water passage therein, whereby to retard the flow of water from said duct to said outlet, and an additional electric heating element provided in said boiler above said baffle plate.

2. In an electric water heating system, the combination of a vertically elongated boiler, a hot water outlet pipe extending from the upper portion of said boiler, a tubular duct extending laterally into the lower portion of the boiler and open at its inner end, a cold water inlet pipe connected to the outer end of said duct, an electric heating element provided in said duct and connected to

a source of electric power, a transverse baffle plate provided in the boiler above said duct and having a restricted water passage therein whereby to retard the flow of water from the duct to said outlet, an additional electric heating element provided in the boiler above said baffle plate and connected to a source of electric power, a room temperature responsive thermostat in circuit with the first mentioned element, a boiler temperature responsive thermostat in circuit with the second mentioned element whereby the second mentioned element may operate selectively in exclusion of and together with the first mentioned element, an electric circulating pump provided on said cold water inlet pipe, said pump being in circuit with said room temperature responsive thermostat for operation together with the first mentioned element, and temperature responsive means provided on said hot water outlet pipe for disconnecting the first mentioned element from the power source independently of said pump.

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