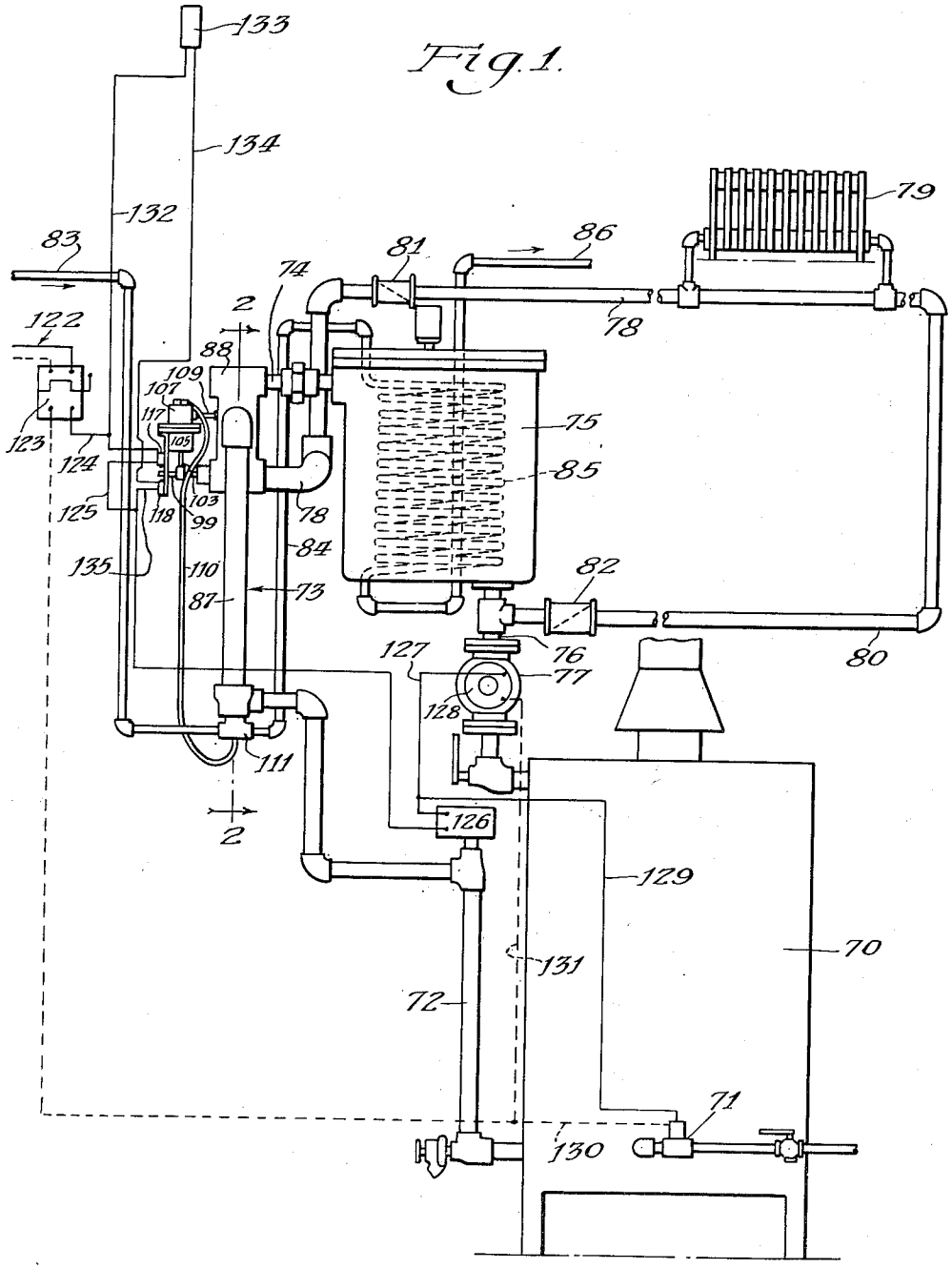
March 28, 1944. R. E. MOORE 2,345,209

HEATING SYSTEM

Original Filed Oct. 8, 1941 2 Sheets-Sheet 1

Fig. 1.



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Fig. 2.

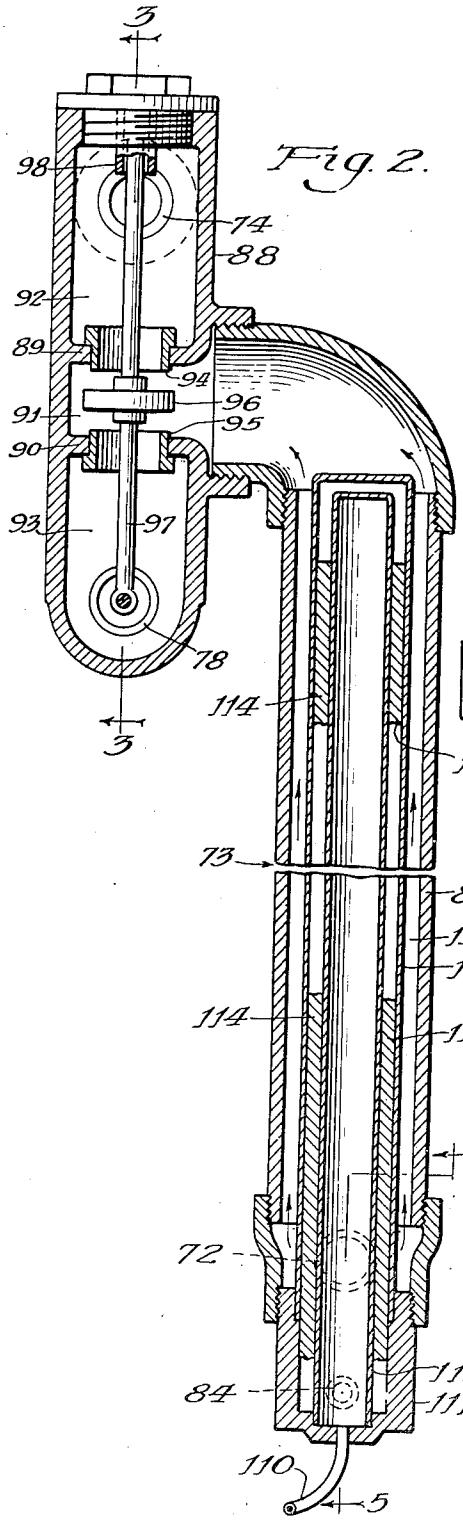


Fig. 3.

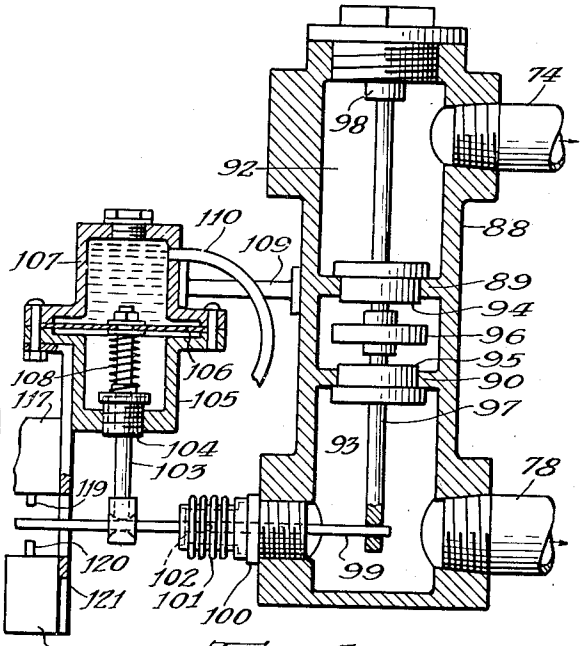


Fig. 4.

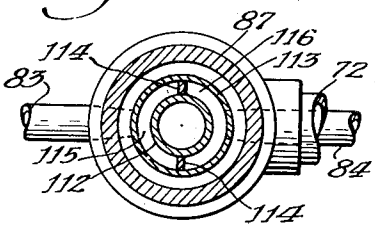
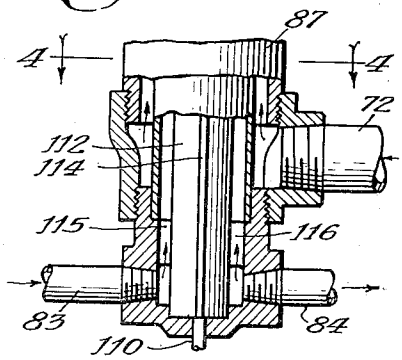


Fig. 5.



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Patented Mar. 28, 1944

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UNITED STATES PATENT OFFICE

2,345,209

HEATING SYSTEM

Robert E. Moore, Park Ridge, Ill.

Original application October 8, 1941, Serial No. 414,127. Divided and this application May 7, 1943, Serial No. 486,007

18 Claims. (Cl. 237—8)

My invention relates to a hot water heating system and more particularly to an arrangement for supplying hot water to the radiators and hot water for service or domestic use in quantities limited only by boiler or water heater capacity and in which the boiler is only required to satisfy either one of these demands at any one time.

In hot water heating systems which are intermittently and automatically fired by gas or oil, a characteristic hookup includes a main circuit leading to the radiators having one or more flow control valves operated by a circulating pump which is responsive to the demands of a room thermostat and a parallel service water heating circuit through which boiler water flows continuously and thermogravitationally and therefore at a slow rate when the pump is not operating. It has been recognized that while a system of this type possesses simplicity of arrangement which is reflected in certain installation advantages, it is objectionable in other respects, namely, a heating efficiency that is lower than it should be and longer "on" periods of the pump and burner under conditions of sustained demand by either the room thermostat or for service water or both.

For example, if after a sustained draw of service water with a consequent reduction in the temperature of the boiler water, the room thermostat should demand heat, there will obviously be a considerable lag in supplying adequate heat to the radiators, since the boiler is at the same time trying to restore the temperature of the service water. This condition is due to the relatively low initial temperature of the boiler water at the instant of demand and also because the cold water from the radiators is continuously circulated through the boiler and over or through the heating coil so that the temperature of the boiler water rises slowly. On the other hand, if the demand for service water follows a heavy radiator demand, the supply of hot spigot water will be inadequate and where both kinds of demands are made simultaneously, neither the radiator nor the service requirements are satisfactorily met. Moreover, due to the slow movement of the boiler water across the hot water heating coil during inactive periods of the pump, the exchange of heat is relatively inefficient. Further, difficulties arise in installations of the foregoing character due to lack of control over the temperature of the service water. In certain localities where the service water is indirectly heated by the boiler water to a temperature in excess of 140° F., deposits of lime and sediment are formed rapidly in the storage tank or the coils of the heater, thus reducing the rate of heat exchange and lowering the temperature of the water available at the service outlets. This liming condition is continuously aggravated by recurrent periods of overheating. Problems of the foregoing nature are frequently encountered in apartment, restaurant, garage and hotel heating systems with their particularly heavy and all year round demands for hot water, but they are not uncommon in domestic installations.

If initial costs are not a factor, a partial solution of the foregoing problem is possible if boilers larger than the ordinary oversize boilers are used with corresponding sizes of heating coils and hot water storage tanks. Such costs, however, must usually be considered. The initial investment required with such a system is not only prohibitive but the fuel costs and heat losses are excessive and there is an extremely wasteful standby heat loss when there are no demands for radiator and service water. The latter condition is especially true with boilers that are built for gas firing, since such boilers are designed with large heating surfaces and relatively small water capacity. Accordingly, such boilers cool rapidly when the burner stops due to the sweep of cold air across the heating surfaces in its passage to the chimney and the temperature of the service water likewise falls.

It is therefore the principal object of my invention to devise a heating system which utilizes a boiler, economical in size and fuel consumption, and so related to the remainder of the system that copious quantities of hot service water are immediately available within a shorter time than is possible with existing equipment and in which hot water for the radiators is furnished more quickly.

A further object is to devise a system of the foregoing character in which the same pump forces water through the radiators and also through the service water heater thus increasing the circulatory rate through the heater and facilitating the exchange of heat.

A further object is to provide a heating system of the character indicated in which the flow of water to the radiators is at all times subordinate to the demand for service water.

A further object is to devise a hot water heating system incorporating a tankless or instantaneous heater for service water in which the flow of water through the heater coil and to the radiators never occurs simultaneously whereby the

full heating capacity of the boiler is applied to either duty.

This application is a division of my copending application for Heating system, Serial No. 414,127, filed October 8, 1941.

These and further objects of my invention will be set forth in the following specification, reference being had to the accompanying drawings, and the novel means by which said objects are effectuated will be definitely pointed out in the claims.

In the drawings:

Fig. 1 shows a system employing a tankless heater in which a draw of service water conditions the system to heat service water only, the supply to the radiators occurring when demanded only between periods of service water draws.

Figs. 2 and 3 are sections along the lines 2—2 and 3—3 in Figs. 1 and 2, both respectively, showing the thermostatic control and valve for determining the flow direction of the boiler water.

Figs. 4 and 5 are sections along lines 4—4 and 5—5 in Figs. 5 and 2, both respectively, showing certain structural details.

Referring to the drawings, there is illustrated a heating system employing a tankless or instantaneous service water heater in which the several parts are arranged so that draws of service water and a flow of hot water to the radiators can never occur simultaneously. The numeral 70 designates a gas fired boiler having the usual gas valve 71 for supplying fuel to the boiler. In this particular instance, the boiler is indicated as being of that type wherein the water flows downwardly across the heating surfaces of the boiler although the conventional upward flow boiler can be employed.

Accordingly, from the lower portion of the boiler extends a supply pipe 72 whose delivery end is connected to a thermostatically controlled valve structure generally indicated by the numeral 73 in Fig. 1. The internal construction of this unit will be hereinafter described, but for the present it will be understood that it contains devices for controlling the flow direction of hot water issuing from the boiler 70 through the pipe 72. This water may be either directed through a pipe 74 into a service water heating tank 75 and thence through a return pipe 76 to the boiler 70, the pipe 76 including the usual circulating pump 77, or the hot water may be directed through the radiator supply pipe 78 to one or more radiators 79 and thence by a return pipe 80 which connects with the return pipe 76 on the inlet side of the pump 77. For purpose of illustration, a one-pipe system is shown, although the radiators may be bridged between the pipes 72 and 78 if desired. In the case of a one-pipe system, the connection of the radiators to the pipe 72 may be effected by fittings of the type disclosed in Patent No. 1,663,271. Preferably, the pipes 78 and 80 are provided with flow control valves 81 and 82 which open only when the pump is operating and the valve structure 73 is conditioned to pass water through the pipe 78 and are closed at all other times. As is well understood in the art, these valves perform another function during the summer season in that they prevent thermogravitational flow of hot boiler water through the radiators.

Cold water is supplied by a pipe 83 which may be connected to any source of water, such as a city main, and this cold supply is passed through the valve structure 73 in order to exercise a certain control on the operation of the system as hereinafter described and thence through the pipe 84 to a service water heating coil 85 which is immersed in the water in the tank 75. The delivery end of the coil 85 is connected by a pipe 86 to any desired number of service outlets. As presently described, the tank 75 contains water substantially at boiler temperature whenever the valve structure 73 is conditioned to pass boiler water through the pipe 74.

The thermostatically controlled valve structure 73 constitutes an essential element of my invention in that it exercises prompt control on the flow direction of the hot boiler water. This structure is more particularly illustrated in Figs. 2 to 5, inclusive, to which reference will now be made. It comprises a tubular member 87 (see Fig. 2) whose upper end is connected to an elongated valve housing 88 having spaced transverse walls 89 and 90 which divide the interior of the housing into an intermediate chamber 91 and upper and lower chambers 92 and 93, respectively. Valve seats 94 and 95 are mounted in the walls 89 and 90, respectively, in spaced and opposed relation and these seats are engaged by a reciprocable valve 96 that is secured to a stem 97, the upper end of the stem being guided in a sleeve 98 secured to the upper end of the housing 88.

As indicated in Fig. 2, the delivery end of the supply pipe 72 from the boiler is connected to the lower end of the member 87 so that hot boiler water courses upwardly through the member 87 and thence into the chamber 91 where the direction of the water, either into the chamber 92 or the chamber 93, is controlled by the position of the valve 96. For purpose of easy illustration, the valve 96 is shown in an intermediate position between the seats 94 and 95, but it will be understood that it normally occupies a position in contact with either one of the seats depending upon conditions occurring in other parts of the system. The inlet end of the pipe 74 communicates with the chamber 92, while the inlet end of the pipe 78 communicates with the chamber 93.

The lower end of the valve stem 97 is pivotally connected to one end of a lever 99 which is intermediately pivoted in a nipple 100 that is threaded in the lower portion of the housing 88. As in the case of the structure shown in Fig. 3, the lever extends without the housing 88 and leakage is prevented by means of a bellows 101 whose ends are connected to the nipple 100 and to a disk 102 that may be welded or otherwise secured to the lever 99. Beyond the bellows, the lever 99 is pivotally connected to the lower end of an operating rod 103 which extends freely upwardly through a bushing 104 mounted in the bottom of a cup 105 whose open end is closed by a diaphragm 106. The periphery of the diaphragm is clamped against the cup 105 by a cover 107 formed as an inverted cup. The upper end of the rod 103 is secured to the diaphragm and interposed between the diaphragm and bushing 104 is a helical spring 108 which serves to move the diaphragm 106 upwardly when downwardly displaced as hereinafter described. The unit comprising the cup 105 and cover 107 may be supported from the housing 88 by a bracket 109.

The cover 107 may be filled with water or any desired liquid and one end of a small tube 110, the internal diameter of which may be of the order of $\frac{1}{16}$ of an inch, is connected to the interior of the cover 107, while the opposite end is mounted in a cup 111 that is secured to the lower end of the member 87 (see Fig. 2). The lower end of a casing 112 is supported by the cup 111 and may

contain air or any gaseous medium which communicates with the water in the casing through the tube 110. The casing 112 is preferably coaxial with the member 87 and it extends for substantially the length thereof. Also coaxial with the member 87 and disposed therebetween and the casing 112 is a tube 113 whose lower end is rested on a shoulder provided in the cup 111 and whose upper end is closed, the upper ends of the casing 112 and tube 113 being spaced from each other as indicated in Fig. 2.

A pair of diametrically arranged baffles 114—114 are disposed between the casing 112 and tube 113 with their lower ends resting on the bottom wall of the cup 111 and the upper ends terminating close to the upper end of the casing 112. This construction provides a pair of passages 115 and 116 between the casing 112 and the tube 113 so that cold water flowing through the pipe 83 is caused to upwardly and downwardly traverse the full length of the casing 112 before passing into the pipe 84 for delivery to the coil 85. This arrangement insures that when a faucet is opened, the cold water flows along the surface of the casing 112 and exercises an almost instantaneous effect on the gas in the casing to thereby insure a prompt shifting of the valve 96 as hereinafter described.

The lever 99 extends beyond its pivotal connection with the rod 103 into operative relation to electric switches 117 and 118 which are located in opposed relation on opposite sides of the lever 99 and which, respectively, are provided with fingers 119 and 120 which are engaged by the rocking movement of the lever to close the switches. The internal construction of these switches form no part of the present invention and have not been illustrated in detail, but it will be understood that the switch 117 is closed when the finger 119 is moved upwardly and the switch 118 is closed when the finger 120 is pushed downwardly. The switches may be conveniently carried by an arm 121 depending from the cup 105.

The switches 117 and 119 form part of an electrical circuit which will now be described. Referring to Fig. 1, the numeral 122 designates a power line which is connected to the remainder of the circuit by a main switch 123. From the latter switch leads a hot wire 124 to one terminal of the switch 117 and from the other terminal of this switch leads a hot wire 125 to a conventional high limit or safety control 126 conveniently mounted in the supply line 72 and which interrupts the circuit when, for example, the temperature of the boiler water exceeds 220° F. A hot wire 127 connects the control 126 with one terminal of a motor 128 which is drivably connected to the pump 77 and a hot wire 129 connects the wire 127 with a gas valve 71. A ground wire 130 connects the gas valve with the main switch 123 and a similar wire 131 connects the pump motor 128 with the wire 130.

A wire 132 connects the wire 124 with a room thermostat 133 positioned to be affected by the radiator 79 and a wire 134 connects the thermostat with one terminal of the switch 118. The other terminal of the switch is connected by the wire 135 to the wire 125.

In describing the operation of the system, it will be assumed that one of the service outlets (not shown) is open so that cold water is flowing through the passages 115 and 116 to the heating coil 85. Under these conditions, the cold water chills the air or gas within the casing 112 sufficiently to enable the spring 108 to move the diaphragm 106 upwardly and cause the valve 96 to engage the seat 95, thereby diverting water from the boiler 70 into the pipe 74 and thence through the tank 75.

This clockwise rocking of the lever 99, as viewed in Fig. 3, engages the finger 119 and closes the switch 117 which completes the electric circuit through the motor 128 and the gas valve 71. Accordingly, the boiler 70 is fired and all water is continuously circulated downwardly through the boiler and upwardly through the pipe 72, the annular passage 136 surrounding the tube 113 and thence through the pipe 74, tank 75 and return pipe 76 to the boiler. This condition persists as long as a faucet is open so that the full capacity of the boiler 70 is directed to satisfying the demand for hot service water.

When the faucet is closed, cold water no longer flows through the passages 115 and 116 and the water then contained in these passages is heated by the hot water in the passage 136 which is substantially at boiler temperature. The heating of the water in the passages 115 and 116 raises the temperature of the air in the casing 112 so that the diaphragm 106 is moved downwardly, thus rocking the lever 99 in a counterclockwise direction and opening the switch 117 and breaking the circuit to the pump motor and gas valve. The last noted rocking of the lever 99 engages the valve 96 with the seat 94, whereupon the device is conditioned to supply hot water to the radiators whenever the room thermostat 133 demands heat, and also engages the finger 120 to close the switch 118. Therefore, when the thermostat 133 demands heat, the electric circuit is again closed through the pump motor 127 and gas valve 71 so that the full capacity of the boiler 70 is utilized to supply heat to the radiators. If at any time during the period when the radiators are being supplied with hot water, a faucet should open, the ensuing flow of cold water through the passages 115 and 116 chills the air in the casing 112, whereupon the lever 99 is rocked in a clockwise direction to engage the valve 96 with the seat 95 and close the switch 117. The first noted operation of heating the service water will then be resumed.

I have ascertained that after all the faucets have been closed, the valve 96 is shifted from a position engaging the seat 95 to one in contact with the seat 94 in approximately five seconds so that even though there should be a demand by the room thermostat 133 immediately after the closing of the faucets, only a very short time is required to condition the system for radiator supply. From a temperature standpoint, a variation of 25° F. in the temperature of the gas in the casing 112 is sufficient to shift the valve 96 from one position to another if the pump is not operating. Ordinarily, water from a city main would enter the passage 115 at approximately 60° F. and since the water in the boiler is never below 140° F., a surplus of thermopower is available to effect each operation of the valve 96.

During summer operation, when hot water is not desired in the radiators, the system may be operated in the usual manner, i. e., by setting the thermostat 133 to a point such that it can never demand heat. Hence, regardless of the closing of the switch 118, the pump motor 123 will not function because the thermostat 133 is then open, while the valves 81 and 82 prevent thermogravitational flow to the radiators during times when the valve 96 is in contact with the seat 94.

I claim:

1. In a hot water heating system, the combination of a boiler, a radiator circuit and a service water heating circuit each communicating with the boiler, a service water pipe in heat exchanging relation to the heating circuit, and valve means common to the radiator and heating circuits and responsive to the draw of water through the pipe for directing boiler water through the heating circuit while denying flow to the radiator circuit.

2. In a hot water heating system, the combination of a boiler, a radiator circuit and a service water heating circuit each communicating with the boiler, a service water pipe in heat exchanging relation to the heating circuit, valve means shiftable between positions directing flow of boiler water to one circuit while denying flow to the other circuit, and means responsive to the flow of water through the pipe for shifting the valve means to direct boiler water through the heating circuit while denying flow to the radiator circuit.

3. In a hot water heating system, the combination of a boiler, a radiator circuit and a service water heating circuit each communicating with the boiler, a service water pipe in heat exchanging relation to the heating circuit, valve means shiftable between positions controlling flow to either circuit, and means connected to the valve means and responsive to the temperature of the boiler water and of the cold water when flowing through the pipe, the cold water flow exercising primary control on the responsive means to shift the valve means to direct boiler water through the heating circuit and the valve means is shifted to direct boiler water through the radiator circuit when the cold water flow is interrupted.

4. In a hot water heating system, the combination of a boiler, a radiator circuit and a service water heating circuit each communicating with the boiler, a service water pipe in heat exchanging relation to the heating circuit, valve means for controlling the flow of boiler water to the circuits, thermally responsive means connected to the valve means, a cold water passage in heat exchanging relation to the responsive means, and a boiler water passage in heat exchanging relation to the cold water passage whereby flow of cold water through the cold water passage exercises primary control on the responsive means to shift the valve means to direct boiler water through the heating circuit and the valve means is moved to direct boiler water through the radiator circuit by the indirect boiler water heating of the responsive means when the cold water flow is interrupted.

5. In a hot water heating system, the combination of a boiler, a radiator circuit and a service water heating circuit each communicating with the boiler, a service water pipe in heat exchanging relation to the heating circuit, valve means comprising a chamber filled with gas whose variations in pressure effect changes in position of the valve means, a cold water passage enclosing the chamber in heat exchanging relation thereto and a boiler water passage enclosing the cold water passage in heat exchanging relation thereto whereby the cold water flow exercises primary control on the responsive means to move the valve means to direct boiler water through the heating circuit and the valve means is moved to direct boiler water through the radiator circuit by the indirect boiler water heating of the gas chamber when the cold water flow is interrupted.

6. In a hot water heating system, the combination of a boiler, a radiator circuit and a service water heating circuit each communicating with the boiler, a service water pipe in heat exchanging relation to the heating circuit, valve means shiftable between positions directing flow to either circuit, means thermally responsive to the boiler water and to the cold water flow through the pipe and adapted to shift the valve means to direct flow to the radiator circuit between draws of service water.

7. In a hot water heating system, the combination of a boiler, a radiator circuit and a service water heating circuit each communicating with the boiler, a circulating pump common to both circuits, a service water pipe in heat exchanging relation to the heating circuit, valve means shiftable between positions directing flow to either circuit, means connected to the valve means and responsive to the temperature of the boiler water and of the cold water when flowing through the pipe, the cold water flow exercising primary control on the responsive means to shift the valve means to direct boiler water through the heating circuit and the valve means being shifted to direct boiler water through the radiator circuit when the cold water flow is interrupted, and an electric circuit comprising a motor connected to the pump and a pair of switches arranged in parallel, one switch closing when the valve means directs boiler water to the radiator circuit and the other switch closing when the valve means directs boiler water through the heating circuit, and a room thermostat included in the circuit with the first named switch.

8. In a hot water heating system, the combination of a boiler, a radiator circuit and a service water heating circuit each communicating with the boiler, a circulating pump common to both circuits, a service water pipe in heat exchanging relation to the heating circuit, valve means shiftable between positions directing flow to either circuit, means connected to the valve means and responsive to the temperature of the boiler water and of the cold water when flowing through the pipe, the cold water flow exercising primary control on the responsive means to shift the valve means to direct boiler water through the heating circuit and the valve means being shifted to direct boiler water through the radiator circuit when the cold water flow is interrupted, and an electric circuit comprising firing means for the boiler, a motor connected to the pump, and a pair of switches arranged in parallel, one switch closing when the valve means directs boiler water through the radiator circuit and the other switch closing when the valve means directs boiler water through the heating circuit, and a room thermostat included in circuit with the first named switch.

9. In a hot water heating system having a boiler, a radiator circuit and a service water heating circuit each communicating with the boiler, the combination of a service water pipe in heat exchanging relation to the heating circuit, a valve common to both circuits, and thermostatic means responsive to the flow of water through the pipe for actuating the valve to direct boiler water through the heating circuit and responsive to the temperature of the boiler water to shift the valve to direct boiler water to the radiator circuit when the flow through the pipe is interrupted.

10. In a hot water heating system, the combination of a boiler, a radiator circuit and a service water heating circuit each communicating with the boiler, a service water pipe in heat exchanging relation to the heating circuit, valve means common to both circuits, and thermostatic means responsive to the flow of water through the pipe for actuating the valve means to direct boiler water through the heating circuit and responsive to the temperature of the boiler water to shift the valve means to direct boiler water to the radiator circuit when the flow through the pipe is interrupted.

11. In a hot water heating system, the combination of a boiler, a radiator circuit and a service water heating circuit each communicating with the boiler, a service water pipe in heat exchanging relation to the heating circuit, and valve means for controlling flow of boiler water to the radiator and heating circuits and responsive to the draw of water through the pipe for directing boiler water through the heating circuit while denying flow to the radiator circuit.

12. In a hot water heating system, the combination of a boiler, a radiator circuit and a service water heating circuit each communicating with the boiler, a service water pipe in heat exchanging relation to the heating circuit, valve means for controlling the flow of boiler water to the circuits, thermally responsive means connected to the valve means, a cold water passage and a boiler water passage in heat exchanging relation to the responsive means, the cold water passage exercising primary control on the responsive means whereby the valve means acts to direct boiler water only through the heating circuit when the cold water is flowing and the thermal means being heated by the boiler water passage when the cold water flow is interrupted whereby the valve means acts to direct boiler water only through the radiator circuit.

13. In a hot water heating system, the combination of a boiler, a radiator circuit and a service water heating circuit each communicating with the boiler, a service water pipe in heat exchanging relation to the heating circuit, valve means for controlling the flow of boiler water to the circuits, thermally responsive means connected to the valve means, a cold water passage and a boiler water passage in heat exchanging relation to and in concentric relation to the responsive means, the cold water passage exercising primary control on the responsive means whereby the valve means acts to direct boiler water only through the heating circuit when the cold water is flowing and the thermal means being heated by the boiler water passage when the cold water flow is interrupted whereby the valve means acts to direct boiler water only through the radiator circuit.

14. In a hot water heating system, the combination of a boiler, a radiator circuit and a service water heating circuit each communicating with the boiler, a service water pipe in heat exchanging relation to the heating circuit, valve means for controlling the flow of boiler water to the circuits, thermally responsive means connected to the valve means, a cold water passage surrounding and in heat exchanging relation to the thermal means, and a boiler water passage surrounding and in heat exchanging relation to the cold water passage, the cold water passage exercising primary control on the thermal means whereby the valve means acts to direct boiler water only through the heating circuit when the cold water is flowing and the thermal means being heated by the boiler water passage when the cold water flow is interrupted whereby the valve means acts to direct boiler water only through the radiator circuit.

15. In a hot water heating system, the combination of a boiler, a radiator circuit and a service water heating circuit each communicating with the boiler, a service water pipe in heat exchanging relation to the heating circuit, valve means shiftable between positions directing flow of boiler water to either circuit, means connected to the valve means and responsive to the temperature of the boiler water and of the cold water when flowing through the pipe, the cold water exercising primary control on the responsive means to shift the valve means to direct boiler water through the heating circuit and the valve means being shifted to direct boiler water through the radiator circuit when the cold water flow is interrupted, and an electric circuit comprising firing means for the boiler, a pair of switches arranged in parallel, one of the switches closing when the valve means directs boiler water to the radiator circuit and the other switch closing when the valve means directs boiler water through the heating circuit, and a room thermostat included in the circuit with the first named switch.

16. In a hot water heating system having a boiler, a radiator circuit and a service water heating circuit each communicating with the boiler, the combination of a service water pipe in heat exchanging relation to the heating circuit, valve means for controlling flow through both circuits, and thermostatic means responsive to the flow of water through the pipe for actuating the valve means to direct boiler water through the heating circuit and responsive to the temperature of the boiler water to shift the valve means to direct boiler water to the radiator circuit when the flow through the pipe is interrupted.

17. In a hot water heating system, the combination of a boiler, a radiator circuit and a service water heating circuit each communicating with the boiler, a service water pipe in heat exchanging relation to the heating circuit, valve means for controlling flow through both circuits, and thermostatic means responsive to the flow of water through the pipe for actuating the valve means to direct boiler water through the heating circuit and responsive to the temperature of the boiler water to shift the valve means to direct boiler water to the radiator circuit when the flow through the pipe is interrupted.

18. In a hot water heating system having a boiler, a radiator circuit and a service water heating circuit each communicating with the boiler, the combination of a service water pipe in heat exchanging relation to the heating circuit, valve means for controlling the flow of boiler water to the circuits, thermally responsive means connected to the valve means, a cold water passage and a boiler water passage in heat exchanging relation to the responsive means, the cold water passage exercising primary control on the responsive means whereby the valve means acts to direct boiler water only through the heating circuit when the cold water is flowing and the responsive means being heated by the boiler water passage when the cold water flow is interrupted whereby the valve means acts to direct boiler water only through the radiator circuit.

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