June 19, 1951 F. C. BRODERICK 2,557,368

HEATING SYSTEM

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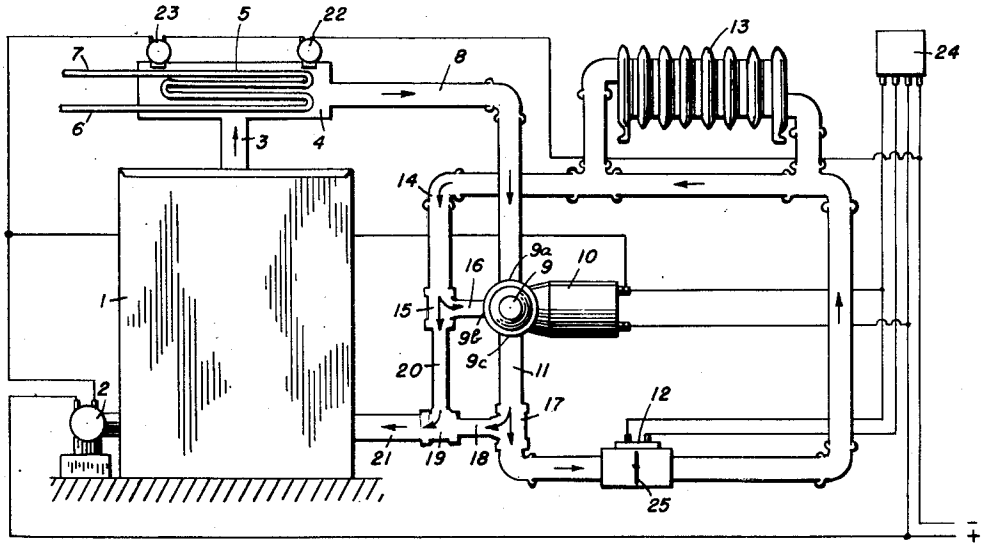


FIG. 1

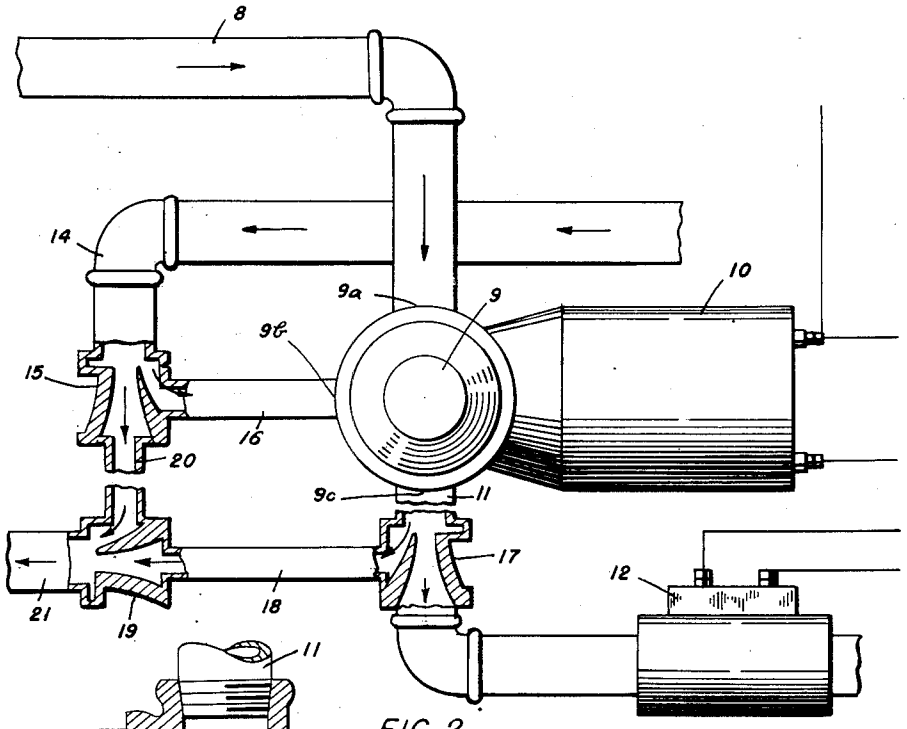


FIG. 2

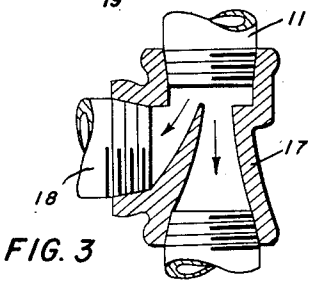


FIG. 3

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HEATING SYSTEM

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6 Claims. (Cl. 237—8)

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This invention relates to new and useful improvements in heating system and is directed to a hot water heating system of the type having a space heating circuit and a domestic hot water circuit wherein the heated water is circulated by pump action to the radiators when needed and is also circulated over a heat exchanger for heating water for domestic use when required.

The primary object of this invention is to provide a hot water heating system utilizing a single circulating pump for forcing the water through both the space heating circuit and the water heating circuit whenever either circuit requires heat.

Another object of this invention is to provide a novel arrangement of elements whereby heated water from the boiler is forced by the pump over the heat exchanger for the domestic water and back to the boiler whenever the heat of the water adjacent the heat exchanger falls below the desired temperature.

Still another object of this invention is to provide such a system wherein when the space to be heated falls below a specific temperature heated water from the boiler will be mixed with radiator return water and forced by the same pump to the radiators and some of such mixed water will be returned directly to the boiler.

A further object of this invention is to provide a forced hot water system as described wherein standard parts are used and arranged in a simple manner to effect an efficient inexpensive system.

Other objects and advantages will be apparent from the following detailed description:

In the drawings:

Fig. 1 is a diagrammatic view of a heating system embodying the invention herein described.

Fig. 2 is an enlarged view partly in section showing the specific arrangement of the feed and return pipes relative to the pump.

Fig. 3 is a cross sectional view of fitting 17 and indicates clearly the structure of fitting 17 and similar fittings 15 and 19.

In detail 1 indicates the boiler and 2 the burner or heating means. A riser 3 leads from the boiler to the heat exchanger tank 4 containing the hot water coil 5 that receives cold water from pipe 6 and discharges hot water from pipe 7. Feed pipe 8 leads from the tank 4 to pump 9 which is actuated by motor 10. Pump 9 has two inlets 9a and 9b and one outlet 9c.

Supply conduit 11 leads from pump 9 through motor valve 12 to radiator 13. Radiator return conduit 14 leads from radiator 13 to a shunt fitting 15 of standard make provided with a web

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that will direct a portion of the water to one outlet of the fitting 15 and a portion to the other outlet. A pipe 16 of reduced cross-section leads from one outlet of fitting 15 to inlet 9b of pump 9.

Positioned between pump 9 and valve 12 in supply conduit 11 is another similar shunt fitting 17. A pipe 18 of reduced cross-section leads from this fitting 17 to another similar shunt fitting 19. Another pipe 20 of reduced cross-section connects fitting 15 with fitting 19. A boiler return conduit 21 is connected between fitting 19 and the boiler 1.

The temperature of the water in tank 4 is controlled by water thermostats 22 and 23 as hereinafter described and the space to be heated by the radiator 13 is controlled by thermostat 24.

Motor valve 12 is of well known construction and operation and consists of the usual valve member 25 adapted to open when motor valve is energized and close when de-energized.

A source of electricity is connected as shown to the thermostat 24, boiler thermostats 22 and 23, motor valve 12, pump motor 10 and burner 2.

Thermostat 22 is a safety, or high limit control adapted to break the circuit to the burner 2 when the temperature in tank 4 reaches a certain temperature. Thermostat 23 is adapted to complete the circuit when the temperature in the tanks falls below a predetermined minimum.

In operation.—Upon call for heat by water thermostat 23, the thermostat 24 being satisfied, the pump 9 and the burner 2 will be energized to heat the water and circulate it from boiler 1, through tank 4, pipe 8, conduit 11, pipe 18, fitting 19 and conduit 21. At this stage motor valve 12 is closed and the circulation is limited to the circuit described. The forced circulation in this circuit permits the use of smaller pipes and results in greater heating efficiency for the domestic water system.

Upon call for heat by thermostat 24 the motor valve 12 will turn to open position and the pump 9 and burner 2 will be energized. Now the heated water from boiler 1 will be circulated over the coil 5 through the pump 9 and conduit 11. At fitting 17 part of the water will be shunted back to the boiler 1 and the rest to radiator 13 and return pipe 14. At fitting 15 some of the return water will be shunted to pump 9 to be mixed with the freshly heated water and directed to conduit 11. The rest of the return water will flow through pipe 20 to fitting 19 where it will be directed to boiler 1.

By this arrangement one pump functions in a simple manner to force circulate both systems,

Also standard shunt fittings function to mix part of the return water with freshly heated water to avoid over-shooting the desired temperature in the space to be heated. This gives smoother space heating and more efficient water heating.

Furthermore, by this novel arrangement the water in boiler 1 will never be excessively cooled by return water from the space heating circuit because some of the mixed fresh hot water and the return water from the radiating circuit is always diverted directly to the boiler. Thus in prolonged cold periods when the space heating circuit is in frequent operation the boiler water will not be cooled to such an extent that the efficiency of both circuits will be impaired.

The wiring circuits to effect the operation above described are believed clear to one skilled in the art it being obvious that thermostat 24 functions to completely separate motor valve 12 from the electrical circuit by breaking both negative and positive leads when satisfied or in open position and to energize not only the valve 12 but the pump 10 and heater 2 when moved to closed position calling for heat. By such an arrangement motor valve 12 remains closed in summer seasons and is unaffected by the periodic operation of the burner 2 and pump 10 as called for by thermostat 23.

In detail, thermostat 24 is similar to a double pole, single throw switch but operable automatically by variations in the temperature of the space surrounding it. A positive and a negative wire lead to their respective connections on the thermostat and a positive and a negative wire lead to the motor operated valve 12. The thermostat breaks both of these leads when the temperature surrounding the thermostat is at or above the desired living temperature, so the valve 12 remains in closed position as shown, whenever this situation prevails. When the temperature falls below that point the two arms of the thermostat close to complete both the negative and positive connections to the valve so that it opens. Simultaneously current is directed to burner 2 and pump 9 so that all operate when the two arms of thermostat 24 close.

Positive and negative connections lead to burner 2 and pump 9 through water thermostats 22 and 23 independent of thermostat 24 so as to actuate burner 2 and pump 9 when temperature in water in tank 4 falls below a predetermined minimum. Thus it is clear that when heat exchange tank 4 demands heat through thermostat 23 the burner will go into operation as will the pump 9 to rapidly circulate the water in the heat exchange circuit only. When thermostat 24 calls for heat the burner 2, pump 9 and valve 12 will be actuated regardless of thermostat 23 and water will be force circulated through both circuits.

I claim:

1. In a heating system having a burner, a boiler, a domestic water heat exchange tank receiving its supply therefrom and an immersion type thermostat controlling the operation of the heater depending upon the boiler water temperature, the improvement that comprises a feedpipe leading from said tank to a pump, a supply conduit leading from the pump to a radiating means, a return conduit leading back to the pump and to the boiler, a pipe leading from the supply conduit to the boiler, a motor valve in said supply conduit, a thermostat controlling said valve and said pump, said pump also under control of said immersion thermostat whereby the pump will operate when either thermostat calls for heat, and means for diverting a part of the radiating means return water to the pump and means for diverting part of the radiating means supply to the boiler.

2. In a heating system having a burner and comprising two circuits one being a boiler, and a heat exchange tank connected therewith, conduits leading from the tank back to the boiler and thermostatic means controlling the burner operation, the other being radiating means, supply and return pipes for said means and a motor valve controlling the supply to said radiating means, the improvement that comprises a single pump for both circuits positioned in the conduit leading from the tank of the first circuit, the radiating circuit supply pipe connecting with conduit of the first circuit leading back to the boiler, the return pipe of the radiating circuit leading to the pump and the boiler return, said pump being connected in both circuits to operate when the motor valve is opened and when the burner is put in operation by the thermostat of the heat exchange tank.

3. In a heating system having a boiler and a domestic water heat exchange tank and radiating means, a conduit connecting the boiler and the tank, a pump, a pipe leading from said tank to the pump, conduit means leading from the pump to the radiating means and to the boiler, conduit means leading from the radiating means to the pump and to the boiler, a valve controlling the conduit means leading to the radiating means, said pump adapted to circulate water from the tank to the boiler and return when the valve is closed and circulate water from the tank to the radiating means and back to the boiler when the valve is open.

4. In a heating system having a boiler and a domestic water heat exchange tank and radiating means a conduit connecting the boiler and the tank, a pump, a pipe leading from said tank to the pump, conduit means leading from the pump to the radiating means and to the boiler, conduit means leading from the radiating means to the pump and to the boiler, a valve controlling the conduit means leading to the radiating means, means for diverting part of the water from the pump to the boiler and means for diverting part of the water from the radiating means to the pump when the valve is open.

5. In a hot water heating system having a boiler and a domestic heat exchange tank and radiating means and a conduit connecting the boiler and the tank, a pump, a pipe leading from said tank to the pump, conduit means leading from the pump to the radiating means and to the boiler, conduit means leading from the radiating means to the pump and the boiler, a valve controlling the conduit leading to the radiating means, means for opening the valve and starting the pump when the radiating means requires heat and means for starting the pump when the heat exchange tank requires heat, said pump adapted to circulate water from the tank to the boiler and return when the valve is closed and circulate water from the tank to the radiating means and back to the boiler when the valve is open.

6. In a hot water heating system having a boiler, a domestic heat exchange tank a conduit connecting the boiler and the tank, radiating means and a pump the improvement that comprises a conduit leading from the tank to the pump, a return pipe leading from the pump to

the boiler, a supply conduit leading from the return pipe to the radiating means, a radiating means return conduit leading from said radiating means to the boiler, a pipe connecting said radiating means return with the pump, a valve in said supply conduit, means for directing part of the water from the pump to the boiler and part to the radiating means when said valve is open, means for directing part of the radiating means return water to the pump and part to the boiler, a thermostat controlling the operation of said valve, a thermostat controlling the boiler temperature, said pump being under the control of both thermostats whereby it will circulate water from the boiler through the tank and return when the boiler thermostat requires heat and

will circulate water from the boiler, through the tank to the radiating means and return when the other thermostat opens the valve.

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