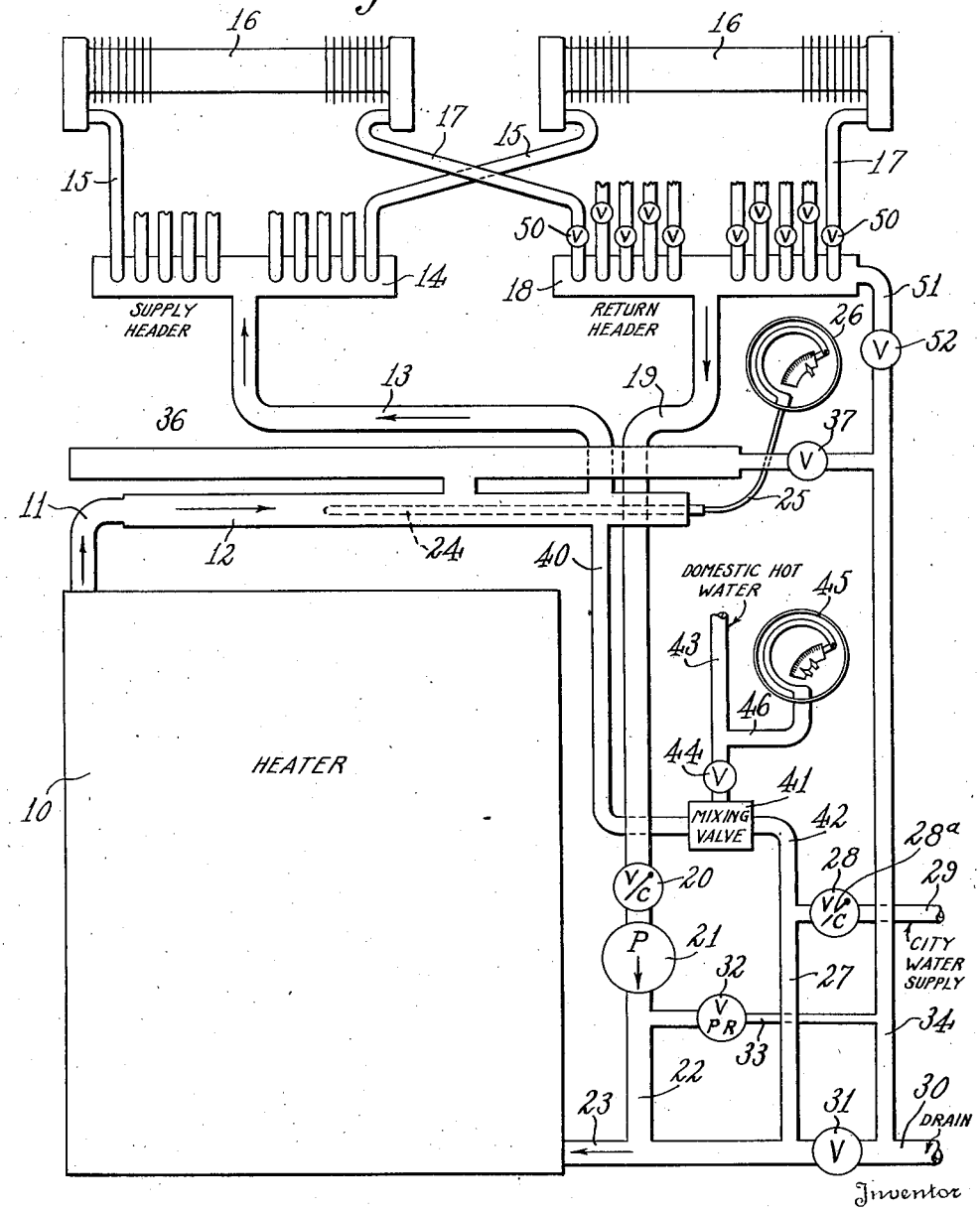
Oct. 3, 1944. C. W. COLBY 2,359,547

HEATING SYSTEM

Filed Nov. 28, 1941 2 Sheets-Sheet 1

Fig. 1.



Inventor

Clyde W. Colby

By Rockwell, Fauchon & Low

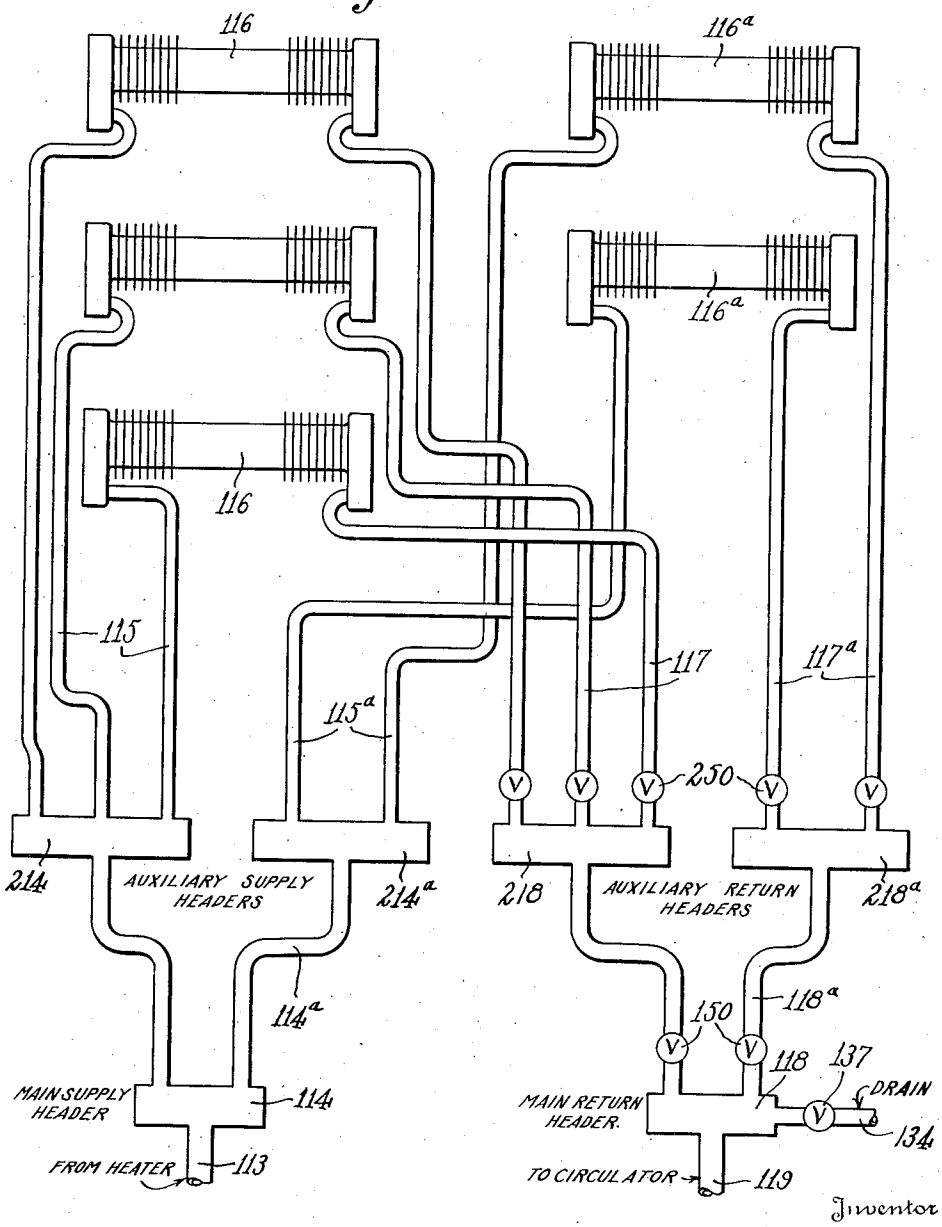
Attorneys

Oct. 3, 1944. C. W. COLBY 2,359,547

HEATING SYSTEM

Filed Nov. 28, 1941 2 Sheets-Sheet 2

Fig. 2.



Inventor

Clyde W. Colby

By Bicknell & Bacheller

Attorneys

Patented Oct. 3, 1944

2,359,547

UNITED STATES PATENT OFFICE

2,359,547

HEATING SYSTEM

Clyde W. Colby, Branford, Conn.

Application November 28, 1941, Serial No. 420,766

4 Claims. (Cl. 237—19)

This invention relates to heating systems, and more particularly to a combined heating system and domestic hot water supply system, wherein the system is arranged to contain a relatively small volume of water and is connected at all times to a water supply such as a city water system, for example, so that when hot water is drawn from the system for domestic purposes it will be replenished from the city water supply.

In connection with hot water heating systems, it is necessary to provide means for venting the air from the room radiators so that circulation will not be prevented by the collection of air in the radiators. Usually this is done by providing a valve upon each of the radiators, and the valve must be opened to vent the air therefrom. Such an arrangement is an inconvenient one, and requires that each radiator be vented individually, necessitating a trip to each of the rooms of the house or building in which the heating system is installed. It is also desirable that the radiators be flushed out and purged of any foreign particles that may collect therein.

One object of the present invention is to provide a heating system of the character described, having means for flushing all of the radiators from a central point.

A still further object of the invention is the provision of a hot water heating system of the character described, wherein the return pipes carrying water from the radiators toward the heater are directed into a so-called return header, whereby each of the radiators may be individually flushed out at a point adjacent the return header so that this operation may be conveniently carried out at this position for all of the radiators attached to the heater.

A still further object of the invention is to provide a hot water heating system in constant communication with a source of fresh water supply, whereby hot water may be drawn from the system for domestic purposes, and to provide for the flushing of each of the radiators individually in such a manner that the flushing operation may be controlled from one point in the system.

To these and other ends the invention consists in the novel features and combinations of parts to be hereinafter described and claimed.

In the drawings:

Fig. 1 is a diagrammatic view illustrating a heating plant embodying my improvements; and

Fig. 2 is a modified form of my invention.

To illustrate one form of my invention, I have shown in Fig. 1 of the drawings a heating system comprising a heater 10, shown diagrammatically, from which the hot water rises through a pipe 11 to a chamber 12, from which it is carried by the pipe 13 to a supply header 14. From the supply header a series of pipes 15 lead to the individual room radiators 16, and from these radiators return pipes 17 lead to the return header 18. It will be apparent that while only two room radiators are shown in the drawings, as many as required may be attached to the system, and usually there will be a supply pipe 15 and a return pipe 17 for each of the radiators 16 employed.

From the return header 18 a return pipe 19 leads through a check valve 20 to a circulating pump 21, and thence through a pipe 22 to an inlet pipe 23 of the heater 10, thus completing the circuit.

The heater 10 may be of any preferred form, preferably an oil-burning heater such as shown, for example, in my co-pending application Serial No. 371,511, filed December 24, 1940. The circulating pump 21 will preferably be electrically driven and controlled from a room thermostat, so that when the temperature of the room falls below a certain point the circulator will be started and cause a circulation of water from the heater through the radiators and return. As indicated, the check valve 20 will permit a flow of water in the pipe 19 toward the circulating pump 21, or toward the heater 10, in the direction induced by the circulator, but will prevent circulation of the water in the opposite direction, and will prevent gravity circulation of hot water through the radiators when the circulator is not in operation.

A fluid thermometer or thermostatic element 24 is placed in the chamber 12 so as to be subject to the temperature of the water therein. The member 24 communicates through a tube 25 with a control 26 which will serve as an upper limit control of the system. That is, if the water in the chamber 12 rises above a given temperature, the control 26 will act to cut off the current to the oil burner of the heater 10, and thus act as a safety control to prevent overheating. The burner is placed in operation together with the circulator whenever the room thermostat calls for heat, and likewise when domestic hot water is drawn from the system, as will be hereinafter explained. As the heating of the water is substantially instantaneous and no storage of hot water is usually required, a lower limit control may be dispensed with.

The pipe 23 is connected through a branch pipe 27 and a check valve 28 to the city water supply 29, the check valve being so disposed that water

will be freely admitted to the pipe 27 from the pipe 29, but will not flow freely in the opposite direction. The valve clapper may be pierced as at 28a to permit pressure developed in the heating system to expand slowly into the water supply system. The system may be drained by the pipe 30 connected to the pipe 23 by means of the valve 31, which valve is normally kept closed, and opened only when draining is desired. In order to prevent pressure in the system rising to an excessive point, a pressure relief valve 32 is provided in a pipe 33 which connects the return pipe 22 with a pipe 34 leading to the drain 30.

Adjacent the chamber 12 and in communication therewith is an expansion chamber 36 which may permit the expansion of the water against a confined quantity of air. This chamber may be connected with the drain pipe 34 through a normally closed valve 37, so that the chamber 36 may be "blown out" when desired.

Domestic hot water may be drawn from the system through a pipe 40 connected to the hot water chamber 12 at one end, and leading at its other end to a mixing valve 41 within which the hot water from the chamber 12 is mixed with cold water entering the mixing valve through a pipe 42 which communicates with the pipe 29 of the city water supply system. From the mixing valve 41 a pipe 43 controlled by a valve 44 leads to the faucet from which the water is drawn, the valve 44 being of the variable orifice type so as to regulate the rate of flow of hot water from the system. In order that the burner may be set into operation when hot water is drawn from the system, although the room system may not call for heat, as, for example, during summer weather, a pressure control device 45 may be employed which is connected by the pipe 46 with the domestic hot water outlet pipe 43. This pressure device 45 is of well-known form, and will operate when the pressure in the pipe 43 reaches a minimum figure to start the burner of the furnace, and will also serve to cut out the burner when the pressure reaches a certain maximum figure. Thus if domestic hot water is drawn from the system through pipe 43, the pressure will fall to such an extent as to set the burner in operation, and it will be continued in operation until the hot water faucet is shut off, at which time the normal pressure in pipe 43 will be restored.

In order to provide means for draining or clearing out each of the radiators individually, each of the pipes 17 is provided with a shut-off valve 50, the valves preferably being located adjacent the return header 18, so that all may be operated from a single point. The return header is also connected through a pipe 51 controlled by valve 52 with the pipe 34 leading to the drain, so that the header may be drained by opening the valve 52. Preferably the valves 50 will be capable of a variable adjustment so as to permit any desired rate of flow from the radiator to the header so as to restrict this flow to any extent, or to shut it off entirely. It may be desirable, for example, to restrict the flow through certain of the radiators 16, and this may be done by means of the valves 50, or when draining one of the radiators the remainder of the valves may be closed entirely to shut off any flow through the remaining radiators.

As will be apparent, it is possible with this arrangement to drain any one or all of the radiators if they become filled with air or sediment, and if draining is found desirable for any other reason. This may be done in the following manner:

When the heating plant is in operation, the valves 50 will usually stand in open or partially open position, and the valve 52 will be closed. If, however, it is desired to drain one or more of the radiators 16, all of the valves 50 will first be closed, so as to prevent drainage from the radiators into the return header. The valve 52 will then be opened to permit draining of the header into the drain 30. At this time a check may be made of the check valve 20 to determine whether or not it is preventing a flow in the pipe 19. If the check valve is acting properly when the valve 52 is opened, with the valves 50 closed, the return header 18 will be drained, but thereafter the flow will stop. If, however, the check valve 20 is not functioning, water would be drawn from the system, which would be replenished from the city water supply 29, and the continued flow of water from the header would at once give an indication of this fact. With the valve 52 opened, the valves 50 may be opened and closed individually to completely flush out any one of the radiators 16. It will, of course, be understood that as the water is drawn from the radiators it will be replenished from the city water supply, which is always in communication with the heating system, so that one of the valves 50 will be left open only long enough to flush out the radiator. That valve may then be closed and another opened until all of the radiators have been drained, or as many drained as is desired. It will be understood that in the usual practice only one of the valves 50 is opened for drainage at any one time. After the draining operation has been completed the valve 52 is closed, and all of the valves 50 are opened to permit the heating system to function in the usual manner.

In Fig. 2 of the drawings I have shown a slightly modified form of my invention, wherein a plurality of heating systems are supplied with hot water from a single source or heating unit, the heating systems being so arranged that the heat exchangers or radiators of any one group may be flushed out independently of the other group, and wherein each group is controlled by a single valve.

In this modification the heating systems are supplied from a heater through a pipe 113 which corresponds to the pipe 13 shown in Fig. 1. This pipe leads from the heater to a main supply header 114, which in turn through pipes 114a supplies auxiliary headers 214 and 214a, each of the auxiliary headers being adapted to serve as the main supply for one of the heating systems, or for a group of radiators.

For example, the auxiliary header 214 is connected through supply pipes 115 to radiators 116, while the header 214a is connected to radiators 116a through supply pipes 115a. Return pipes 117 lead from the radiators 116 to an auxiliary return header 218, while a second auxiliary return header 218a receives water from the radiators 116a through return pipes 117a. The auxiliary return headers are in turn connected through return pipes 118a with the main return header 118, from which a pipe 119 leads to the circulating pump, which pipe 119 corresponds to the pipe 19 shown in Fig. 1.

Each of the return pipes 117 and 117a is provided with a control valve 250 adjacent the auxiliary return headers, which valves may be of the variable orifice type so that the flow through these pipes may be restricted to any desired extent, or

shut off entirely. Likewise, the pipes 118a leading from the auxiliary return headers to the main return header are provided with similar valves 150 located adjacent the main return header. These valves 150 serve to shut off entirely the water through the respective heating systems and radiators incorporated therein, or to regulate this flow to the desired extent. The main return header 118 is connected to the drain through a pipe 134 which is controlled by the shut-off valve 137, which valve will be normally closed during the operation of the heating plant.

If it is desired to shut off the flow of hot water through any one of the heating systems, the corresponding valve 150 may be closed, and this valve may likewise be set at the desired position to regulate or restrict the flow through one of the heating systems if desired. The valves 250 may be likewise operated to restrict or close the flow through any one of the radiators of the respective systems.

If it is desired to flush out the radiators of one of the systems, the valve 150 of the other system will first be closed so as to prevent the draining of water from that system. Thereafter, the valves 250 of the system to be purged or drained will be closed, and the valve 137 opened to the drain. The valves 250 may then be opened and closed, one at a time, so as to drain the individual radiators belonging to that system. It will be seen that with this arrangement it is only necessary to operate one of the valves 150 to close off the corresponding heating system, and it is not necessary to operate each of the valves 250 connected to the individual radiators of such system. If a large number of radiators is supplied from an auxiliary header, this results in a considerable convenience.

While I have shown and described some preferred embodiments of my invention, it will be understood that it is not to be limited to all the details shown, but is capable of modification and variation within the spirit of the invention and within the scope of the claims.

What I claim is:

1. A heating system comprising heating means, radiation elements, supply pipes connecting the heating means with the radiation elements, a return header, a return pipe connecting each of said radiation elements with said header, a return conduit connecting said header with the heating means to complete the circuit, a regulable shut-off valve in each of said return pipes, valve-controlled means for draining said header, circulating means in said return conduit, a check valve in the conduit between the circulating means and the header, and means placing said system in constant communication wiith a source of water supply under pressure.

2. A heating system comprising heating means, radiation elements, supply pipes connecting the heating means with the radiation elements, a return header, a return pipe connecting each of said radiation elements with said header, a return conduit connecting said header with the heating means to complete the circuit, a regulable shut-off valve in each of said return pipes, valve-controlled means for draining said header, circulating means in said return conduit, a check valve in the conduit between the circulating means and the header, and means providing a source of water supply under pressure in constant communication with said return conduit between the check valve and the heating means.

3. A heating system comprising heating means and a plurality of heating circuits, each circuit containing a plurality of radiation elements, supply pipes leading from the heating means to said circuits, a return header for each of said circuits and return pipes connecting said headers with the heating means, individual return pipes connecting said radiation elements with said return headers, a shut-off valve in each of said individual return pipes adjacent the headers to which said pipes are connected respectively, a shut-off valve in each of the return pipes between the headers and the heating means, and means for draining said return pipes.

4. A heating system comprising heating means and a plurality of circuits each including a plurality of radiation elements, supply means to carry the heating fluid from the heating means to the radiation elements, an auxiliary return header for each of said circuits, return pipes connecting each header with the radiation elements of the corresponding circuit, a regulable shut-off valve in each of said return pipes adjacent said headers, a main return header in communication with said heating means, a pipe connecting each of said auxiliary headers with the return header, a regulable shut-off valve in each of said last-named pipes, and means for draining said main return header.

CLYDE W. COLBY.