

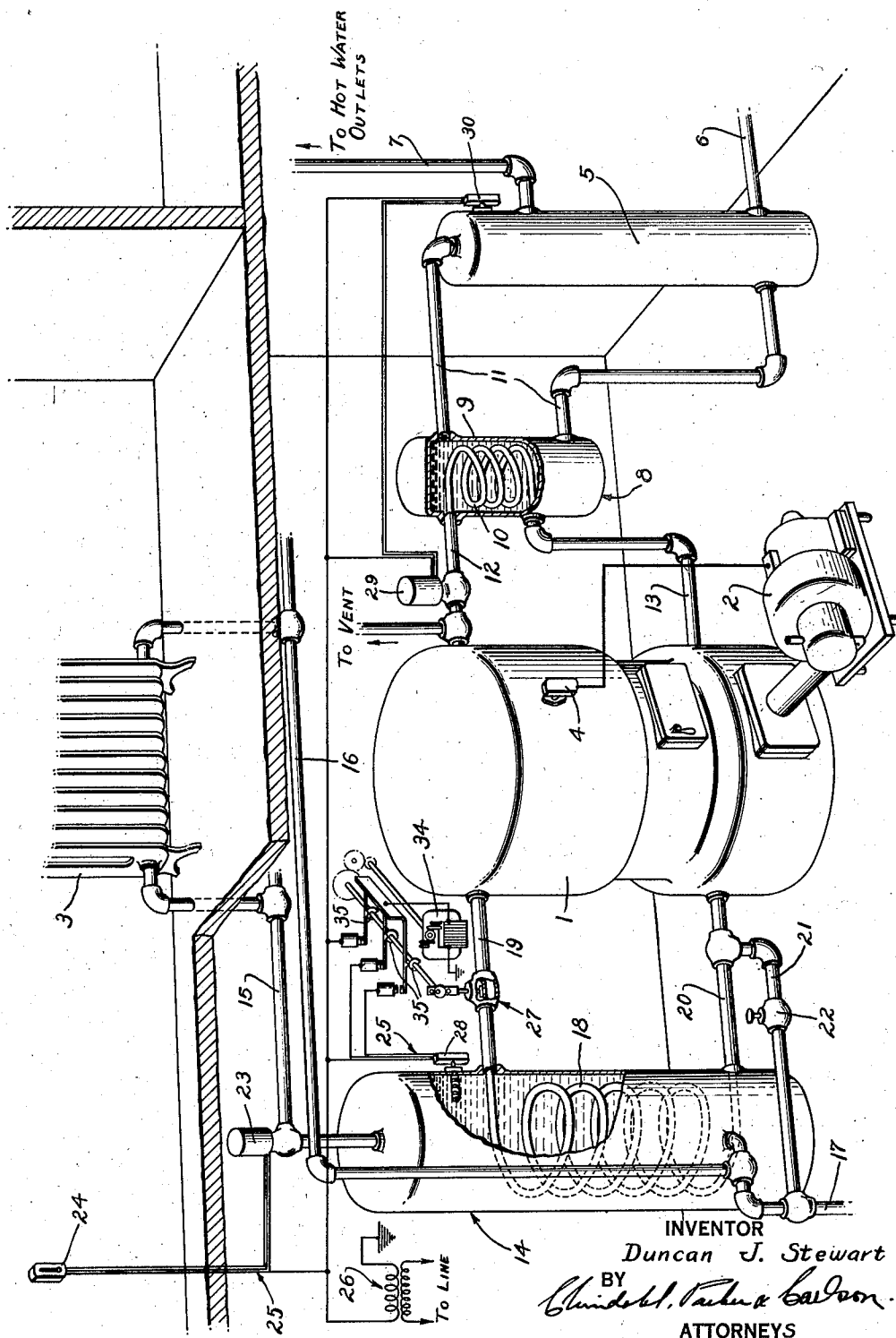
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D. J. STEWART

1,992,251

COMBINED HEATING AND DOMESTIC HOT WATER SUPPLY SYSTEM

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COMBINED HEATING AND DOMESTIC HOT
WATER SUPPLY SYSTEMDuncan J. Stewart, Rockford, Ill., assignor to
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Application September 16, 1932, Serial No. 633,432

1 Claim. (Cl. 237—8)

The invention relates generally to house heating systems and particularly to improvements in a combined hot water heating system and a domestic hot water supply system, both heated from a common source.

Heating systems of the above character, now in use, commonly employ a hot water boiler as a common source of heat for a plurality of radiators comprising the house heating system and for a domestic hot water supply system including a tank, both systems being usually supplied with heat from the boiler under thermostatic control. With such arrangement, difficulty is experienced in mild weather, because in order to maintain the temperature of the water in the hot water supply tank sufficiently high (approximately 180° F.), it is necessary to maintain the boiler water temperature at a correspondingly high temperature, and as a result when the heating medium is supplied at such high temperature to the radiators, a greater amount of heat is delivered than necessary and the room temperature unduly increased after the radiators have been cut off from the boiler, i. e., there is what is commonly known as an "over-run".

The present invention has for its object the correction of the aforesaid difficulty through the provision of a water supply tank for the house heating system, which derives its heat from the boiler or other source but whose temperature is varied preferably automatically according to varying weather conditions.

Other objects and advantages will become apparent from the following detailed description and the drawing, somewhat diagrammatic in character and partially in section, disclosing a system embodying the features of the invention.

For purposes of illustration, I have shown in the drawing a boiler 1, heated by any suitable means such as an oil burner 2, which constitutes a common heat source for a domestic hot water supply system and a heating system supplying heat to the rooms of a dwelling by means of the usual radiators of which I have shown only one, which is designated 3. The temperature of the boiler 1 is maintained at a predetermined degree equal to or preferably slightly above the maximum temperature desired in either the domestic supply system or the heating system. This is accomplished by means of an insertion thermostat 4 (disclosed in detail in the application of Preston W. Cummings, Serial No. 502,379, filed December 15, 1930), mounted on the boiler 1 so as to be responsive to the temperature thereof and operable in a well-known manner to initiate

and arrest operation of the burner 2 upon fall or rise of the boiler temperature below or above the predetermined degree.

The domestic hot water supply system as herein shown comprises a storage tank 5 having a cold water supply pipe 6 near the bottom and a hot water take-off pipe 7 near the top. The water in the tank 5 is heated by the boiler by means of a suitable heat exchanger here shown as an independent immersion heater 8, interposed between the tank 5 and boiler 1, and having a casing 9 and a coil 10 disposed within the casing. The immersion heater has its casing 9 connected by pipes 11 to the tank 5 to form a closed circulating system, and its coil 10 is connected by pipes 12 and 13 to the boiler.

Also connected with the boiler 1 to receive heat therefrom is the hot water house heating system. According to my invention, it includes a water storage reservoir 14 of comparatively large capacity and having a supply pipe 15 leading to the radiator 3 and a return pipe 16 completing a closed circulating system. Loss of water in the heating system is replenished by way of a pipe 17 opening into the return pipe 16.

The reservoir 14 is connected with the boiler 1 in any suitable manner to receive heat therefrom. As herein shown, heat is transferred to the system by means of a heat exchanger, interposed between the boiler and the system, which here takes the form of an immersion heater having a coil 18 positioned directly within the reservoir 14. The coil 18 at its upper end communicates with the boiler through a pipe 19 and at its lower end through a pipe 20. The boiler may be supplied with water from the same source as the heating system and is connected thereto by a pipe 21 opening into the pipe 20 and controlled by a valve 22.

Flow of hot water to the radiator 3 is regulated in accordance with the demand for heat in the dwelling by a motor operated valve 23, in the supply pipe 15, under the control of a room thermostat 24 adjustable to maintain any desired temperature. Such a thermostat is well known to those skilled in the art but for a detailed disclosure reference is made to my copending application for a Thermostat, Serial No. 941,505, filed October 27, 1930. The thermostat 24 and valve 23 are connected by leads 25 and a switch mechanism, hereinafter more particularly described, to a transformer 26 from which the motor of the valve receives its power. The periods at which heat is supplied to the dwelling is thus entirely controlled, and the quantity of heat supplied is

primarily controlled by the room thermostat 24.

The temperature of the water in the reservoir 14 is maintained at a temperature independent of the boiler temperature by varying the flow of hot water from the boiler to the coil 18. A motor-operated valve 27, similar to the valve 23, is interposed in the pipe 19 for that purpose. Operation of the valve 27 is rendered automatic by placing the valve under the control of an adjustable control device 28 responsive to the temperature of the water in the reservoir 14 and operable in well-known manner to open and close the valve 27. Like the valve 23, the valve 27 is connected by leads 25 to the transformer 26 which excites the motor of the valve.

Varying the temperature in accordance with outdoor temperatures is accomplished by adjusting the device 28 to maintain high or low temperatures and may be done manually or by automatic means responsive to outdoor temperature conditions in a well-known manner. When the weather is cold, the device is set to maintain a high temperature; but when the weather is mild, the device is set to maintain a correspondingly lower temperature. In this manner, the quantity of heat supplied to the dwelling when the valve 23 is opened by the room thermostat 24 will be in proportion to the heat required and will thus prevent an undesirable overrunning of room temperatures. It will be seen that the device 28 thus exercises a control over the quantity of heat supplied, which is secondary to the control exercised by the room thermostat 24 and maintains the temperature of the heating system independent of the temperature of the boiler and of the domestic supply system. That is to say, the temperature of the water in the radiator will in mild weather be at a moderate value so that the transfer of heat subsequent to the closing of the valve 23 will be comparatively small and have little effect on the temperature of the room.

Preferably the temperature of the domestic water supply is also automatically maintained independently of the temperature of the boiler. For this purpose, a motor-operated valve 29 is placed in the pipe 12 and under the control of an insertion thermostat 30 responsive to the temperature of the water in the tank 5. Like the valve 23 and thermostat 24, the valve 29 and thermostat 30 are electrically connected to the transformer 26 to obtain power for operating the motor of the valve. The thermostat 30 is also adjustable and may be set at the temperature desired. Thus the flow of heat from the boiler to the coil 10 of the heat exchanger will be varied

to maintain the temperature in the supply system at the desired degree.

The thermostats 24, 28 and 30 may be of any usual or preferred character susceptible of adjustment for different temperatures, and the thermostat 28 may if desired be of that type which is automatically adjusted according to varying weather conditions. The valves 23, 27 and 29 may also be of any preferred form as for example like the valve 27 shown diagrammatically. As shown, the valve proper is actuated by an induction motor 34 of the shading ring type which also actuates a shaft carrying a plurality of cams 35 arranged to condition circuits controlled by the thermostats to permit starting of the motor and to stop the motor after the valve has been moved to open or closed position.

While I have particularly described my invention as applied to an apparatus using hot water as a circulating medium for the house heating system, it will be understood that the invention is susceptible of application to systems in which other circulating mediums, such as steam, are employed.

I claim as my invention:

Apparatus for supplying heating fluid to room heating radiators and domestic water supply devices comprising, in combination, two independent tanks for containing heating fluid and respectively communicating with said radiators and supply devices, two closed circulating systems arranged in parallel relation with each other and respectively arranged in heat exchanging relation to the fluid in said tanks, a boiler adapted to contain heating fluid and constituting a common source of supply for said systems, a burner for heating the fluid in said boiler, means including a thermostat responsive to the boiler fluid temperature to control the operation of said burner, independent means including a thermostat responsive to the temperature in the room heating supply tank for controlling the circulation of heating fluid through the system for heating the tank, means including a thermostat responsive to the temperature of the fluid in said other tank to control the circulation of fluid through the other system, said thermostatic control means coacting to permit the maintenance of different fluid temperatures in said boiler and each of said tanks, and means including a thermostat responsive to the room temperature for controlling the supply of heating fluid to said radiators.

DUNCAN J. STEWART.

CERTIFICATE OF CORRECTION.

Patent No. 1,992,251.

February 26, 1935.

DUNCAN J. STEWART.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 1, second column, line 48, for the serial number "941,505" read 491,505; 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 9th day of April, A. D. 1935.

Leslie Frazer

Acting Commissioner of Patents

(Seal)