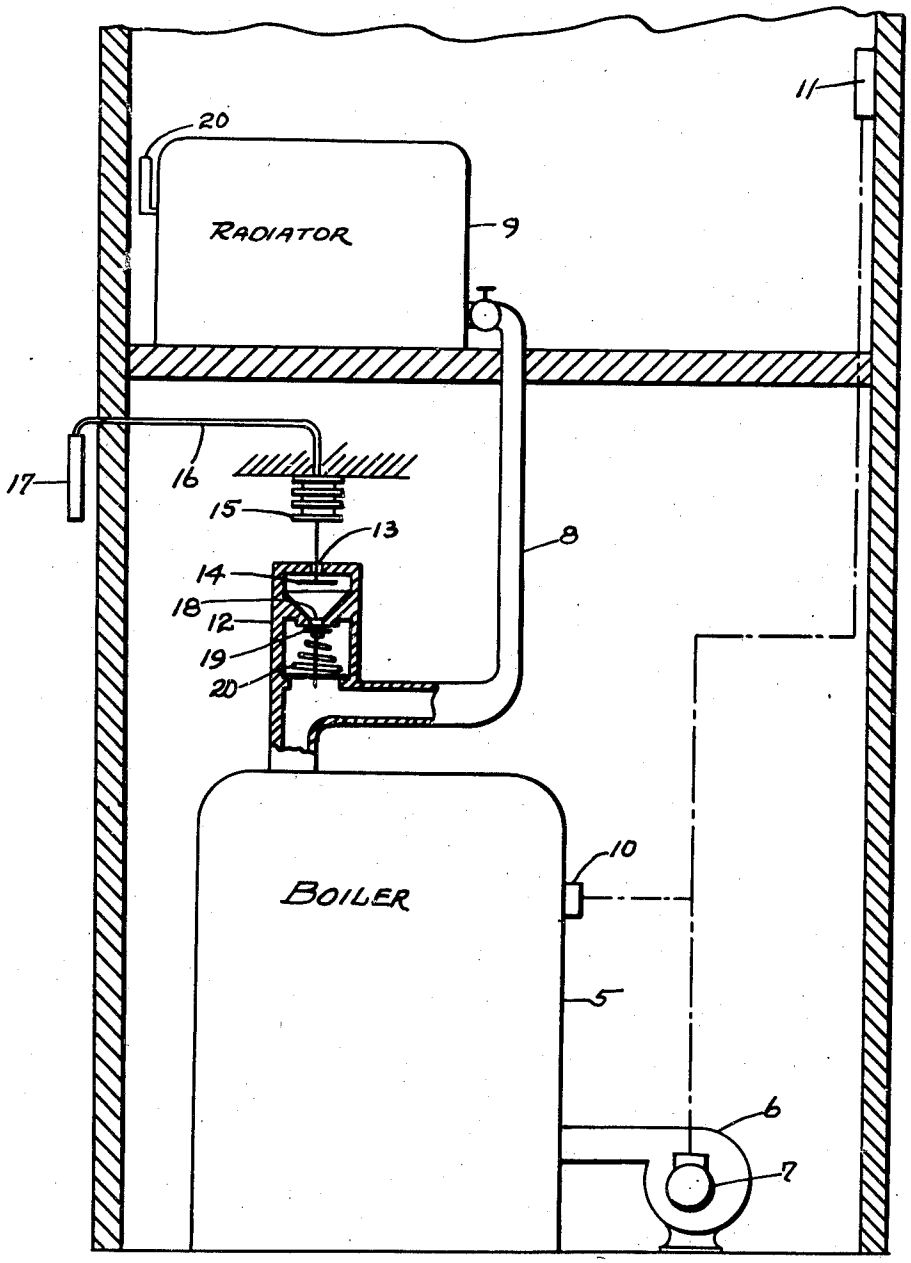
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HEATING SYSTEM

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## HEATING SYSTEM

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2 Claims. (Cl. 237—9)

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This invention relates to steam heating systems, and has an object to maintain heat in the radiators of such systems during the periods of the thermostats in the heated spaces are not calling for heat.

In an intermittently fired, one-pipe, steam heating system, such, for example, as one fired by an oil burner, the radiators usually get cold before the burner, started by an indoor thermostat, can heat the boiler sufficiently to again supply steam to the radiators. This results in the radiators being alternately hot and cold, and in discomfort during the "off" periods of the burner when the outdoor temperatures are relatively low.

This invention provides controls for an intermittently fired steam heating system, which results in steam being supplied to the radiators of the system during the "off" periods of the burner at low outdoor temperatures, thereby providing comfort equal to that provided by a conventional, hot water heating system.

The invention will now be described with reference to the drawing which illustrates diagrammatically, a one-pipe, steam heating system embodying this invention.

The conventional boiler 5 fired by a conventional oil burner 6 driven by an electric motor 7, supplies steam through the pipe 8 to a radiator 9 having a conventional vent valve 20.

The motor 7 is connected to be started and stopped by the conventional control 10 which responds to the temperature of the boiler water, and by the conventional control thermostat 11 which responds to the temperature of the space heated by the radiator 9.

The steam pipe 8 contains the valve 12 which acts as a vacuum breaker and which has the air bleed port 18 therein. The port 18 is opened and closed by the piston 19 which responds to negative pressures in the boiler, and the opening or down movement of which is opposed by a spring 20. The port 18 in the valve 12 communicates with a closed chamber which, itself communicates with the atmosphere through the port 13. The piston 14 closes the port 13 and is movable by the hydraulic bellows 15. The bellows 15 is connected by the tube 16 to a conventional thermostat 17 which is exposed to the temperature of the outdoor air.

It is obvious that when the port 13 is not closed by the piston 14, the port 18 will be opened to the atmosphere by the down movement of the piston 19. When the port 13 is closed by the piston 14, the port 18 will not be opened to the

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atmosphere even though the piston 19 moves downward.

At one specific setting the thermostat 17 may be adjusted to cause the bellows 15 to move the piston 14 to open the port 13 at outdoor air temperatures above 34° F. and to close the port 13 at outdoor temperatures below 34° F.

The piston 19 and the spring 20 may be adjusted to open the port 18 when the negative pressure in the boiler reaches 10" of mercury.

The control 10 which may be a conventional "Aquastat" may be adjusted to maintain the boiler water at a mean temperature of about 175° F.

The indoor thermostat 11 may be adjusted to attempt to maintain a desired indoor temperature of 75° F.

In operation the thermostat 11 may call for heat and start the burner 6 to create steam in the boiler 5 and expel all air from the system through the valve 20. When the temperature surrounding the indoor thermostat 11 reaches 75°, the burner 6 will be stopped. Steam will condense throughout the system, creating a negative pressure in all parts above the water level in the boiler. When this negative pressure reaches 10" of mercury the piston 19 will move downwardly to open the port 18. If the outdoor temperature is above 34° F., the port 13 will be open, and consequently, the entire system will be vented to the atmosphere through the ports 18 and 13. The port 18 will remain open until the pressure within the system stabilizes at 10" of mercury, negative pressure. As the negative pressure increases, the boiling point of the water in the boiler 5 drops so that vapor is continuously formed and the heat of evaporation can be obtained from the heat stored in the system. The boiling point at 10" of mercury is 193° F.

If the temperature surrounding the outdoor thermostat 17 is below 34° F., the port 13 will be closed by the piston 14, and although the port 18 may be opened as the negative pressure increases in the boiler, there can be no venting and no air will be bled into the boiler. The negative pressure in the boiler will continue to increase beyond 10" of mercury until the pressure equals 16.4" of mercury which corresponds to the 175° temperature. At this point the "Aquastat" 10 will start the motor 7 and the burner 6, thus adding heat to the water and causing more steam to flow to the radiator 9. The continued operation of the burner will raise the temperature of the water to the cut-off temperature of the control 10 which will again stop the motor.

It should be clear that valve 12 as described, will permit the heating system to operate as a vacuum system with a negative pressure which does not increase above 10'' of mercury whenever the outdoor temperature is greater than 34° F., thus producing the desirable hold-over characteristic necessary for this moderate temperature when the burner is stopped. The valve 12 will also cause the system to act as a vacuum system when the outdoor temperature is less than 34° F. and maintain steam in the system during the periods when the burner is not operating.

It should be further understood that the above selected outdoor temperatures and water temperatures may be varied to suit the climatic conditions as they exist.

While one embodiment of the invention has been described for the purpose of illustration, it should be understood that the invention is not limited to the exact apparatus and arrangement of apparatus illustrated, as modifications thereof may be suggested by those skilled in the art without deparature from the essence of the invention.

What is claimed is:

1. A steam heating system comprising a boiler, a heat producer for heating the boiler, a radiator in the space to be heated and connected to the boiler, a thermostat responsive to the temperature of said space for energizing said heat producer, means responsive to the temperature of the boiler water for energizing said heat producer for maintaining the water at a predetermined minimum temperature, an air bleeding valve connected to the boiler, an outdoor thermostat, and means including said outdoor thermostat and including means responsive to pressure changes in the boiler for maintaining a predetermined negative pressure in the boiler and for actuating said valve to bleed air into said boiler at outdoor air temperatures above a predetermined temperature when the negative pressure in said boiler increases above said predetermined negative pressure.



2. A steam heating system comprising a boiler, a heat producer for heating the boiler, a radiator in the space to be heated and connected to the boiler, a thermostat responsive to the temperature of said space for energizing said heat producer, means responsive to the temperature of the boiler water for energizing said heat producer for maintaining the water at a predetermined minimum temperature, an air bleeding valve connected to the boiler, a port in said valve for bleeding air into the interior thereof, means including an outdoor air thermostat for opening and closing said port for bleeding air into said valve at outdoor temperatures above a predetermined temperature, a second port in said valve connecting the interior thereof with the interior of the boiler, and means responsive to changes in the pressure above the water level in the boiler for opening and closing said second port for maintaining a predetermined negative pressure in said boiler.

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REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

| Number | Name | Date |
|---|---|---|
| 616,575 | Jamer | Dec. 27, 1898 |
| 1,921,708 | Snavely | Aug. 8, 1933 |
| 2,249,706 | Ferguson | July 15, 1941 |