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THERMOSTATICALLY CONTROLLED HEATING SYSTEM

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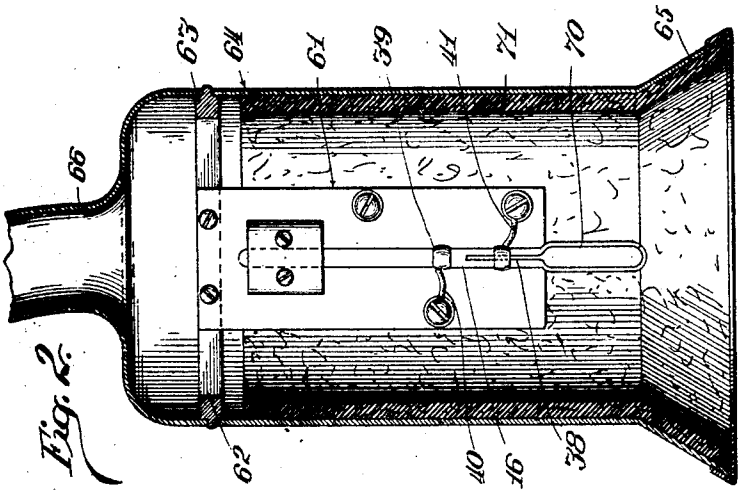


Fig. 2.

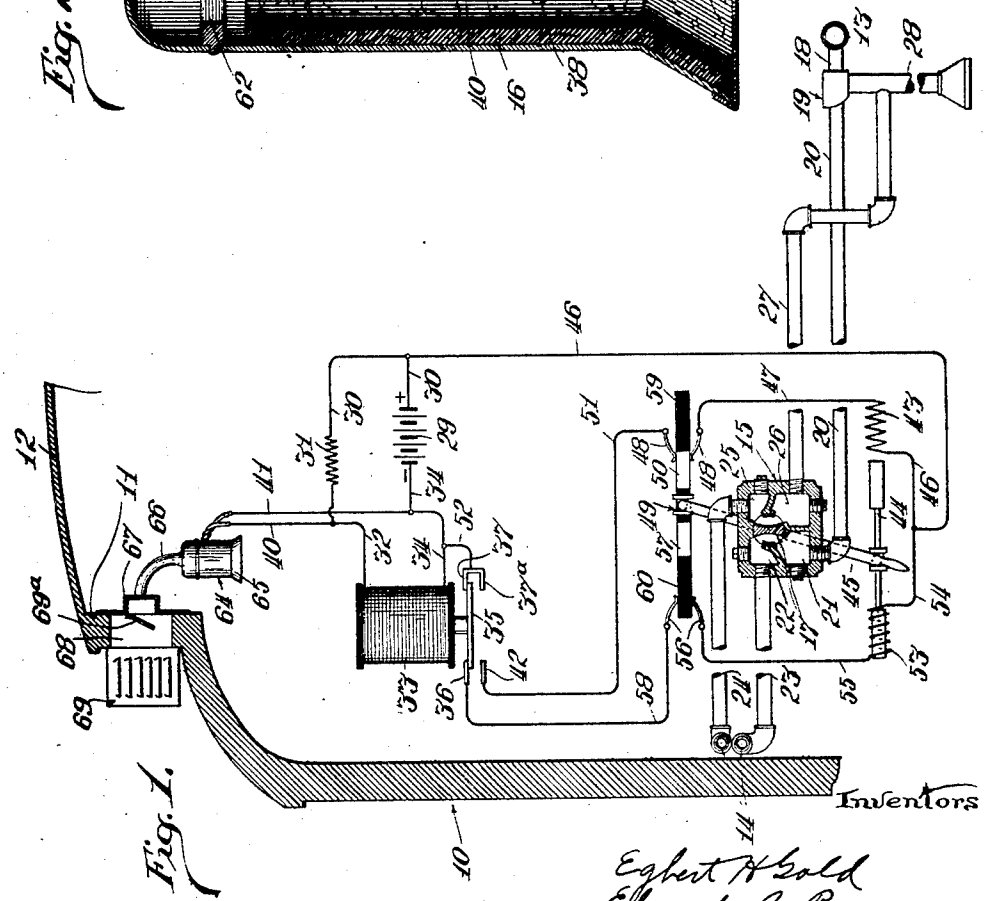


Fig. 1.

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UNITED STATES PATENT OFFICE.

EGBERT H. GOLD AND EDWARD A. RUSSELL, OF CHICAGO, ILLINOIS; SAID RUSSELL ASSIGNOR TO VAPOR CAR HEATING COMPANY, INC., OF CHICAGO, ILLINOIS, A CORPORATION OF NEW YORK.

THERMOSTATICALLY-CONTROLLED HEATING SYSTEM.

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To all whom it may concern:

Be it known that we, EGBERT H. GOLD and EDWARD A. RUSSELL, citizens of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Thermostatically-Controlled Heating Systems, of which the following is a specification.

Our invention relates to a railway car heating system of the type employing a thermostat located in the car for controlling the circulation of steam through the radiator or radiators which supply the car with heat. On account of the shape of a railway car and the fact that it is at times standing still with perhaps the doors at the ends of the car open and at other times is moved at varying rates of speed, under different conditions of sun and wind, it is a difficult matter to locate the controlling thermostat so that the thermostat will respond with any approximate degree of accuracy to changes in temperature in the car as a whole. The difficulty is particularly serious in the heating of sleeping cars in a system of this type because when the berths are made up the car is divided into a number of more or less completely enclosed spaces, the temperatures of which may differ quite widely. In accordance with our invention the thermostat is provided with a housing open at both ends and the housing is arranged so that air from the car is constantly drawn through the same. Preferably the housing is open at its lower end to the car while its upper end communicates with one of the ventilating openings of the car which is preferably provided with a ventilator of the suction type. As a result of this arrangement the temperature of the air coming into contact with the thermostat corresponds more nearly with the general temperature of the car atmosphere as a whole and is less likely to be exclusively affected by the temperature in the immediate vicinity of the thermostat or by occasional and temporary drafts and eddy currents than would otherwise be the case. The housing also protects the thermostat against being influenced by its proximity to the car wall which will vary in temperature according to the outside temperature, the position of the sun, the direction of the wind, and similar conditions.

Where, as is preferred, the thermostat housing communicates with a ventilator of the constantly open suction type, the draft of air in contact with the thermostat will cease, or be diminished at least, when the car stops, as a ventilator of this type produces its suction on the car atmosphere through movement of the car. With the thermostat located near the roof of the car and not far from the ventilating openings in the clere-story, the stoppage or draft through the thermostat housing is likely to bring about a reduction of temperature in the air in contact with the heat sensitive member of the thermostat, particularly as outside air may blow or back in through the ventilator. This is not an objection but rather an advantage, because when the car is standing the doors are likely to be open and the car temperature cooled down at the ends of the car, particularly, rather rapidly. This heat loss is compensated by quicker actuation of the thermostat in its valve opening sense while the car is standing still than while it is in motion.

The invention is illustrated, in a preferred embodiment, in the accompanying drawing, wherein—

Fig. 1 is a fragmentary sectional view of a railway passenger car, the seats or berths being omitted, provided with a controlling thermostat housing, arranged in accordance with the invention, and illustrating, in a diagrammatic manner, the elements of the heating system and its controlling mechanism, and

Fig. 2 is a vertical sectional view through the thermostat housing.

Referring first to Fig. 1, 10 designates the side wall of the car, 11 the clere-story panel and 12 the roof. 13 designates the steam train pipe, 14 the car radiator located along the side wall of the car near the floor, 15 a valve for controlling the circulation of steam through the radiator, and 16 (Fig. 2) a mercury tube thermostat for actuating the opening and closing movements of the valve body 17 of valve 15. Steam passes from the train pipe 13 through pipe 18 to the high pressure side of the vapor regulator 19 and from the low pressure side of the vapor regulator through pipe 20 to chamber 21 of valve 15, thence to chamber 22 of the valve and by pipe 23 to the radiating coil

14. The medium is returned from the radiator by pipe 24 to chamber 25 of the valve and from there passes into chamber 26 and through pipe 27 to the thermostat casing 28 of the vapor regulator 19. For this position of the parts of the apparatus current is flowing from battery 29 through wire 30, resistance 31, wire 32, the core of a relay 33 and wire 34 to the battery. The armature 35 of the relay is held up against a pair of upper contacts 36, 37.

As soon as the mercury column 38 reaches the circuit closing contact 39 in the mercury tube of thermostat 16 a circuit is closed which short circuits relay 33, this circuit being as follows:

From battery 29 through wire 30, resistance 31, wire 40, mercury column 38, wire 41 and wire 34 to the battery.

Relay 33 is effectively deenergized, dropping its armature 35 on the lower contacts 42, 37ª. Current now flows through a solenoid 43, the armature 44 of which engages the lever 45 that rotates the valve body 17 of valve 15, the circuit being as follows:

Battery 29, wire 30, wire 46, solenoid coil 43, wire 47, one of the pair of spring contacts 48 of a reciprocating limit switch 49 engaged by the lever 45, conducting portion 50 of the limit switch, the other spring contact 48, wire 51, contact 42, armature relay 35, contact 37ª, wire 52 and wire 34 to the battery.

The valve is shifted to its closed position and steam from pipe 20 is short circuited through valve chambers 21 and 26 and pipe 27 to the thermostat chamber of the vapor regulator 19. Limit switch 49 will also be shifted to the left to break the circuit through the solenoid 43 after the valve movement has been completed. When the temperature adjacent thermostat 38 falls below the temperature for which the thermostat is set, the thermostat circuit will be broken between the mercury column 38 and contact point 39 and relay 33 will be energized raising its armature against the upper pair of contacts 36, 37, whereupon a circuit will be closed through the other valve operating solenoid 53 as follows:

Battery 29, wire 30, wire 46, wire 54, solenoid 53, wire 55, one of the pair of contact springs 56, conducting portion 57 of limit switch 49, the other contact spring 56, wire 58, contact 36, armature 35, contact 37 and wires 52 and 34 to the battery.

The valve body 17 will now be rotated to the open position shown in Fig. 1 and the radiator again supplied with steam. The function of the limit switch 49 is to shut off the current to solenoids 43, 53 at the end of the valve movements. To that end the switch is provided with insulating portions 59, 60.

The thermostat 16, which may be of any suitable type, is secured to a plate 61 suspended from a cross web 62 forming part of the head piece 63 of a sheet metal tubular housing 64, this housing having a flared opening 65 at the bottom and being formed at the top with a neck 66 which is secured to a recessed plate 67 fastened to the inside of the clere-story panel 11 across one of the ventilating openings 68 in said panel. 69 designates a ventilator of a constantly open suction type arranged on the outside of the ventilating opening 68. While the car is in motion the impingement of air against the forward face of ventilator 69 produces a vacuum which draws air from the interior of the car. The air, so far as ventilator 69 is concerned, is drawn wholly or in part through the thermostat casing 64 so that it flows past and around the bulb 70 in the thermostat, the latter being preferably arranged to project below the bottom edge of support 61. Preferably the thermostat casing 64 is provided with a lining 71 of heat insulating material. The opening into ventilator 69 may be provided with a damper or shutter 69ª adjustable by hand or automatically in accordance with the speed of the train.

While we have described our invention in a preferred embodiment, we wish to be understood as intending to cover all modifications thereof within the scope of the appended claims.

We claim:

1. In combination with a railway car, a radiator therein, a thermostat for controlling the circulation of heating medium through the radiator, and means independent of the radiator for creating a forced draft of air in contact with the thermostat.

2. In combination with a railway car, a radiator therein, a thermostat for controlling the circulation of heating medium through the radiator, and means independent of the radiator for creating a forced draft of air in contact with the thermostat while the car is in motion.

3. In combination with a railway car, a radiator therein, a thermostat for controlling the circulation of heating medium through the radiator, a housing for the thermostat, and means independent of the radiator for creating a forced draft of air through said housing.

4. In combination with a railway car, a radiator therein, a thermostat for controlling the circulation of heating medium through the radiator, a housing for the thermostat having an air inlet opening into the car, and a discharge duct opening to the outside atmosphere.

5. In combination with a railway car, a radiator therein, a thermostat for controlling the circulation of heating medium through the radiator, a housing for the

thermostat having an air inlet opening into the car, a discharge duct opening to the outside atmosphere, and means exposed to the air currents outside the car for creating a forced draft through the housing.

6. In combination with a railway car, a radiator therein, a ventilator for discharging air from the car, and a thermostat arranged in the path of said discharging air current for controlling the circulation of heating medium through the radiator.

7. In combination with a railway car, a radiator therein, a ventilator communicating with the outside atmosphere and adapted to discharge air from the car, a thermostat for controlling the circulation of heating medium through the radiator, and a housing for the thermostat having an air inlet opening into the car and an outlet duct leading to said ventilator.

8. In combination with a railway car, a radiator therein, a ventilator for discharging air from the car, a thermostat for controlling the circulation of heating medium through the radiator, a housing for the thermostat having an air inlet opening into the car and an outlet duct leading to said ventilator, and means for supporting the thermostat centrally in the housing out of contact with the wall thereof.

9. In combination with a railway car, a ventilating opening near the roof of the car, a ventilator for drawing the air through said opening, a radiator, a thermostat for controlling the circulation of heating medium through the radiator, and a housing for the thermostat having an inlet opening into the car and a discharge duct communicating with said ventilating opening.

10. In combination with a railway car, a radiator therein, a thermostat for controlling the circulation of heating medium through the radiator, a housing having an air passage therethrough in which the thermostat is positioned, and means for creating a forced draft of air through said air passage.

11. In combination with a railway car, a radiator therein, a thermostat for controlling the circulation of heating medium through the radiator, a housing having an air passage therethrough, a bracket for supporting the housing in position spaced from the car wall, means for supporting the thermostat in the air passage out of contact with the walls of the housing, and means for creating a forced draft of air through said air passage.

12. In combination with a railway car, a radiator therein, a thermostat for controlling the circulation of heating medium through the radiator, a housing having an air passage therethrough, a ventilator in a wall of the car, a hollow bracket for supporting the housing in position spaced from the car wall, the hollow bracket being in communication with the ventilator at one end and with the air passage at the other, and means for supporting the thermostat in the air passage and out of contact with the walls of the housing.

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