L. P. HYNES.

VAPOR HEATING SYSTEM.

APPLICATION FILED MAR. 15, 1912.

1,245,233. Patented Nov. 6, 1917.

Fig. 1.

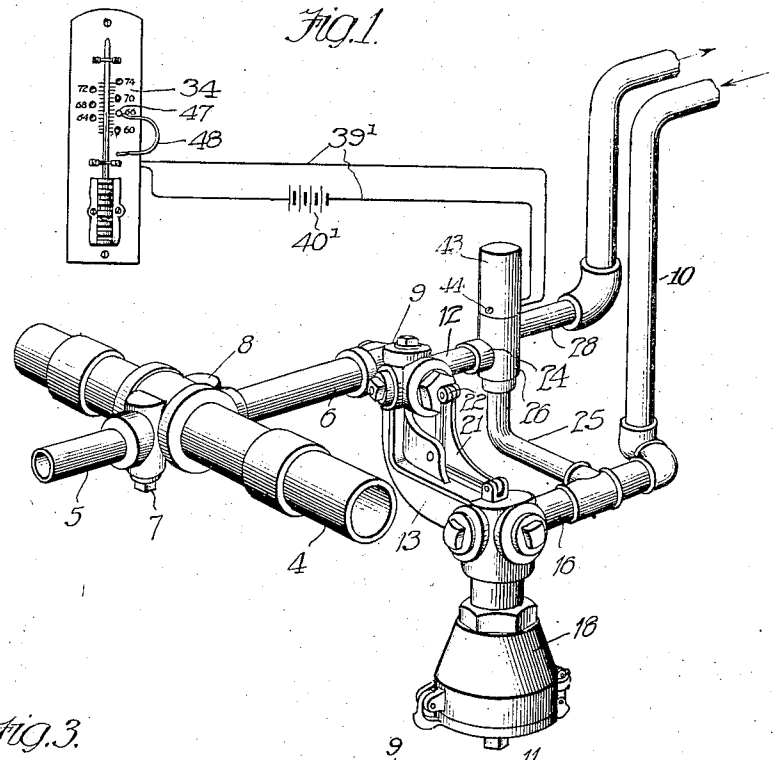


Fig. 3.

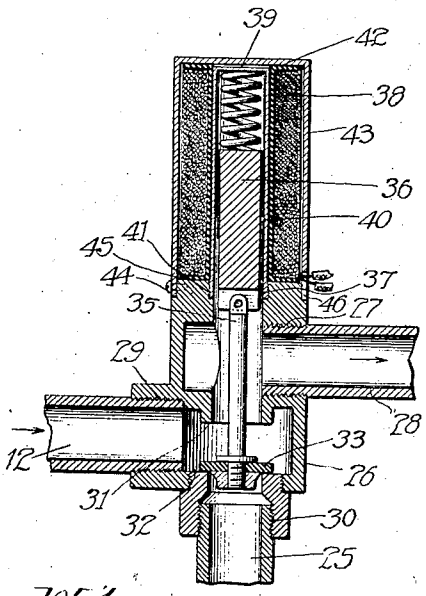
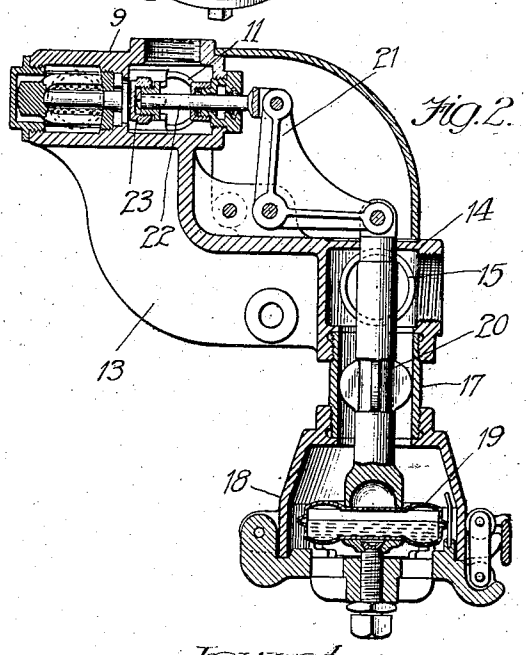


Fig. 2.



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UNITED STATES PATENT OFFICE.

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VAPOR-HEATING SYSTEM.

1,245,233. Specification of Letters Patent. Patented Nov. 6, 1917.

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To all whom it may concern:

Be it known that I, LEE P. HYNES, a citizen of the United States, residing at Chicago, county of Cook, and State of Illinois, have invented a new and useful Improvement in Vapor-Heating Systems, of which the following is a specification.

This system of heating is generally employed in connection with the cars of railroad trains in which steam from the engine or other source of supply is distributed throughout the train at a considerable pressure. The train pipe, as the conduit conveying the steam through the train is known, is tapped at suitable intervals for the connection of the radiators, but intermediate each radiator and the train pipe is inserted a reducing valve by which the pressure in the radiators is reduced substantially to atmospheric pressure. After passing through the radiator, the vapor or low pressure steam is permitted to escape to the outside atmosphere through an outlet arranged below the floor of the car, and in the outlet is arranged a thermostat which is connected up to and controls the pressure reducing valve. The construction is such that when the steam passing through the outlet is sufficiently hot, the thermostat closes the reducing valve, shutting off the supply to the radiator, but when the thermostat cools slightly, it opens the valve a little, permitting more steam to flow into the radiator, which, when it reaches the thermostat, again serves to close the valve. Of course, the operation of the device is so rapidly intermittent and the movement of the valve so slight that steam or vapor pressure is practically constant. In the application of such a system to, for example, a sleeping car, it is necessary to provide a series of radiators which are individually under dissimilar surrounding conditions and are required to maintain different temperatures, thus, separate radiators must be employed for the smoking room and other compartments which the car may contain, and it is practically essential that means be provided for regulating the supply of vapor to each of these radiators to control the temperature of the compartment. The objection to manually operated valves under the conditions are many and obvious. Furthermore, it is a characteristic of this system of vapor heating that the outlets containing the thermostats must be in constant communication with the source of steam, save only for the interposed reducing valve.

My invention has for its object the provision of an automatic control for the radiators of a vapor system of heating which meets the conditions set forth above, and it comprises a by-pass connection or shunt from the pressure reducing valve to the outlet, across the terminals of the radiators, and a valve controlled by the temperature in the compartment in which the radiator is located, which valve serves to direct the incoming vapor, either through the system of radiating pipes or directly to the outlet, according to the temperature in the compartment. In the accompanying drawings and the following detailed description I have set forth a preferred form of apparatus embodying my invention, but it will be understood that the specific structure is disclosed for the purpose of exemplification only, and that my invention is not limited thereto, but is defined in the following claims:

Referring now to the drawing, Figure 1 is a perspective, partly diagrammatic illustration of a portion of a vapor system to which my invention is applied. Fig. 2 is a vertical central section through the reducing valve, outlet and connected parts. Fig. 3 is a detail vertical section through the valve for controlling the passage of vapor to the outlet, by way of the radiator and by-pass respectively. A broken section of the train pipe conveying steam from the engine is shown at 4, Fig. 1, from which branch pipes 5 and 6 lead to the radiators of the car. 7 and 8 are strainers to keep dirt and scale from valve seats. A casing 9 is interposed between the pipe 6 and the radiator coil 10, from the outlet opening 11, of which, a pipe 12 leads toward the radiator. The casting 13, which comprises the reducing valve chamber, also includes a chamber 14, into which is tapped at 15 the pipe 16 leading from the radiator, and also the pipe section 17 connected to the outlet casing 18 below the floor of the car. The latter casing incloses a thermostat 19, which is connected by rod 20, bell crank 21 and valve-rod 22 to the reducing valve 23. As explained in the introductory part of this specification, when steam is admitted by the reducing valve it circulates through the radiators and heats up the thermostatic member 19 in the outlet, which in turn tends to close the reducing

valve, the thermostatic member acting, when sufficiently cooled by the shutting off of the steam supply, to again open the reducing valve. The parts thus far described are old in this art, and I make no claim thereto *per se*.

Intermediate the reducing valve 9 and the intake 28 of the radiator I interpose a three-way valve 24, which is connected not only to the reducing valve chamber and radiator, but also to the outlet pipe 16 by means of the by-pass or shunt 25. Referring more particularly to Fig. 3, it will be seen that the valve casing 26 of valve 24 is tapped at 27 to receive the radiator inlet pipe 28, at 29 to receive the pipe section 12 from the reducing valve, and at 30 to receive the by-pass 25. The valve casing 26 is formed at 31 and 32 with opposed valve seats, the openings of which communicate with the pipes 10 and 25 respectively, and a valve 33, mounted for vertical reciprocation between the valve seats, controls the flow of steam to the radiator and to the by-pass, and shuts off the flow of steam to the radiator or to the by-pass accordingly as it is in its upper or lower position. The valve is controlled electromagnetically by a thermostat, shown at 34, as of the mercury column type. To the valve 33 is secured by means of its valve stem 35 a solenoid core 36, which is inclosed in a chamber 37 opening into the valve chamber and surrounded by a solenoid 38, the coil of which is connected by wires 39′ to the battery 40′ and to the thermostat above referred to. The solenoid core 36 is preferably formed of soft iron and electro-plated with a non-oxidizing metal, or otherwise covered to prevent its rusting, and, if desired or found necessary in the particular situation in which the valve is employed, a spring 39 of non-rusting metal is interposed between the upper end of the solenoid and the top of the casing to assist the force of gravity in retaining the valve in its lower position. The chamber 37 containing the solenoid consists of a cylindrical capsule 40, preferably of brass or other non-magnetic metal closed at its upper end and tapped into the upper end of the valve casing, as at 41. The coil of the solenoid is wound upon spool 42, also of non-magnetic material and which has a central bore fitting upon the exterior of the core chamber, so that if desired the coil may be removed as an entirety. The metal cap 43 covers the solenoid and is secured at its lower end, as by screws 44, upon the reduced upper end 45 of the valve chamber, the cap being notched on its lower edge, as at 46, to permit the passage of the wires 39′. Preferably the mercury column thermostat is adjustable and, as shown, the upper contact consists of one of a series of wires extending through the glass to the bore and connection with which is made by a removable plug 47 connected by a wire 48 with one of the wires 39′. By the employment of the solenoid and core for operating the valve I entirely dispense with the necessity of packing a moving part, the solenoid and spring being entirely inclosed and hermetically sealed within the chamber formed by the valve casing and capsule. It will be understood that with the thermostat 34 adjusted to the desired temperature, the valve 33 will normally rest upon its lower seat, thereby closing direct communication between the reducing valve chamber and the outlet, whereby the flow of steam is directed through the radiator pipes. When, however, the temperature rises above the desired point the thermostat 34 closes the circuit through the solenoid coil, causing the core and attached valve to be drawn upward, seating the valve and shutting off the steam from the radiator, and permitting it to flow through the by-pass directly to the outlet chamber. By this means it is possible to automatically and independently regulate the flow of steam in each radiator and hence the temperature of the particular compartment, or part of the car, in which the radiator is located, without in any manner interfering with the operation of the pressure reducing valve.

While in the accompanying drawings and in the above specific description I have disclosed as an exemplification of my invention a heating system in which the by-pass containing the electrically operated valve is arranged immediately adjacent the reducing valve and outlet chamber, it will be understood that the invention is applicable for the purpose of shunting any portion of the radiating system, and in the following claims where I have used the word "radiator", it is to be understood to refer to any such portion of the radiating system.

I claim:

In a steam car heating system, in combination a steam supply pipe, an inlet valve therein, a radiator having an outlet, a pipe connected to the supply pipe on the radiator side of the inlet valve and leading to the outlet, a valve therein, a thermostat in the car controlling said last named valve, and a thermostat at the outlet controlling said inlet valve whereby said inlet valve is controlled by the temperature of the discharge from said radiator and by the temperature of the car.

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