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J. F. McELROY.

REGULATING DEVICE FOR STEAM HEATING SYSTEMS.

APPLICATION FILED AUG. 31, 1901.

Fig. 1.

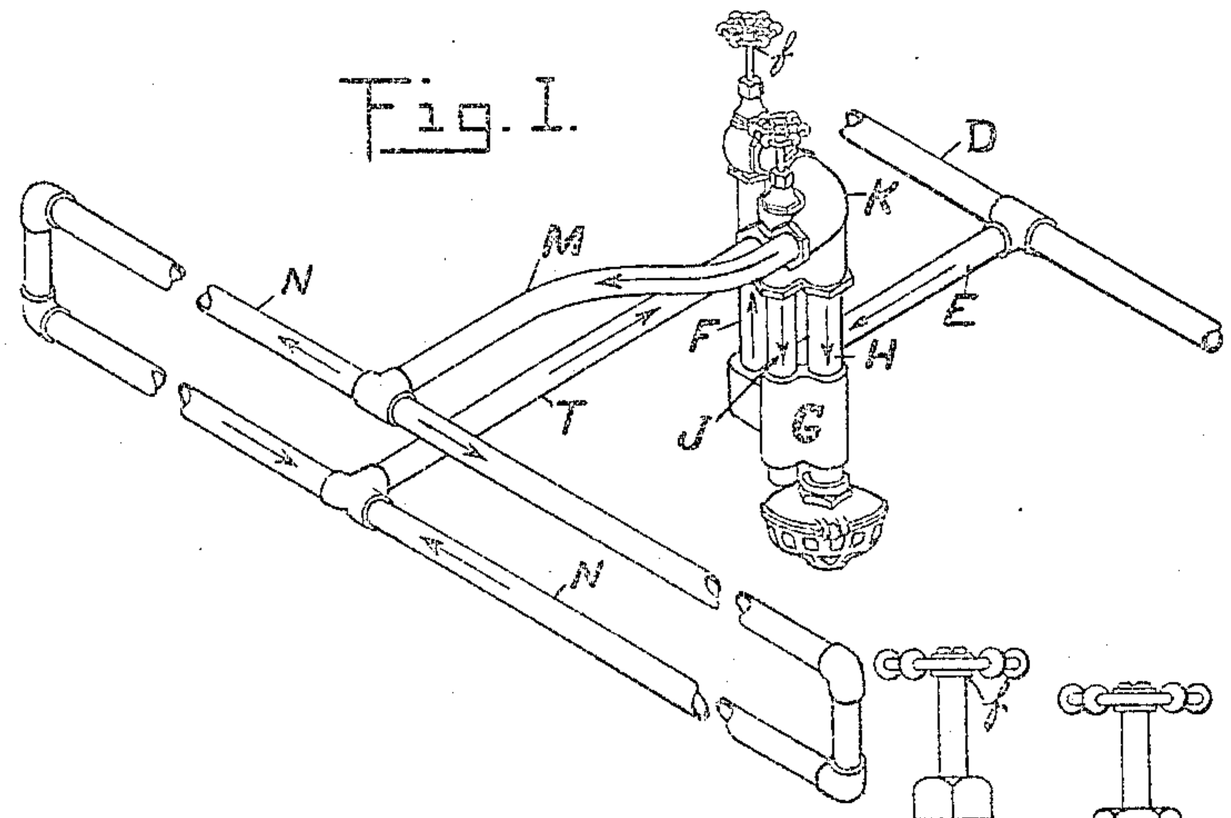


Fig. 2.

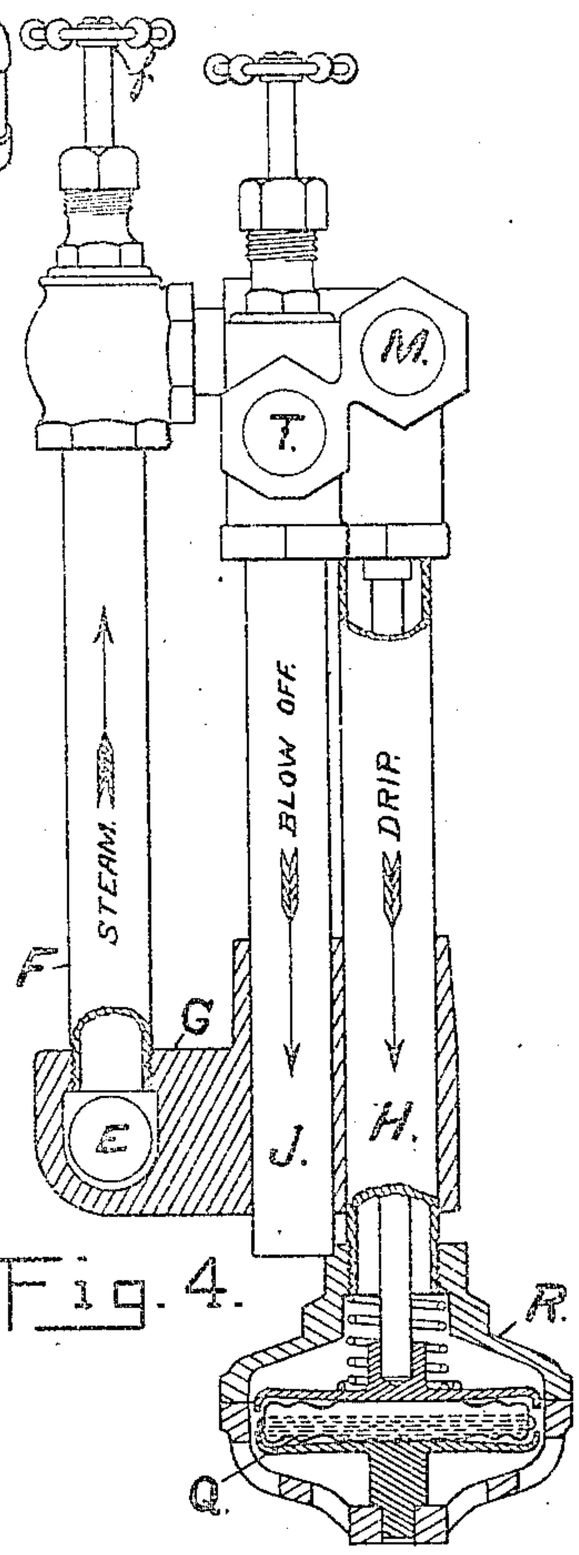
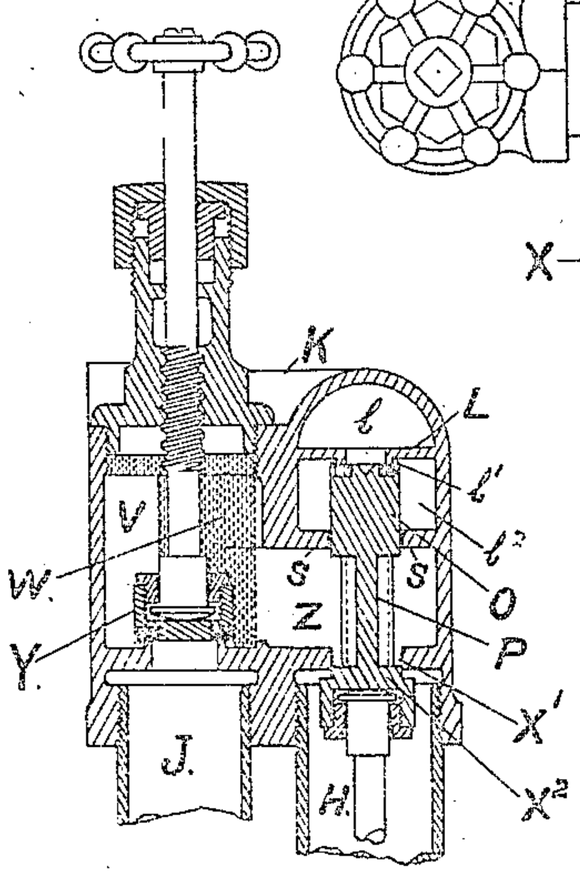
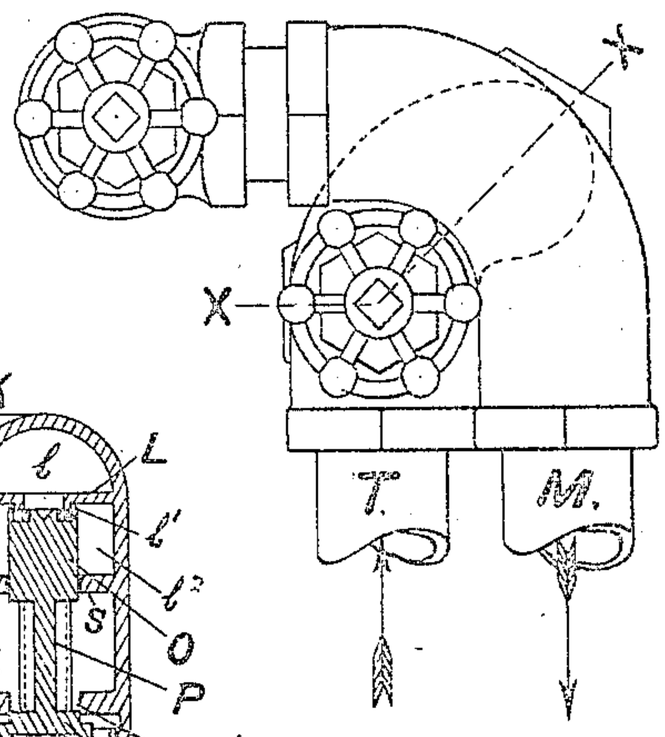


Fig. 3.





Witnesses

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UNITED STATES PATENT OFFICE.

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REGULATING DEVICE FOR STEAM-HEATING SYSTEMS.

No. 884,287. Specification of Letters Patent. Patented April 7, 1908.

Application filed August 31, 1901. Serial No. 73,981.

To all whom it may concern:

Be it known that I, JAMES F. McELROY, a citizen of the United States of America, and a resident of the city of Albany, county of Albany, and State of New York, have invented certain new and useful Improvements in Regulating Devices for Steam-Heating Systems, of which the following is a specification.

My invention relates to steam heating system, especially adapted for use in railway car service, and the object of my invention is to provide a means for controlling the supply of steam in the radiator pipes and to regulate the temperature of the apartment in which the radiator pipes are placed. I accomplish this object by means of the mechanism illustrated in the accompanying drawings, in which

Figure 1 is a perspective view of a steam regulator and connections constructed and arranged according to my invention. Fig. 2 is a plan view of the regulator. Fig. 3 is a sectional view along the line *x*—*x* in Fig. 2. Fig. 4 is an elevation of the regulator, partly in section, as though looking at Fig. 2 from below

Similar letters refer to similar parts throughout the several views.

The train pipe D is connected by the pipe E to the upright pipe F, and at the point of connection between the pipes E and F, I arrange a fitting G adapted to make hot metallic contact between the pipe F, the blow-off pipe J and drip pipe H, the fitting G being heated by steam from the pipe E and thus preventing freezing in the drip and blow-off pipes respectively. In the pipe F, I preferably arrange a valve operated by a valve handle *f*. The fitting or casting K, preferably curved, connects the pipe F with the pipe M through which steam passes to the radiator pipes N. Within the fitting K, I arrange a wall L in such a manner that the steam from the pipe F will pass through the chamber *l* and through the port *l'* and wall L into the chamber l^2 and from thence into the pipe M connected with the radiator pipes N. The port *l'* may be closed by the valve operated by the valve-stem P which is connected with the diaphragm or sealed liquid-vapor cell Q in the thermostat casing R. The valve O is arranged to reciprocate freely, having a loose fit enabling the water to escape from the chamber l^2 and is guided by the partition S—S and adapted to be seated firmly against the seat surrounding port *l'* in the wall L. The action of the thermostatic trap will tend to open and close the port *l'*.

After the steam has passed through the radiator pipes the steam and water of condensation will pass through the pipe T to the blow-off chamber V in the fitting or casting K, within which chamber is placed a concavo-convex screen W through which the steam and water of condensation must pass before reaching the discharge chamber Z, communicating with the thermostat casing R, by means of the drip pipe H. The discharge port X^1 is controlled by the valve X^2 also opened and closed by the action of the thermostatic element Q.

Within the chamber V, I place a valve Y, finding its seat at the end of the blow-off pipe J. By this arrangement the water of condensation, after the same has passed through the radiator pipes, will be conveyed to the chamber V in the fitting or casting K and the dirt and sediment deposited within the blow-off chamber V. The water passing into the discharge Z and through the drip pipe H will be transmitted to the thermostat casing R and the action of the thermostat will tend to either open or close the port *l'* and the port X^1 depending upon the temperature of the discharge.

It will be seen that the steam will be prevented from entering the radiator pipes because of the closing of the valve O, when the discharge therefrom is sufficiently warm to cause the thermostat to act and thus the temperature of the car may be regulated, since the radiator pipes being then hot will continue to give off heat until the discharge therefrom is cooled, when additional steam will be admitted because of the opening of the port *l'*.

By having both the supply and discharge chambers of the radiator in the same casing or fitting K of my regulating device I secure many important advantages. Thus the device is much cheaper to make and more easily applied to a car or other situation than prior thermostatic regulators, besides taking less room, and I am enabled to employ the powerful yet delicate form of thermostat shown in the drawings and consisting of the expansible cell or diaphragm and its connections, situated within the heating system or circuit at or near the point where the latter discharges

to the atmosphere, said thermostat being thus distinct from the piping of the system, though contained in and supported by the same. It is thus enabled to open and close the valve or valves accurately and with the minimum of effect from expansion and contraction or other movement of the casing and pipes. This construction also minimizes the number of packed working joints and can, as shown, be made to dispense entirely with a stuffing-box for the valve-spindle. Where I control the discharge in addition to the supply of the radiator by means of the thermostat, as here shown, it is preferred to have one of the valves close slightly before the other. In the illustration given, the discharge valve X^2, which is a piston-valve, closes just before the supply valve O, which enables me to retain a slight pressure of steam in the radiator.

In my drawings I have shown the inlet to a radiator or heater as controlled by a thermostat which is located outside of the car or other apartment and exposed to the temperature of the outside air, the thermostatic element Q being shown at or below the level of the train-pipe D, which is located below the car in the usual manner. Hence the heating activity of the radiator is subject to automatic control both by the condition of its contents and the temperature of the outside air. This feature broadly is not claimed herein, being made the subject of an application of William P. Cosper, Serial No. 53,768. Lastly it will be seen that my present improvements enable the inlet valve, if only one be employed, or both valves if both be employed as shown, to be withdrawn from the discharge end of the drip-pipe underneath the car, upon opening the lower half of the casing of trap R which is secured to the upper half in a manner well known in car traps. The valve O is of such diameter as to be withdrawn through partition S S and port X′ as will be readily understood from the drawing.

The two valves O and X^2 are closed "concurrently," that is both closed by the expanding movement of the thermostat as distinguished from an opposite closing, although preferably, as hereinafter pointed out, the concurrent closing and opening is not a simultaneous closing and opening but one valve closes slightly before the other.

It will be understood that the loose fit of the lower body of valve O in partition S S is merely such as to enable the small amount of condensation from chamber l^2 to squeeze through into chamber Z without allowing any substantial amount of steam to escape by this avenue into the discharge-chamber. In fact the water or moisture forms a packing for the steam at the low steam pressure employed. This loose fit, while not perhaps essential, I regard as a useful improvement which does away with the use of a stuffing-box. In the drawings the free opening in partition S S is somewhat exaggerated for the sake of making its presence apparent.

I claim:

1. The combination with a heating system including a heater for the apartment, of a regulator comprising a casing formed with a supply chamber for said heater, a source of steam supply for the heater, an inlet valve in said casing controlling the connection between said source and the supply chamber, a discharge passage from the heater, a thermostat located in said passage so as to be affected by the temperature of the discharge from the heater and rigidly connected with the casing, and an operating connection between said thermostat and inlet valve.

2. The combination with a heating system including a heater for the apartment, of a regulator comprising a casing formed with a supply chamber for said heater, a source of steam supply for the heater, an inlet valve in said casing controlling the connection between said source and the supply chamber, a discharge passage from the heater including a terminal thermostat casing open on one side to the atmosphere outside of the apartment to be heated and rigidly connected with the inlet-valve casing, a thermostat supported in said thermostat chamber, and an operating connection between said thermostat and inlet valve.

3. In a regulator for steam heaters, the combination with the heater and source of steam supply, of a casing having a supply-chamber connected with the inlet end of the heater and a discharge-chamber connected with the outlet end thereof, a discharge-conduit leading from the discharge-chamber to the atmosphere, a thermostat mounted in said discharge-conduit, and two valves in said casing operated by said thermostat and having concurrent closing movements, one being an inlet valve controlling the connection between the steam supply and said supply-chamber and the other being an outlet valve controlling the connection between said discharge-chamber and the discharge-conduit.

4. A thermostatic regulator for steam heating systems comprising a casing having supply and discharge chambers separated by a partition, a discharge-conduit leading from said casing, a thermostat located in said conduit, a valve-stem having a sliding fit in said partition, and two valves mounted upon said stem and both closed by expansion of the thermostat, one being a valve controlling the inlet to said supply-chamber and the other a valve controlling the outlet from said discharge-chamber to the discharge-conduit.

5. In a steam heating system, the combination with the heater and source of steam supply, of a regulator having a casing at one end provided with supply and discharge chambers connected respectively with the

inlet and outlet ends of the heater, a partition separating said chambers and having an opening, a thermostat at the opposite end of the regulator, a discharge conduit extending between the discharge chamber of the casing and the thermostat, a valve in the casing smaller in diameter than said opening and controlling the passage of steam from the source of supply to the inlet end of the heater, and an operating connection passing from the thermostat through said opening to the valve, whereby the valve and its connection are made withdrawable through the thermostatic end of the regulator.

6. A regulator for steam heating systems having a valve-casing at one end formed with inlet and discharge chambers having ports for the supply of steam to a heater and the discharge of steam and water of condensation therefrom, a valve stem, inlet and outlet valves controlling said ports and mounted on said stem, a thermostat casing at the other end of the regulator, an intermediate discharge pipe, a thermostat mounted in the thermostat casing, and a connection between said thermostat and the valves, all arranged so that the thermostat, the valves and the said connection may be withdrawn through the thermostat end of the regulator.

7. The combination with a steam heater, of a regulator therefor including a casing containing two valves, one of which closes before the other, controlling respectively the inlet to and discharge from said heater, and a thermostat for operating said valves located in a discharge pipe rigidly connected to said casing and on the discharge side of the inlet valve and subject to the temperature of the discharge passing said valve and to the temperature of the outer air.

8. The combination with a steam heater, of a regulator therefor including a casing containing two valves controlling respectively the inlet and discharge of the heater and so arranged that the discharge valve closes before the inlet valve, and a thermostat in a discharge passage rigidly connected to said casing and operating said valves and subject to the temperature of the steam and water of condensation which have passed said discharge valve and to the temperature of the outer air.

9. A regulator for steam heating systems comprising a casing having supply and discharge chambers separated by a partition, a discharge conduit leading from the discharge chamber to the atmosphere, a thermostat subject to the temperature of the discharge, and a valve operated by the thermostat and controlling the entrance of the steam from a source of supply to said supply chamber, said valve provided with a stem having a loose working fit in said partition permitting passage of water from the supply chamber to the discharge chamber.

10. In a steam heating system, the combination with a heater for the interior of a car or other apartment and a source of steam supply for said heater, of a regulator for the heater having a casing provided with supply and discharge chambers connected with the inlet and outlet ends of the heater respectively, a discharge conduit leading from said discharge chamber to the atmosphere and rigidly connected to said casing, a valve controlling the supply of steam to said supply chamber, and an expansible thermostatic cell located in the discharge conduit outside of the car or apartment and subject both to the temperature of the discharge from the heater and to the temperature of the outside air, for operating said valve.

11. In a heating system for railway cars, the combination with a source of steam supply and a means for heating the interior of the car, of a regulator mounted in an upright position and including at its upper end a casing having supply and discharge chambers connected respectively with the source of steam supply and with the heating means, inlet and outlet valves within said casing, a thermostat casing at the lower end of the regulator having a movable lower portion of open-work construction, a discharge pipe connecting said casings, and a thermostat mounted in the thermostat casing and having an operating connection with the valves, said thermostat, operating connection, and valves being withdrawable through the lower end of the thermostat casing.

12. In a regulator for car-heating systems, a valve-casing formed with supply and discharge chambers and with a blow-off chamber communicating with the discharge chamber, a blow-off valve controlling an outlet from said blow-off chamber, inlet and outlet valves controlling respectively the inlet to the supply chamber and the outlet from the discharge chamber, a discharge conduit on the drip side of said outlet valve and rigidly connected to said casing, and a thermostat in said conduit controlling the two valves.

13. The combination with a car-radiator and steam-supply pipe, of a regulator provided with an upright casing whose lower part is in heat-conductive metallic connection with the steam-supply pipe, a valve-casing included in the regulator casing and formed with supply and discharge chambers for the radiator, an inlet valve in said valve casing controlling the radiator supply, and a thermostat in the upright regulator casing in the path of the radiator discharge for operating said valve.

Signed at Albany, N. Y. this 29 day of Aug. 1901.

JAMES F. McELROY.

Witnesses:
FREDERICK W. CAMERON,
CHAS. I. WIRT.