J. F. McELROY, DEC'D.
S. H. McELROY, EXECUTRIX.
STEAM HEATING SYSTEM.
APPLICATION FILED AUG. 14, 1911.

1,161,872. Patented Nov. 30, 1915.

4 SHEETS—SHEET 1.

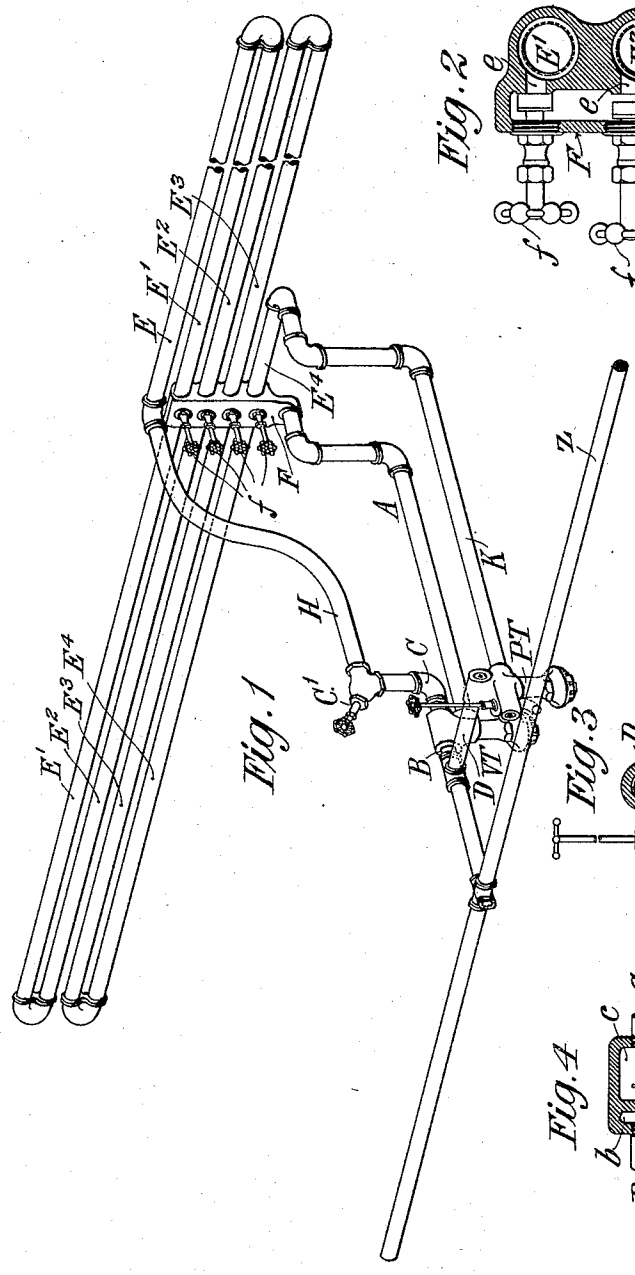


Fig. 1

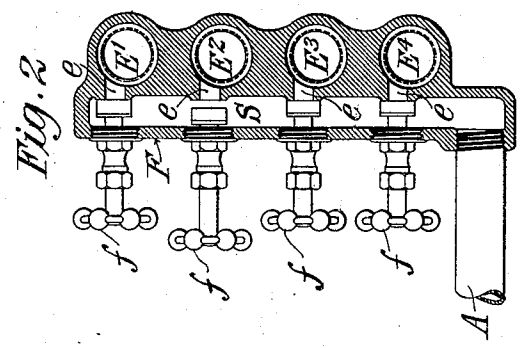


Fig. 2

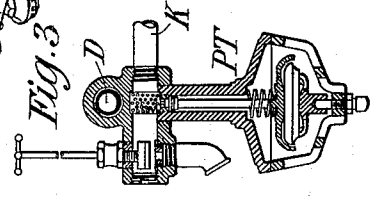


Fig. 3

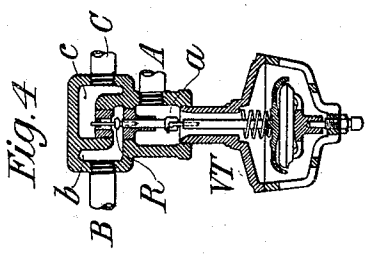


Fig. 4

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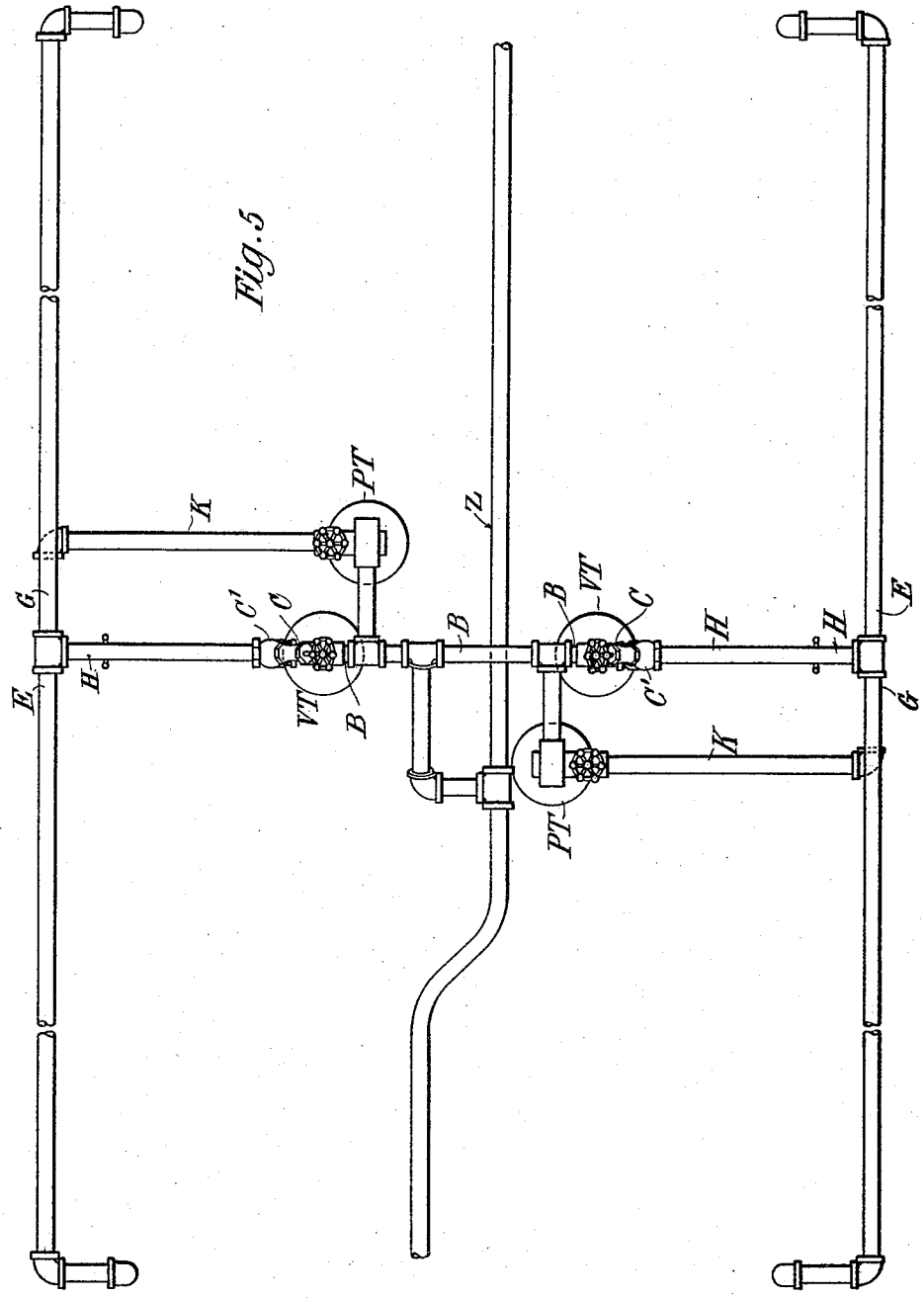
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4 SHEETS—SHEET 2.

Fig. 5



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4 SHEETS—SHEET 3.

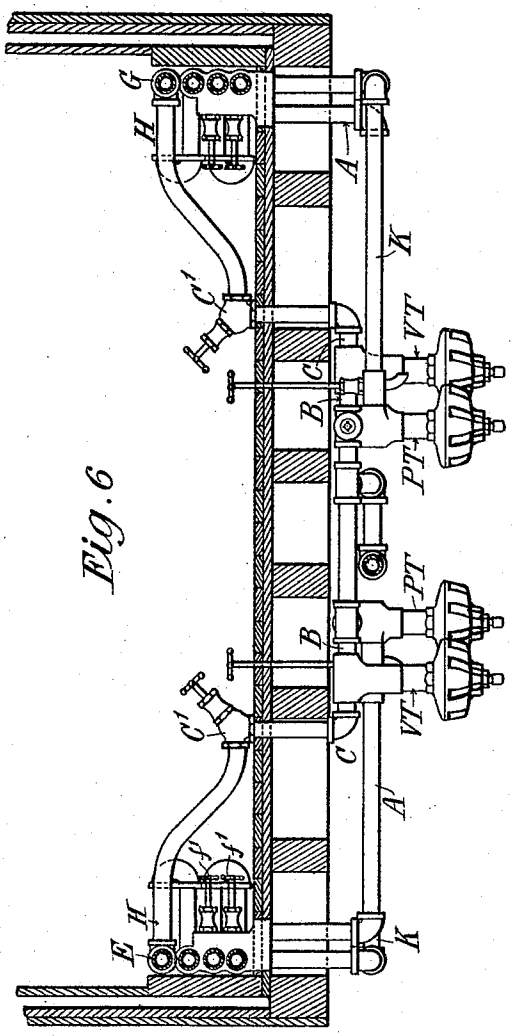


Fig. 6

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4 SHEETS—SHEET 4.

Fig. 7

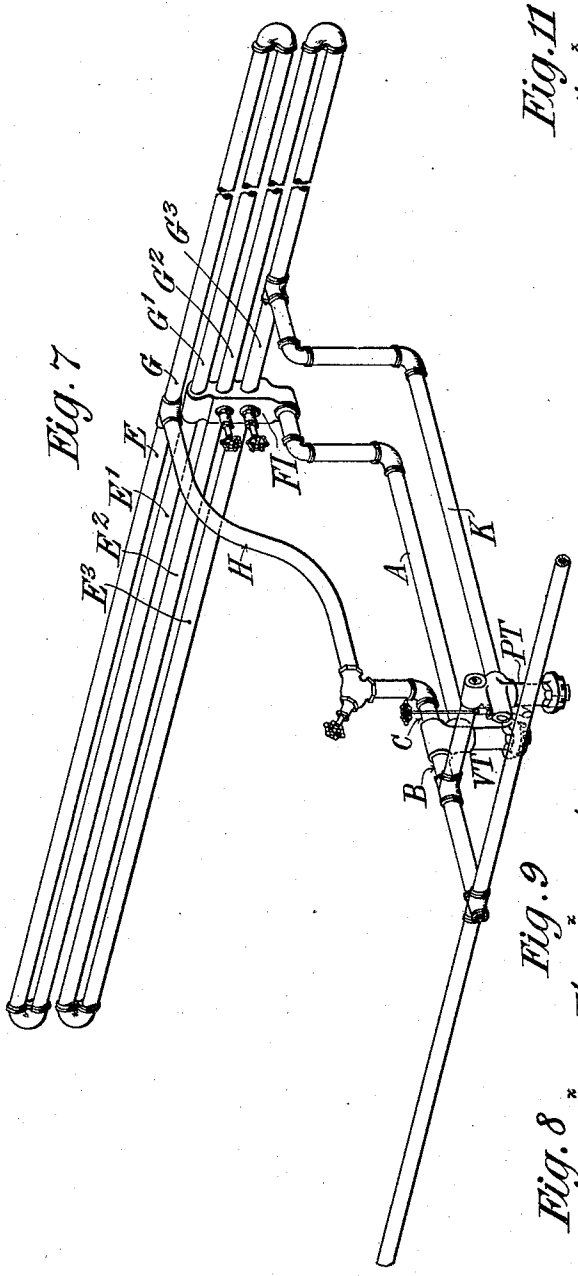


Fig. 11

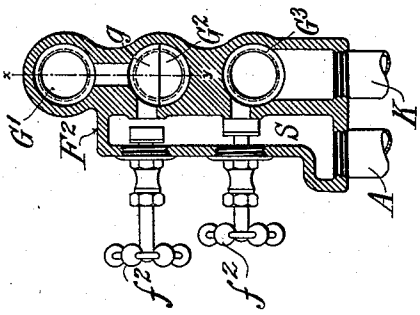


Fig. 9

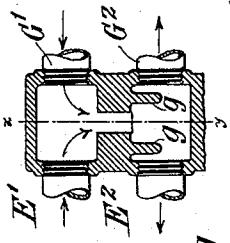


Fig. 10

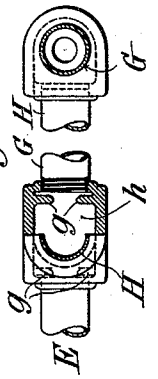
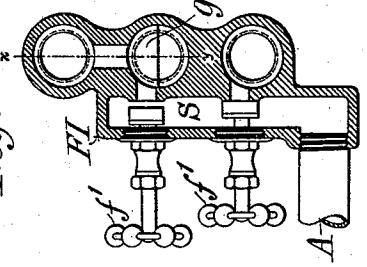


Fig. 8



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UNITED STATES PATENT OFFICE.

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STEAM-HEATING SYSTEM.

1,161,872. Specification of Letters Patent. Patented Nov. 30, 1915.

Application filed August 14, 1911. Serial No. 643,888.

To all whom it may concern:

Be it known that I, JAMES F. McELROY, a citizen of the United States, residing at Albany, county of Albany, State of New York, have invented certain new and useful Improvements in Steam-Heating Systems, the following being a full, clear, and exact disclosure of the one form of my invention which I at present deem preferable.

For a detailed description of the present form of my invention, reference may be had to the following specification and to the accompanying drawing, which illustrates my invention.

Figure 1 is a diagrammatic representation of my improved system; Figs. 2, 3 and 4 are details thereof in section; Fig. 5 represents a plan of the car piping; Fig. 6 is a transverse section of the car showing the pipes in position; Fig. 7 is a diagrammatic representation of a modified form of the invention; Fig. 8 is a sectional view of the pressure trap, Fig. 9 is a transverse sectional view of the radiator illustrated in Fig. 7; a line being taken longitudinally through the manifold; Fig. 10 is a detail sectional view taken at right angles to Fig. 9, and Fig. 11 is a detail front view of a portion of the manifold, parts being broken away and shown in section.

My invention relates to a heating system designed particularly for railway cars which may be readily converted from a "vapor" system wherein the thermostatic trap controls the inflow of steam to the radiators to a "pressure" system in which the thermostatic trap controls the outflow of steam from the radiators. It involves, moreover, an arrangement whereby from one or more points along the length of a set of radiating pipes a shunt connection may be established at will to conduct the steam directly to the vapor trap thereby practically putting out of action all of the radiating pipes beyond the point at which the shunt connection is established.

My invention also involves several special features which may be associated with the principal arrangements just mentioned.

Referring to Fig. 1 of the drawings, Z represents the train pipe of a car-heating system from which a branch pipe B goes directly to the vapor-trap VT. Thence, assuming that the admission port of the said vapor-trap is open, the steam passes by the outlet pipe C to the pipe H, through a control valve C^1, and from the pipe H it passes through a series of horizontal radiating pipes E, E^1, E^2, E^3, E^4 to the outlet pipe K leading to the pressure-trap PT. In the aforesaid horizontal radiating pipes there is placed at a convenient point—for instance, at the center of the car—a vertical manifold F intersecting the length of pipe at the several successive points, which points are therefore at different pressures while at each point the pipe may be put into communication, by means of a valve, with a chamber in the manifold which chamber has an outlet connection A directly to the vapor-trap VT, the outflow of steam from the said pipe A serving to determine the action of the thermostatic regulator in the trap. By this means a shunt connection may be established from any one of a series of intermediate points of different pressure along the length of the radiator-pipe directly to the vapor-trap.

In Fig. 2 there is shown a section of the aforesaid manifold. It comprises a casting with a vertical series of four chambers which form respectively a section or continuation of the several horizontal pipes E^1, E^2, E^3, E^4. Each of these chambers communicates, by means of a port or passage *e*, with a large chamber S, the passage *e* being preferably introduced into the upper part of the pipe-chamber so as to receive the steam therefrom, while allowing the water of condensation to remain in the pipe and flow through the series of pipes to the outlet pipe K and the pressure-trap PT. Each of the passages *e* is controlled by a valve *f*. Each of these valves therefore serves to control a shunt connection from a point along the length of the radiating pipes through the chamber S to the pipe A leading to the vapor-trap.

In Fig. 4 there is shown a section of the vapor-trap VT which is of a well known construction, there being in the bottom of the trap the usual thermostat which operates

a valve R controlling the flow of steam from the train-pipe branch B, through the chambers *b* and *c*, to the pipe C which leads to the radiator. The aforesaid shunt pipe A enters the chamber *a* in the trap and passes down therefrom to the thermostat, so that the action of the thermostat is dependent upon the outflow of steam from the radiator through the aforesaid shunt pipe A.

Fig. 3 shows a section of the pressure-trap wherein the thermostat in the bottom of the trap controls the outflow from the terminal pipe K of the radiating system and which outflow is also a determining agency for the thermostat, being allowed to pass down through the control-valve into the thermostat and, by virtue of its temperature, cause the thermostat to operate in accordance with the degree of that temperature. When the outflow is at a high temperature, the thermostat will tend to expand and close the outlet valve and, conversely, to open the said valve when the temperature of the outflow is at a predetermined lower degree. The pipe D leads from the train-pipe branch B to a dead-end chamber in the pressure-trap, and serves to keep the trap warm and prevent its freezing by the heat of the live steam in the pipe D. An ordinary blow-off cock for cleaning out the pipe is shown in Fig. 3 at the left of the trap.

The operation of the system above described is as follows: If all of the valves *f* are closed, none of the horizontal radiating pipes will be in communication with the chamber S of the manifold, and the stem will consequently pass through all of the radiating pipes in succession until it reaches the pressure-trap PT, which will then be in control of the system and make it of the pressure type, wherein the flow through the radiator is controlled at the outlet by means of the pressure-trap. The vapor-trap VT will, under those circumstances, remain open, since no steam will be admitted thereto through the shunt pipe A. If, however, the bottom valve *f* is open, the steam from the lower radiating pipe E^4 will flow directly into the chamber S and thence through the shunt pipe A to the vapor-trap VT. The system will then become a vapor system, since the trap VT is in control and operates upon the admission or inflow end of the radiator-pipes. The water of condensation will, however, flow largely or wholly through the said pipe K to the pressure trap by reason of the fact that port *e* leading from the lower radiator pipe E^4 to the shunting chamber S of the manifold departs from the top side or upper part of the pipe-chamber in the manifold which chamber is entered by and communicates with the radiator-pipe E^4. Moreover, as will be explained hereafter, the pipe E^4 as well as pipes E^1, E^2, E^3 may be restricted by transverse internal flanges extending partly across the pipe in the manner shown in Figs. 8, 9 and 10 wherein such flanges are represented as applied to certain pipes E^2 and G^2 at the point where it enters the manifold so that the steam may be diverted into chamber S and shunt pipe A in a more positive manner.

In the arrangement shown in Fig. 1 the radiator-pipes extend from end to end of the car and are connected in series, so that (when the valves *f* are all closed) the steam will flow through them in succession before reaching the terminal pipe K leading to the pressure-trap. The radiator-pipes may, however, be arranged as in Fig. 7 wherein the inflow stream from the pipe H branches and flows in opposite directions to the respective ends of the car through the pipes EG respectively. From the ends of the car the steam flows back by the pipes E^1 and G^1 to the manifold which, in this figure is marked F^1. From the manifold the steam again branches to the opposite end of the car through the pipes E^2 and G^2 and returns again to the manifold by the pipes E^3 and G^3. In the T between the pipe H and the branch pipes E and G I preferably provide a restricted opening into each of the branch pipes E and G, as appears more clearly in the sections through the T shown in Fig. 11. As is clearly shown in this figure the pipe H enters a chamber *h* in the T from which the ports leading respectively to the branch pipes E and G are restricted by means of flanges *g* projecting inwardly from the sides of the chamber *h* at points immediately adjacent to the ends of the entering pipes E and G. By this means the steam flow will be equally divided between the outflow branches E and G. Similarly in the manifold F^1 (see Figs. 9 and 10) the outflow into the branch pipes E^2 and G^2 is restricted by flanges *g g* which serve to equally divide the outflow between the two branch pipes and to divert the steam flow from the space between pipes E^1 and G^1 into the chamber S when the corresponding valve f^1 is opened.

The manifold employed in the arrangement of Fig. 7 is shown at F^1, a section thereof being represented in Fig. 9. It is similar in its character to the manifold F, heretofore described in connection with the arrangement of Fig. 1—that is to say, each radiating pipe which passes through the manifold may be put in communication with a chamber S by means of a valve f^1 and the steam thereby shunted through the chamber S and the pipe A to the vapor trap. In Fig. 11, however, the manifold, which is designated as F^2, is slightly different in that it contains a passage communicating with the under side of the lower radiator pipe G^3 which serves to connect said pipe G^3 with the terminal pipe K leading to the pressure-trap, whereas in the arrangement of Fig. 7,

which employs the manifold F^1, the terminal pipe K has a separate connection with the lower radiating pipe G^3 outside of the manifold.

As appears in Fig. 5, the train pipe Z passes centrally through the car in a longitudinal direction and the branch pipe B therefrom extends in opposite directions toward the respective sides of the car, each side being provided with a system of radiating pipes arranged as in Fig. 7 and with a separate set of vapor and pressure-traps and manifold as I have heretofore described.

Fig. 6 shows the same arrangement that appears in Fig. 5, but represents the apparatus as it appears in a sectional view taken transversely of the car at a point on one side of the several traps and calls for no further explanation.

By virtue of the arrangement above described I not only can convert the system from one type to another by merely opening or closing the lower shunting connection from the radiator to the inflow-controlling thermostat, but I can also adjust the heating effect of the radiator by shunting more or less of its length, while also diverting the water of condensation into the pressure-trap. The part of the radiator thus put out of action may retain some heat from the water therein, but will no longer be positively heated by the steam, it being my discovery that, by merely opening a shunt passage for the steam from a point in the radiator to the vapor-trap, that trap will then so adjust the inflow that it will penetrate through the radiator only to the point where the shunt passage is taken off, even though there still remains an open passageway through the remainder of the radiator to the terminal pipe K and the pressure-trap, which passageway may still be followed by the water. This is due to the pipe resistance and to the pressure required to overcome it. The radiator pipe is of considerable length, so that even if it opens at its outlet end into the atmosphere, the pressure at its inlet end must be above atmosphere while at the intermediate point or points where the one or more shunting connections are taken off the pressure will be at some intermediate valve sufficient to divert the steam flow into the shunt leading to the vapor trap. In other words, the adjustment of heating capacity in the radiator involves, not merely a cutting out of service of a portion of the radiator-pipe, but also an automatic adjustment of the steam inflow proportionate to the length of radiator-pipe that is thus cut out or shunted and the length of the part that is cut out or not shunted.

I do not limit myself to the particular forms shown and described herein but may utilize in a variety of forms the matter invented by me and stated in the following claims covering what I consider as new and desire to include in my patent.

What I claim as new and desire to secure by Letters Patent is:

1. A heating system comprising a radiator provided with an inlet and an outlet pipe, a valve controlling said inlet pipe, a thermostat for operating said valve, a thermostatic valve for said outlet pipe controlled by the medium escaping through said outlet pipe, a shunt pipe leading from an intermediate portion of said radiator to said thermostat, and means controlling the admission of heating medium free from said radiator to said shunt pipe, the latter when in communication with said radiator serving as the outlet therefor.

2. A heating system comprising a radiator provided with an inlet and an outlet pipe, a valve controlling said inlet pipe, a thermostat for operating said valve, a thermostatic valve for said outlet pipe controlled by the medium escaping through said outlet pipe, a shunt pipe leading from an intermediate portion of said radiator to said thermostat, a plurality of connections between said radiator and said shunt pipe, and means for independently controlling the admission of heating medium from said radiator to said shunt pipe, the latter when in communication with said radiator serving as the outlet therefor.

3. A heating system comprising a radiator, a vapor trap provided with a thermostatic valve controlling the inlet to said radiator, a pressure trap controlling the outlet of said radiator, and a plurality of shunt connections located at points of different pressure along the radiator, for shunting the outflow of the radiator from the pressure trap to the vapor trap.

4. A heating system comprising a radiator, a vapor trap provided with a thermostatic valve controlling the inlet to said radiator, a pressure trap controlling the outlet of said radiator, and a plurality of shunt connections located at points of different pressure along the radiator, for shunting the outflow of the radiator from the pressure trap to the vapor trap, and valves for controlling the respective shunt connections.

5. A heating system comprising a radiator, a vapor trap provided with a thermostatic valve controlling the inlet to said radiator, a pressure trap controlling the outlet of said radiator, a plurality of shunt connections located at points of different pressure along the radiator for shunting the outflow of the radiator from the pressure trap to the vapor trap, said shunt connections being located at points above the flow of condensation.

6. In a heating system, the combination with a radiator, of a vapor trap having a thermostatic valve controlling the inlet to

said radiator, an outlet pipe leading from one end of said radiator, a thermostatic pressure trap controlling the outlet from said outlet pipe, and one or more shunt connections from the top of the radiator pipes at one or more points of different pressure, and means for diverting the steam from said shunt pipe connections to the vapor trap and the water to the said pressure trap.

7. In a heating system, the combination with a radiator, of a vapor trap having a thermostatic valve controlling the inlet to said radiator, an outlet pipe leading from one end of said radiator, a thermostatic pressure trap controlling the outlet from said outlet pipe, and one or more shunt connections from the top of the radiator pipes at one or more points of different pressure, and means for diverting the steam from each of said points to the vapor trap, leaving the water to follow the course of the radiator to the pressure trap.

8. A heating system comprising a radiator, a vapor trap provided with a thermostatic valve controlling the inlet to said radiator, a pressure trap controlling the outlet of said radiator, a manifold applied to the radiator and intersecting the radiator at a plurality of points of different pressure in the radiator, means controlling the communication between said radiator and manifold at said points, and a conduit leading from said manifold to said vapor trap and shunting the flow of heating medium from said pressure trap.

9. In a heating system the combination with a radiator in the apartment to be heated, an external thermostat controlling the supply to said radiator, a manifold within the compartment applied to the radiator and intersecting the radiator at a plurality of points of different pressure in the radiator, means controlling the communication between said radiator and manifold at said points, and a conduit leading from said manifold to said thermostat.

10. A heating system comprising a radiator provided with an inlet and an outlet pipe, a valve controlling said inlet pipe, a thermostat for operating said valve, a thermostatic valve controlling said outlet pipe, a manifold intersecting the radiator at a plurality of points of different pressure, a shunt pipe leading from said manifold to said thermostat, and means controlling the admission of steam from said radiator to said manifold.

11. In a heating system the combination with a radiator, of a thermostat controlling the inflow thereto, a discharge pipe leading from one end of said radiator, a thermostat controlling the same, a second discharge pipe leading from the radiator to the first-mentioned thermostat, a plurality of shunt connections between said second discharge pipe and a corresponding number of points of different pressure in the radiator, and means for diverting the flow from the radiator at said points to the second discharge pipe.

12. In a heating system, the combination with a radiator, of a thermostatic vapor trap controlling the inflow thereto, a thermostatic pressure trap controlling the outflow of said radiator, and connections provided with restricted ports from two or more points of different pressure in the length of the radiator pipe leading to said vapor trap to shunt the outflow of the radiator from said pressure trap.

13. In a heating system, the combination with a series of radiator pipes in the apartment to be heated arranged vertically one above another, a vertical manifold intersecting the radiator pipes at points of different pressure, and having a chamber in controllable communication with said radiator pipes at the points of intersection therewith, a thermostatic vapor trap controlling the inflow to the radiator, a thermostatic pressure trap controlling the outflow of said radiator, and a pipe connecting said vapor trap with the manifold chamber to shunt the outflow of the radiator from said pressure trap.

14. In a heating system, the combination with a series of radiator pipes in an apartment to be heated, arranged vertically one above the other and inter-connected at their outer ends, an inlet pipe and an outlet pipe for said radiator pipes, a vertical manifold intersecting said pipes at points of different pressure and having a chamber in controllable communication with the said pipes at the points of intersection therewith, a thermostatic valve with the inlet pipe, a thermostatic valve for the outlet pipe controlled by the medium escaping through said outlet pipe, and a pipe connecting the chamber of the manifold with the inflow controlling thermostat, said pipe serving as the outlet for the radiator when the manifold is in communication with the latter.

15. In a heating system the combination of a radiator, a manifold intersecting the radiator pipes at separated points of different pressure in its length and provided with flanges adjacent to and opposite the ends of the radiator pipes within the manifold, controlling means controlling the inflow to said radiator, and a connection from said manifold to said controlling means.

16. In a steam heating system, the combination with a radiator pipe having two or more sections in series, of an inlet valve, a thermostat controlling said valve, a discharge pipe for said radiator, a thermostatic valve controlling the discharge therefrom, a second discharge pipe leading from said radiator to said thermostat, one or more shunt connections to said second discharge

pipe leading from one or more intermediate junction points of the said sections, and valves controlling the said several connections for diverting the outflow of the radiator from the thermostatic outlet valve to the thermostat controlling the inlet valve.

In witness whereof I have hereunto set my hand, before two subscribing witnesses, this 11th day of August, 1911.

JAMES F. McELROY.

Witnesses:
HERBERT A. CALKINS,
CLARENCE PALMER.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."