No. 834,991. PATENTED NOV. 6, 1906.

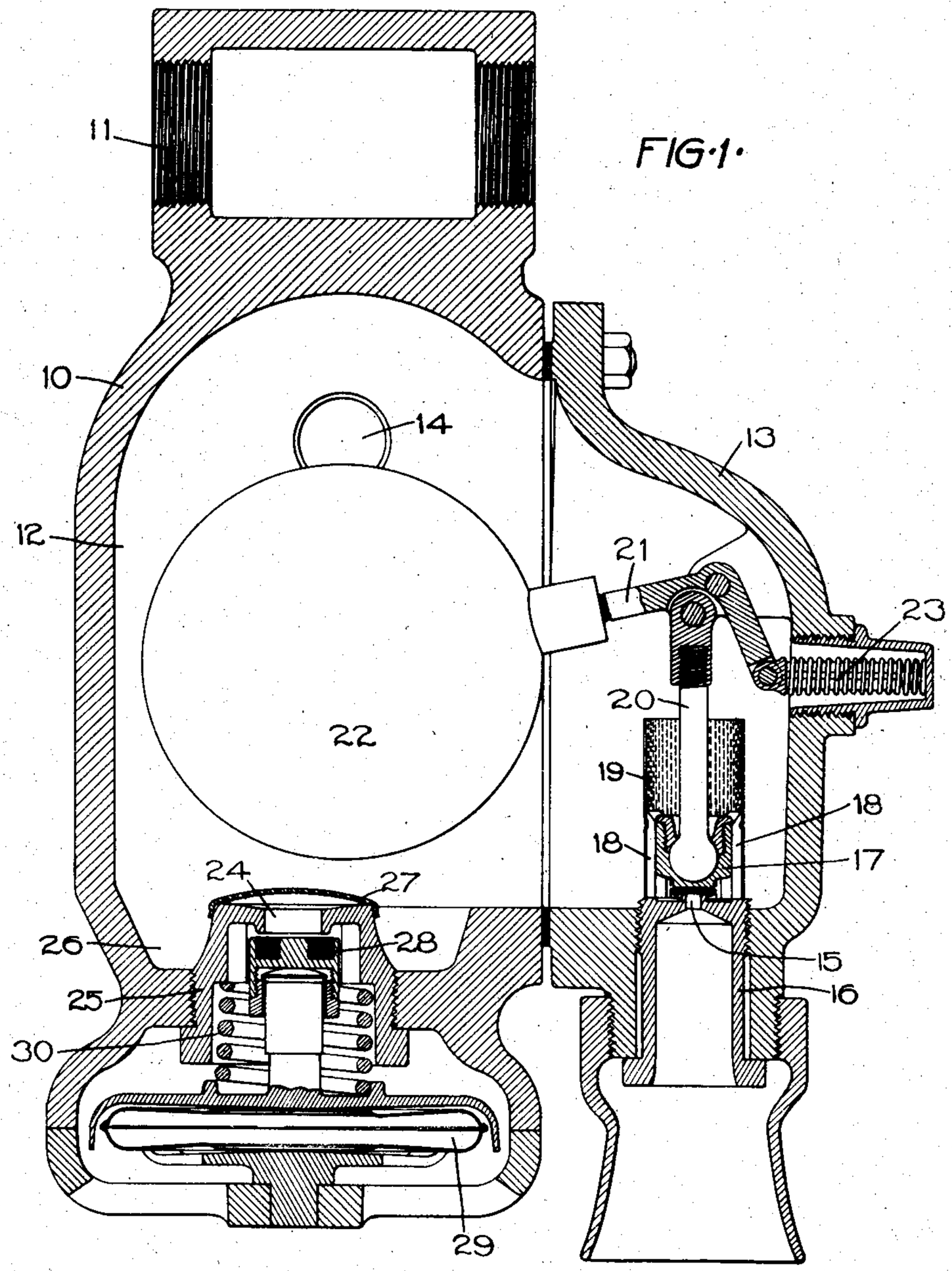
J. F. McELROY.

THERMO FLOAT TRAP.

APPLICATION FILED JUNE 16, 1906.

2 SHEETS—SHEET 1.

FIG·1·



WITNESSES·

J. Blake

E. Shafer

INVENTOR·

J. F. McElroy

BY Robert W. Pierson

ATTY.

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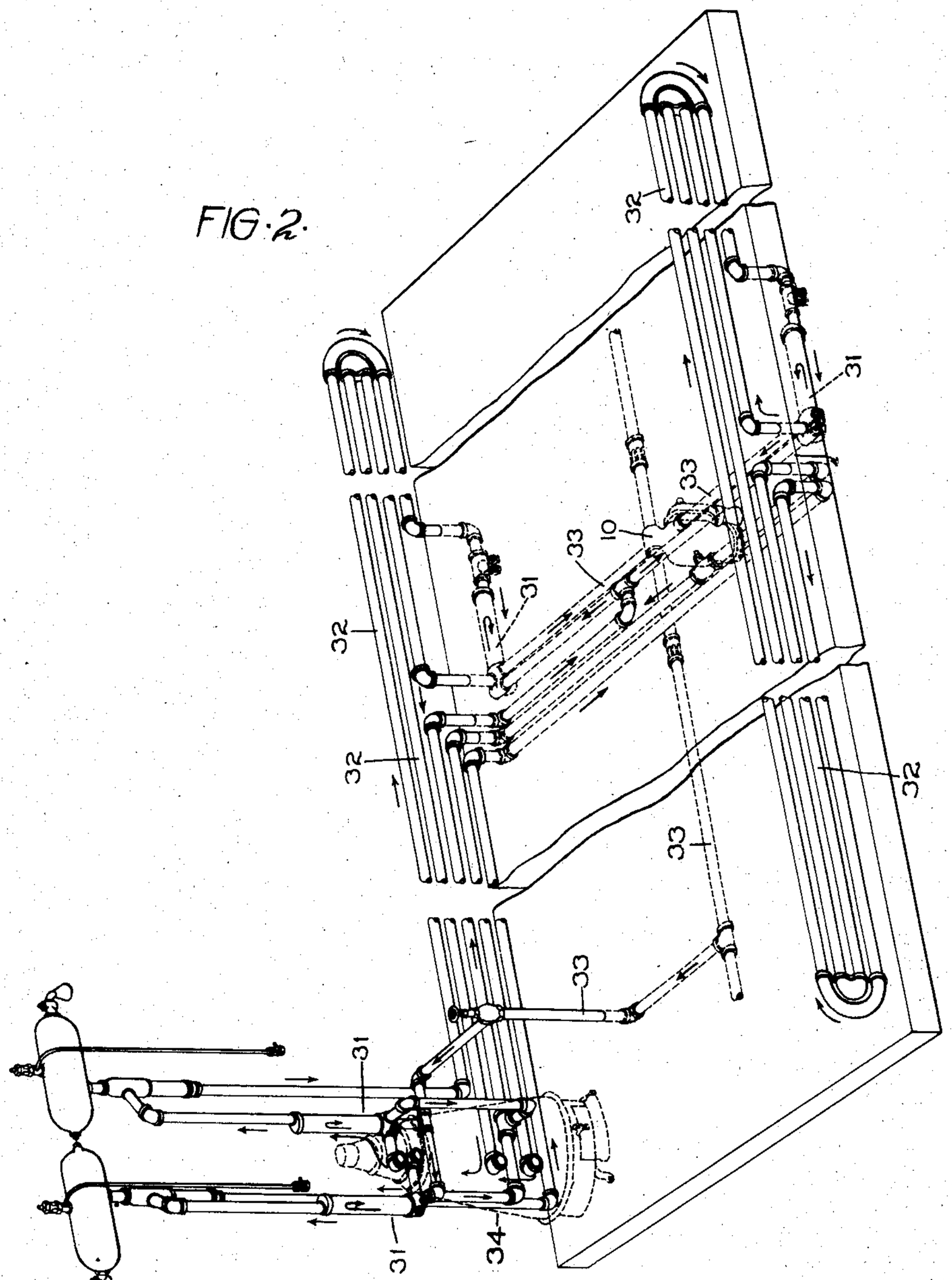
2 SHEETS—SHEET 2.

FIG. 2.



WITNESSES

G. Blake

E. Shafer

INVENTOR

J. F. McElroy

BY Robertson Peirce

ATTY.

UNITED STATES PATENT OFFICE.

JAMES F. McELROY, OF ALBANY, NEW YORK, ASSIGNOR TO CONSOLIDATED CAR-HEATING COMPANY, OF ALBANY, NEW YORK.

THERMO-FLOAT TRAP.

No. 834,991. Specification of Letters Patent. Patented Nov. 6, 1906.

Application filed June 16, 1906. Serial No. 322,065.

To all whom it may concern:

Be it known that I, JAMES F. MCELROY, a citizen of the United States, residing at Albany, in the county of Albany and State of New York, have invented certain new and useful Improvements in Thermo-Float Traps, of which the following specification and accompanying drawings illustrate the invention in a form which I now regard as the best out of the various forms in which it may be embodied.

This invention relates to devices for draining steam-heating systems; and it has for its object to provide means for discharging both the water of condensation and the air from such systems irrespective of the temperature of the water and without substantially liberating the steam. No mechanism, so far as I am aware, has heretofore been contrived, which will accomplish that result.

My invention is especially applicable to car-heating systems, though not wholly confined thereto. At the present time steam car-heaters are usually drained by means of thermostatic traps, which open a discharge-valve when the discharge is sufficiently cool to allow the thermostatic element to contract and close it when the steam begins to escape. Such traps will discharge the air which accumulates in the pipes when the system is cold, but they will obstruct the passage of water which is so hot as to expand the thermostatic element, the consequence being that water frequently accumulates in the pipes to a considerable depth. This water is very troublesome, especially when the system is a combination steam and hot water system containing water in the radiator-pipes heated by means of steam-drums. In such systems the circulation depends upon the formation of steam bubbles in the risers of the hot-water circuit, and when water backs up into the steam-drums it is usually cold enough to prevent the bubble formation, and it therefore stagnates the water circulation. On the other hand, traps responsive to water-level, such as float-traps, while they will drain the water down to the level of the float are yet unable to discharge either air or the small permanent pool of water which is necessary to buoy the float. This small pool frequently freezes and puts the trap out of operation. I have formerly attempted to remedy this last difficulty in a float-trap by means of a check-valve for draining the float-chamber, said valve being closed by the pressure of the steam, but since said valve was also closed by the pressure of any air present in the pipe when steam is first turned on the trap became air-bound.

My present invention not only combines the advantages of the different types of traps heretofore employed, but it attains new results which are not attainable by any of the prior traps used alone.

My trap in its preferred form includes two discharge-valves, one being operated by a float and the other by a thermostat, and the thermostatic valve is preferably so arranged as to work below the operative range of the float-valve, and thus remove the pool of water from beneath the float after the float-valve has ceased its action, the consequence being that the float-valve takes care of the normal discharge when the heating system is working, and the thermostatic valve discharges the air when the system is started up and drains the float-chamber after steam is shut off. Consequently there is no freezing, and the heating system is enabled to work perfectly under all conditions.

Of the accompanying drawings, Figure 1 represents a vertical section showing a thermo-float trap constructed according to my invention. Fig. 2 represents a perspective diagram of a car-heater with the trap applied thereto.

The same reference characters indicate the same parts in both views.

Referring to Fig. 1, 10 indicates a casing having a threaded socket 11 at its upper end for the support of the trap and the passage of the main steam-pipe in a well known manner, so that the trap is kept hot so long as steam is on the car. This casing contains a single water-accumulating chamber 12, contained partly in the main body of the casing and partly in a removable side member 13 thereof, said casing having one or more inlets 14 for the water of condensation, air, and steam from the steam-heating system. 15 is a discharge-outlet formed in a removable valve-seat member 16 and controlled by a float-valve 17, which seats downwardly with the discharge-flow and is guided within the chamber 12 by upwardly-extending guide-arms 18, formed on the valve-seat member. A cylindrical strainer 19 surrounds the approach to

the valve 15. This outlet is rather small in relative size, since it only has to discharge water, but is large enough to take care of all the water of condensation coming from the heating system to which the trap is applied.

Valve 17 connects by a link 20 with an angle-lever 21, having on one arm the float 22, which operates said valve. This float is preferably made heavy and strong to remain water-tight, and its weight is partly counterbalanced by a spring 23, acting on the other arm of the lever. This increases the buoyant effect due to the displacement of the float and enables the float to operate when somewhat less than half immersed.

24 is a second discharge-opening leading from the chamber 12 at about the same level as the opening 15 and formed in a removable valve-seat member 25, surrounded by a sediment-collecting trough 26, which may have a suitable blow-off. (Not shown). The discharge-opening is covered by a strainer 27, This opening 24 is controlled by a valve 28, seated upwardly against the discharge-flow and operated by an external thermostatic cell 29 on well-known principles, the valve being normally pressed open by a spring 30, which is overcome when the hot discharge expands the contents of cell 29.

In the normal operation of this trap, when hot water is being received in the chamber 12 from the heating system, the thermostatic valve 28 remains closed, and the float-valve 17 handles the accumulation of water, being opened when the water has risen so far as to sustain the float 22 and closing when the water is below that level. It is apparent that the valve 17 would be unable to discharge air even if it could liberate the water down to the lip of the valve-seat, for the valve would have to close when the water had reached that level. I have arranged this trap so that the critical level of the water is considerably above the level of the discharge-opening 15. It will be apparent also that the float-valve could not dispose of the pool of water required to sustain the float, and this pool of water would freeze and disable the trap. Thermostat-valve 28 operates to supply the deficiencies in the operation of float-valve 17. When steam is first turned into the cold pipes, it drives before it the air, and valve 28 being then open allows the air to escape and the steam to follow it and fill the pipes. It also prevents the trap from getting air-bound and holding back water in the pipes. Valve 28 also disposes of the first cold water of condensation. As soon as steam enters the trap it closes valve 28 by thermostatic action, and thereafter the float-valve 17 disposes of water of condensation. When the system is shut down and the trap cools off, valve 28 again opens and drains the pool of water from chamber 12 down to a point below the float 22 and slightly below the valve 17. Any moisture which then freezes in the casing cannot affect subsequent proper working of the trap.

Fig. 2 shows my improved trap applied to a combination steam and hot-water system. 10 indicates the trap receiving drainage from the steam-drums 31, here shown as four in number, located in two water-circuits, one for each side of the car, which I have designated by the numeral 32. 33 indicates the steam-pipes. The direction of the steam circulation is indicated by arrows within the pipes, and the direction of water circulation by arrows outside of the pipes. Heretofore, with the thermostatic traps commonly applied to hot-water systems of this type, hot water would accumulate to the level of drums situated similarly to the lower drums 31, and would sometimes partly fill the drums located above the Baker heater 34. Such water is at about 170° Fahrenheit, while the drum requires for effective operation steam of perhaps 230° Fahrenheit. My improved trap avoids this trouble and keeps the drums and steam-pipes clear for the proper circulation of steam.

I claim—

1. In combination, a steam-heating system, outlets leading from a low-draining point thereof, discharge-valves controlling said outlets, a temperature-responsive device controlling one of said discharge-valves, and a water-level responsive device controlling the other discharge-valve.

2. In combination, a steam-heating system having a water-drainage outlet, a level-responsive device for automatically controlling said outlet, and temperature-controlled means for automatically draining the system to a point below the operative range of said level-responsive device.

3. A trap for steam-heating systems comprising a water-collecting chamber having a discharge-valve, a level-responsive device in said chamber causing said valve to be opened when the water rises to a predetermined level, a second discharge-valve adapted to drain said chamber below that level, and a thermostat controlling the latter valve and subject to the temperature of the drainage.

4. A thermo-float trap for steam-heating systems comprising a float-chamber and a float therein controlling the trap-discharge, and thermostatic means for automatically draining said float-chamber.

5. A thermo-float trap for steam-heating systems comprising a collecting-chamber containing a float and having two discharge-orifices controlled by valves one of which is operated by the float and the other of which drains the collecting-chamber below the operative range of the float-valve, and a thermostat controlling the last said valve and subject to the temperature of the drainage.

6. A thermo-float trap for steam-heating

systems comprising a collecting-chamber having two water-discharge outlets in its lower portion, valves controlling said outlets and seating, one with the discharge-flow and the other against said flow, an external thermostat controlling the latter valve and located in the line of its discharge, and a float in said chamber controlling the first said valve and operated by water accumulating above the level of said outlets.

7. A thermo-float trap for steam-heating systems comprising a casing having a single water-collecting chamber with two discharge-outlets, and devices, one responsive to temperature and the other to water-level, controlling the respective outlets and each adapted to discharge water from said chamber which is not discharged by the other.

8. The combination, with a steam-heating system, of level-responsive means for draining water of condensation therefrom, and mechanism for automatically draining the level-responsive means below the range of the latter's operation and including a temperature-responsive device which discharges air from the system.

9. A heating system comprising in combination, a hot-water radiator, a steam-drum for communicating heat to the water, included in a steam-conduit, and means for automatically discharging both the air and the water of condensation from said steam-conduit and drum irrespective of the temperature of the water and without substantially liberating the steam.

In testimony whereof I have hereunto set my hand, in the presence of two subscribing witnesses, the 13th day of June, 1906.

JAMES F. McELROY.

Witnesses:

BEULAH CARLE,

ERNEST D. JANSEN.