(No Model.) 2 Sheets—Sheet 1.

E. H. GOLD.

CAR HEATING SYSTEM.

No. 528,158. Patented Oct. 30, 1894.

Fig. 1.

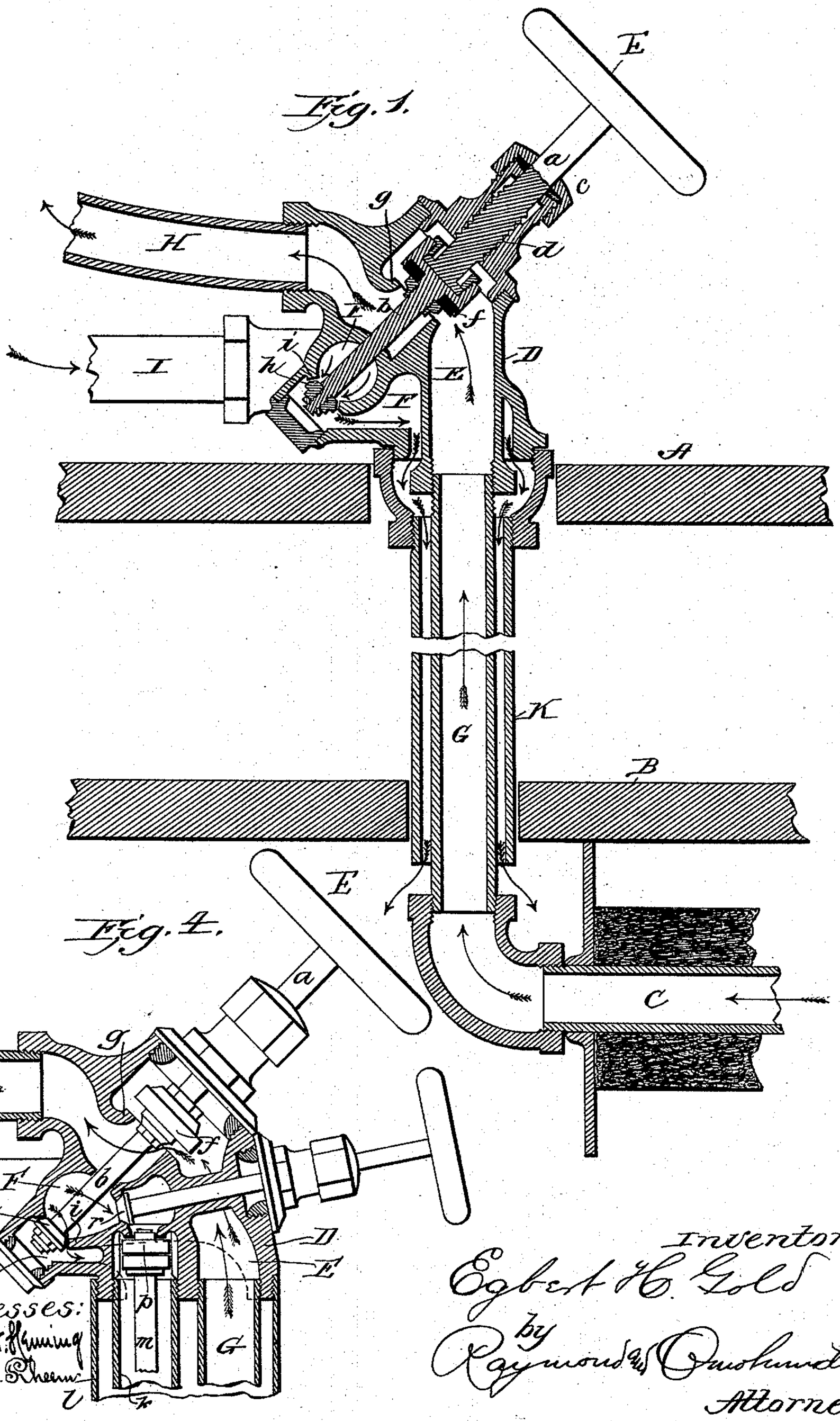

Fig. 4.

Witnesses:
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Wm. N. Sheem

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THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

(No Model.) 2 Sheets—Sheet 2.

E. H. GOLD.

CAR HEATING SYSTEM.

No. 528,158. Patented Oct. 30, 1894.

Fig. 2.

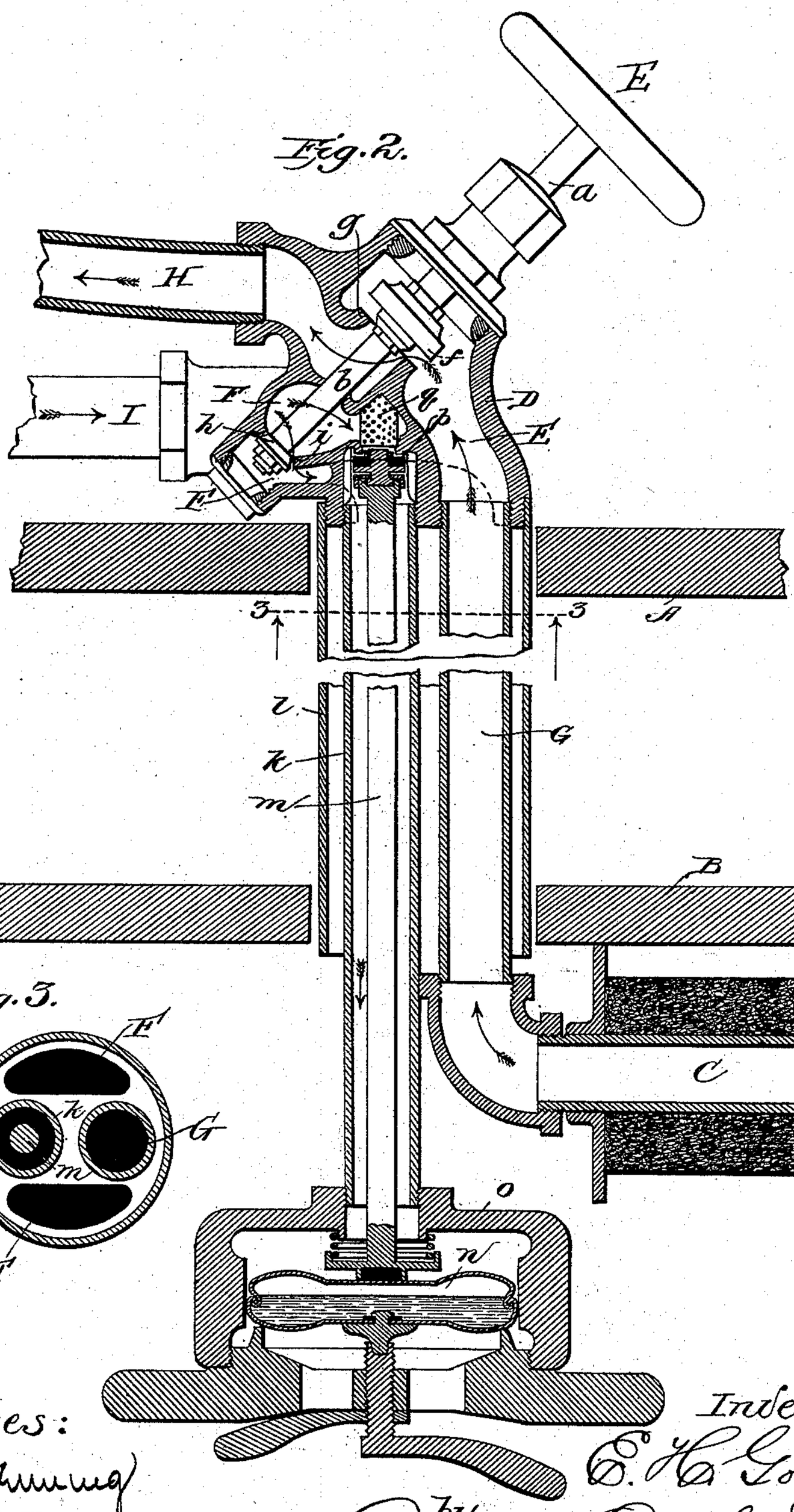

Fig. 3.

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UNITED STATES PATENT OFFICE.

EGBERT H. GOLD, OF CHICAGO, ILLINOIS.

CAR-HEATING SYSTEM.

SPECIFICATION forming part of Letters Patent No. 528,158, dated October 30, 1894.

Application filed April 24, 1893. Serial No. 471,558. (No model.)

To all whom it may concern:

Be it known that I, EGBERT H. GOLD, a citizen of the United States, residing in Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Car-Heating Systems, of which the following is a specification, reference being had to the accompanying drawings.

This invention relates to improvements in that class of car heating systems in which the water of condensation is discharged from the system as rapidly as it is formed, and has for a primary object to so dispose the supply and exhaust pipes and their controlling valves with relation to each other, that the live steam may be utilized to prevent the freezing of, or for thawing out, the exhaust pipe, as well as for discharging the water of condensation.

Another primary object of my invention is to have the supply and exhaust pipes and their controlling valve of such character and so disposed that the water of condensation may be automatically discharged in such manner that the live steam may not only be utilized for thawing out or preventing the freezing of the exhaust pipe and the trap, but at the same time the water of condensation may be directly discharged into the air without passing through the steam trap.

A further primary object is to have the supply and exhaust pipes and their controlling valve of such character and so disposed that the water of condensation may be either automatically or intermittently discharged from the system at the will of the train men, so that in the event the automatic valve becomes disabled or undesirable for any reason, the operation of the system will not be prevented or seriously impeded.

These and other objects hereinafter more particularly pointed out, are attained by the devices illustrated in the accompanying drawings, in which—

Figure 1 represents a central, vertical section through a double acting valve embodying my invention; Fig. 2, a similar view showing an automatic steam trap combined therewith; Fig. 3, a horizontal section on the line 3—3 of Fig. 2 looking in the direction indicated by the arrows; and Fig. 4, a detail section showing a modification of my invention.

Similar letters of reference indicate the same parts in the several figures of the drawings.

Referring by letter to the accompanying drawings, A indicates the car floor; B, the underneath sheathing thereof and C the steam supply pipe connected with the engine boiler or any other suitable source of steam and from which the car heaters or radiators (not shown) are supplied.

Within the car, and preferably, just above the floor thereof, is located an angularly disposed valve casing D provided generally with two chambers or passages E and F, the former being connected at one end by a pipe G with the supply pipe C and at the other end by a pipe H with the radiator or car heater, so that all steam supplied to the car heater must pass through the chamber E of the valve casing. The other chamber or passage F, is also connected at one end by a pipe I with the radiator or car heater, which pipe serves as a return or exhaust pipe for the radiator while the other end of the passage or chamber F is extended by means of a pipe K attached to the casing D and extending down through the flooring and sheathing of the car so as to open at its lower end into the air. This pipe K is shown in the drawings as surrounding pipe G connecting the supply pipe C with the valve casing so that the water of condensation and exhaust steam from the radiators, in being discharged, must pass down through this shell-like casing in contact with the pipe G which latter thus serves in cold weather to prevent the freezing of the exhaust pipe or even the formation of icicles thereon, while if, from any cause, the exhaust pipe becomes frozen and choked, the heat from the pipe G would quickly thaw it out. It is obvious, however, that so far as the other features of my invention are concerned the pipes G and K might be arranged side by side instead of one within the other, although the desirable result above referred to, that of preventing freezing of the exposed portion of the supply pipe, would be rendered more difficult and uncertain of accomplishment.

Through the valve casing D and preferably at an oblique angle, extends a two-part valve stem *a*, *b*, the part *a* working through the usual stuffing box or gasketed cap *c* and having a screw-threaded connection *d* with

the casing whereby the stem may be given an endwise movement as usual in valves, a hand-wheel E being provided on the outer end thereof for this purpose. The inner section *b* of the valve stem has a loose connection with the outer section *a*, that is to say, a connection which permits a free rotation of the outer section independent of the inner section, while the endwise movement of the outer section in both directions is transmitted to the inner section. This inner section of the valve stem carries two valves, one which I will call the supply valve *f* having a seat on a perforated diaphragm *g* in the chamber or passage E, and the other, which I will call the exhaust valve *h* having a seat upon a perforated diaphragm *i* in the passage or chamber F whereby these two valves serve to close the said chambers or passages E and F, when desired.

The valves *f* and *h* seat in opposite directions and are so disposed upon the valve stem that they are seated and unseated alternately, that is to say, when the supply valve *f* is seated, the exhaust valve *h* is unseated and vice versa. By a proper manipulation the valves may be each partially unseated at the same time, and I may here state that in practice the position of the valve shown in the drawings is the position that will produce the most satisfactory result in the use of these devices, for in this position while the supply valve is practically all the way open, the exhaust valve is also open, but very slightly and just sufficient to permit a constant exhaust of the water of condensation, this opening of the exhaust valve being increased and diminished according to the amount of condensation taking place and the desired temperature of the car to be heated. With these devices as described and especially when used in the manner set forth the water of condensation may be discharged from the heating system as rapidly as it forms and in such manner as to not only avoid but prevent the freezing of the exposed portion of the supply pipe, and this, too, without the necessity for using an automatic steam trap of any character such as is now commonly used in railway heating systems. I prefer, however, for the sake of economy and especially for use in very cold climates, to employ in connection with my double acting valve just described, an automatic steam trap for discharging the water of condensation automatically and only as it accumulates. The devices for accomplishing this desirable object are more particularly shown in Figs. 2 and 3 wherein the general arrangement of the double valve with its pipe connections to the source of steam supply and the radiator, are the same as just described and illustrated in Fig. 1. The principal difference is in the application of an automatic steam trap, which so far as relates to the broad idea of my invention, may be of any suitable or desirable construction. In the drawings I have shown a simple and effective form which consists of a tube *k* extending parallel with the pipe G and through a shell or inclosing pipe *l* which corresponds with the exhaust pipe K of the construction shown in Fig. 1 enveloping both the pipe G and tube *k* and serving as an exhaust pipe for discharging direct to the open air the water of condensation and exhaust steam, which incidental to such discharge would serve to thaw out the tube *k* in the event it should become frozen up. Through the tube *k* extends a rod *m* connected at its lower end with an expansion device *n* of any suitable character contained within a casing *o* attached to the end of the tube *k* below the sheathing B. The rod *m* carries upon its upper end a valve *p* seating upon the diaphragm *i* of the valve casing D on the same side as the exhaust valve *h*, but in a chamber separated from the chamber F, so that the water of condensation and condensed steam may pass out of the chamber F past the valve *p* and the expansion device while the exhaust valve *h* is seated. The valve *p* is automatic in its action and is simply a type of its class, its operation being such that when no steam is on, the expansion device *n* is contracted under the influence of the cooler atmosphere outside of the car so as to unseat the valve *p* which will remain unseated after the steam is turned on until all the water of condensation which has lodged in the car heater or radiator and its connecting pipes, is discharged therethrough to the open air and sufficient steam has been exhausted through the valve to cause the expansion of the device *n* by the heat thereof so as to close the valve *p*. As soon as the expansion device is cooled sufficiently by the atmosphere the valve *p* will again be temporarily opened thereby to permit the discharge of the accumulated water of condensation and so remain until the heat of the escaping steam has again affected the expansion device to the extent of reseating the valve, and this operation of intermittently opening and closing the valve *p* will be constantly and automatically repeated during the use of the heating apparatus.

As will be seen more particularly by an inspection of Fig. 3, the chamber or passage F divides so as to open into the inclosing shell *l* at each side of the pipe G and tube *k* so that in the event said tube should become clogged or frozen, by a proper manipulation of the valves *f* and *h* the water of condensation and condensed steam may be exhausted directly out of the system to the open air without going through the automatic steam trap, and if the latter be frozen up, it will operate to thaw out the same when the exhaust valve may be again closed. A strainer *q* may be provided surrounding the seat of the valve *p* within the chamber or passage F so as to prevent the lodgment upon the valve seat of dirt or other foreign substances which might interfere with the operation of the valve.

It will be found desirable at times to dis-

pense with the employment of the automatic steam trap, even where the system is equipped therewith, or when the steam trap may become defective in its operation and remain constantly open. To provide for these contingencies, a hand-operated valve of any suitable character and of any desired location may be employed for shutting off communication between the chamber F and the chamber in which the automatic valve *p* is located and many different ways of accomplishing this result will readily suggest themselves to one skilled in the art to which my invention appertains.

In Fig. 4 I have shown a valve *r* merely for the purpose of illustrating the idea, the stem and casing thereof passing through but not closing or materially obstructing the supply passage E of the valve casing. Obviously when this valve is seated the automatic steam trap is entirely cut out of the system and the exhaust must then take place through the exhaust valve the same as if no steam trap were used in connection therewith, that is to say, the apparatus would at that time be exactly the same as the apparatus shown in Fig. 1; but upon reopening this hand-operated valve and closing the exhaust valve, the steam trap with its automatic valve would be again brought into play.

While I have shown and described the valves *f* and *h* as disk valves separate and distinct from each other, but simultaneously operated by the one valve stem, to alternately seat and unseat, it would of course be within the spirit of my invention to have a single or double acting slide, rotary or other form of valve operating in the same manner to alternately open the supply passage and close the exhaust passage or vice versa.

With a trap embodying the preferred form of my invention such as that shown in Fig. 2, or rather, with the complete apparatus shown in Fig. 4 the steam heating system may be readily and quickly adapted either for direct exhaust or for an automatic exhaust and under all conditions the exposed portions of the pipes are prevented from freezing, or if by failure of operation they should become frozen especially under extreme temperatures, they may be quickly thawed out without the necessity for the attendant leaving the car; and furthermore, these valve devices are of such character that the controlling exhaust valves, whether hand-operated or automatically operated, may be located within the space to be heated and therefore safe from the liability of freezing, while the automatic expansion device may be located wholly outside of the space to be heated and therefore exposed to the atmospheric temperature which renders the same quick and effective in its responses.

Having described my invention, what I claim as new therein, and desire to secure by Letters Patent, is—

1. The combination with a valve casing having separate steam supply and exhaust passages or chambers and located within the space to be heated, said supply chamber being connected with a source of steam supply and a heater or radiator and said exhaust chamber being also connected with the heater or radiator and with a pipe opening to the outer air and inclosing the supply pipe, of a valve for alternately closing said supply and exhaust passages, substantially as described.

2. The combination with a valve casing having separate steam supply and exhaust passages or chambers and located within the space to be heated, said supply chamber being connected with a source of steam supply and a heater or radiator and said exhaust chamber being also connected with the heater or radiator and with a pipe opening to the outer air and inclosing the supply pipe, of separate valves for closing said passages, and a hand-operated valve stem for simultaneously but alternately seating said valves, substantially as described.

3. The combination with a valve casing having separate supply and exhaust passages or chambers, said supply passage being connected with a source of steam supply and a heater or radiator and said exhaust passage being also connected with the heater or radiator and an exhaust pipe opening to the outside air in proximity to the supply pipe, of a hand-operated valve adapted to alternately close said supply and exhaust passages and an automatically operated exhaust valve also located in the exhaust passage, substantially as described.

4. The combination with a valve casing having separate supply and exhaust passages or chambers, said supply passage being connected with a source of steam supply and a heater or radiator and said exhaust passage being also connected with the heater or radiator and an exhaust pipe opening to the outside air in proximity to the supply pipe, of a hand-operated valve adapted to alternately close said supply and exhaust passages, an automatically operated exhaust valve also located in the exhaust passage, and a hand-operated valve for cutting off communication between the exhaust passage and said automatic valve, substantially as described.

5. The combination with a valve casing having separate steam supply and exhaust passages or chambers, said supply chamber being connected with a source of steam supply and a radiator or heater and said exhaust chamber being also connected with the radiator or heater and with a pipe opening to the outer air and inclosing the supply pipe, of a valve for alternately closing said supply and exhaust passages, a discharge tube also connected with the exhaust passage and extending through the exhaust pipe leading therefrom, an automatic valve for closing said discharge tube and an expansion device connected with and operating said valve, substantially as described.

6. The combination with a valve casing having separate supply and exhaust passages or chambers, said supply passage being connected with a source of steam supply and a heater or radiator and said exhaust passage being also connected with the heater or radiator and an exhaust pipe opening to the outside air in proximity to the supply pipe, of separate valves for closing said supply and exhaust passages, a hand-operated valve stem for simultaneously operating said valves to alternately seat the same, and an automatically operated exhaust valve also located in the exhaust passage, substantially as described.

7. The combination with a valve casing having separate supply and exhaust passages or chambers, said supply passage being connected with a source of steam supply and a heater or radiator and said exhaust passage being also connected with the heater or radiator and an exhaust pipe opening to the outside air in proximity to the supply pipe, of separate valves for closing said supply and exhaust passages, a hand-operated valve stem for simultaneously operating said valves to alternately seat the same, an automatically operated exhaust valve also located in the exhaust passage, and a hand-operated valve for cutting off communication between the exhaust passage and said automatic valve, substantially as described.

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