No. 689,869. Patented Dec. 31, 1901.

E. H. GOLD.

STEAM TRAP.

(Application filed Feb. 1, 1900.)

(No Model.) 2 Sheets—Sheet 1.

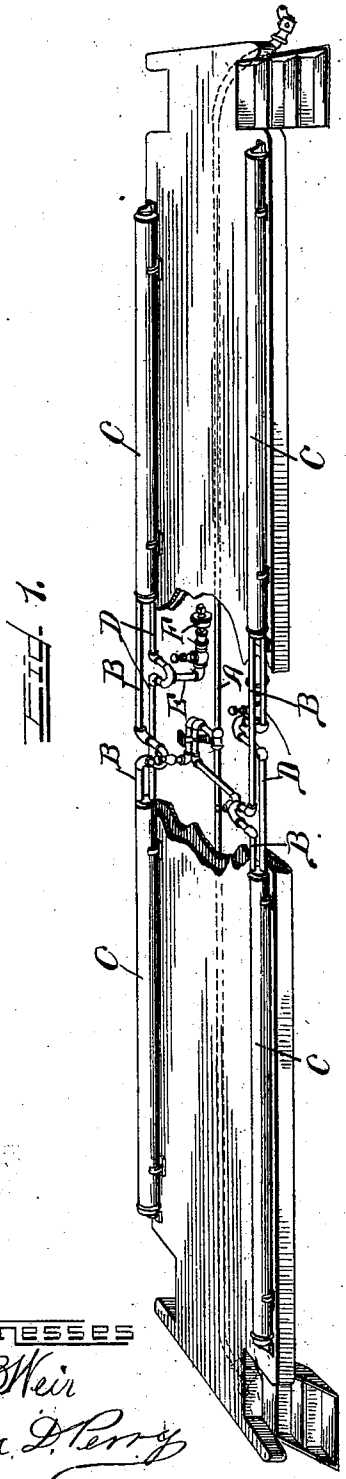

Fig. 1.

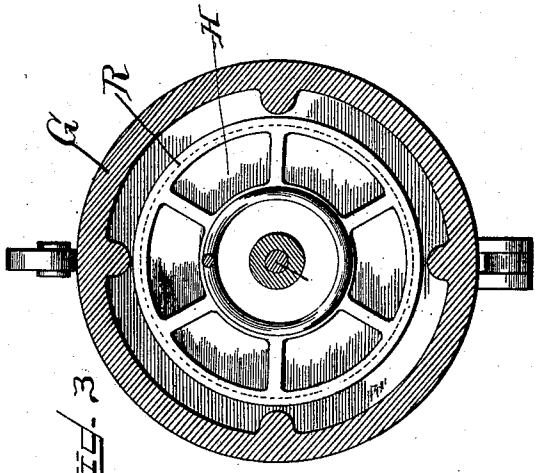

Fig. 3.

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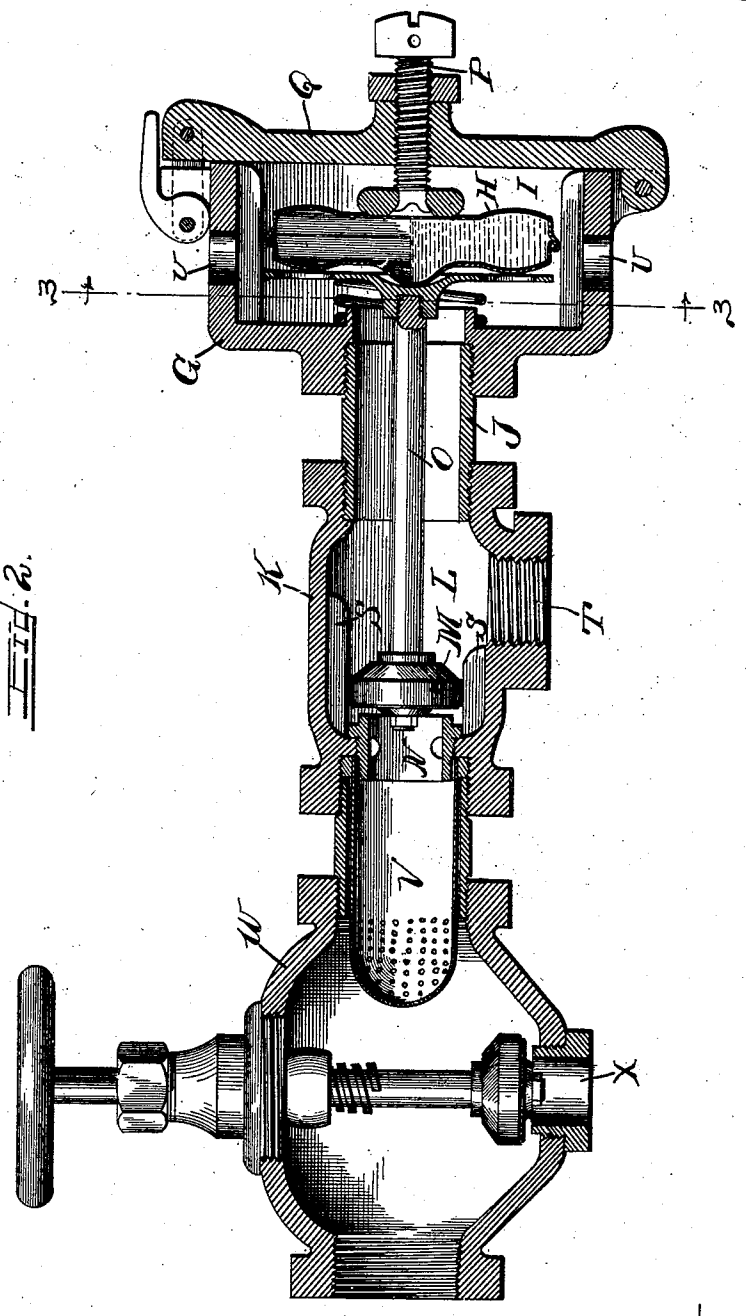

Fig. 2.

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STEAM-TRAP.

SPECIFICATION forming part of Letters Patent No. 689,869, dated December 31, 1901.

Application filed February 1, 1900. Serial No. 3,608. (No model.)

To all whom it may concern:

Be it known that I, EGBERT H. GOLD, a citizen of the United States, residing at No. 5931 Indiana avenue, Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Steam-Traps, of which the following is a specification.

This invention relates to improvements in steam-traps designed for use in connection with the steam-heating systems upon railway-cars to automatically control the discharge of water of condensation from the steam-pipes, but relates more particularly to that class of traps, comprising expansion devices for operating the valve controlling the discharge-port of the steam-pipe, which are located outside of the car-body exposed to the elements and are generally known as "horizontal" traps. Such traps as heretofore constructed have proved objectionable in practice because of their lack of sensitiveness and their sluggish action, resulting from the contact of the water of condensation with the expansion device during its passage through the trap, which frequently results in freezing of the water of condensation in the trap and the connecting exposed pipes.

The primary object of my present invention is to prevent contact of the water of condensation with the expansion device in its passage through the trap by providing for the escape of the water from the trap before it reaches the expansion device.

Another object is to isolate the expansion device from the valve operated thereby and the port controlled by said valve, whereby the water of condensation may be discharged from the trap after passing the valve, but without coming in contact with the expansion device.

These and such other objects as may hereinafter appear are attained by the devices illustrated in the drawings, in which—

Figure 1 is a perspective view of the floor of a car, showing a steam-heating system of the "Gold" type with a steam-trap applied thereto embodying my invention. Fig. 2 is an enlarged central longitudinal section through the trap; and Fig. 3 is a transverse vertical section thereof, taken on the line 3 3 of Fig. 2 looking in the direction indicated by the arrows.

Referring now more particularly to Fig. 1, A indicates the train-pipe bringing in the live steam; B, branches leading therefrom to the heaters C of any desired construction; D, the exhaust-pipes leading from each heater to a drop-pipe E, on the end of which is secured the steam-trap F, in which resides my present invention, the steam-trap being designed to control the discharge of the water of condensation from the steam-pipes on each car as rapidly as the same accumulates.

It will be observed that the steam-trap F and the drop E are necessarily located below and outside of the heated space of the car, are both at all times exposed to the atmosphere, and are so placed that there is a constant accumulation therein of the water of condensation, which flows by gravity thereto, and in cold weather it is necessary to discharge this water of condensation at frequent intervals in order to prevent the freezing up of the heating system and the consequent injurious results flowing therefrom. This I accomplish by my steam-trap.

Heretofore in all forms of steam-traps with which I am familiar the water of condensation is brought in contact with and must flow past, through, or over the expansion device during its discharge through the trap to the atmosphere. The result of such action is that as soon as the water commences to flow the expansion device is immediately affected and commences to close the valve controlling the discharge-port from the steam-pipe in which the water of condensation is contained, thus throttling the discharge almost as soon as it commences and frequently closing the valve before all of the water of condensation has escaped. In other instances the effect of the water of condensation on the expansion device is such as to render its action very sluggish and uncertain, although it commences to act as soon as the water of condensation strikes it; but it frequently fails to entirely close the valve, because the heat of the water of condensation and the temperature of the outside atmosphere keep the expansion device practically on a balance, and thus cause the valve to remain slightly open, permitting a constant drip from the trap, which is seriously objectionable. These objections are all overcome by the construction of my trap, which I will now proceed to describe.

Referring more particularly to Figs. 2 and 3, G indicates the casing for the expansion device H, which latter is located in the ex-

pansion-chamber I, contained in said casing, the casing being connected by a pipe J of suitable length with the valve-casing K, containing the valve-chamber L, in which is located the valve M, controlling the discharge-port N from the steam-pipe or drop E, said valve being connected by a stem or rod O with the expansion device. The expansion device is in the form of a flat double-walled diaphragm containing an expansive fluid readily responsive to the effects of heat and cold and is confined between an adjustable screw P, threaded through the cap Q of the casing G, and the end of the valve-rod O, upon which I preferably mount a guide-ring R, supported upon arms extending from a central hub fastened to the valve-rod.

It will of course be understood that the position of the expansion device in the expansion-chamber is so adjusted that when there is no steam on the valve M is always open. It will also be understood that the pipe-section J may be dispensed with, and the casings G and K may be formed in a single casing with a suitable connecting-passage taking the place of that formed by the pipe J.

In the lower side of the casing K adjacent to the seat of the valve M, which latter is guided upon ribs S, formed on the interior of the casing, is formed a discharge-opening T, through which the water of condensation is discharged to the atmosphere as soon as it has passed the valve M and entered the casing K, which thus effectually prevents the passage of the water of condensation into the expansion-chamber, where it would come in contact with the expansion device. Of course to make certain of this result care must be taken to have the expansion-chamber located a sufficient distance from the valve-chamber to prevent the water being forced through the valve-chamber and passage connecting the same with the expansion-chamber. The expansion-chamber is provided with two or more outlets U, through which the steam-vapor, both before and after condensation, may escape.

In practice I protect the discharge-port N with a strainer V of usual form preferably projecting into the chamber of an ordinary blow-off valve W, attached, respectively, to the trap-casing and the drop-pipe, said valve being provided at the lower side thereof with a discharge-opening X, leading to the atmosphere, so that it may be used as a blow-off valve in the ordinary manner, this blow-off valve and the strainer forming no part of my present invention.

By isolating the expansion device from the valve controlling the discharge-port from the steam-pipe and providing an outlet for the water of condensation between the valve and the expansion device such water will be free to promptly escape from the trap without entering the expansion-chamber or coming in contact with the expansion device, while as soon as the steam-vapor begins to flow it is free to pass by the valve and on into the expansion-chamber, where its heat will instantly affect the expansion device and cause prompt and almost instantaneous seating of the valve.

To get the best results from a steam-trap, it is plain that the automatic valve thereof should open wide and remain fully open until all of the water of condensation has been discharged from the steam-pipe and to then instantly close as soon as the steam begins to escape, and this action cannot be accomplished by any device in which the water of condensation comes in contact with the expansion device during its passage through the trap, but is most effectually accomplished by my present construction, in which means are afforded for the escape of the water from the trap without entering the expansion-chamber. This valve I have found to be very sensitive and prompt in its operation, remaining open as long as it should do so to permit the complete discharge of the water of condensation and closing quickly and promptly, almost with a snap, as soon as the steam begins to flow through the trap, thus insuring complete discharge of the water of condensation from the trap and its pipe connections, and thereby avoiding all danger of the freezing up of the steam-pipe, with the attendant danger and loss of time, money, and the service of the car.

Having thus fully described my invention, what I claim, and desire to secure by Letters Patent, is—

1. A steam-trap comprising an inlet-port, an expansion device, means for freely admitting steam entering through said inlet-port to immediate contact with said expansion device, an automatic valve operated by said expansion device, and a discharge-opening from the valve-chamber to the atmosphere located between the valve and the expansion device through which the water of condensation may pass without coming in contact with the expansion device, substantially as described.

2. A steam-trap comprising an expansion device, an automatic valve mounted upon and operated thereby, an expansion-chamber, a valve-chamber, a passage connecting said chambers and separate discharge-ports leading from each of said chambers to the atmosphere, substantially as described.

3. A steam-trap comprising a valve-chamber, an inlet-port leading to said valve-chamber, a valve controlling said inlet-port and operated by the diaphragm of an expansion device, an expansion-chamber containing said expansion device, a passage connecting said valve-chamber with said expansion-chamber and a discharge-opening from said valve-chamber opening to the atmosphere, substantially as described.

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