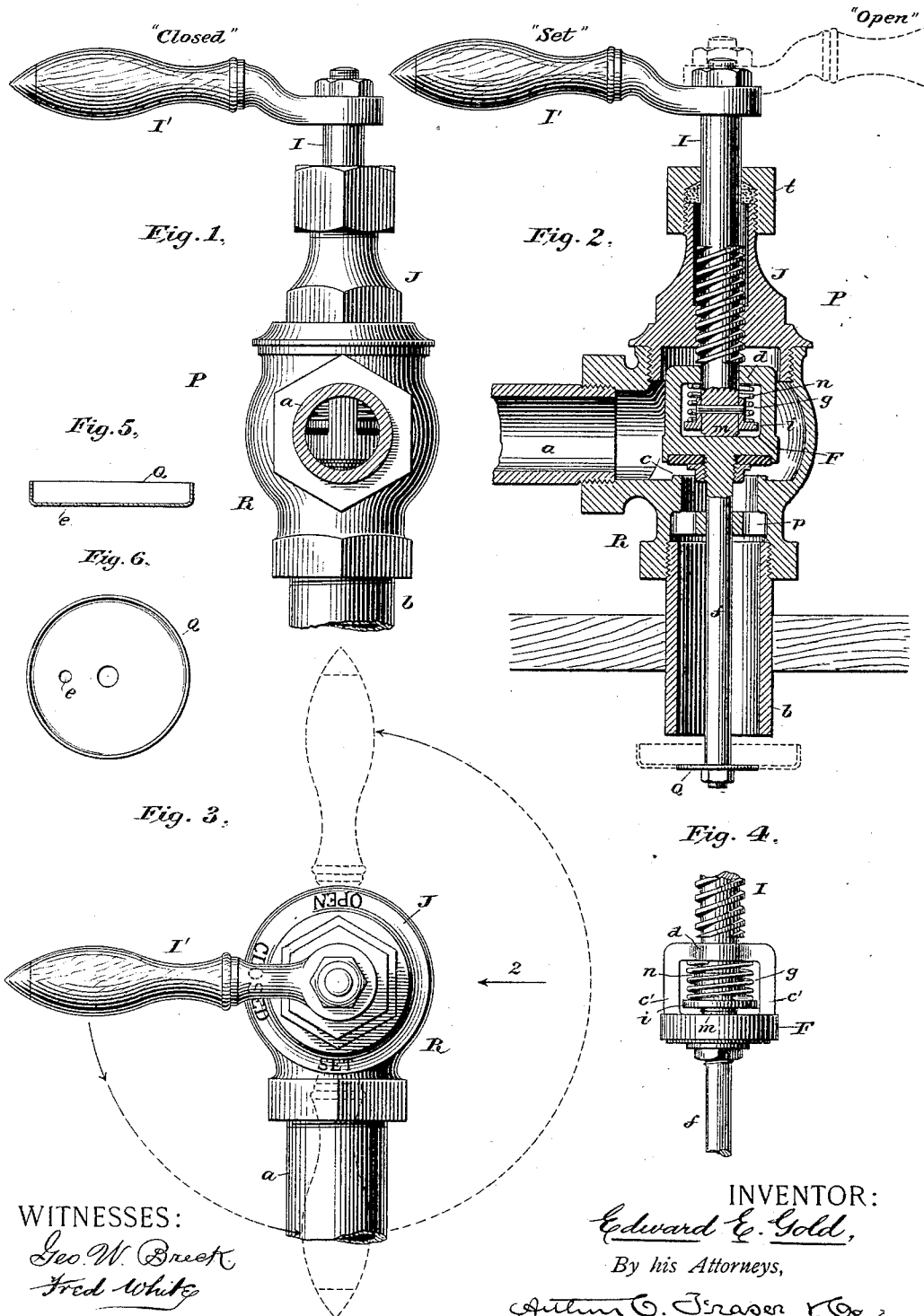


(No Model.)

E. E. GOLD.
VALVE FOR STEAM HEATING SYSTEMS.

No. 450,767.

Patented Apr. 21, 1891.



UNITED STATES PATENT OFFICE.

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VALVE FOR STEAM-HEATING SYSTEMS.

SPECIFICATION forming part of Letters Patent No. 450,767, dated April 21, 1891.

Application filed July 31, 1890. Serial No. 360,447. (No model.)

To all whom it may concern:

Be it known that I, EDWARD E. GOLD, a citizen of the United States, residing in New York city, in the county and State of New York, have invented certain new and useful Improvements in Valves for Steam-Heating Systems, of which the following is a specification.

This invention relates to valves in the nature of steam-traps or drainage and relief valves and blow-off valves, applicable to steam-heating systems and designed most especially for use with the steam-heating pipes of railway-cars.

It relates more especially to drainage or trap valves of that character wherein the valve opens inwardly, being closed by the steam-pressure and having a spring tending to open it, the tension of which is insufficient to withstand the normal steam-pressure, so that the valve remains closed as long as the pressure is maintained, but opens automatically to drain off the water of condensation after the pressure ceases or falls sufficiently to enable the spring to act.

My invention in its entirety provides a valve which combines an automatic trap-valve with a blow-off valve, so that when the operating-handle of the valve is in one position the valve is opened against a steam-pressure to cause the steam to blow through. When it is in another position, the valve is forced to its seat, positively closing it, and when in a third position the valve becomes an automatic drainage-trap opened by a spring and closed by the steam-pressure.

Figure 1 of the accompanying drawings is an elevation of my combined automatic trap and blow-off valve, the terminal pipe *a* of the steam-heating pipes within a railroad-car or elsewhere being in transverse section. Fig. 2 is a vertical section of the valve, showing it set to act as an automatic trap, the view looking in the direction of the arrow 2 in Fig. 3. Fig. 3 is a plan of the valve. Fig. 4 is a fragmentary elevation of the interior parts in Fig. 2 removed. Fig. 5 is a transverse section, and Fig. 6 is a plan, of a construction of impact-plate to be applied to this valve.

It is usual in the heating of railway-cars to carry a branch steam-pipe from the main sup-

ply-pipe which runs from end to end of the car, this branch pipe being carried into the car and connected to radiators, storage-heaters, or other devices within the car for radiating the heat from the steam admitted through the branch pipe. At the end of the branch pipe is commonly provided some sort of valve or trap for discharging the water of condensation that collects in the branch pipe or in the heaters or radiators as the steam condenses. Such terminal valve or trap is sometimes a mere manually-operated cock, which may be opened from time to time by an attendant to blow out the accumulated condensation-water. In other instances it is an automatic trap adapted to open from time to time and automatically discharge the water. Such automatic traps are of two kinds, those of the first class being thermostatic and acting to open and discharge the water whenever the temperature in the valve falls below a certain degree, while those of the second class are pressure-relief valves which open automatically whenever the steam-pressure is turned off or falls below a certain amount. The valve illustrated in the drawings is of the latter class, and combines with the automatic feature of the trap the ability to positively open or positively close at will, in order in the one case to blow the steam through it and in the other to suspend its automatic operation and prevent any escape from the steam-pipe.

Referring to the drawings, the pipe *a* is the terminal portion of the branch steam-pipe or is a discharge or drainage pipe leading from any suitable heater or radiator. The end of this pipe is screwed into the lateral arm of a valve-shell *R*, as shown in Fig. 2. This shell is similar to that of an angle globe-valve. In its lower arm is fastened a drainage-pipe *b*, which passes down through the floor of the car or other apartment and opens beneath. The shell *R* has a screw-cap *J*, closing its upper side, and through this screw-cap works a threaded stem or rod *I*, the threads on which engage female threads in the cap *J*, after the manner well known in globe-valves. The stem *I* is turned by a crank-handle *I'*, which may be turned through an arc of about two hundred and seventy degrees, as indicated in

the plan view, Fig. 3. In Figs. 1 and 3 this handle is shown turned to the position marked "Closed," and in Fig. 2 it is shown turned thence ninety degrees to the position marked "Set." In Fig. 3 it is shown in dotted lines in the position marked "Set," and also as turned one hundred and eighty degrees to the position marked "Open." It is shown in dotted lines in this latter position in Fig. 2. When the handle is in the set position, the valve is set to act as an automatic steam-trap.

Within the shell R is arranged a movable valve or valve-proper F, having a guiding-stem *f* projecting downwardly through the valve-seat and guided in a skeleton guide or spider *p*, formed in the shell. The valve F is formed with two upwardly-projecting arms *c'*, which support a ring or boss *d*, through which the valve-stem I freely passes. On the portion of the stem beneath this boss is fixed a collar having a flange *i* and formed at its upper end with a shoulder *n*, adapted to strike against the under side of the boss *d*. The lower end of the stem I forms a shoulder lettered *m*, adapted to abut against the upper side of the valve F and limit its upward movement. The spring *g* is confined between the shoulder *i* and the boss *d* and tends to press the valve F upwardly until the latter is stopped against the end shoulder *m*.

When the handle I' is in the set position, as shown in Fig. 2, the shoulders *m* *n*, carried by the valve-stem, stand at such height relatively to the valve F and valve-seat *c*, against which it closes, that the valve is free to seat itself against this seat, or to be lifted therefrom by the tension of the spring *g* to the position shown in Fig. 2. It thus constitutes an automatic drainage-trap adapted to be closed by the pressure of the steam whenever the latter is turned on and to be again opened by the pressure of the spring whenever the steam is turned off or its pressure falls sufficiently to enable the spring to act. When the valve is seated, the boss *d* is not quite in contact with the shoulder *n*, so that there is no impediment to the close seating of the valve.

By turning the handle I' from the set position to the closed position the screw-stem I is run down sufficiently to cause its lower end *m* to press the valve F down tight against its seat, thus closing the valve absolutely and rendering it inoperative as a trap. This position is desirable when it is necessary to heat by exhaust-steam, or at a very low pressure, or when for any reason an automatic trap would be undesirable.

When it is desired to blow out the water of condensation by the steam-pressure, or to blow off steam through the branch heating-pipe, in order to quickly heat up the radiator, the handle I' is turned from the set position around to the open position, thereby screwing up the stem I and lifting the valve F with it until this valve is lifted too high to be able

to seat itself, or, in other words, until its boss *d* would strike the shoulder *n* before the valve-face would come against the seat *c*. If the valve should be already seated, it would be forcibly lifted by the contact of the shoulder *n* with the under side of the boss *d*, and while the valve remains in the open position the valve proper F remains elevated with its boss *d* clamped between this shoulder *n* and the undersurface of the cap J. Upon swinging the handle back to the set position the valve ceases to be a blow-off valve and becomes again a trap-valve. This will be its normal position in use.

My improved combined trap and blow-off valve is very advantageous, because it combines in one construction the capabilities that have heretofore required two separate valves, the one an automatic trap-valve and the other a manually-operated blow-off valve, and because at the same time it provides means for discontinuing the automatic operation of the trap whenever desired. It thus avoids complication and expense and simplifies the operations necessary for the management of steam-heating apparatus.

In order to facilitate the closing of the automatic trap-valve when steam is turned on and prevent the undue wasting of the steam by its escape through the valve before it attains sufficient pressure to force it to its seat, my invention provides means for utilizing the impact or force of the jet of steam to assist in closing the valve. To this end I provide an impact plate or disk Q in position to receive against it the current of steam issuing from the valve, and I connect this plate to the valve proper F in such manner that the pressure of this jet of steam against it will tend to oppose the retractile tension of the spring *g*. This is clearly shown in Fig. 2, where the valve-guiding stem *f* is extended downwardly through the outlet-pipe *b*, and on its end is fixed the impact-disk Q. A mere flat plate will answer as this disk, as shown in full lines in Fig. 2; but to make it more effective I find it preferable to extend it laterally and bend up its edges to form a shallow cup, as shown in dotted lines in Fig. 2. This cup is shown removed in Figs. 5 and 6. In order to prevent the accumulation of water in it, which might freeze, I form it with a small drainage-hole *e*, through which the water may run out. This latter feature of my invention is applicable to almost any of the forms of automatic steam-traps shown and claimed in my patent No. 398,719, dated February 26, 1889, and is not limited in its application to a trap which is constructed to form a combined automatic trap and blow-off valve, as illustrated in the drawings; or, in other words, since this feature of my invention consisting of the impact-plate to co-operate with the freely-movable valve to assist in closing it is only serviceable when the valve-stem is in the "set" position to constitute the valve an automatic trap, it is obvious that

this feature might be used without means for pressing the movable valve up or down to constitute it a blow-off or manually-closing valve.

5 I claim as my invention the following-defined novel features or combinations, substantially as hereinbefore specified, namely:

1. An automatic trap for a steam-heating system, consisting of a valve opening inwardly, a tension device arranged to exert a pressure against such valve tending to open it, but insufficient to resist the normal steam-pressure against it, whereby said valve is closed when steam is turned on and opens automatically when the steam-pressure ceases, and an impact-plate arranged in the path of the issuing steam and connected to said valve, whereby the pressure of the issuing steam against such plate tends to seat said valve.

2. The combination, to form an automatic trap, of a valve-shell formed with a valve-seat, a movable valve adapted to close against said seat, a spring tending to unseat said valve, a valve-stem connected to said valve and passing out of the shell through the outlet-opening thereof, and an impact-plate mounted on said stem in the path of the issuing steam escaping through the shell, whereby the pressure of the issuing steam against said plate is communicated to said valve and tends to seat it.

3. The combination, to form an automatic trap, of a valve-shell, a movable valve, a spring tending to unseat the valve, and an impact-disk arranged in the path of the issuing steam and formed with upturned edges to constitute a cup for receiving and partially confining the pressure of the issuing steam.

4. A combined steam-trap and blow-off valve for a steam-heating system, consisting of a shell or casing, a valve opening inwardly, a spring tending to lift said valve from its seat and having a tension insufficient to resist the normal steam-pressure whereby said valve seats itself when steam is turned on and automatically opens and discharges the water of condensation after the steam is turned off, and a movable valve-stem formed with a shoulder engaging said valve and adapted when moved to draw the valve away from its seat and prevent its being seated by the steam-pressure, thereby permitting steam to blow through.

5. A combined steam-trap and blow-off

valve for a steam-heating system, consisting of a shell or casing, a valve opening inwardly, a spring tending to lift said valve from its seat and having a tension insufficient to resist the normal steam-pressure whereby said valve seats itself when steam is turned on and automatically opens and discharges the water of condensation after steam is turned off, and a screw-stem working through said shell and engaging said valve and adapted when screwed up to draw the valve away from its seat and prevent its being seated by the steam-pressure, thereby permitting steam to blow through.

6. A combined steam-trap and blow-off valve for a steam-heating system, consisting of a shell or casing, a valve opening inwardly, a spring tending to lift said valve from its seat and having a tension insufficient to resist the normal steam-pressure whereby said valve seats itself when steam is turned on and automatically opens and discharges the water of condensation after steam is turned off, a screw-stem working through said shell, and a handle for turning said stem, the said shell provided with marks for indicating three distinct positions of said handle and stem corresponding to open, closed, and set positions of said valve, and said stem connected to said valve and adapted when screwed up to the open position to draw said valve away from its seat, when screwed down to the closed position to press said valve against its seat, and when in an intermediate or set position to leave said valve free to open or close automatically by the variations of the steam-pressure.

7. A combined steam-trap and blow-off valve consisting of a shell R, a valve F, movable therein and having a boss *d*, a screw-stem I, formed with a shoulder *n*, adapted when the stem is screwed up to draw the valve from its seat, and with a shoulder *m*, adapted when the stem is screwed down to force the valve against its seat, and with a flange *i* and a spring *g* for unseating the valve interposed between said flange *i* and boss *d*.

In witness whereof I have hereunto signed my name in the presence of two subscribing witnesses.

EDWARD E. GOLD.

Witnesses:

GEORGE H. FRASER,
CHARLES K. FRASER.