J. J. ROYLE.

Expansion Steam-Trap.

No. 209,424. Patented Oct. 29, 1878

FIG. 1.

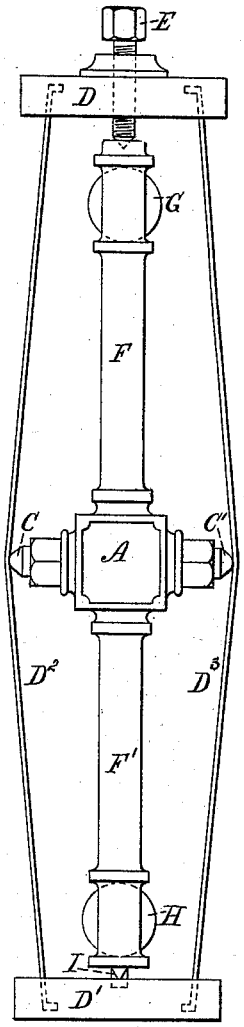


FIG. 2.

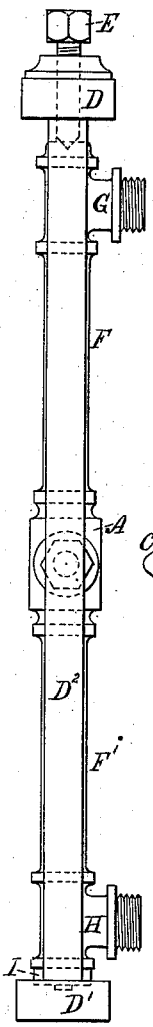


FIG. 3.

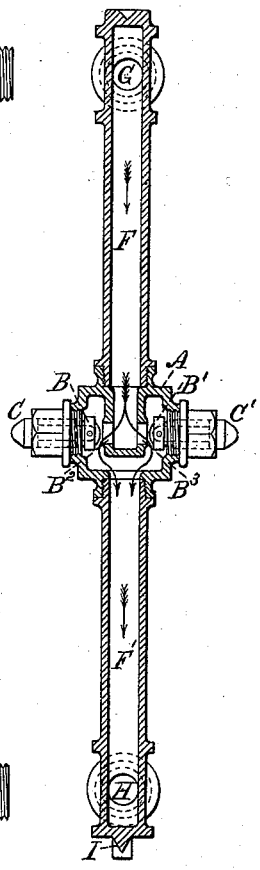


FIG. 4.

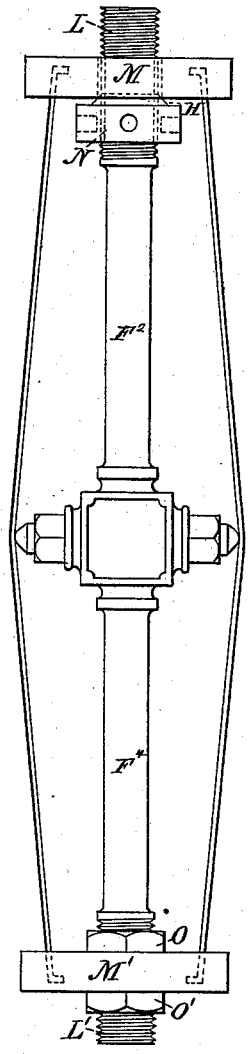
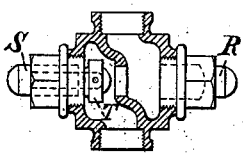


FIG. 5.



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UNITED STATES PATENT OFFICE.

JOHN J. ROYLE, OF MANCHESTER, GREAT BRITAIN.

IMPROVEMENT IN EXPANSION STEAM-TRAPS.

Specification forming part of Letters Patent No. **209,424**, dated October 29, 1878; application filed October 8, 1878; patented in England, February 28, 1877.

To all whom it may concern:

Be it known that I, JOHN JAMES ROYLE, of Manchester, in the county of Lancaster, Kingdom of Great Britain and Ireland, have invented certain new and useful Improvements in Expansion Steam-Traps, which are fully set forth in the following specification, reference being had to the accompanying drawings.

This invention relates to traps for automatically discharging air and water of condensation from steam apparatus without permitting steam to escape; and it relates to that class of said traps in which the expansion of a tube or tubes by the entrance of steam is made to close the escape valve or valves.

The present improvement consists in an expansion steam-trap having a central valve-box containing a valve or valves which open outwardly and inlet and outlet tubes attached to opposite sides of said box and at right angles to the valve spindle or spindles, as hereinafter more fully set forth. The effect of this combination is superior sensitiveness and adaptation to work at an angle as well as in vertical position, together with the utmost simplicity and compactness.

In the accompanying drawing, Figure 1 is a front exterior view, Fig. 2 a side view, and Fig. 3 a partial section, of my improved expansion steam-trap. Fig. 4 is a front view of a steam-trap, and Fig. 5 a sectional view of a trap-valve, illustrating certain modifications.

In Figs. 1, 2, and 3, A represents a double valve-chamber, containing two outwardly-opening valves, B and B^1, provided with spindles C and C′ passing through the outside of the valve-chamber. In action these valves close down upon their respective seatings, B^2 and B^3. F and F^1 are the tubes extending from the valve-chamber A, and hereinafter called the "inlet and outlet pipes," respectively. They are provided with branch pipes G and H, which form the inlet and outlet, respectively. The set-screw E constitutes the means of adjustment, the point of the set-screw working in a countersunk recess formed in the closed end of the tube F. The opposite end bears against the boss D^1 through a V-center, I.

Two tension bars or strips of metal, D^2 and D^3, preferably of steel and of a slightly-bowed form, as illustrated, are cast in the bosses, as seen by the dotted lines in Fig. 1; or they may be connected to such bosses in any other suitable manner.

It will be seen that the tension-bars D^2 and D^3 bear upon the ends of the valve-spindles C and C′, their function being to close the valves B and B^1, as hereinafter explained.

The inlet-pipe F is connected in the usual way to the steam-pipe or other apparatus requiring to be drained of air and condensed water; and the outlet-pipe F^1 may be left open or be connected to a length of pipe communicating with the drain or other outlet for waste-water.

The adjusting-screw E should be slackened sufficiently to allow the valves to open to their widest extent, as seen in Fig. 3, when the steam-trap will be ready for action. Steam being now admitted into the steam-pipe or apparatus hereinbefore mentioned, the cold air and water contained within the same will enter the inlet-pipe F and flow freely past the now open valves, escaping therefrom through the outlet-pipe F^1; but as soon as the steam arrives the expansion of the inlet and outlet pipes F and F^1, and also of the valve-chamber A, causes the bosses D and D^1 to separate farther from each other, at the same time straightening the tension-bars D^2 and D^3 to such an extent as to force the valves B and B^1 to their respective seatings, and so closing the thoroughfare through the steam-trap. Upon first fixing the steam-trap the adjusting-screw E should be set so as to cause the tension-bars D^2 and D^3 just to close the valves when the steam has arrived. Any condensed water, which may flow into the trap will then be discharged self-actingly. The condensed water running into the inlet-pipe F being of a lower temperature than the steam causes such tube to shorten slightly by contraction. This allows the bosses D and D^1 to approach each other to the same extent, and by virtue of the peculiar arrangement of the tension-rods this movement is transferred to the valves only in a highly-increased ratio, and as a consequence the trap is extremely sensitive, the slightest contraction of the pipes F and F^1 causing a considerable movement of the valves. The nearer the tension-bars D^2 and D^3 are to being

parallel with the center line of the valve box and pipes the more sensitive will the steam-trap be in action, and the greater the movement given to the valves B and B^1.

In Fig. 5 I show a modification of the valve-box, illustrating how one valve may be used in place of the double valve hereinbefore explained. In this case one of the tension-bars would rest against the solid cap R, and the whole movement of the tension-bars would thus be transferred through the spindle S to the valve T.

Fig. 4 illustrates another modification of my invention. The construction is substantially and the action precisely as in the first-described arrangement.

The two tubes F^2 and F^4 pass through the bosses M and M′. M′ is fixed in position upon the tube F^4 by the two lock-nuts O and O′. The other boss, M, is free to slide upon the tube F^2 under the control of the adjusting nut or wheel N, which runs upon the screw-thread formed upon the tube F^2. A portion of the screw-thread formed upon each pipe extends through and beyond the bosses, as illustrated, for making the usual connections.

In the preferred form illustrated by Figs. 1 and 2, after the trap is fixed, the bosses D and D^1 and tension-rods D^2 and D^3, forming what may be called the "bracing-frame," may be removed at any time by simply slackening the set-screw E and drawing it off, leaving the trap as in Fig. 3. The valves are thus very accessible for cleaning or examination without disconnecting any joints.

I claim as my invention and desire to secure by Letters Patent—

The combination, in an expansion steam-trap, of a central valve-box, inlet and outlet tubes attached, respectively, to the top and bottom of said box, an outwardly-opening valve or valves working at right angles to said tubes, a pair of bosses or heads applied to the outer extremities of said tubes, and a pair of outwardly-bowed tension-rods engaging with the spindle or spindles of said valve or valves, substantially as herein shown and described, for the purposes set forth.

JOHN JAMES ROYLE.

Witnesses:
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