





# UNITED STATES PATENT OFFICE.

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## STEAM-TRAP.

SPECIFICATION forming part of Letters Patent No. 720,195, dated February 10, 1903.

Application filed May 4, 1900. Serial No. 15,444. (No model.)

*To all whom it may concern:*

Be it known that I, ROBERT H. THORPE, a citizen of the United States, residing at Montclair, county of Essex, and State of New Jersey, have invented certain new and useful Improvements in Steam-Traps, fully described and represented in the following specification and the accompanying drawings, forming a part of the same.

10 This invention relates to certain improvements in steam-traps, and more particularly to that class of traps in which some parts of the trap are constructed from material which has a different coefficient of expansion at a  
15 given temperature than the material from which other parts of the trap are constructed, the opening and closing of the valves of the traps being due to the varying expansion and contraction of the different materials.

20 Traps of the general class to which the invention relates are shown in the patents to Geipel, No. 560,491, Goold, No. 594,005, and Thornycroft, No. 615,764.

25 In the best traps heretofore known in the art the casing which contained the valve-seat has been connected to two pipes, one of which is made, for instance, of steel tubing and the other of drawn brass, the two pipes therefore having different coefficients of expansion. The valve-casing containing the valve-seat and the top of the casing was also provided with a stuffing-box, through which the valve-stem passed. The valve was forced inward for a given distance by means of a lever  
30 normally disconnected from the valve-stem, and a stop was provided which limited the movement of the lever, and consequently the movement of the valve, toward its seat. A spring was also provided which cushioned the  
35 movement of the lever produced by the outward movement of the valve due to the pushing against it of the seat in the casing. The lever, stop, and spring were so adjusted as to cause the valve to be normally held firmly  
40 against its seat when the trap was closed, and the spring-cushion permitted the lever to yield in case the valve-seat was forced too strongly against the valve by the action of the supporting-pipes. In such traps, however, difficulty was experienced at times in permitting

the trap to blow off, for when the lever was forced down against its spring the steam-pressure in the pipe was sometimes insufficient to raise the valve from its seat and allow the steam to escape. Furthermore, it sometimes happened that the valve, after the closing movement of the valve casing and seat had taken place because of the friction between the valve-stem and the gland, or for other reasons, would follow the seat as it made  
55 its opening movement, in which case the opening movement of the casing would not open the trap.

It is the object of this invention to improve the construction of traps heretofore referred to, so as to insure a movement of the valve  
60 whenever the lever is operated to blow off the trap and also to insure the positive opening of the valve when the opening movement of the casing takes place.

70 With this and other objects in view the invention consists in certain constructions and in certain parts, improvements, and combinations, as will be hereinafter fully described and then more specifically pointed out in the  
75 claims hereunto appended.

In the accompanying drawings, which form a part of this specification, and in which like characters of reference indicate the same parts, Figure 1 is a sectional view of a trap  
80 constructed in accordance with the invention, certain parts being shown in elevation. Fig. 2 is a detail front view, on an enlarged scale, of the connection between the valve-controlling lever and the valve-stem. Figs. 3 and 4  
85 illustrate modified forms of the invention.

Referring to the drawings, 1 is a valve-casing, which is provided with a valve-seat 2. This valve-seat is shown as a separate part  
90 screwed into a partition in the valve-casing, but it may be formed integrally with the casing, if desired. The casing is supported by two pipes 3 and 4, the casing forming a junction-box for the pipes and the pipes being arranged so that they can be secured, the pipe  
95 3 to a separator and the pipe 4 to an exhaust-pipe. The pipes 3 and 4 are preferably arranged one above the other and at an angle to each other and are constructed of metals  
100 having different coefficients of expansion.



The pipe 3, which has the greater coefficient of expansion, may be constructed of, say, solid drawn-brass tubing, while the pipe 4, which has the smaller coefficient of expansion, may be made of steel tubing. In the construction shown the pipe 3 is arranged beneath the pipe 4.

Coöperating with the valve-seat 2 is a valve 5, provided with a stem 6, said stem passing through a gland 7, as usual in such constructions.

In order that the movement of the valve toward its seat may be positively controlled, a controlling-lever 8 is provided, said lever being supported in any suitable manner—as, for instance, by ears 9, secured to a supporting-bracket 10, through which the pipes pass. The controlling-lever has its movement in one direction cushioned by a spring and its movement in the other direction controlled by a suitable stop. The stop and spring referred to may be variously constructed and arranged. In the construction shown the lever 8 is provided with a perforation 11, through which passes a pin or rod 12, said pin or rod being secured in any suitable manner in a perforation in the bracket 10. A spring 13 surrounds this rod and presses against the under side of the lever, the movement of the lever under the stress of the spring being controlled by means of a head 14, formed on the rod 12, as shown in Figs. 1 and 4, or of a nut 15, as shown in Fig. 3.

The valve-stem and the controlling-lever are loosely connected together, so as to allow for the pivotal movement of the lever and the right line movement of the valve-stem. This loose connection between the lever and the stem may be variously constructed. In the form of the device shown in Fig. 1 a yoke 16 is provided, said yoke having a threaded stem 17, which engages a threaded opening 18 in the end of the lever. A lock-nut 19 is or may be provided, which engages the projecting portion of the threaded stem of the yoke. This yoke is provided with inturned flanges 20, which engage a head 21, connected to the valve-stem. The head 21 may be either integral with the valve-stem or it may, as shown, be a separate piece, which is screwed onto the stem. It will be understood that by screwing the stem 18 into or out of the threaded opening in the lever the movement of the valve 5 toward its seat 2 produced by the lever may be adjusted. This connection constitutes one form of adjustable means for positively determining the amount of movement of the valve toward its seat; but other constructions may be adopted for this purpose. In the construction shown in Fig. 3, for instance, a yoke or stirrup 22 is provided, the valve-stem 6 being screwed into the lower cross-bar of the yoke and the end of the lever being inserted into the opening in the stirrup, said end bearing against a boss 23 thereon. The rod 12, however, instead of being provided with a head 14 is

provided with the adjusting-nut 15 and a lock-nut 25. It will be seen that by adjusting the nut 15 downwardly on the stem the spring 13 will be compressed, and the end of the lever which is connected to the valve-stem will be thrown upward. In this case, therefore, the nut 15 serves as the adjustable means by which the movement of the valve toward its seat is limited.

Fig. 4 shows another construction for adjustably limiting the inward movement of the valve toward its seat. In this construction the boss 23 is replaced by a screw 26, and the upper end of the valve-stem, which will preferably be rounded somewhat, may be screwed through the lower cross-bar of the stirrup 22. By loosening the screw 26 and screwing the stirrup up or down on the valve-stem the movement of the valve toward its seat will be adjusted, because by this operation the valve-stem is in reality shortened or lengthened. In this construction the stem 12 is provided with a head 14, as shown in Fig. 1.

In all the constructions described it will be seen that by pressing on the end of the lever 8 the valve will be lifted from its seat, so as to insure a raising of the valve whenever it is desired to blow off. Since in all the constructions described the amount of movement of the valve toward its seat is positively controlled, it follows that a movement of the casing which carries the valve-seat away from the valve will invariably produce a separation of the valve-seat and the valve, thus opening the valve.

It will be understood that the mechanical details by which the invention is carried into effect may be varied and that the invention is not therefore to be limited to the specific details of construction which have been hereinbefore described.

What is claimed is—

1. In a steam-trap, the combination with the valve-casing containing a valve-seat and valve, of two metal pipes, said pipes having different coefficients of expansion and serving as conduits for escaping water and steam, the valve and valve-seat being adapted to be separated and brought together by the contraction and expansion of the pipes, a lever, positive connections between the lever and the valve-stem, a spring acting against the lever and tending to force the valve to its seat, and a stop for limiting the movement of the lever produced by the spring, substantially as described.

2. In a steam-trap, the combination with a valve-casing containing a valve-seat and valve, of two metal pipes connected to the casing, said pipes having different coefficients of expansion and serving as conduits for the escaping water and steam, the valve-seat and valve being adapted to be separated and brought together by the contraction and expansion of the pipes, a lever, and a loose connection between the valve-stem and the lever, and means for controlling the move-



ment of the lever in order to prevent the valve from following the valve-seat when the casing makes its opening movement, substantially as described.

5 3. In a steam-trap, the combination with a valve-casing containing a valve-seat and valve, of two metal pipes connected to the casing, said pipes having different coefficients of expansion and serving as conduits  
10 for the escaping water and steam, the valve-seat and valve being adapted to be separated and brought together by the contraction and expansion of the pipes, a lever and a loose connection between the valve-stem and lever,  
15 a spring for cushioning the movement of the lever in one direction, and means for controlling the movement of the lever in the opposite direction in order to prevent the valve from following the valve-seat when the casing  
20 makes its opening movement, substantially as described.

4. In a steam-trap, the combination with a valve-casing containing a valve-seat and valve, of two metal pipes connected to the casing, said pipes having different coefficients of expansion and serving as conduits for the escaping water and steam, the valve-seat and valve being adapted to be separated and brought together by the contraction and expansion of the pipes, a lever, a yoke connected to the lever, a spring for controlling the movement of the lever in one direction, a stop for limiting its movement in the other direction, and a loose connection between the  
30 yoke and the valve-stem, substantially as described.

5. In a steam-trap, the combination with a valve-casing containing a valve-seat and

valve, of two metal pipes connected to the casing, said pipes having different coefficients of expansion and serving as conduits  
40 for the escaping water and steam, the valve-seat and valve being adapted to be separated and brought together by the contraction and expansion of the pipes, a lever, a yoke adjustably connected to the lever, a spring for controlling the movement of the lever in one direction, a stop for limiting its movement in the other direction, and a loose connection between the yoke and the valve-stem, substantially as described.  
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6. In a steam-trap, the combination with a valve-casing containing a valve-seat and valve, of two metal pipes connected to the casing, said pipes having different coefficients of expansion and serving as conduits  
55 for the escaping water and steam, the valve-seat and valve being adapted to be separated and brought together by the contraction and expansion of the pipes, a lever, a spring for cushioning the movement of the lever in one direction, a stop for limiting its movement in the other direction, a yoke having a threaded stem passing through an opening in the lever, a nut for adjusting the position of the yoke,  
60 flanges on the yoke, and a head on the valve-stem with which the flanges on the yoke engage, substantially as described.

In testimony whereof I have hereunto set my hand in the presence of two subscribing  
70 witnesses.

ROBERT H. THORPE.

Witnesses:

T. F. KEHOE,  
A. A. V. BOURKE.