

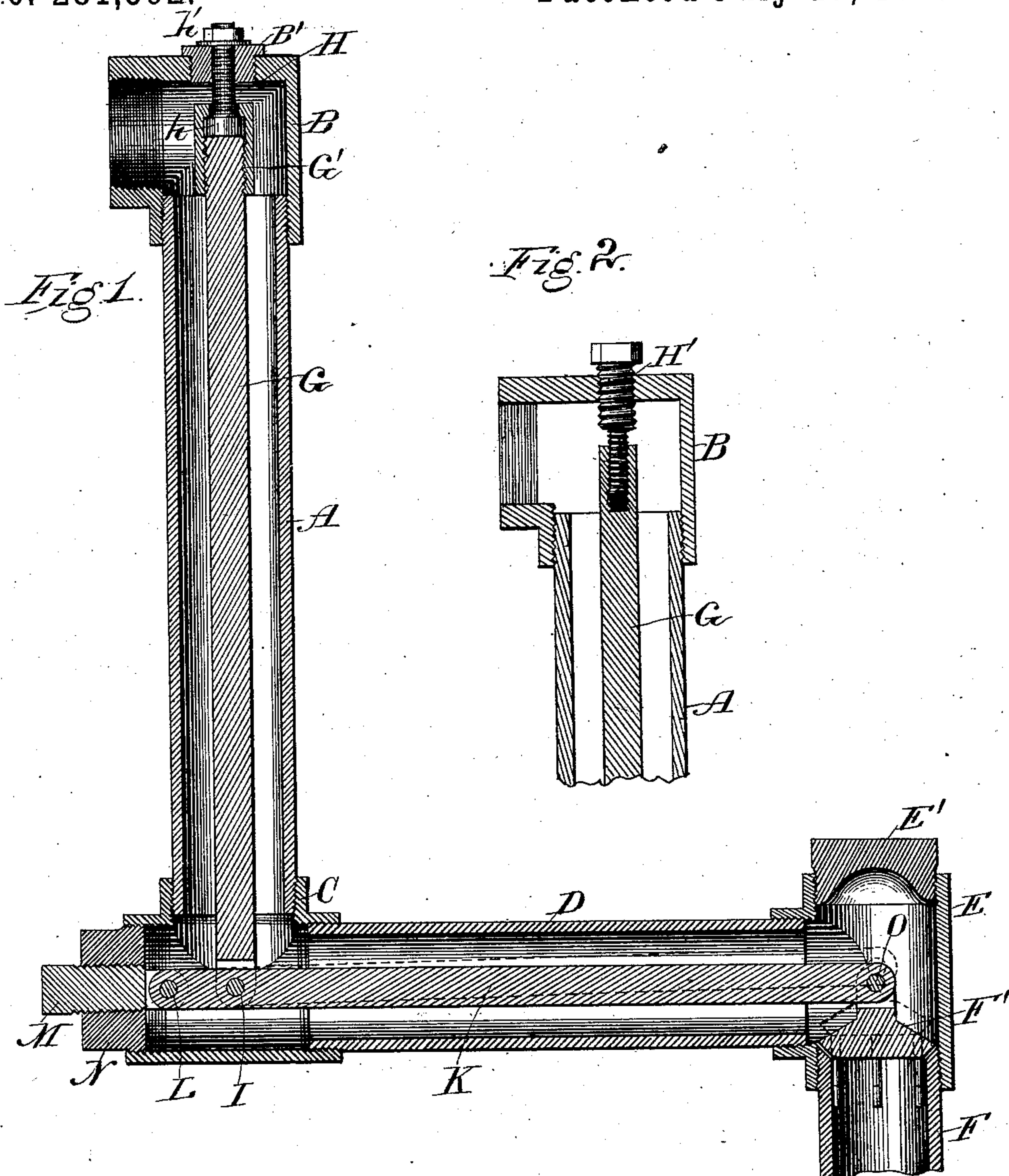
(No Model.)

F. H. WEST.

STEAM TRAP.

No. 281,592.

Patented July 17, 1883.



Witnesses:

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# UNITED STATES PATENT OFFICE.

FRANCIS H. WEST, OF MILWAUKEE, WISCONSIN.

## STEAM-TRAP.

SPECIFICATION forming part of Letters Patent No. 281,592, dated July 17, 1883.

Application filed March 27, 1883. (No model.)

*To all whom it may concern:*

Be it known that I, FRANCIS H. WEST, of Milwaukee, in the county of Milwaukee, and in the State of Wisconsin, have invented certain new and useful Improvements in Steam-Traps; and I do hereby declare that the following is a full, clear, and exact description thereof.

My invention relates to devices for removing the water of condensation from steam coils and pipes; and it consists of a device located entirely within the system of pipes to be drained, or in a continuation of the same, having an expansion-rod connected by a lever to a valve closing solely by gravity, and by this means taking up the lost motion at the pivotal points, all as will be more particularly set forth hereinafter.

In the drawings, Figure 1 is a sectional view of the preferred form of my entire device; and Fig. 2 is a similar view of a modification of part thereof.

A is a short section of steam-pipe in a vertical position, having a connecting-elbow, B, screwed upon its upper end. The lower end of the pipe A is connected by another elbow, C, to a short horizontal section of steam-pipe, D, and at the outer end of this last named pipe is attached another elbow, E, which receives the upper end of a vertical section of pipe, F, the top of which forms a seat for the gravity-valve F', to be hereinafter described, the said elbow being closed at the top by a screw-plug, E', of ordinary construction.

G is an expansion-rod, made of brass or of some metal having greater expansive force than iron, and is located inside of the pipe A. Its upper end receives a screw-cap, G', by which it is connected to the swivel-head *h* of a screw, H, that passes up through a bushing, B', screwing into the top of the elbow B, and is there provided with a washer and secured by a nut, *h'*. To the lower end of this rod G is pivoted by bolt I the lever K, the short arm of which has its fulcrum on the bolt L at the inner end of a screw, M, which passes through a plug, N, screwing into the outer end of the elbow C, the said fulcrum-point being thereby made adjustable, while the farther end of the long arm of the lever K carries the gravity-valve F', pivoted thereto by bolt O, as shown.

From the foregoing it will be apparent that by turning the screw H down the expansion-rod G will be forced down and with it the lever K and the valve F', while by turning the screw up a reverse result will be obtained, a barely-perceptible movement of the rod G, where it is pivoted to the valve-lever K, serving to make a very decided movement of the valve F', and thus regulating its set. The valve F', when open (which is its normal or primary condition, as is represented by dotted lines in Fig. 1) and hanging upon the long arm of the lever K, has a constant tendency to close, caused solely by its own gravity, and thereby it takes up any lost motion that otherwise might occur from loose joints at the pivotal points of its lever K, and this is a very decided advantage and improvement over other devices now in use, resembling my invention in other respects. The play of the valve F' may be increased by lengthening the rod G, or by lengthening the lever K, or by shortening the distance from the fulcrum to the point where the rod G is attached to the lever K, or by all of these means, or by any of them.

The operation of the trap is as follows: Set the trap so that the expansion-rod G will be in a perpendicular position; attach the steam-pipe to the elbow B; set the valve F' so that it will hang open from its seat the required distance when the trap is cold. When hot water or steam reaches the expansion-rod, a slight expansion of the same will lower the lever K, permitting the valve to close; retaining the water until it begins to cool, which will cause a slight contraction of the expansion-rod, raising the lever and valve and letting the water escape, and this operation will continue automatically. The valve may be set to close at any desired temperature, and it will remain closed as long as the same or a higher temperature obtains, commencing to open as soon as a lower temperature is reached. After the valve is closed, a little lost motion at the pivotal points will not be a disadvantage, as in case there is further expansion of the rod it will now be spent in passing this lost motion, and thus relieve the parts of any undue strain. This lost motion will all be taken up again by the time the temperature is lowered to the point it was when the valve closed, when all parts will be



taut and in condition for positive action on the valve as soon as a still lower temperature is reached.

In Fig. 2 I have shown a modification of the screw which serves to raise or lower the expansion-rod G. Here, instead of using a screw with swivel-connections to the said rod, I have shown a differential screw, H', passing through the top of the elbow B by screw-threads of one gage, and into the upper end of the rod G by threads of a different gage, and by turning the screw down or up the expansion-rod will be forced down or drawn up just the difference that there is between the gage in the threads in the elbow B and the gage in the threads where it screws into the top of the expansion-rod G, and thus an exceedingly-delicate adjustment can be obtained.

I am aware that expansion-rods and valve-levers have been used in the construction of steam-traps apparently similar to my invention, but a close examination of the details will show a wide difference in their practical operations. In some of these, for instance, the expansion-rod has been attached to the valve-lever outside of the fulcrum; but the hanging of the lever to the expansion-rod between the valve and the fulcrum, as in my arrangement, gives the expansive motion of the rod and the motion of the valve the same direction, and causes the valve, when pendent, to take up all lost motion at the pivotal points in its tendency to close by gravity. When it is considered that an ordinary expansion-rod of sixteen inches in length will expand but about one one-hundredth of an inch more than the iron in which it is incased, only part of which expansion can be made available in practice, it will be seen how essential it is to prevent the slightest loss of motion at the fulcrum or at the pivotal point of the rod with the lever. Heretofore the failure to so pivot as to overcome this slight loss of motion, which is sure

to occur, especially after a little wear, has been found to partially or wholly neutralize the expansion of the rod, and even where the rod and valve-lever have been connected in a manner more closely resembling my device the valve has not been attached, so far as known to me, so as to close solely by gravity, and hence my advantages in the matter of taking up lost motion have not been gained. In some cases a slide-valve has been used; but, obviously, this is open to all the objections named, with the additional objection of requiring a chamber for its movements, which chamber forms a lodging-place for sediment, requiring a blow-off cock for cleaning it out.

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

1. The combination of the pipe A, elbow B, having bushing B', expansion-rod G, screw-cap G', screw H, with swivel-head h, confined and adapted to operate between the top of the expansion-rod and the head of the screw-cap, and nut h', substantially as shown and described, and for the purposes set forth.

2. In a steam-trap having ordinary vertical and horizontal pipes and elbows, the combination of the gravity-valve F', suspended by pivot O from one end of the lever, the other end of which is connected by pivot L to a screw-plug, M, and the expansion-rod G, provided at top with an adjusting-screw passing through the elbow above the vertical pipe, and connected at the lower end by pivot I to lever K, between the pivots L and O, substantially as set forth.

In testimony that I claim the foregoing I have hereunto set my hand, on this 23d day of March, 1883, in the presence of two witnesses.

FRANCIS H. WEST.

Witnesses:

H. G. UNDERWOOD,  
M. KAUMHEIMER.