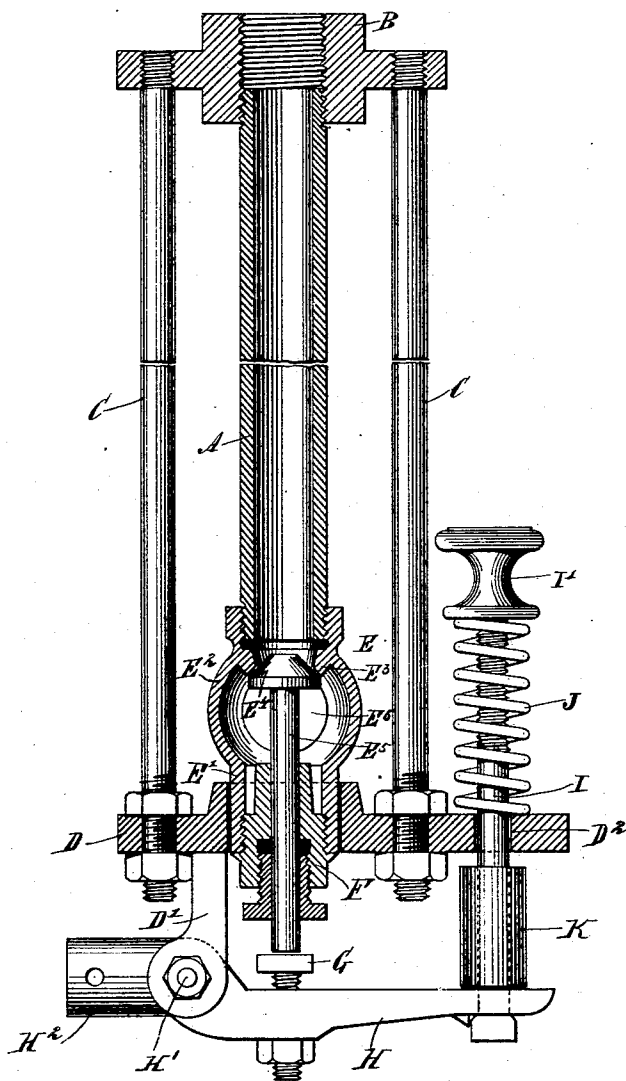


(No Model.)

H. F. SMURTHWAITE.
EXPANSION STEAM TRAP.

No. 570,777.

Patented Nov. 3, 1896.



WITNESSES:

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HUBERT F. SMURTHWAITE, OF COATESVILLE, PENNSYLVANIA.

EXPANSION STEAM-TRAP.

SPECIFICATION forming part of Letters Patent No. 570,777, dated November 3, 1896.

Application filed May 7, 1896. Serial No. 590,596. (No model.)

To all whom it may concern:

Be it known that I, HUBERT F. SMURTHWAITE, of Coatesville, in the county of Chester and State of Pennsylvania, have invented a new and Improved Expansion Steam-Trap, of which the following is a full, clear, and exact description.

The object of the invention is to provide a new and improved expansion steam-trap which is simple and durable in construction and arranged to permit of convenient adjustment to set the trap for automatic action at any desired pressure and to permit of cleaning the trap of sediment whenever desired.

The invention consists of certain parts and details and combinations of the same, as will be described hereinafter, and then pointed out in the claims.

Reference is to be had to the accompanying drawing, forming a part of this specification, in which the figure is a sectional side elevation of the improvement.

The improved expansion steam-trap is provided with an expansion-tube A, preferably made of brass and secured at one end in a cross-head B, connected with the steam-supply pipe, so that the water of condensation and steam can pass into the said expansion-tube A. The cross-head B is connected by rods C with a second head D, which latter, with the said rods C, and the cross-head B constitute the frame for supporting the steam-trap. It is understood that the frame is made of a different metal from the tube A, so that the latter expands and contracts more rapidly when subjected to heat and cold.

In the cross-head D is formed an opening loosely engaged by the end E' of the valve-body E², forming a part of the discharge-valve E, the said valve-body being secured on the free end of the expansion-tube A, as plainly shown in the drawing.

Within the valve-body E² and in alinement with the tube A is formed the valve-seat E³; normally closed by a conical valve E⁴, held on a valve-stem E⁵, fitted to slide in a suitable stuffing-box F, fastened in the end E' of the valve-body E². The valve-body E² is provided on one side with a discharge-opening E⁶ for carrying off the water of condensation.

The lower outer end of the valve-stem E⁵ is

adapted to be engaged by the head of a set-screw G, screwing in a lever H, fulcrumed at H' on a bracket D', depending from the under side of the cross-head D. The free end of the lever H is engaged by a bolt I, extending upwardly and passing through an opening D², formed in the cross-head D, so that the latter guides the said bolt I.

A spring J is coiled on the upper end of the bolt I, one end of the spring resting on the top of the cross-head D and the other end of the spring being engaged by a nut I', screwing on the extreme upper and threaded end of the bolt I.

A stop-collar K is held loosely on the lower end of the bolt I intermediate of the free end of the lever H and the under side of the cross-piece D. This stop-collar K serves to limit the upward-swinging motion of the lever H, for the purpose hereinafter more fully described.

It will be seen that when the steam is turned into the pipes connected with the steam-trap it condenses very rapidly on account of the lower temperature of the pipes and passes off through the expansion-tube. When the steam strikes the tube A, the latter is expanded, and consequently it will move against the valve E⁴, so that the latter closes the valve-seat E³, thus shutting off the escape of the water. As soon, however, as the water collects in the tube A its temperature becomes lower and the tube contracts away from the valve E⁴, so that the water escapes through the outlet E⁶. Now by the improvements described the valve E⁴ can be set in such a manner relative to its seat E³ that the valve will open at any desired pressure, it being understood that the tension of the spring J is set accordingly by the operator adjusting the nut I'.

When it is desired to clean the tube A of any sediment or other impurities accumulating in the said tube, the operator simply presses on the nut I', so as to cause the downward swinging of the lever H to permit a ready opening of the valve E⁴ to discharge the sediment from the tube A. As soon as the operator relieves the pressure on the nut I' the lever H is drawn back to its former position, and by the set-screw G again closes the valve E⁴ by seating it on its seat E³.

The stop-collar K prevents undue pressure

of the valve E¹ on the seat and also allows the lever H to follow the valve in its contraction beyond that point which the adjusting-bolt will allow. The adjusting-bolt I serves to
 5 force the lever H downward after a sufficient pressure is given by the spring J, usually enough to clear the stop-collar K about one-eighth of an inch off the cross-head D. By this arrangement the expansion-tube A can
 10 contract a short distance without the valve E¹ leaving its seat, so that no leakage of steam is liable to take place during this contraction of the tube A. It is understood that by this arrangement I am enabled to properly regulate the head in the pipes connected with the
 15 traps, as it is evident that the water discharged by the trap must be at a much lower temperature than that of boiling water. It is also evident that by the arrangement described the trap if set to two hundred pounds
 20 pressure will work fully as well as if only set to five pounds pressure. The trap can also be readily used as a relief-valve for steam-engine cylinders, as it is only necessary to remove the ordinary petcock and fasten the
 25 cross-head B in the position previously occupied by the cock.

By adjusting the nut I' the spring J receives sufficient tension to stop all pulsations
 30 of the valve caused by the compression of steam in the cylinder at the end of the stroke of the piston. The valve is then ready for work, and water in the cylinder will be readily and automatically discharged by the valve.

35 It will be understood that instead of employing the spring J a weight may be attached to the pivot end of the lever, as at H².

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

1. An expansion steam-trap comprising a frame, an expansion-tube secured at one end in the said frame and having connection at said end with the steam supply, a discharge-
 45 valve secured on the other free end of the said tube and provided with a valve having

its stem fitted to slide in a stuffing-box attached to the valve-body, the latter being fitted to slide in the said frame, a lever fulcrumed on the said frame, a bolt held on the
 50 free end of the said lever, and a spring engaging the said bolt to give the desired tension to the bolt, lever and valve, substantially as shown and described.

2. An expansion steam-trap comprising a
 55 frame, an expansion-tube secured at one end in the said frame and having connection at said end with the steam supply, a discharge-valve secured on the other free end of the said tube and provided with a valve having
 60 its stem fitted to slide in a stuffing-box attached to the valve-body, the latter being fitted to slide in the said frame, a lever fulcrumed on the said frame, a bolt held on the free end of the said lever, and a spring en-
 65 gaging the said bolt to give the desired tension to the bolt, lever and valve, the tension of the spring being regulated by a nut on the said bolt, substantially as shown and described.

3. An expansion steam-trap comprising a frame, an expansion-tube secured at one end in the said frame and having connection at said end with the steam supply, a discharge-
 75 valve secured on the other free end of the said tube and provided with a valve having its stem fitted to slide in a stuffing-box attached to the valve-body, the latter being fitted to slide in the said frame, a lever fulcrumed on the said frame, a bolt held on the
 80 free end of the said lever, a spring engaging the said bolt to give the desired tension to the bolt, lever and valve, and a stop-collar held on the said bolt intermediate of the said lever and the said frame, to limit the swinging motion of the lever, substantially as shown and
 85 described.

HUBERT F. SMURTHWAITE.

Witnesses:

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JNO. H. VANDERSLICE.