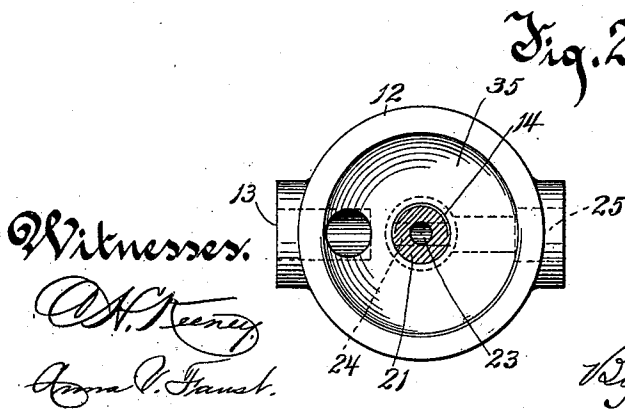
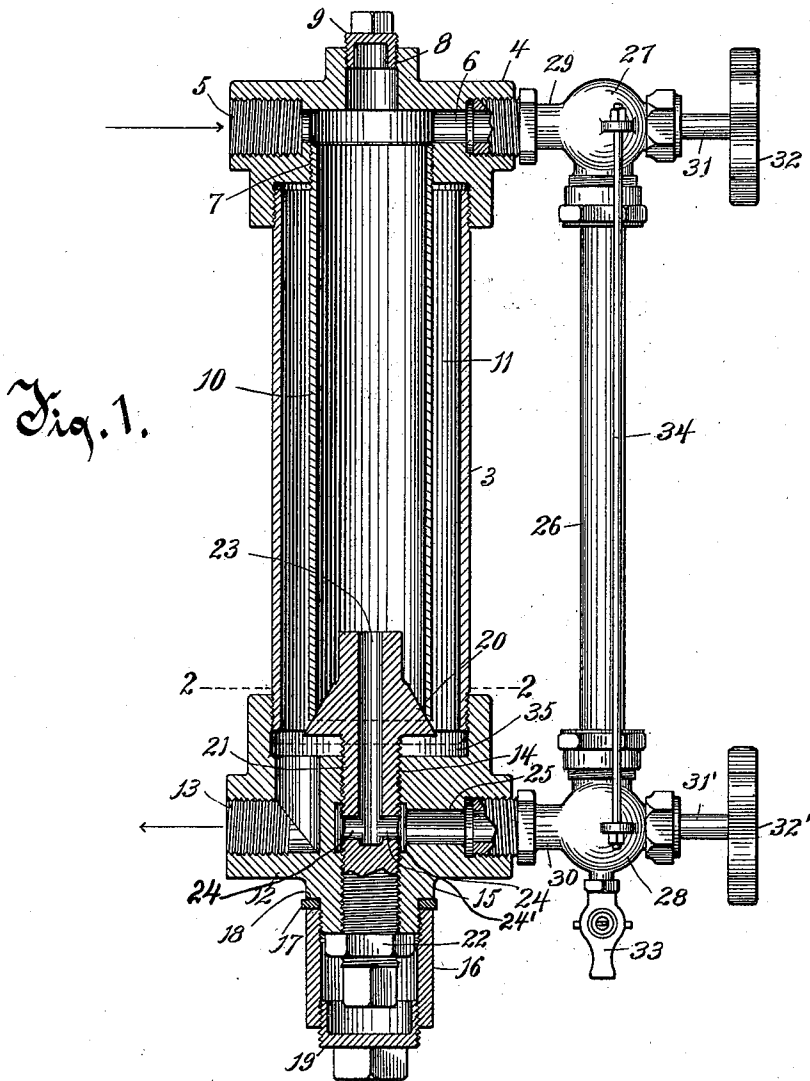


(No Model.)

H. LUCAS.
STEAM TRAP.

No. 594,885.

Patented Dec. 7, 1897.



Witnesses.

W. H. Keeney

Anna V. Faust

Inventor.

Henry Lucas

By Benedict & Mossell
Attorneys.

UNITED STATES PATENT OFFICE.

HENRY LUCAS, OF LAKE, WISCONSIN, ASSIGNOR TO THE GEORGE ZIEGLER COMPANY, OF MILWAUKEE, WISCONSIN.

STEAM-TRAP.

SPECIFICATION forming part of Letters Patent No. 594,885, dated December 7, 1897.

Application filed April 16, 1897. Serial No. 632,462. (No model.)

To all whom it may concern:

Be it known that I, HENRY LUCAS, of Lake, in the county of Milwaukee and State of Wisconsin, have invented a new and useful Improvement in Steam-Traps, of which the following is a description, reference being had to the accompanying drawings, which are a part of this specification.

My invention has relation to improvements in steam-traps.

The invention pertains more particularly to steam-traps working on the thermostatic principle, wherein the difference between the heat of the steam and the heat of the water actuates a valve to discharge the collected water.

The primary object of the invention is to improve the general construction and arrangement of this class of devices, whereby simplicity and better results in effective working are obtained.

A further object resides in providing a gage, in connection and combination with a steam-trap, whereby the height of the water in the trap may at all times be readily determined.

With the above and other objects in view the invention consists of the improved construction and combination of parts, as hereinafter more fully set forth.

In the accompanying drawings, Figure 1 is a view of the complete device, the steam-trap being in section and other parts broken away; and Fig. 2 is a horizontal section on the line 2 2 of Fig. 1.

It will be understood that while the invention is more particularly adapted for use in a system of steam-pipes, yet it can be used in various other relations—as, for instance, in steam-engines and in steam-heating systems in railway-cars.

Referring to the drawings, the numeral 3 indicates an outer casing, preferably of cylindrical form. This casing is threaded at its opposite extremities, and to the upper threaded extremity is connected the downwardly-extending flange from an upper steam-pipe coupling 4. This steam-pipe coupling is provided with an interiorly-threaded inlet-opening 5 and with a similarly-threaded steam-outlet opening 6. The opening 5 is provided for the purpose of connecting thereto a branch pipe (not shown) leading from a system of pip-

ing. The outlet-opening 6 is provided for the purpose of allowing the steam to pass into the gage, as will hereinafter more fully appear. The coupling is extended inwardly over the upper edge of the casing 3, and this inwardly-extending portion is provided with a central interiorly-threaded opening 7. The top of the coupling is also provided centrally with an opening 8, which is smaller than, but in communication with, the opening 7. This smaller opening, while not absolutely necessary, is advisably provided, so that, if desired, the branch pipe leading from the system of piping may lead directly into the top of the coupling. This opening 8 when the inlet-opening 5 of the coupling is utilized for the admission of steam is closed by means of a screw-plug 9. The central opening 7 of the coupling is threaded for the purpose of connecting thereto the upper threaded end of an interior expansible tube 10, composed of any suitable metal best adapted for expanding and contracting under the effects of heat and cold, respectively. This tube constitutes a self-acting thermostatic valve.

By reason of the connection of the upper end of the expansible tube 10 to the threaded opening 7, formed in the inwardly-extending portion of the coupling, a space 11 is necessarily formed between the expansible tube and the outer casing.

To the lower threaded end of the outer casing is also connected a lower coupling 12, which is provided with an angular passage 13, the horizontal portion of which is threaded for the connection thereto of a discharge-pipe (not shown) for carrying off the water of condensation. The coupling 12 is provided centrally with a threaded opening 14, and said coupling is also provided on its under side with a depending boss 15, through which the opening 14 continues. The lower extremity of this boss is reduced and threaded, and adapted to fit the threads is a casing 16. A bushing 17 is compressed between the upper end of this casing and a shoulder 18 formed on the boss by reason of its reduced extremity. The lower extremity of the casing 16 is open and provided with interior threads which are engaged by a screw-cap 19.

The numeral 20 indicates a valve-seat,

the top portion of which has inclined sides, against which the lower end of the expansible tube or valve is adapted to be seated, said lower edge of the tube or valve being beveled in order to fit closely to the seat. The lower portion of this valve-seat is in the form of a threaded stem 21, which is adapted to be screwed through the central threaded opening 14 of the coupling 12 and to project downwardly beyond the lower end of the boss 15. A jam-nut 22 takes onto this lower projecting end of the stem and is adapted to be turned upwardly against the lower end of the boss 15. The extreme end of the stem is unthreaded and formed square or hexagonal in shape for the engagement therewith of a wrench or other suitable turning-tool. Extending from the top of the valve-seat downwardly for a desired distance is a vertical passage 23, which at its lower end branches horizontally in opposite directions, as indicated at 24 24, so as to communicate with an annular recess 24' in the coupling 12, said recess in turn communicating with a lateral passage 25 in the coupling 12.

The gage is provided with the usual glass tube 26, and to the upper and lower ends of this tube are connected, respectively, the couplings 27 and 28. The upper coupling has an inwardly-extending threaded branch 29, which connects with the upper steam-outlet 6, and the lower coupling is provided with a similar branch or extension 30, which connects with the lateral passage 25 of the coupling 12. These upper and lower couplings are provided, respectively, with interior valves (not shown) having the stems 31 31', respectively, which stems are provided at their outer ends with the operating hand-wheels 32 32', respectively. The lower coupling is also advisably provided with a discharge-faucet 33. The two couplings 27 and 28 are advisably connected by means of a tie-rod 34.

In the operation of my invention the steam which is passing through the system of steam-pipes is also free to pass into the steam-trap, which, as previously stated, is connected to the steam system by means of a branch pipe. The steam entering the trap passes through the inlet-opening 5 into the expansible tube 10. As the water of condensation forms it settles in the expansible tube, and after it reaches a height above the upper end of the valve-seat it is free to pass down the passage 23 of said seat and enter the gage, so that after the water of condensation as it accumulates in the tube 10 reaches the height referred to it will also pass into the gage, so that the columns of water in the expansible tube and in the gage will be on the same level. By glancing at the gage, therefore, it can be readily determined just what the height of the column of water is in the expansible tube. It will be understood that the steam passing into the expansible tube heats the same and causes an elongation thereof, so that its lower end will be firmly

held against the valve-seat. After the column of water of condensation, however, reaches a certain height within the expansible tube said tube will have been cooled sufficiently to cause a contraction thereof, and consequently an opening to be formed between its lower edge and the valve-seat. The water of condensation when this contraction takes place at once escapes through the opening so formed and passes first into an annular chamber 35 and from thence into and out of the discharge-passage 13. Before the entire column of water escapes from the tube the temperature will have been raised sufficiently by the steam to again expand the tube 10 and cause its lower end to be seated, and thus shut off the outflow of the slight column of water still remaining in the tube. It will thus be seen that a little water is always left in the tube, which acts as an effective water seal against the escape of the steam out of the expansible tube and into the discharge-passage 13.

It is to be further noted that by providing the steam-outlet opening 6 in the upper coupling 4, which outlet-opening is in communication with the upper coupling 27 of the gage, steam is also free to pass into said gage, so that there is always a pressure of steam in the gage on the upper surface of the column of water therein equal to the pressure of steam on the upper surface of the column of water in the expansible tube. By operating the hand-wheels 32 32' the valves of the upper and lower couplings of the gage can be closed, so as to prevent the entrance of steam and water to the gage whenever this may be desired. The faucet 33 is also provided for discharging the water of condensation from the expansible tube and gage whenever it may be found necessary to do this for any purpose before the expansible valve has been sufficiently cooled to unseat itself. By providing the projecting threaded stem 21 of the valve-seat said seat is thereby adjustable. This allows the trap to be set so as to permit the escape of steam at any desired pressure.

Besides the advantages already stated and other apparent advantages it will be seen that by my construction and combination of parts all the joints are practically water and steam tight. By the provision also of the casing 16, abutting against the bushing 17, a very tight lower joint is obtained, and at the same time when it is desired to obtain access to the stem of the valve-seat for the purpose of adjusting said valve-seat this casing may be readily removed and a wrench applied to the stem for turning the same.

The space 11, formed between the outer side of the expansible tube 10 and the inner side of the outer casing 3, forms an annular air-chamber, which prevents the outer casing from being heated and thereby expanding with the tube 10.

What I claim as my invention is—

A steam-trap, having a lower portion pro-

5 vided with an outlet-passage and with a lateral passage, a valve-seat provided with a vertical passage in communication at its lower end with the lateral passage of the lower portion of the trap, an expansible tube in communication with a source of steam-supply, and having its lower free end adapted, when the tube is under expansion, to bear against the seat, and a gage in communication with

the expansible tube and also in communication with the lateral passage of the lower portion of the trap.

In testimony whereof I affix my signature in presence of two witnesses.

HENRY LUCAS.

Witnesses:

A. L. MORSELL,
ANNA V. FAUST.