(No Model.)

2 Sheets—Sheet 1.

J. H. BLESSING.

STEAM TRAP.

No. 548,770. Patented Oct. 29, 1895.

Fig. 1.

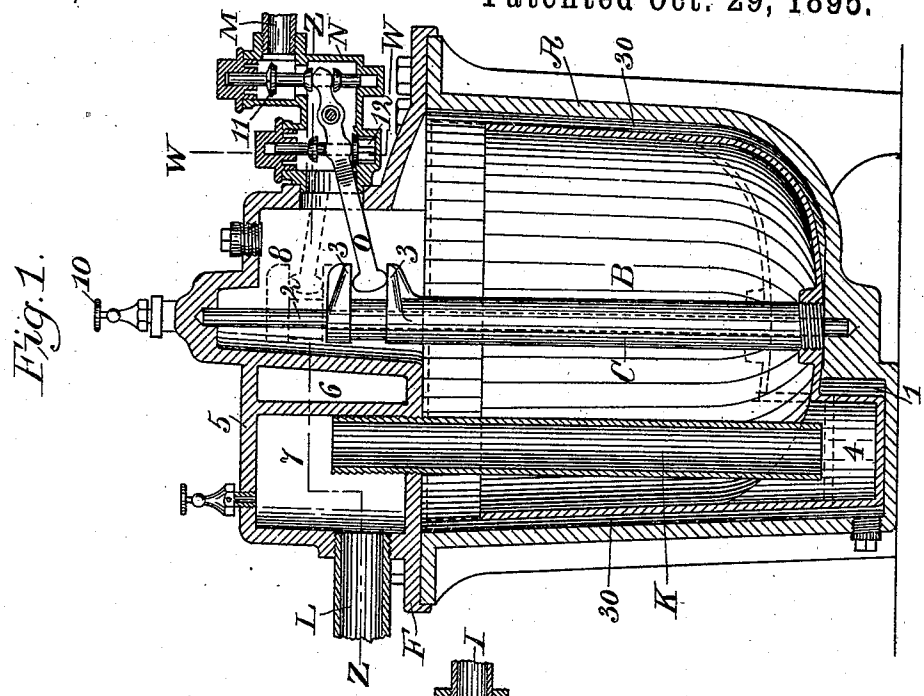
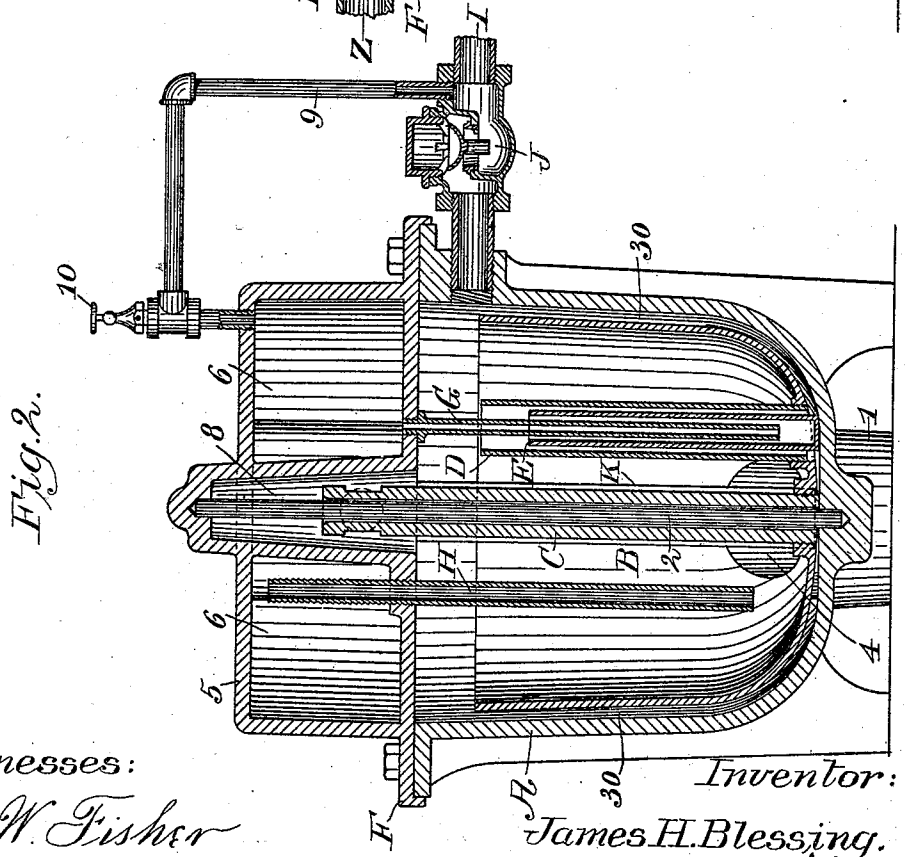


Fig. 2.



Witnesses:

J. W. Fisher

E. Ludwig

Inventor:

James H. Blessing.

by William A. Low.

Attorney.

(No Model.) 2 Sheets—Sheet 2.

J. H. BLESSING.

STEAM TRAP.

No. 548,770. Patented Oct. 29, 1895.

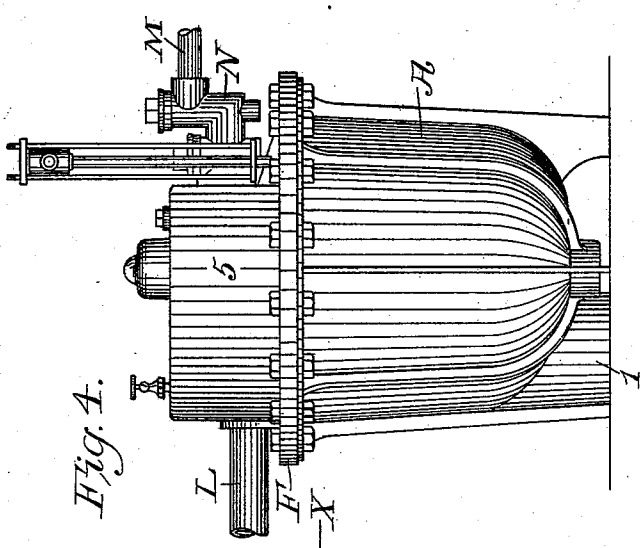


Fig. 4.

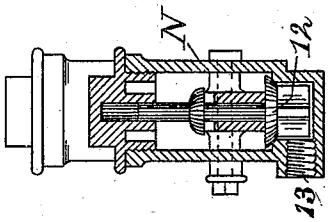


Fig. 6.

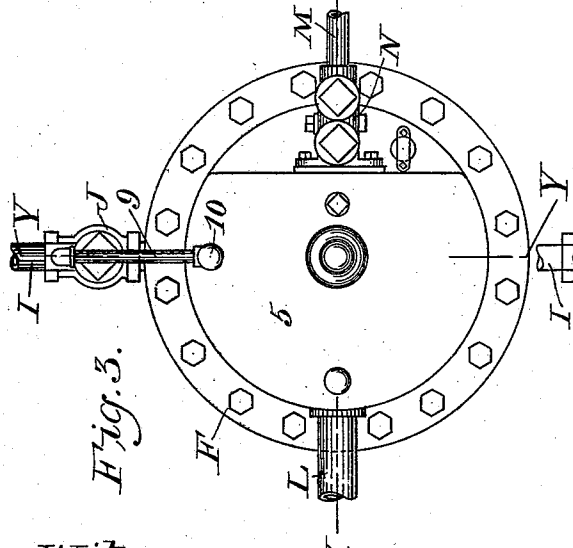


Fig. 3.

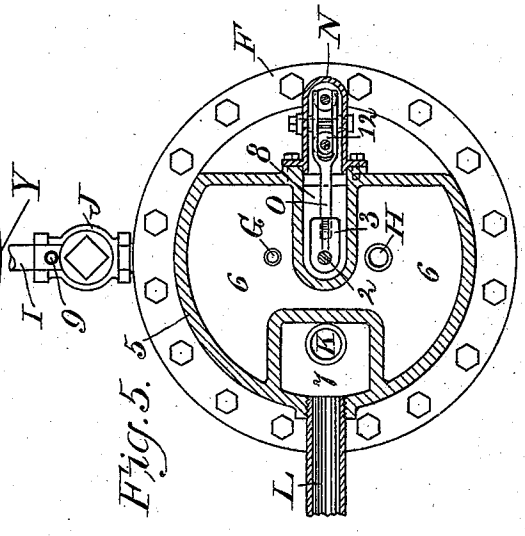


Fig. 5.

Witnesses:
J. W. Fisher
E. Ludeker

Inventor:
James H. Blessing.
by William H. Low,
Attorney.

UNITED STATES PATENT OFFICE.

JAMES H. BLESSING, OF ALBANY, NEW YORK.

STEAM-TRAP.

SPECIFICATION forming part of Letters Patent No. 548,770, dated October 29, 1895.

Application filed July 2, 1895. Serial No. 554,682. (No model.)

To all whom it may concern:

Be it known that I, JAMES H. BLESSING, of Albany, in the county of Albany and State of New York, have invented new and useful Improvements in Steam-Traps, of which the following is a specification.

This invention relates to improvements in steam-traps for returning to a steam-boiler the water condensed in the heating-pipes of closed pressure steam-heating systems, in which the pressure of steam in the heating-pipes is less than the pressure in the steam-boiler, and the construction of this trap differs materially from those for which Letters Patent of the United States have heretofore been granted to me; and the object of my present invention is to simplify the construction and to render the operation of the trap more certain and effective under all conditions in which it may be situated.

In the accompanying drawings, which are herein referred to and form part of this specification, Figure 1 is a longitudinal vertical section of my improvements in steam-traps at the line X X on Fig. 3; Fig. 2, a transverse vertical section of the same at the line Y Y on Fig. 3; Fig. 3, a plan view; Fig. 4, a side elevation; Fig. 5, a horizontal section of Fig. 1 at the line Z Z, and Fig. 6 a transverse vertical section of the valve-casing on the line W W on Fig. 1.

As illustrated in the drawings, A designates the casing of my improved steam-trap, which has a pocket 1 formed in its lower part; B, a metallic bucket inclosed in the casing A and adapted to rise and fall with the fluctuations of the volume of water contained in said casing. The bucket B has a sleeve C, which is secured centrally in said bucket and is fitted to slide loosely on a vertical guide-rod 2, that is secured in the casing A. The sleeve C has, near its upper end, lugs 3, projecting laterally therefrom for a purpose hereinafter explained. The height of the bucket B should be proportioned to the height of the casing A, so as to allow sufficient space for the rising and falling movements of said bucket in the casing A, and the interior diameter of the latter should allow an annular space 30 between said casing and the exterior diameter of said bucket for water to flow from the bottom of the casing upward into the open top of the bucket until the latter becomes sufficiently filled to overcome the flotation of said bucket. A standing pipe D is secured in the bottom to the bucket B and extends to about the level of the top of the bucket and the upper and lower ends of said standing pipe are both always open to form a free communication between the lower part and upper part of the casing A through said standing pipe, the difference between the concavity of the bottom of the casing A and the convexity of the bottom of the bucket B, as shown in Fig. 2, being sufficient to allow at all times a free communication between the lower end of said standing pipe and the annular space 30. A water-seal pipe E, whose upper end is open and lower end closed, is placed loosely in the standing pipe D with its lower end resting on the bottom of the casing A; said water-seal pipe being provided for a purpose hereinafter explained. The bottom of the bucket B is provided with a pocket 4, which loosely enters the pocket 1 of the casing A, and is for a purpose that will be explained herein.

F is a bonnet that forms a closure for the top of the casing A. Said bonnet has on its upper face a casing 5, which is preferably made in the form of a segment of a cylinder and which contains a receiving-chamber 6, a discharging-chamber 7, and a slotted opening 8, for the various purposes set forth herein. Said chambers are closed at the top and bottom, and the opening 8 has a closed top, but its bottom is open to afford a free communication with the interior of the casing A and to allow the upper end of the sleeve C to move freely therein while the bucket B is making its movements. A pendent pipe G has its upper end secured in the lower member of the bonnet F, and its lower end extends into the water-seal pipe E and reaches nearly to the closed lower end of the latter. The pipe G conveys the water from the chamber 6, when the conditions of the trap require it, into the water-seal pipe E, and, by overflowing the latter, into the casing A. The water-seal pipe E will normally contain sufficient water to form a water seal at the lower end of the pipe G to prevent the steam from flowing upward through the latter. A pipe H, which is secured in the lower member of the bonnet F, is arranged to extend from near the upper

part of the chamber 6 downward nearly to the bottom of the interior of the bucket B, the pipe H being for a purpose that will be presently herein explained.

I is an inlet water-pipe, which connects the trap with the system of heating-pipes, and which is provided with a check-valve J, that will prevent the pressure from passing into said pipe when the pressure in the trap exceeds the pressure in the system of heating-pipes. A branch pipe 9 leads from the pipe I, outside of the check-valve J, into the chamber 6, for the purpose of admitting water from the system of heating-pipes into said chamber when occasion requires. An air-outlet 10 is arranged in the pipe 9 to prevent an accumulation of air in the chamber 6 to interfere with the proper operation of the trap. The inlet water-pipe I is arranged to deliver the water condensed from the steam in the system of heating-pipes into the annular space 30 and, after the latter becomes filled, into the bucket B.

K is a water-discharge pipe, which is secured to the bonnet F and leads from the discharging-chamber 7 into the bucket B, wherein the lower end of the pipe K is carried into the pocket 4 of said bucket to effectually drain the water from said bucket. An outlet-pipe L leads from the discharging-chamber 7 into the water-space of a steam-boiler, (not shown in the drawings,) and it should be understood that the level of the lower end of said outlet-pipe, where it enters the steam-boiler, must be sufficiently below the bucket B to have the outlet-pipe operate as a siphon to drain the water from the bucket B and deliver such water into the water-space of the steam-boiler; and it should be understood that the pipe L has near its point of entrance into said steam-boiler a check-valve of the usual form to prevent the water from said boiler from passing upward through said pipe.

M is a steam-pipe which leads from the steam-space of the steam-boiler and is connected to a valve-casing N, which forms a communication with the opening 8 for the purpose of equalizing the pressure in the trap. The valve-casing N contains a steam-valve 11 and an exhaust-valve 12, which are so arranged that when one of said valves is open the other will be closed. A lever O is pivoted to the casing N between the two valves and is bifurcated to span the stems of said valves. Both of the said stems are provided with collars, between which said lever takes to operate the valves in such manner that the steam-valve will be closed before the exhaust-valve can begin its opening movement. The opposite end of the lever O engages between the lugs 3, so that the rising-and-falling movements of the bucket B will effect the movements of the valves 11 and 12. The casing N is provided with an exhaust-opening 13, to which an exhaust-pipe can be connected to carry off the exhaust-steam.

This trap will operate, but not in so perfect a manner, when the water-seal pipe E is omitted therefrom, the bucket B, under such arrangement, being only partially filled between its reciprocating movements, and tests prove that the volume of water discharged in a given time will be much less than when the water-seal pipe is used; but my invention includes a steam-trap of this construction whether said water-seal pipe is retained or not.

My steam-trap operates in the following manner: The trap being connected to a system of steam-heating pipes and to the water-space of a steam-boiler that supplies the steam to said system in the manner hereinbefore described; but before the trap will start to operate automatically a stop-valve in the steam-pipe M (which stop-valve is not shown in the drawings, but is the kind ordinarily used for such purposes) must be closed, so as to allow the water that has been condensed in said heating-pipes to flow into the trap under the pressure existing in said heating-pipes. The water thus entering the trap will first fill the space between the bucket B and the interior of the casing A, thereby causing the bucket B to float upward into the position indicated by dotted lines in Fig. 1 and closing the steam-valve 11. The inflowing water will continue to rise until it has attained a level that will allow it to pour into the bucket B, and when a sufficient quantity of the water has entered said bucket to overcome the flotation of the water acting on the outer surface of the bucket the latter will begin to sink into the casing A; but the pressure in the trap being now at an equilibrium with the pressure in the heating-pipes no water will be expelled from the bucket until the stop-valve in the steam-pipe M has been opened to allow the pressure of steam from the boiler to enter the trap and thereby create a pressure in the latter that will equal the pressure in the boiler. Before the pressure in the body of the trap becomes fully equalized the water in the bucket B will be forced upward through the pipe H in sufficient quantity to nearly fill the receiving-chamber 6. When the bucket B has attained the lowest point of its movement, the steam-valve 11 will be fully opened, thereby allowing the steam-pressure of the boiler to act upon the surface of the water in the bucket B, whereby the water in the latter will be forced upward through the pipe K into the chamber 7, and will be siphoned from the latter through the pipe L into the water-space of the steam-boiler. When the water has been sufficiently discharged from the bucket B to uncover the lower end of the pipe H, steam will pass upward through said pipe and force the water from the chamber 6 to pass downward through the pipe G into the water-seal pipe E and, by overflowing the latter, thence downward through the standing pipe D into the bottom of the casing A. The sudden influx of the water into said casing A will cause the bucket B to rise rapidly and effect the closing of the steam-valve 11,

thereby leaving the trap in condition for a repetition of the operation just described, and it should be understood that after the stop-valve in the steam-pipe M is first opened to start the trap in its operations, the latter will continue to operate automatically so long as the steam and water shall continue to flow thereinto.

What I claim as my invention, and desire to secure by Letters Patent of the United States, is—

1. An automatic steam-trap consisting of a closed vessel provided with a removable bonnet having separated receiving- and discharging-chambers formed therein, an open top bucket arranged to rise and fall in said vessel and having within said bucket a standing-pipe secured to its bottom to form an open communication between the upper and lower parts of the interior of said vessel, and pendent pipes G and H, leading from said receiving chamber, as and for the purpose specified.

2. In an automatic steam-trap, the combination of a closed vessel having a removable bonnet which contains a receiving-chamber that is formed in said bonnet, an open top bucket arranged to rise and fall in the interior of said vessel, a standing-pipe secured in the bottom of said bucket and arranged to form an open communication between the upper and lower parts of the inclosing vessel, a pendent pipe leading from the upper part of the receiving-chamber into the interior of said bucket, and a pendent pipe leading from the lower side of the receiving-chamber into said standing-pipe, as and for the purpose specified.

3. In an automatic steam-trap, the combination of a closed vessel provided with a removable bonnet having a receiving-chamber formed therein, an open top bucket arranged to rise and fall in said vessel, a standing-pipe secured in the bottom of said bucket and arranged to form an open communication between the upper and lower parts of the interior of the inclosing vessel, a water-trap pipe arranged to form a water passage between its exterior and the bore of said standing-pipe; the lower end of said water-trap pipe being closed, a pendent pipe leading from the upper part of said receiving-chamber into the interior of said bucket, and a pendent pipe leading from the lower side of the receiving-chamber into and nearly to the lower end of said water-trap pipe, as and for the purpose specified.

JAMES H. BLESSING.

Witnesses:
M. L. HARRIS,
WM. H. LOW.