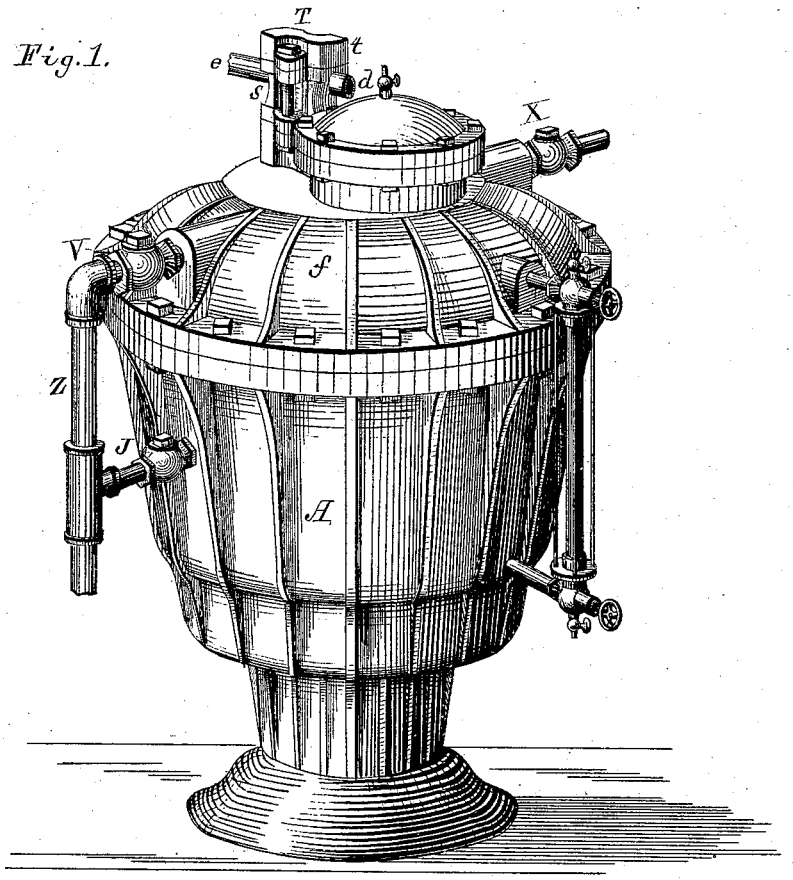
(No Model.) 2 Sheets—Sheet 1.

B. W. FELTHOUSEN.

STEAM TRAP.

No. 264,522. Patented Sept. 19, 1882.

Fig. 1.



Witnesses:
Chas. L. Goss.
F. H. Battum

Inventor.
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Attorney.

(No Model.) 2 Sheets—Sheet 2.

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Fig. 3

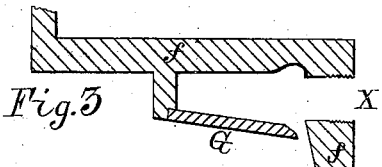

Fig. 7.

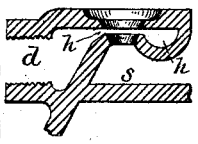

Fig. 2.

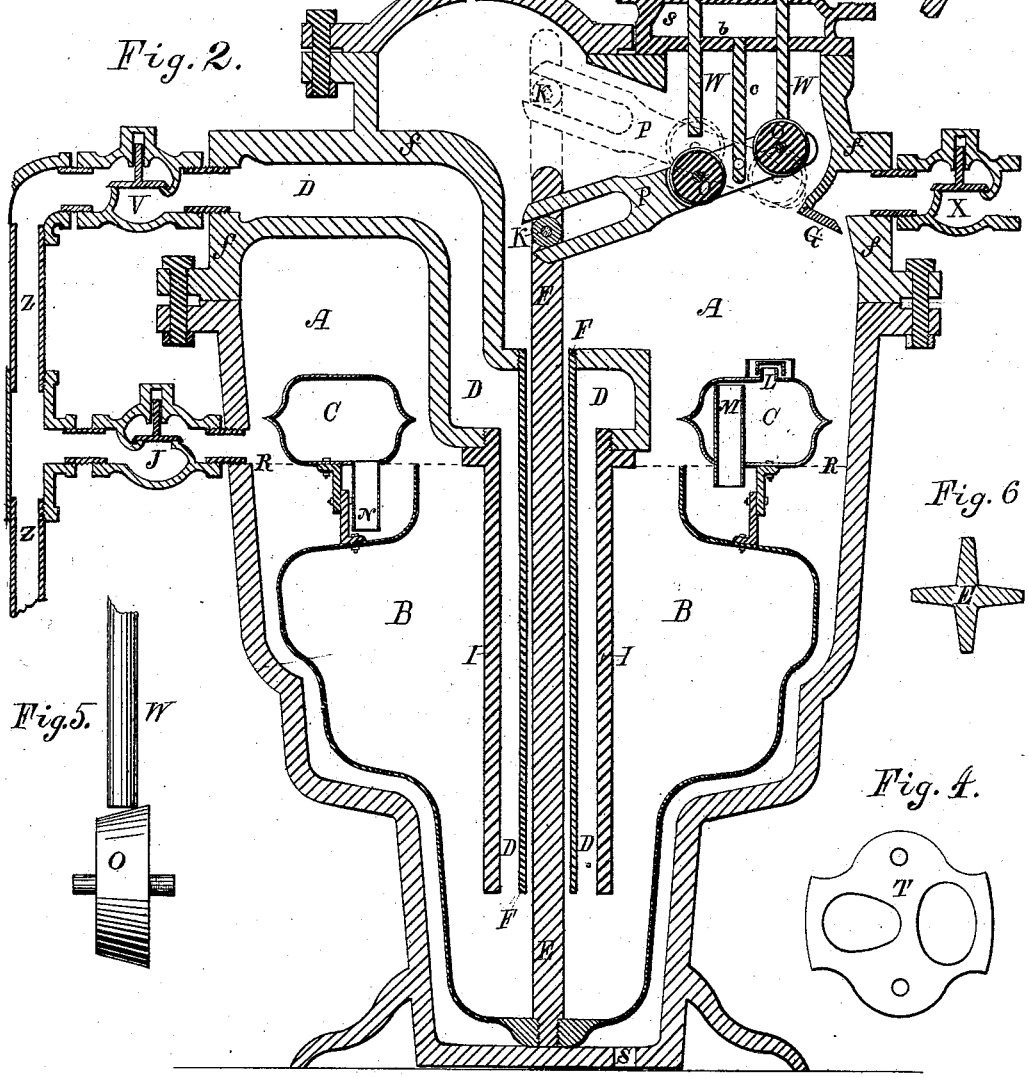

Fig. 6

Fig. 5.

Fig. 4.

Witnesses:
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per

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UNITED STATES PATENT OFFICE.

BARRENT W. FELTHOUSEN, OF MILWAUKEE, WISCONSIN.

STEAM-TRAP.

SPECIFICATION forming part of Letters Patent No. 264,522, dated September 19, 1882.

Application filed May 23, 1882. (No model.)

To all whom it may concern:

Be it known that I, BARRENT W. FELTHOUSEN, of Milwaukee, in the county of Milwaukee and 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 of the invention, which will enable others skilled in the art to which it pertains to make and use the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

My invention relates to that particular class of devices used to return the water of condensation from steam-coils to the boiler automatically, and which are denominated "steam-traps." Its object is the construction of a simpler device and better arrangement and combination of devices than those heretofore made use of for that purpose.

In the accompanying drawings, Figure 1 is a perspective view of my improved trap ready for connection with coils and boiler. Fig. 2 is a vertical transverse section of the same, with the interior valves, pipes, and connections, with the valves U and H and their covers and connections shown out of place for facility in showing all the parts in one figure, their true position being shown in Fig. 1. Fig. 3 represents a part of the top of the trap, with a plate for directing the course of the inflowing water. Fig. 4 shows a view of the cover of the valve-case T from beneath. Fig. 5 shows the device for raising and turning the valves U and H in detail. Fig. 6 shows a cross-section of rod E.

The exterior shell A of my improved trap is constructed of cast-iron or other suitable material. It is connected with the drip or condensation chamber or lower portion of the coils by means of a pipe leading to the trap and provided with check-valve X, opening inward. A return water-pipe, Z, leads from the trap to the boiler. A valve-case, T, is placed on its top, and this is, at *e*, connected with the steam-space of the boiler and at *d* with a waste-pipe. Within the shell A is placed the bucket-float B, constructed, as shown, contracted at the top, but provided with a wide mouth. An upright rod, E, is firmly attached to the interior of the bucket B at its bottom, and is guided and supported by a surrounding tube, F, firmly inserted at its upper end in the lid of the trap *f*. The shell A is constructed of two segments, a lower and the upper one, *f*, attached to each other by means of flanges and bolts. The tube of F is surrounded by an annular passage, D, formed as shown in Fig. 2, and leading directly into the pipe Z, through an outwardly-opening check-valve, V. The lower portion of passage D is formed of a tube screwed into the upper or elbow portion, which is preferably cored out in casting the upper segment of the trap. The tubes F and D terminate below at a point which enables them to check the vertical movement of the float B at the proper place. Upon the neck of float B is placed an annular tank, C, provided with two pipes, M and N. On top of the tank is a cup-valve, L, surrounded by an open cup. At the top of rod E is placed a friction-roller, K, which fits the forked opening of a lever, P, pivoted to the lower end of a standard, *c*, affixed to the bar *b*, attached to the sides of the valve-case T. The lever P is provided with rollers O O, beveled, as shown in Fig. 5, on either side of its pivotal point.

The valve-case T consists of a box constructed in two sections, *s* and *t*, and bolted on the outside to the lid of the trap over an opening therein, and containing the valves U and H, which I prefer to construct with spindles W W, that are guided by perforations in guide-bars *a* and *b*, extending from side to side of the valve-case, but arranged so as not to retard the free passage of the steam. The valve U has a double seat, with an annular passage, *h*, between them, so as to cause the valve to balance very nearly under the pressure of the steam above and below and lift very readily. The spindles W W of the valves U H depend in such a position as to be touched and raised by the rollers O O, pivoted to the lever P, when the lever is oscillated by the rising and falling of the float B. The lower ends of spindles W W are square, and their edges rest on the beveled edge of the wheel, as shown in Fig. 5. The valve is therefore turned as it is raised and seated in a new place each time, and thereby is kept ground to its seat.

G is a plate or shelf attached to the lid of the trap and placed near the water-inlet, so as to prevent the water as it enters the trap from falling into the float B. A check-valve (not

shown in the drawings) is placed in the pipe Z at its lower end, near the boiler. Now, should this check-valve leak, the water will pass up the pipe Z, through check-valve J, and into the body of the trap, as shown in Fig. 2, connecting with pipe Z, and furnished with an inwardly-opening check-valve. An air-cock, worked by hand for the purpose of freeing the trap from air in starting, is placed in the lid of the trap at *z*. A globe-valve is placed in the steam-pipe communicating with the boiler and entering the trap at *e*, but is not shown in the drawings.

My improved device operates as follows: The trap being entirely empty at starting, the weight of the float B causes it to sink to the bottom of the trap and bring all the parts into the position shown in the drawings. The air-cock *z* is opened. The globe-valve in the steam-pipe, entering at *e*, is closed, and the pressure of the steam in the coils causes the water of condensation to enter the trap through check-valve X, whence it flows on to shelf G, and is directed down along the inside of shell A. As the water flows in it lifts the float B until that is checked by the lower ends of pipes I and F striking the bottom of the float. As float B rises it will raise the relief-valve U and allow the valve H to seat itself. The air-cock *z* should then be closed. The water will then continue to rise in the trap until the body of the trap is full, when it will overflow into the float B and fill and sink it to the bottom. As float B descends it carries tank C underneath the water, and the tank is also filled with water through the pipes M N, any air or steam in the tank escaping through the upwardly-opening cup-valve L. Meanwhile, as soon as the trap has partially filled with water, the globe-valve in steam-pipe entering at *e* should be opened. Fig. 7 shows the construction of the seat of valve U in detail. As the float B descends it opens the steam-valve H and allows relief-valve U to close. The steam from the boiler rushes through steam-valve H and presses upon the surface of the water till the pressure in the boiler and trap are equal. As the trap is placed above the boiler, the water in the trap, being acted on by this continued equalizing pressure, will find its level, passing down into float B and up passage-way D, out through check-valve V, into pipe Z, down through another outwardly-opening check-valve (not shown) near the boiler, and finally into the boiler, the water above the float having been forced out of the trap till it reaches the level of dotted line R. All the water below the dotted line and outside the float B is left every time. The water in the float B is forced up and out by the same pressure. As the water is forced out of float B it is held down by the tank C being full of water. When sufficient water has been forced out of float B to make it buoyant enough to float in the water remaining in the trap and lift tank C and its contents, so as to expose the lower end of pipe M, which leads nearly to the top of tank C, the steam will enter the tank through pipe M and allow the water in tank C to empty itself through pipe N very quickly, as pipes N and M are quite large. Now, the float B, being relieved of its weight, ascends suddenly, allowing steam-valve H to close, and opens the relief-valve U, through which the trap will lose its pressure of steam and any air which may accumulate in the circuit of condensation. Now, the steam-equalizing valve H is closed, and the water-pressure from the boiler will close the discharge check-valves in pipe Z. The trap has lost its pressure through valve U, so that it is ready to continue its work automatically. It will therefore be seen that any amount of pressure may exist in the boiler and only enough pressure may exist in the coils to force the water of condensation up into the trap against no pressure. A globe-valve may be placed in passage *d* to regulate the amount of waste, if desired.

By means of the relief-valve U the trap is enabled to commence filling almost as soon as it is emptied, without waiting for the condensation of the steam within the trap.

It will be seen at a glance should the check-valve at the boiler (not shown) and outlet check-valve V leak the water would return back into the float, causing it to sink and operate before the trap is full. I therefore place a small check-valve, J, just above the dotted line R, opening toward the trap and on the discharge from trap to boiler, which would make any leakage pass directly into the trap. Hence under any circumstances the trap must fill first before there can any water enter the float. So it will be perceived that the amount of water allowed to accumulate in the main body of the trap A before the float fills regulates the size of the trap, the float being only used for the purpose of opening the steam and relief valves, allowing the same valves to close themselves. Only one size float is thus required for all sizes of traps. Now, should the float by accident fill and sink before the trap A is full and open the steam-valve H, the steam-pressure will force the tank full of water from below the dotted line R, as the pipe M is of sufficient length to admit of this and not expose the lower end, so the float B must lift tank C and its contents, and in so doing will nearly empty itself every time it works. The action of the steam and relief valves is therefore made very positive by the sure and sufficient ascension of the float.

It will be noticed that the air-valve L on top of tank C is surrounded by an open tank, which is full of water to prevent any air entering into the tank.

The hole S at the base of the trap is an orifice to clean it, which is closed by a tap-screw.

I claim—

1. A steam-trap provided with a movable tank attached to the float, arranged and constructed so as to alternately receive and dis-

charge water, and by its consequent change of weight render the movements of the float more positive, for the purpose already described.

2. A steam-trap provided with a movable tank connected to the float, furnished with an inlet and outlet pipe and a valve at the top, substantially as and for the purposes set forth.

3. A steam-trap provided with a tank attached to an open-top vertical float.

4. A steam-trap provided with a steam and relief valve, with a partition in the cover that separates the two valves, substantially as described.

5. The combination, in a steam-trap, of the lever P, beveled rollers O O, float B, and valve-spindles adapted to be rotated whenever they are opened, substantially as and for the purposes set forth.

6. In combination with a steam-trap, an inwardly-opening check-valve, J, situated in the discharge-pipe below the discharge check-valve V, and leading into the body of the trap above the line R R, substantially as and for the purposes set forth.

7. In a steam-trap, the combination of the rod E, attached to float B, and provided with roller K and lever P, forked for the reception of the roller, so as to prevent all lost motion, substantially as and for the purposes set forth.

8. In a steam-trap, the combination of the steam-valve H, relief-valve U, the check-valves X and V, float B, tank C, rod E, guide-pipe, and passage D, all constructed and arranged substantially as and for the purposes set forth.

In testimony that I claim the foregoing as my own I affix my signature in presence of two witnesses.

BARRENT W. FELTHOUSEN.

In presence of—
E. H. BOTTUM,
T. H. BOTTUM.