2 Sheets—Sheet 1.

T. E. McNEILL.

Return Steam-Trap.

No. 206,344. **Patented July 23, 1878.**

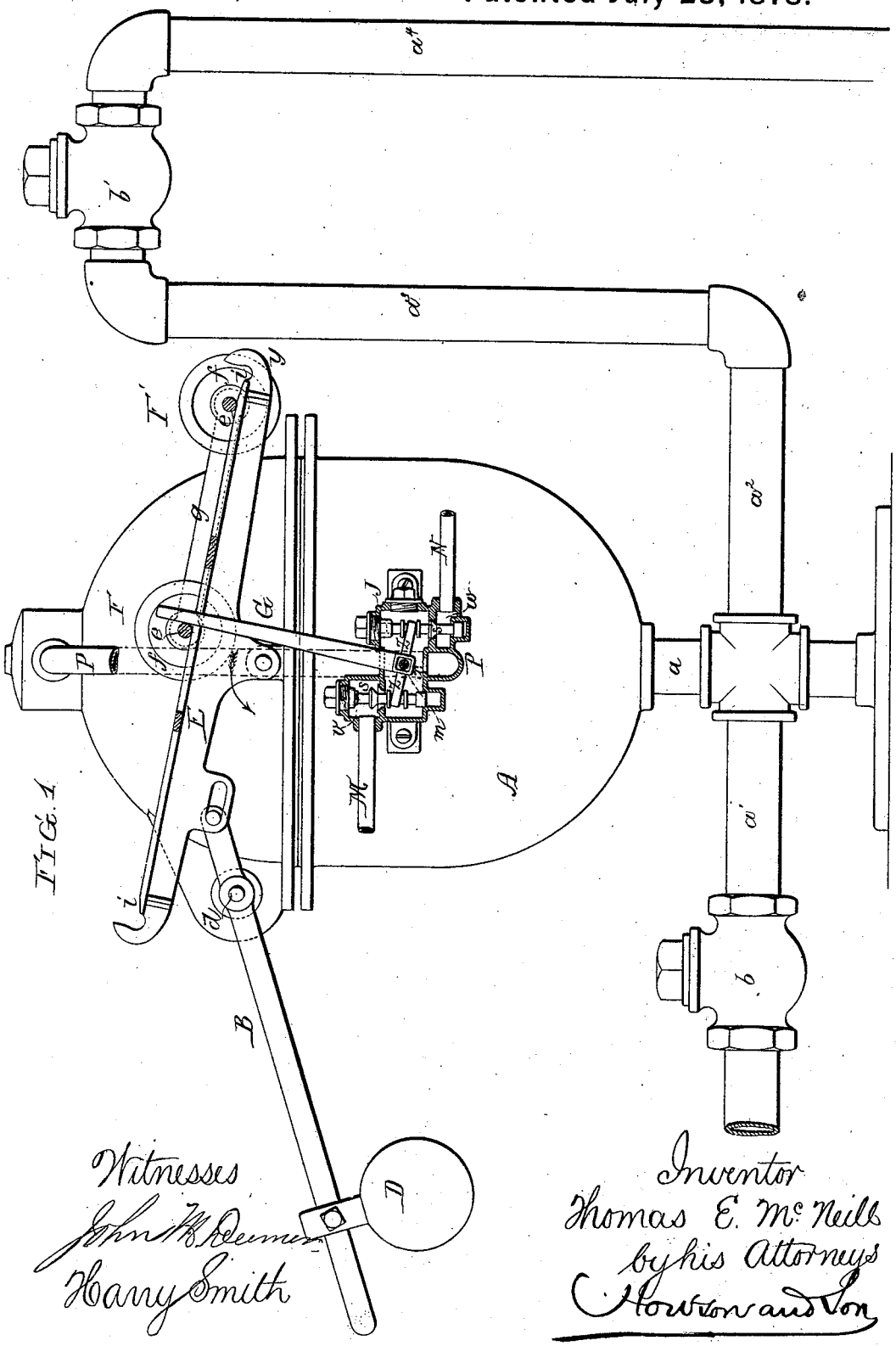

FIG. 1.

Witnesses
John K. Reemer
Harry Smith

Inventor
Thomas E. McNeill
by his Attorneys
Howson and Son

2 Sheets—Sheet 2.

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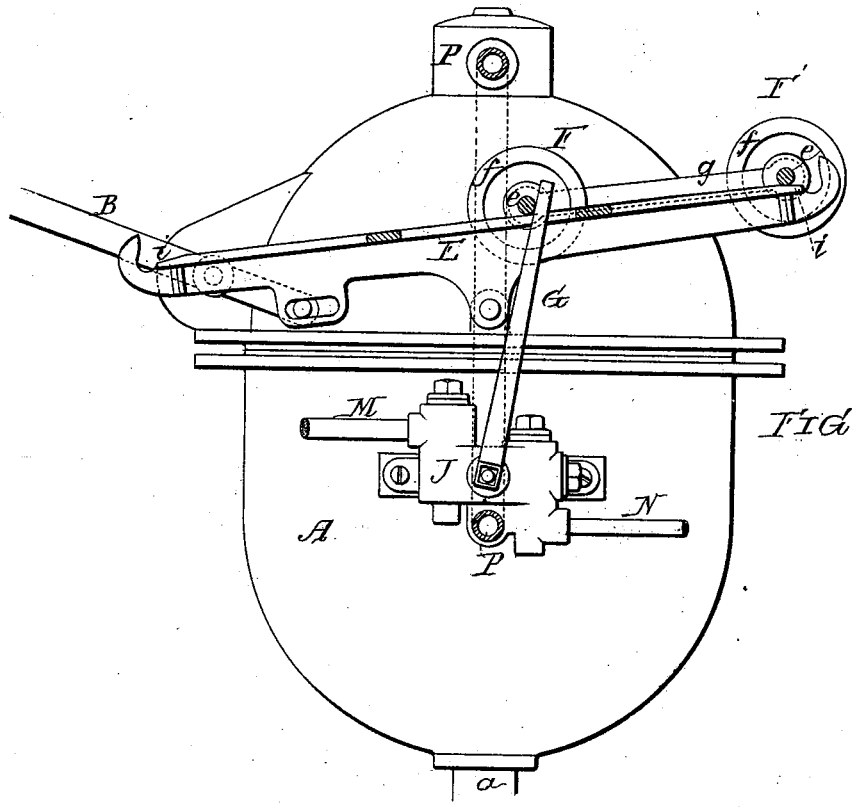
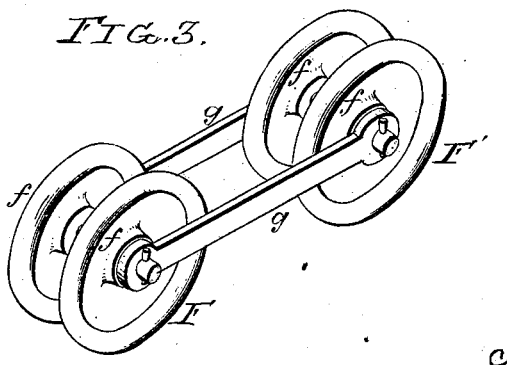


FIG. 2.

FIG. 3.



Witnesses
John W. Dennis
Harry Smith

Inventor
Thomas E. McNeill
by his Attorneys
Howson and Son

UNITED STATES PATENT OFFICE.

THOMAS E. McNEILL, OF NEW YORK, N. Y.

IMPROVEMENT IN RETURN STEAM-TRAPS.

Specification forming part of Letters Patent No. **206,344**, dated July 23, 1878; application filed April 29, 1878.

To all whom it may concern:

Be it known that I, THOMAS E. McNEILL, of the city of New York, in the State of New York, have invented a new and useful Improvement in Return Steam-Traps, of which the following is a specification:

The objects of my invention are to simplify the construction and improve the operation of the valves and valve-shifting appliances of a return steam-trap, and to prevent the action of the check-valve between the steam-pipes and the reservoir from being interfered with by the weight of the water in the reservoir. These objects I attain in the manner which I will now proceed to describe, reference being had to the accompanying drawing, in which—

Figure 1, Sheet 1, is a side view, partly in section, of my improved steam-trap; Fig. 2, Sheet 2, a side view of a portion of the same with the moving parts in a different position; and Fig. 3, a detached perspective view of part of the apparatus.

A represents a vessel or reservoir, with the interior of which, at the bottom, communicates a pipe, *a*, having branches a^1 and a^2, the former communicating with the boiler above the water-level, while the pipe a^2 communicates, through pipes a^3 and a^4, with the coil or coils of steam-pipes to be drained.

The pipe a^1 is provided with a check-valve, *b*, which is closed by pressure from the boiler, but opened by pressure from the vessel A, while in the branch which connects the pipes a^3 and a^4 is a check-valve, b', which is closed by pressure from the vessel A, but opened by pressure from the steam-pipes connected with the pipe a^4.

Within the vessel A is the usual bucket or float, hung to an arm on the shaft *d*, the latter passing through the vessel, and being provided at its outer end with a lever, B, the long arm of which carries a weight, D, while a pin on its short arm enters a slot in a lever, E, pivoted in the center to a stud on the vessel A.

The lever E carries two rolling weights, F F′, each of which consists of a spindle, *e*, resting upon the lever, and provided at each end with a disk, *f*, the weights F F′ being connected together by means of links *g*, adapted to the opposite ends of the spindles *e*.

At the opposite ends of the lever E are inclined portions *i*, the object of which will be referred to hereinafter.

Through a slot in the lever E extends the upper end of an arm, G, the lower end of which is secured to a spindle, *m*, which extends through and is adapted to bearings in a box, J, secured to a lug on the casing of the vessel A.

The box J incloses a chamber, *x*, which communicates, through openings provided with valves *s* and *s′*, with chambers *v* and *w*, the former contained within a projection formed on the upper side of the box J, while the chamber *w* is contained in a projection formed on the under side of said box J.

The chamber *v* communicates with the steam-space of the boiler through a pipe, M, and a chamber, *w*, communicates with the atmosphere or with a suitable receiving-vessel through a pipe, N, while the chamber *x* of the valve-box communicates, through a pipe, P, with the interior of the vessel A at the top of the same.

The spindle *m* within the valve-box is provided with two forked arms, *z z*, which engage with collars on the stems of the valves *s* and *s′*, so that, as the arm G is vibrated and the spindle *m* rocked, the valves *s* and *s′* will be raised from or forced down into their seats.

The operation of the apparatus is as follows: When the vessel A is filled with water, the parts are in the position shown in Fig. 1, the valve *s′* being closed and the valve *s* open, so that steam from the boiler has free access to the interior of the vessel A through the pipe M, chambers *v* and *x*, and pipe P.

The pressure of steam in the boiler and vessel A being equal, the water will flow by gravity from the vessel A and through the pipe a^1 into the boiler.

As the level of the water in the vessel A gradually falls the bucket will descend, and, through the medium of the shaft *d* and lever D, will operate the lever E, so as to cause the latter to turn on its pivot in the direction of the arrow, Fig. 1, thus elevating the end *y* of the lever and the weight F′, which rests thereon, the weight F remaining almost quiescent, owing to the fact that it is close to the center of the lever E, where there is but little movement.

As the end *y* of the lever rises the spindle *e* of the weight F′ runs onto the inclined portion *i* of this end of the lever, which thus acts as a detent, and prevents the weights from rolling until the lever E has assumed about the position shown in Fig. 2. By this time the vessel A is nearly or quite empty, and as the weights roll down the inclined lever the spindle *e* of the weight F′ strikes the upper end of the arm G with a force equal to the momentum acquired by both weights, F F′. This causes a rapid movement of the arm G in the direction of the arrow, thus effecting the sudden seating of the valve *s* and unseating of the valve *s′*.

The interior of the vessel A is now open to the atmosphere through the pipe P, chambers *x* and *w*, and pipe N, so that it is free to become filled with the water from the pipe a^2 and its connections.

As the pipe a^2 communicates with the bottom of the vessel A, any steam which enters the latter from said pipe must pass through and impart heat to the water in the vessel before it can escape from the same, a large amount of this steam being also condensed by this operation and added to the water.

Owing, however, to the fact that the check-valve *b′* is at or about the level of the top of the vessel A, the weight of the accumulated water in the latter cannot exert any back pressure on the said valve, which, in consequence, always opens freely to a slight pressure from the pipe a^4, the free inlet of water into the vessel A being thus insured.

As the vessel A gradually becomes filled, a movement of the lever E in a direction the reverse of that above described takes place, the weights, however, operating in the same manner, and serving, when the vessel A is full, to strike the arm G and again restore it and the valves *s* and *s′* to the position shown in Fig. 1.

In carrying out my invention it is not absolutely necessary that the exact form of valves and valve-operating appliances shown and described should be used in every case—for instance, sliding valves might be used instead of plug-valves, as shown and described.

A light spring-catch or similar retaining device, which would serve to hold the weight at the end of the lever E until the latter had assumed a certain angle, might also be substituted for the inclined portions *i* of the lever E, and sliding weights may be used in place of the rolling weights, if desired.

I claim as my invention—

1. The combination, in a return steam-trap, of the valve-operating arm G, the pivoted lever E, under control of the bucket or float, and the rolling or sliding weights F F′, adapted to the lever and connected to each other, all substantially as specified.

2. The combination of the pivoted lever E with the spindles *e*, disks *f*, and links *g*, all substantially as set forth.

3. The combination of a rolling or sliding weight or weights with the pivoted lever E having at each end an inclined portion, *i*, or equivalent retaining device, as described.

4. The combination of the reservoir A, the valve-box J, its chambers *v*, *x*, and *w*, pipes M, N, and P, and valves *s s′*, the arm G and and its arms *z z*, and devices for vibrating said arm, all substantially as specified.

5. The combination of the reservoir A of a steam-trap with an inlet-pipe communicating with said reservoir at the bottom, but carried upward to a point at, near, or above the level of the top of the reservoir, and there provided with a check-valve, as and for the purpose set forth.

In testimony whereof I have signed my name to this specification in presence of two subscribing witnesses.

THOMAS E. McNEILL.

Witnesses:

CHARLES J. GILLIS,

RAYMOND L. COVERT.