

(No Model.)

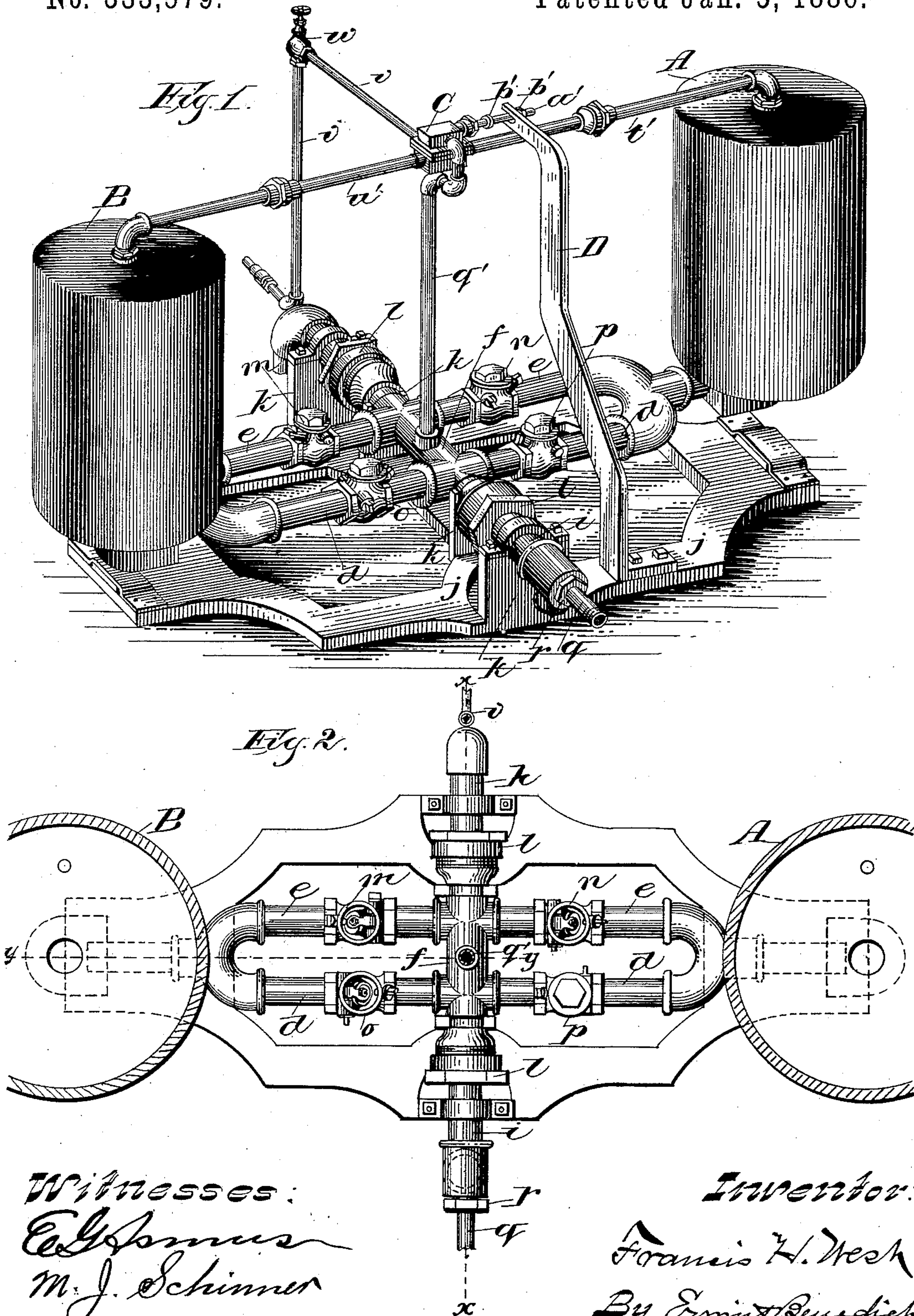
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F. H. WEST.

STEAM TRAP.

No. 333,579.

Patented Jan. 5, 1886.



Witnesses:  
Edgar  
M. J. Schinner

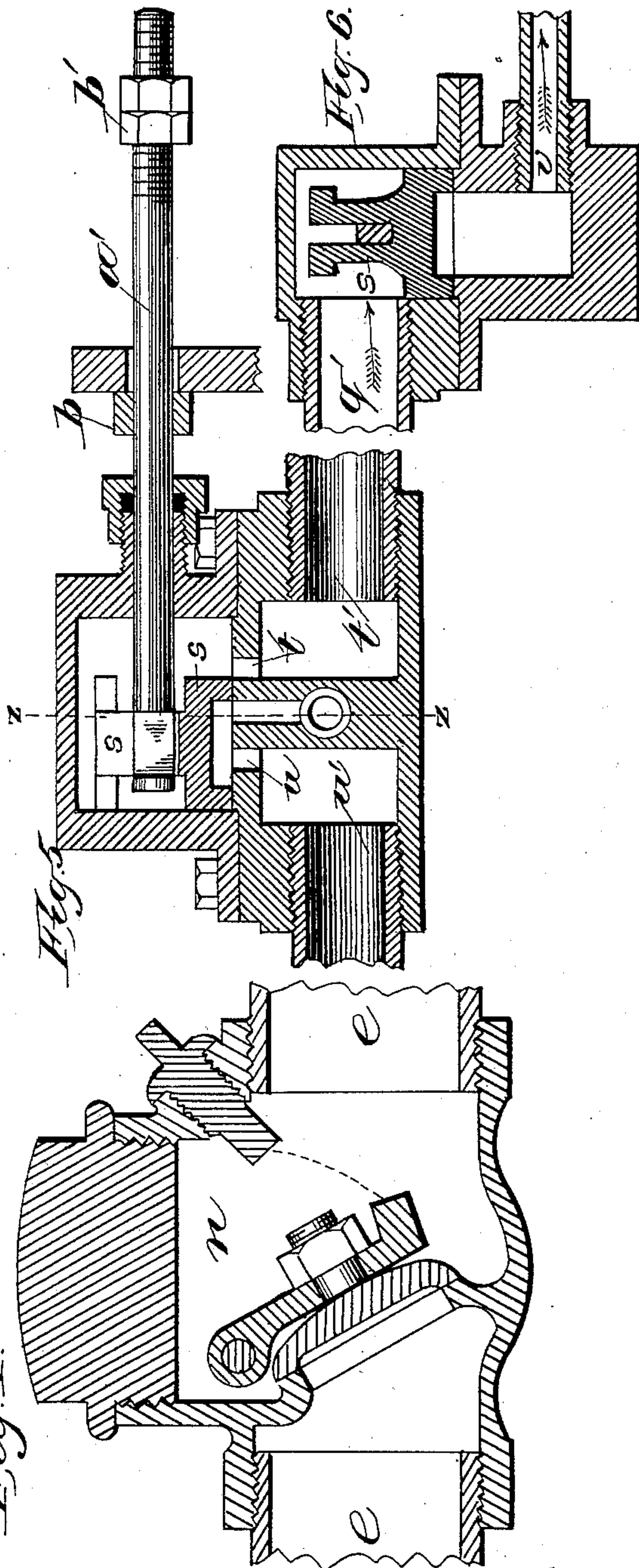
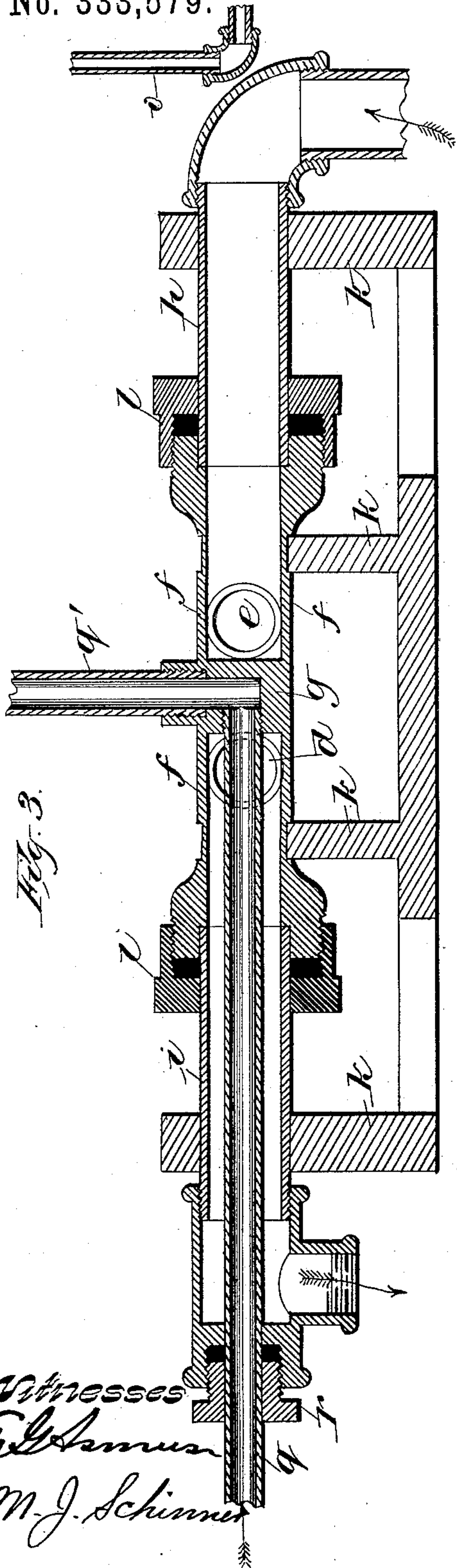
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# UNITED STATES PATENT OFFICE.

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## STEAM-TRAP.

SPECIFICATION forming part of Letters Patent No. 333,579, dated January 5, 1886.

Application filed August 14, 1885. Serial No. 174,364. (No model.)

*To all whom it may concern:*

Be it known that I, FRANCIS H. WEST, of Milwaukee, in the county of Milwaukee and State of Wisconsin, have invented new and useful Improvements in Steam-Traps; and I do hereby declare the following to be a full, clear, and exact description of said invention, reference being had to the accompanying drawings, and to the letters or figures of reference marked thereon, which form a part of this specification.

My invention, to be hereinafter distinctly claimed, relates to improvements in that class of steam-traps having two alternately water receiving and discharging oscillating chambers located above the boiler, which are especially adapted to returning the water of condensation in steam radiators or coils from a point below the boiler to the boiler. This trap may also be used to put water into the boiler against the steam-pressure therein from a reservoir located above the trap, or from any source that would deliver the water into the chambers of the trap.

The nature and object of my improvements will be understood from the following description and accompanying drawings, in which—

Figure 1 is a perspective of my trap. Fig. 2 is a view from above of the lower parts of the trap, being chiefly the water receiving and distributing pipes. Fig. 3 is a vertical cross-section of parts shown in Fig. 2 on line *x x* of Fig. 2. Fig. 4 is a vertical section of one of the four check-valves and its chamber. Fig. 5 is a vertical longitudinal section of the steam-chest C and its appertaining apparatus. Fig. 6 is a vertical cross-section of the steam-chest C on line *z z* of Fig. 5.

The plan of this trap is to have two chambers connected by pipes having valves opened and closed automatically, which said chambers are adapted and made to alternately take from the steam coils or radiators and discharge into the boiler the water of condensation.

In the drawings, A and B are the two tanks or chambers for receiving and discharging the water of condensation. These tanks A and B are supported one on each arm of a bifurcated tubular lever equidistant from the central fulcrum. This tubular supporting-lever opens

at its respective ends into the bottom of the tanks A and B, and between the two tanks is divided into two parts or continuous tubes, *d* and *e*. These tubes *d* and *e* open into and are rigid with the central cross-tube, *f*. This tube *f* is closed centrally between the apertures into the pipes *d* and *e* by a partition, *g*, so as to stop all direct communication therethrough between pipes *d* and *e*. The inlet-pipe *h*, connecting the trap with the steam-coils or other source of water-supply, leads into one end of this pipe *f*, and the discharge-pipe *i* leads out of the other end of the pipe *f* to the boiler, with which it connects at some point below the low-water line therein. The ends of the pipes *h* and *i* that connect with the ends of the pipe *f* are continued therefrom horizontally in the line of the axis of the pipe *f* for a short distance each way, respectively, to provide convenient means of connecting the pipes together, and to give sufficient bearings for the support of the trap on a suitable frame, *j*, on which frame it is supported by and through the pipes *f*, *h*, and *i* in the upright arms or pillow-blocks *k k*, rigid on said frame, two or more of which are provided with suitable removable retaining-caps.

To provide a suitable steam-tight movable connection between the pipe *f* and the pipes *h* and *i*, packing-nuts *ll* are screwed onto the ends of the pipe *f*, through which the ends of the pipes *h* and *i* are respectively inserted into recesses in the ends of the pipe *f*, provided to receive them, whereby said pipe *f* and the apparatus attached thereto are capable of a steam-tight oscillating movement on the ends of the pipes *h* and *i*.

In each of the pipes *d* and *e* are inserted two check-valves, (preferably clack-valves, Fig. 4,) *m n o p*—one in each pipe on each side of the pipe *f*. Of these valves two of them, *m* and *n*, in the pipe *e* open outwardly toward the tanks A and B, and the other two, *o* and *p*, in pipe *d*, open inwardly toward the pipe *f*. To properly operate these four check-valves, to permit the inflow and outflow of the water of condensation to and from the tanks alternately, the pressure of the steam in the boiler is utilized by and through the steam-chest C and its appurtenant apparatus. For this pur-



pose the steam-pipe *g*, connected with the boiler, is run longitudinally through the horizontal part of pipe *i* centrally and through one end of the pipe *f* into the partition *g*, where it opens into an aperture, which aperture opens upwardly into and is made continuous with the pipe *q'*, rigid onto pipe *f*, and leading therefrom to and opening into the steam-chest C. The pipe *q* passes steam-tight rigidly into the pipe *i* through a packing-nut, *r*, fitted onto a suitable elbow of said pipe at the outer end of its horizontal part, and at its inner end said pipe *q* has a movable connection in the partition *g* by means of a screw-thread cut on the outer side of the pipe, and a corresponding thread cut in the partition, whereby a slight but sufficient rotary motion is secured in the loosely-fitted screw-thread joint. This joint is sufficiently steam-tight, as the pressure on the inside and outside of the pipe *q* at this point are equal at all times. If desired, or if found necessary to avoid oxidation in the joint, a brass bushing can be inserted in the partition *g* around the pipe *q*, in which to cut a proper thread.

The chamber of the steam-chest C is provided with a slide-valve, *s*, having ports *t* and *u*, opening into the pipes *t'* and *u'*, respectively, which pipes are extended and lead into the tops of the tanks A and B, respectively. An eduction-pipe, *v*, has its port under the slide-valve *s* centrally, by and through which the pipe *v* is constantly open to either pipe *t'* or *u'*. This pipe *v* is closed by a plug-valve operated by a thumb-screw at *w*, whereby said pipe may be opened sufficiently for a vent when required, for which purpose only such pipe is needed in connection with the closed system of steam-heating. When the pipe *v*, for any purpose, is continued away to the sewer, as indicated in the drawings, it is carried down to the axis of the trap as supported on the arms *k k*, and a loose connection is there made horizontally in the line of said axis, whereby the connection is made at the part of least motion and resistance.

To operate the valve *s*, it is provided with a stem, *a'*, rigid thereto, extending horizontally outward through the side of the steam-chest C in a steam-tight packing-nut, in which it has reciprocating movement, which stem has two collars, *b b'*, thereon a little distance apart, and of which one collar, *b'*, is adjustable toward or from the other collar. This stem *a'* rides between the collars *b b'* in the upper end of the tilting-arm D, which arm is rigid on frame *j*, the jaws of which arm on either side of the socket in which the stem *a'* rides are adapted to impinge against the collars *b b'* as the trap oscillates, and holds the valve *s*, whereby the opening and closing of the ports *t* and *u* are accomplished.

The operation of this trap is as follows: The trap being set level at some point above the drip-reservoir, or lowest point of the steam-pipes or radiator system, and above the water-level in the boiler, and the pipe *h* being

connected with the drip-reservoir, the pipe *i* with the boiler below the low-water line, and the pipe *q* with the steam-chamber of the boiler, the steam from the boiler will enter through the pipe *q q'*, pass through the steam-chest C, and into the lower one of the tanks, and pressing against the valves *m* and *p*, or *n* and *o*, will hold them closed, leaving the valve *n* or *m* free to open to the inflowing water of condensation on its course to the other tank. Thus when the tank B is lowest, as shown in Fig. 1, the steam coming into it from the boiler through the pipe *u'* will close valve *m*, open valve *o*, and close valve *p*, thus excluding the steam from tank A, into which the water of condensation in the drip-reservoir will, by the steam in the coils or radiators behind it, be forced along the pipes *h* and *e* through valve *n*, until the tank A, having received sufficient water to overcome the equilibrium between it and the tank B, the tank A will go down, causing the jaws of the tilting-arm D to impinge against the collars on valve-stem *a'*, and reverse the valve, closing the steam-port into tank B and opening the port into A, permitting the live steam to pass into the tank A, thus equalizing the pressure in that tank and the boiler, when the water in the tank will by gravity discharge itself into the boiler through pipes *d* and *i*, the valve *p* being opened and *n* and *o* closed meantime by the change in the direction of the steam, as aforesaid. By constructing the tanks A and B in an upright form, and locating them on the arms of their oscillating lever entirely above the fulcrum, a very positive oscillating movement is secured by the shifting of the center of gravity as the tanks are filled and emptied, and with the lost motion provided for by placing the collars *b b'* on the stem *a'* at a distance apart sufficient power is secured to successfully operate the slide-valve *s* against the pressure of the steam, with but a comparatively short oscillation of the tanks A and B.

What I claim as new, and desire to secure by Letters Patent, is—

1. In a steam-trap having two tanks adapted to be alternately filled with and discharged of water, and having a receiving and a discharging pipe communicating with each of said tanks and with a common inlet and a common outlet pipe, two sets of check-valves, one set located in the receiving and one set in the discharging pipe, the valves in each set opening in opposite directions, said valves being adapted to be closed by twos by steam-pressure on one side, thereby shutting off the tank on that side from inflowing water, leaving a valve in the receiving-pipe open toward the other tank for the inflowing water, in combination with apparatus for admitting steam to said tanks alternately, substantially as and for the purpose set forth.

2. In a steam-trap having two chambers, A and B, adapted to be alternately filled with and discharged of water, four check-valves, *m n o p*, two of which, *m n*, are set in the re-



ceiving-pipe *e*, and the other two, *o* and *p*, are set in the discharge-pipe *d*, the two valves *m* and *n* being located one on each side of the common intake pipe *f*, and opening outwardly with the flow of the water toward the tank, and the two valves *o* and *p* being located one on each side of the common discharge-pipe *i*, and opening inwardly with the flow of the water toward the pipe *i*, substantially as set forth.

3. In a steam-trap, the combination of two closed tanks, A and B, the receiving and discharging pipes *d* and *e*, opening at their outer ends into the tanks A and B, respectively, and at their inner ends opening into the cross-pipe *f*, the cross-pipe *f*, provided with the partition *g*, and having a rotary movement in its connection at its two ends with the ends of pipes *h* and *i*, and the check-valves *m n o p*, substantially as described.

4. In an oscillating steam-trap, the central supporting rotating pipe, *f*, provided with the partition *g*, having an upwardly-opening aperture, in combination with the horizontal rigid pipe *g*, introduced longitudinally into the pipe *f*, and having a movable connection with pipe *f* by being inserted with a screw-thread into a horizontal intercepting aperture therefor in the partition *g*, wherein it turns when the pipe *f* oscillates, substantially as and for the purpose set forth.

5. The tanks A and B, the therewithcommunicating receiving and discharging pipes *e* and *d*, the therein-inserted check-valves *m, n, o, and p*, the axial cross-pipe *f*, provided with partition *g*, and communicating with the pipes *h, e, d, and i*, respectively, and the pipes *h* and *i*, in combination with the pipe *g* *q'*, steam-chest C, provided with outlet-ports closed by a slide-valve, *s*, having a stem, *a'*, and collars *b b'*, the tilting-arm D, and the steam-pipes *t'* and *u'*, connecting the steam-chest C with the tanks A and B, respectively, all supported on frame *j*, substantially as and for the purpose set forth.

6. In a steam-trap having two oscillating tanks A and B, an oscillating steam-chest, C, having two ports, *t* and *u*, and pipes *t'* and *u'* therefrom, by and through which communication is had therefrom to the two tanks A and B, respectively, and the sliding valve *s*, provided with stem *a'*, having collars *b* and *b'*, in combination with the rigid tilting-arm D, substantially as described.

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

FRANCIS H. WEST.

Witnesses:

C. T. BENEDICT,  
M. J. SCHINNER.