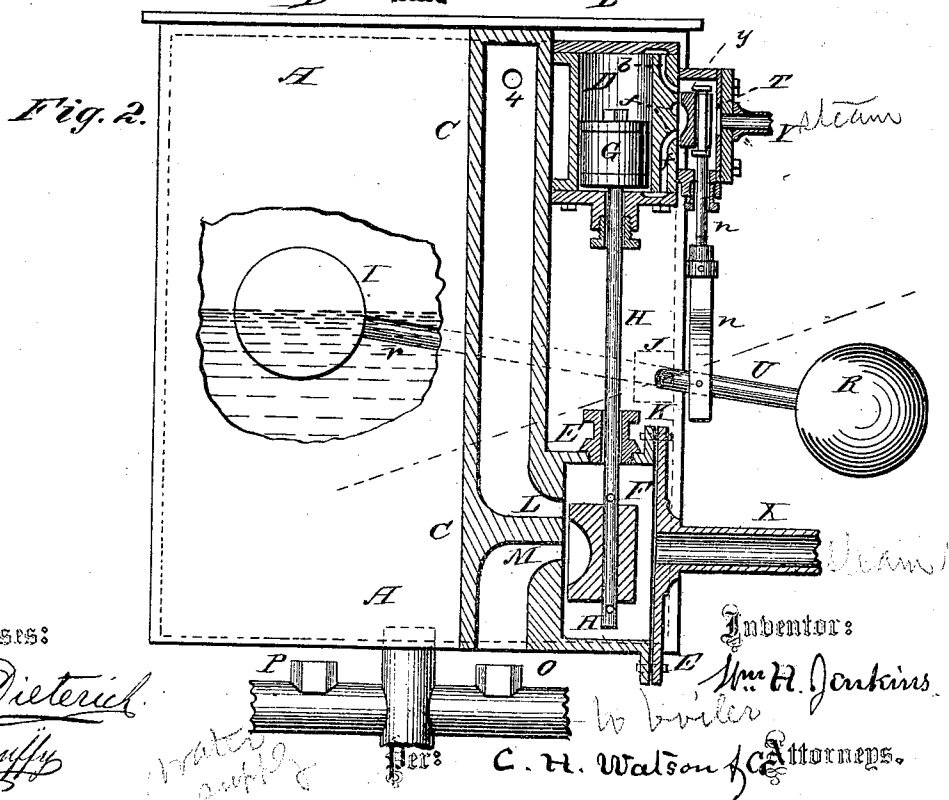
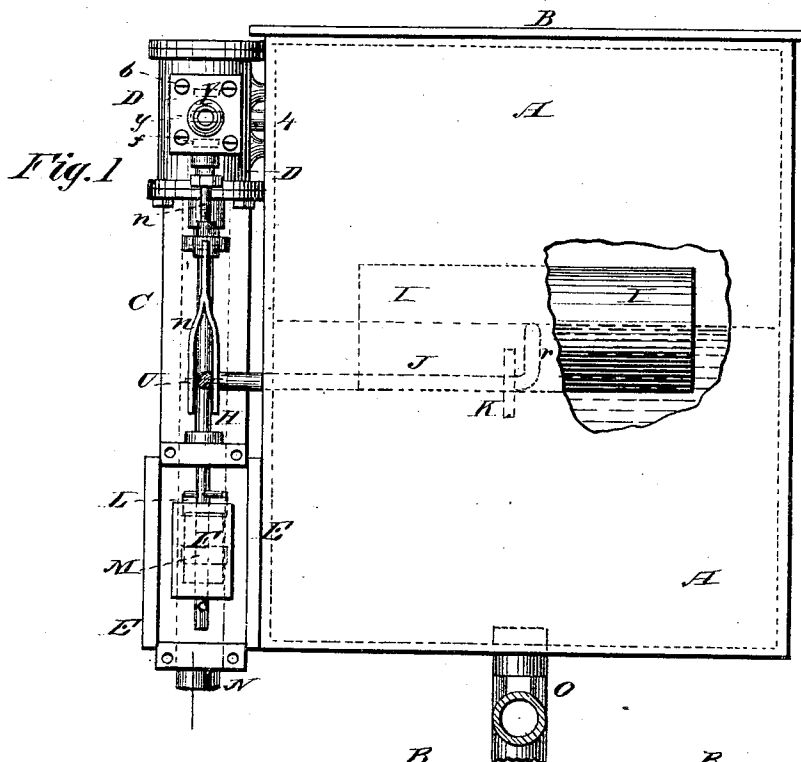


W. H. JENKINS.

BOILER-FEEDER AND RETURN STEAM-TRAP.

No. 178,444.

Patented June 6, 1876.



UNITED STATES PATENT OFFICE

WILLIAM H. JENKINS, OF PHILADELPHIA, PENNSYLVANIA.

IMPROVEMENT IN BOILER-FEEDERS AND RETURN-STEAM TRAPS.

Specification forming part of Letters Patent No. **178,444**, dated June 6, 1876; application filed April 11, 1876.

To all whom it may concern:

Be it known that I, WILLIAM H. JENKINS, of Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Automatic Boiler-Feeder and Return-Steam Trap; and I do hereby declare that the following is a full, clear, and exact description thereof, which will enable others skilled in the art to which it appertains 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 automatic boiler-feeders and return-steam traps; and the nature of my invention consists in the construction and arrangement of parts, as will be hereinafter more fully set forth.

In the annexed drawings, Figure 1 is a side view of the feeder, with the case broken and the cover removed from the lower steam-chest. Fig. 2 is a vertical section of the apparatus.

A represents a cast-iron case, made in one piece, having a flange at the top, on which is bolted a bonnet or cover, B, provided with rubber joints, bolts, &c., to make it steam-tight. C is a hollow cast-iron column, the opening within it extending its entire length, except the partition which divides or separates the ports L M. It is connected at the top to the case A by a nipple, 4. D is a slide-valve steam-engine cylinder complete, with steam-ports *b* and *f*, and exhaust-port *y*, slide-valve T, steam-chest and pipe Y, and valve-stem *n*, piston G, and piston-rod H. E is a cast-iron case, of sufficient size to accommodate the required size and motion of the slide-valve F. The rod H connects the piston G to the slide-valve F in the usual way, passing through stuffing-boxes from the cylinder to the chest, giving the valve room to accommodate itself to its seat, so as to work steam-tight over the ports L M. I is a metal case of any size or proportion that may be found to best suit the purpose, filled with wood or any other light substance, and connected to one end of a lever, *r*, the other end of which is connected to the steel stem J. K is a stud-journal screwed into the case A from the inside. Through this journal the stem J is

extended and operated, the journal acting as a fulcrum for the float or case I and lever *r*. From this the stem J extends out through the side of the case A, being provided with suitable stuffing-box, &c., to make it steam-tight. On the outer end of the stem J is connected another lever, U, upon which is a weight, R, sufficiently heavy to counterbalance the entire weight of the case I, minus one-half the weight of its displacement, thereby causing the case to act by positive displacement as a float. To the lever U is connected the lower end of the valve-stem *n*, the upper end being connected to the slide-valve T, which is operated over the exhaust and steam ports *y* and *b f*, respectively, by the rising and falling of the float or case I, so as to introduce the steam alternately above and below the piston G, driving said piston from one end of the cylinder to the other, according to which end of the cylinder D the steam is admitted, thereby operating the main valve F in the case E, covering and uncovering the ports L and M, as hereinafter explained, thus causing the boiler-pressure to be admitted into or exhausted from the case A. P is a check-valve on the water-supply pipe, arranged to permit the water to flow freely into the case A, but acting as a check to stop any outward flow from said case. O is a check-valve, which permits the water to flow from the case A into the boiler, but prevents any water flowing from the boiler into the case.

The steam-pipe X, connected to the steam-chest E, is to be extended down into the boiler to the exact height the water is to be carried. A live-steam pipe is connected to the steam-chest Y of the cylinder D, and the case A is erected about thirty inches above the water-level in the boiler. A discharge-pipe is then connected from the check-valve O to the boiler below the water-line, and a water-supply pipe connected to the check-valve P.

If used as a feeder, a pipe is connected to the outlet or exhaust pipe N, and extended to the supply-tank (or out in the air) just below the surface of the water.

When the case A is empty the float or case I will rest on the bottom thereof; and if the steam is turned on, and allowed to enter the steam-chest of the cylinder D, the float, being

on the bottom of the case, will cause the levers *r* and *U* to occupy the position shown by dotted lines in Fig. 2. Therefore the upper steam-port will be closed to the steam, but open to the exhaust-port, and the lower steam-port *f* will be open, and admit the steam through the channel-way into the cylinder *D* and under the piston *G*, driving it up and holding it there. The main valve *F* by this action will be drawn up, and, covering both the ports *L* and *M*, will prevent the flow of steam from the pipe *X* (the steam being opened from the boiler into the chest *E*) into the column *C* and open a passage under the valve *F*, so that the pressure within the case *A* (if there be any) can pass freely out. The water-supply is then opened, and as the water rises in the case *A* it will raise the float *I* with it, at the same time moving the slide-valve *T* by means of the stem *n* until the float arrives at the position shown in Fig. 2, when the steam will escape through the exhaust-port *y* from the bottom of the cylinder *D*, and more steam will be admitted through the steam-port *b* into the upper part of the cylinder *D* and drive the piston down, when the slide-valve *F* will cover the exhaust-port *M*, and admit the full boiler-pressure into the case *A* through the port *L*, column *C*, and nipple 4. The case *A* being higher than the water in the boiler, as soon as the steam becomes the same pressure within the case *A* as it is within the boiler, the water in said case will begin to flow out of the case *A* through the check-valve *O* into the boiler, the check-valve *P* being closed by the pressure as soon as it entered the case. Then, if the water in the boiler has risen up to the end of the pipe *X*, which is extended to the water-line, the water in the boiler will rise within said pipe to a height corresponding to the

height of the water within the case *A*, thereby balancing the weight of the water within the case, and stopping the flow of water from the case to the boiler; but as soon as the water within the boiler falls below the end of the pipe *X*, the water contained in said pipe will fall, steam will pass up into the case *A*, and the water begin to flow into the boiler, as before.

Operated as a return-steam trap, the only alteration necessary is the connecting the exhaust-pipe *N* to the supply or return pipe. Working in this way, instead of the pressure blowing into the supply-tank or open air, it would equalize the pressure within the case *A* with that in the return-pipe, and discharge the steam into water contained in the return-pipe, thus increasing and facilitating the condensation, and causing it to work very rapidly.

By means of the cover or bonnet *B* the inside parts of the case *A* can at any time be arranged without trouble.

Having thus fully described my invention, what I claim as new, and desire to secure by Letters Patent, is—

In a feed water heater, the combination of the float and its stem, passing through the casing; the valve rod *n* and valve *T*, for admitting steam to the cylinder *D*; the valve-rod *H* and valve *F* in a separate steam-chest, for admitting steam to, and exhausting it from, chamber *A*, all constructed and arranged substantially as and for the purpose set forth.

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

WM. H. JENKINS.

Witnesses:

A. C. SELTZER,

ROBERT J. ARUNDEL.