(No Model.)

W. SIMPKIN.

STEAM TRAP AND BOILER FEEDER.

No. 385,014. Patented June 26, 1888.

Fig 1.

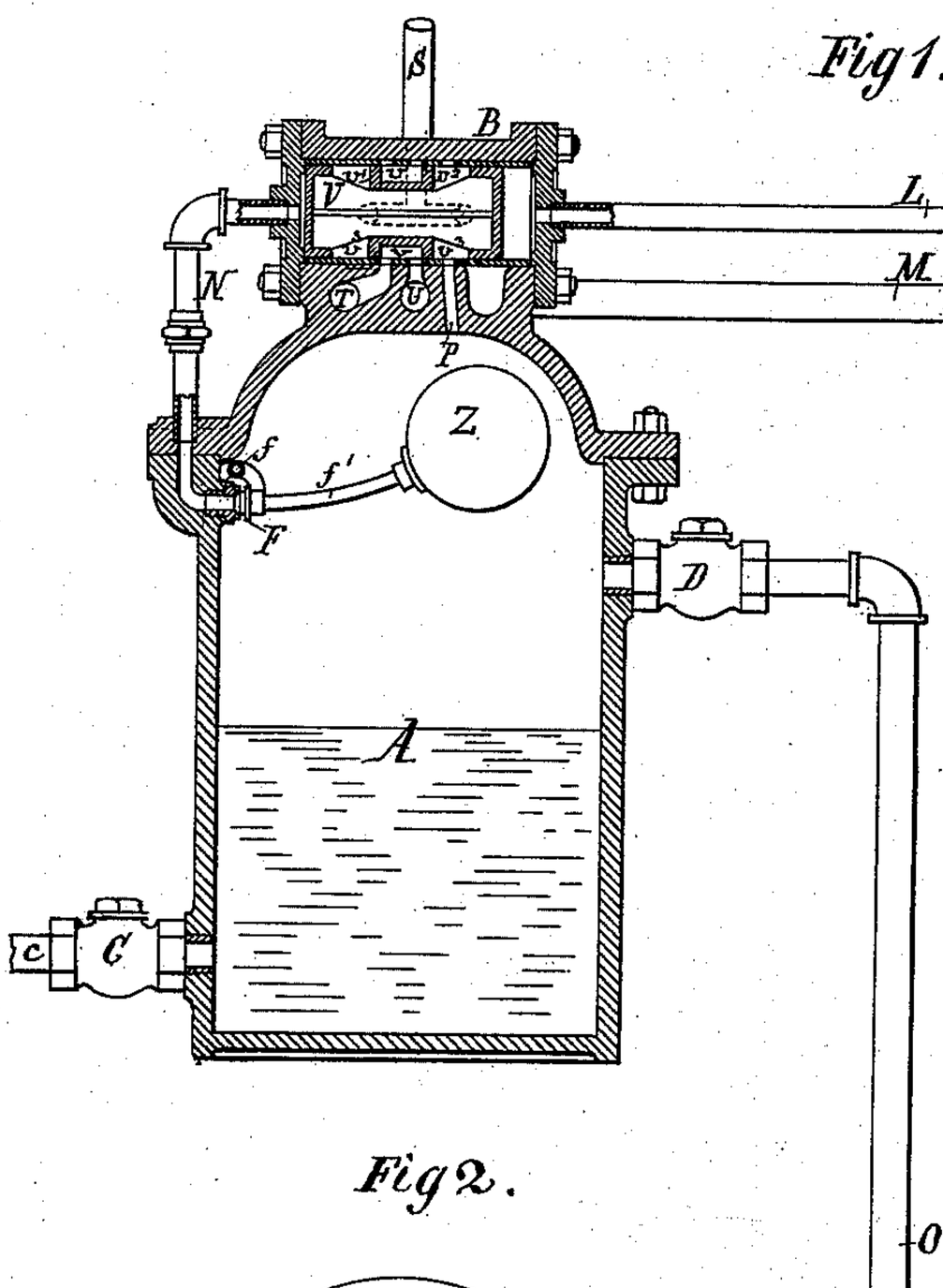
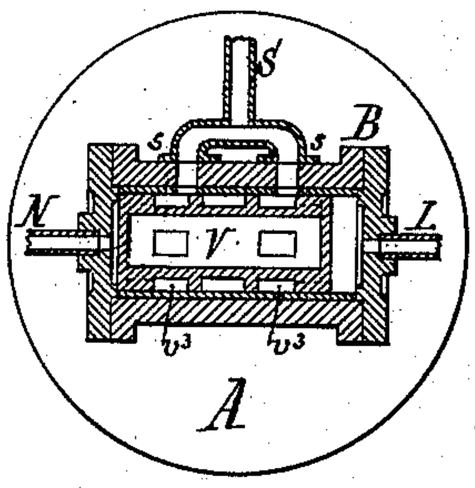
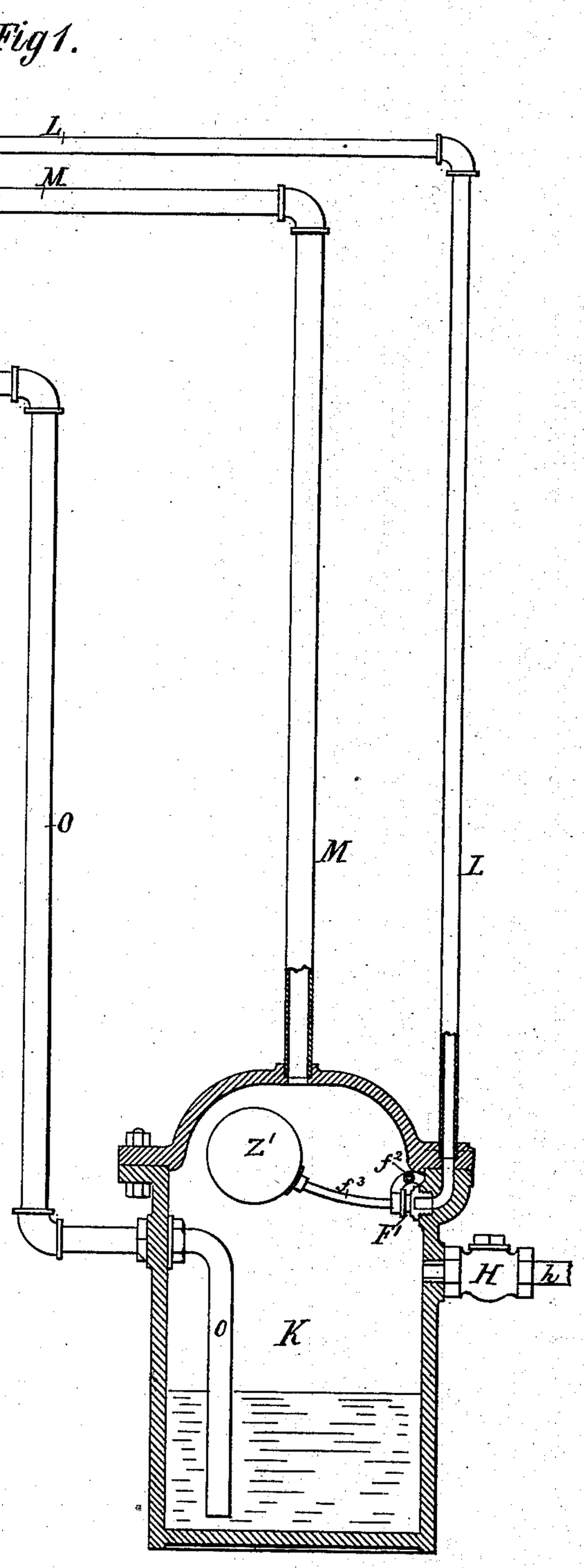


Fig 2.





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UNITED STATES PATENT OFFICE.

WILLIAM SIMPKIN, OF RICHMOND, VIRGINIA.

STEAM-TRAP AND BOILER-FEEDER.

SPECIFICATION forming part of Letters Patent No. 385,014, dated June 26, 1888.

Application filed September 2, 1887. Serial No. 248,573. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM SIMPKIN, a citizen of the United States, residing at Richmond, in the county of Henrico and State of Virginia, have invented certain new and useful Improvements in a Combined Steam-Trap and Boiler-Feeder; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention consists in certain novel constructions, arrangements, and combinations of parts as will be hereinafter fully described, and pointed out in the claims, the same constituting an improved means for feeding the drip-water into the boiler, steam and water being employed as adjuncts to the mechanical appliances, the structure being such that great simplicity and effectiveness of operation are secured.

In the accompanying drawings, Figure 1 is a view, mostly in vertical section, of my improved combined steam-trap and boiler-feeder, and Fig. 2 is a horizontal section along the water-line of its valve-chamber.

The letter A in the drawings represents a receiver or reservoir elevated above a boiler and connected with the same by means of a feed-pipe, *c*, having a check-valve, C, which prevents steam under pressure from entering the said receiver. Formed at the top of the receiver or suitably fastened thereto is a cylindrical valve-chamber, B, provided with three ports, P T U, of which U is an ordinary exhaust-port, P port connecting the valve-chamber with the receiver A, and T port connecting the valve-chamber by means of a pipe, M, with a drip-box, K. A pipe, N, establishes communication between the left end portion of the valve-chamber and the top portion of the receiver, the said communication being opened and closed by means of a float-valve, F, arranged within the receiver and hinged at *f* to the same, said valve being provided with a lever-arm, *f'*, having a float, Z, on its free end. A pipe, L, affords communication between the right end portion of the valve-chamber and the upper portion of the drip-box K. This latter communication is alternately opened or closed by means of a valve, F', within the drip-box, and hinged at f^2 to the same, said valve having an arm, f^3, carrying a float, Z', as shown.

Steam is introduced into the valve-chamber B from the boiler by means of a pipe, S, having two branches, *s*, leading to and connecting with two ports, *s'*, in the valve-chamber. Within the valve-chamber a hollow sliding piston-valve, V, is snugly fitted, said valve having an annular exhaust-space, *v*, about midway of its length, which, when the valve is moved, alternately affords communication between the ports T U and P U, as will be hereinafter shown. The periphery of the lateral annular walls *v' v'* of the valve-space *v* covers the ports P and T when the valve stands at the middle of its stroke, same as in the case of the slide valve of an ordinary steam-engine. Between the annular walls *v' v²* and the end portion of the valve annular steamways v^3 are provided, which receive the steam from the ports *s'* at either side of the walls *v' v²*. The annular walls *v' v²* are bridged over by the branches *s* of the steam-pipe S, so that the steam from the pipe S cannot enter the space *v*. The receiver A is furthermore connected with the drip-box K by means of a drain-pipe, O, having a check valve, D, for preventing back-pressure from the receiver. The drip-water reaches the drip box by means of a drip-pipe, *h*, from which the intermittent steam-pressure in the drip-box K is excluded by means of a check-valve, H.

Operation: From the foregoing description and accompanying drawings it will be understood that the receiver A being placed near the boiler and on a higher level, the steam-chest B, containing a piston-valve, V, with solid ends (or rather a combination of two pistons and a piston-valve—calling the two outer ends "pistons") placed on top of said receiver and working on a three-ported facing—the port T being in direct communication with the drip-box through pipe M N, and the port P in direct communication with the receiver A, and the port U in direct communication with the open air, and the one end of steam-chest B being connected with the receiver by pipe N, the connection being closed by valve F and ball-float Z, while the opposite end of steam-chest communicates with the drip-box through pipe L, and the connection also closed by valve and float, the operation will be as follows: The

condensed water collecting in the drip-box, as soon as it reaches the float lifts the valve, whereby the equilibrium of the piston-valve is destroyed by the reduction of the pressure behind the right-hand piston or end of valve, the valve immediately moving to the right. Steam then passes through port T and pipe M to drip-box, and acting on the water in the drip-box forces it up the pipe O into the receiver through valve D, the steam which was already in the receiver A having been exhausted through port P into port U and out to the atmosphere. As soon as the water in receiver A reaches the float Z it opens valve F, thus again destroying the equilibrium of piston-valve V by the reduction of pressure behind the left-hand piston or end of valve to atmospheric pressure. The pressure in the steam-chest then causes the piston-valve to move to the left back into its first position, and the action described is repeated. The ports T and U being now in communication, the steam in the drip box K is exhausted and live steam enters through port P into the receiver A and balances the pressure therein with that of the boiler, and the weight of the water, by reason of the height of its column in the receiver, lifts the check-valve C and the water runs down into the boiler until the resistance of the check-valve is sufficient to stop the same.

If the fires under the boiler are put out and the boiler allowed to cool down, the operation of the invention will cease, and the drip-box being filled the valve F′ will be opened and the valve V moved to the right, and in this condition the apparatus remains until the steam-pressure is again sufficiently increased to lift the water from the drip box to the receiver.

Thus it will be seen that my invention is independent of regulators—such as steam cocks or globe-valves—for cutting off steam, water, and the like, and mistakes which are liable to occur in the management of such valves will be avoided. By having the movable parts—viz., floats and valves—inclosed in the drip-box and receiver there is no danger of interference and disturbance by unskilled or unauthorized persons. Stuffing-boxes, packing, and the like for the valves and other parts are unnecessary, and the saving of power by the avoidance of friction is accomplished.

The construction of my combined steam-trap and boiler-feeder is such that no other but simple pipe-connections with the boiler and with the drip mechanism are required to attach it to a heating apparatus, and the valve V is actuated directly by steam, there being no intervention of weights, floats, or levers for operating it.

It will be seen that my invention requires no back-pressure on the drip-pipes, and therefore the heating apparatus will not be influenced by the operation of the same, thus avoiding much inconvenience usually experienced with steam-traps.

What I claim as my invention is—

1. The combined steam-trap and boiler-feeder, comprising in its construction a steam-chest on the receiver, having passages which place it in communication with the return drip-chamber, receiver, and steam-generator, and a hollow sliding piston-valve, V, which is wholly within the steam-chest and is constructed with passages v v^3 v^3, said valve being moved in said chest and serving itself to control the flow of live and exhaust steam by moving back and forth by reason of a change alternately of the steam-pressure at its respective ends to atmospheric pressure, substantially as and for the purpose described.

2. The combination of the valve-chamber B, having ports P T U and sliding piston-valve V, the receiver A and drip-box K, a pipe, c, of a steam-boiler, and connections h L M N O S, and suitable valves, as F F′, for operating with the same, substantially as and for the purpose described.

3. The valve-chamber B, having piston slide-valve V, in combination with the receiver A, drip-box K, float-valves F F′, and pipes L N, substantially as and for the purpose described.

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

WILLIAM SIMPKIN.

Witnesses.
H. K. GRIFFITH,
WM. F. HOWARD.