

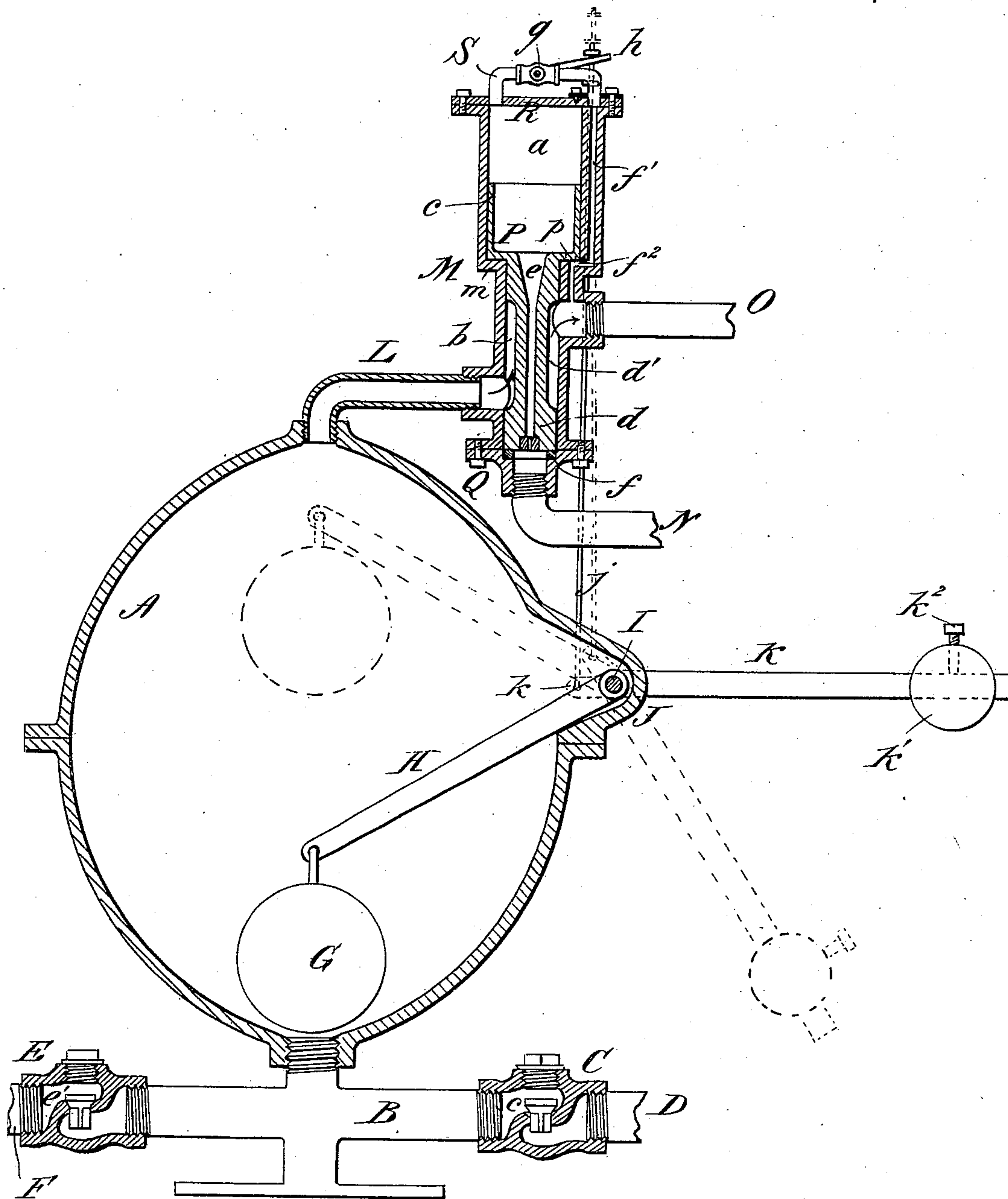
(No Model.)

D. P. KEATING.

FEED WATER RETURN TRAP FOR STEAM HEATING APPARATUS.

No. 310,061.

Patented Dec. 30, 1884.



WITNESSES:

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# UNITED STATES PATENT OFFICE.

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## FEED-WATER RETURN-TRAP FOR STEAM-HEATING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 310,061, dated December 30, 1834.

Application filed March 15, 1884. (No model.)

*To all whom it may concern:*

Be it known that I, DENNING P. KEATING, of Ward's Island, city, county, and State of New York, have invented a new and Improved Feed-Water Return-Trap for Steam-Heating Apparatus, of which the following is a full, clear, and exact description.

The object of this invention is to provide a practical and reliable automatic device for returning the water of condensation of steam-radiators back to the steam-boiler.

Reference is to be had to the accompanying drawing, forming part of this specification, in which the figure is a sectional elevation of my invention, showing the parts in the position they assume before water enters the water-receiver.

A represents a receiver, made by preference of cast-iron. To this is connected the T-pipe B, to one end of which is attached, by the valve-coupling C, the water-inlet pipe D, into which the water of condensation from the steam-radiators is conducted, and which conducts said water to the pipe B, through which it passes into the receiver A. The other end of the T-pipe B is connected, by the valve-coupling E, to the pipe F, which leads directly to the steam-boiler. (Not shown.)

Within the receiver A is placed the float G, which is attached to the arm H, which is secured to the short shaft I, journaled in the enlargement J, made in the receiver A. To one of the outer ends of this short shaft I is secured the lever K, which has the short crank-arm *k* formed at one end, which is provided at the outer end with the sliding counterbalance-weight *k'*, which is adapted to be secured at any desired point upon the lever K by the set-screw *k''*.

At the upper end of the receiver A is fitted the bent pipe L, and to the outer end of this pipe is secured the valve-chamber M, which is connected at its lower end to the steam-boiler by the pipe N, and provided above the entrance of the pipes L with the exhaust-pipe O. The valve-chamber M is made in two unequal diameters, forming the upper larger chamber, *a*, and lower small chamber, *b*. The valve or hollow piston P, which is placed in the chamber M, is also made in two unequal diameters, *c* *d*, which fit, respectively, the chambers *a* *b*. The lower portion, *d*, of the

piston P is reduced in size for a portion of its length, as shown at *d'*, to form the exhaust-passage from pipe L to pipe O. The valve *c* of coupling C opens to pressure from pipe D and closes to pressure from pipe B, while the valve *c'* opens to pressure from pipe B and closes to pressure from pipe F. This arrangement prevents a backward flow of water to pipe D when steam enters receiver A and prevents steam from the boiler entering the receiver A. The piston P has the central passage, *e*, made through it in the line of its length. This opening *e* may be made small to prevent waste of steam, and the piston normally rests at its lower end upon the annular packing *f*, held in the coupling cap or plate Q, bolted to the lower end of the valve-chamber M, and the upper large end of the piston P is cupped, as shown, to reduce its weight, and is made to fit, when the piston is at its lowest position, upon the shoulder *m* of the valve-chamber M. The plate R, which closes the upper end of the valve-chamber M, is provided with the bent pipe S, which communicates at one end with the chamber *a*, and at the other end with the small passage, *f'*, made in the main casting of the valve-chamber M, which passage *f'* terminates at the entrance of the exhaust-pipe O, and this passage *f'* is also cut through to the upper chamber, *a*, at *f''*, immediately under the shoulder or offset *p* of the piston P.

In the pipe S is fitted the cock *g*, the stem *h* of which is connected to the short arm *k* of the lever K by the connecting-rod *j*, and the plug of the cock *g* is so arranged that it will be turned to closed position—that is, so that it closes the pipe S by the short arm *k* and rod *j* when the levers H and K are in the position shown in full lines in the drawing, but will be turned so as to open the pipe S when the levers H K stand in the position shown in dotted lines—the position they assume when the receiver A is full or nearly full of water.

The action of the device is as follows: The water of condensation from the different radiators in the building entering pipe D will pass through valve *c* and T-pipe B into receiver A. When the water reaches a certain level in the receiver A, the weight *k'* on lever K (the weight *k'* having been previously properly set) will overbalance the float G, on ac-



count of the buoyant action of the water and cause the levers H K to turn the short shaft I and cause short arm *k* to lift connecting-rod *j*, which movement will open cock *g* and permit  
 5 steam to pass from chamber *a*, through pipe S, into passage *f'*, to exhaust O, and through opening *f''*, under the shoulder or offset *p* of the valve P. This movement of the steam  
 10 takes the steam-pressure from above the piston P, and, entering under shoulder *p*, avoids the formation of a vacuum beneath the shoulder *p* of the piston P, which permits the steam-pressure, acting upon the lower end of the piston P, to lift the piston in the chamber M, so  
 15 that the lower portion, *d*, of the piston will be raised above the pipe L. The steam then will rush through pipes N and L from the boiler into the receiver A above the water, and will force the water in the receiver through  
 20 valve E and pipe F into the boiler. As the water passes from the receiver A, the float G and levers H and K will assume their original position, and cause short arm *k* to close cock *g*. The steam-pressure in the chamber *a* will  
 25 now equal that in the boiler, and this pressure, acting upon a greater area at the upper end of piston P than is presented to the pressure of the steam at the lower end, will force the piston P downward in valve-chamber M and  
 30 open the exhaust-pipe O and permit the steam in the receiver A to escape to the open air, thus putting all of the parts of the device in

condition to repeat the operation when water again accumulates in the receiver A. In this manner it will be seen that the device is perfectly automatic, and that it is practical and perfectly reliable for its purpose. 35

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

1. The receiver A, provided with float G, 40 connected to short shaft I, having lever K *k* connected thereto, in combination with cock *g*, connected to arm *k* by rod *j*, and the valve-chamber M and automatic piston P, the valve-chamber being connected to the receiver and 45 steam-boiler and provided with the exhaust O, adapted to be automatically opened and closed by the valve P, substantially as and for the purposes set forth.

2. The valve-chamber M, made in two diam- 50 eters, and the piston P, made in two diameters to fit the chamber M, and formed with the central passage, *e*, and cut away at *b* to form the exhaust, in combination with the pipe S, cock *g*, and passage *f'* *f''*, the valve-chamber being 55 connected to the boiler and receiver A, and provided with the exhaust O and the cock *g*, arranged to be automatically opened and closed by the movement of the float G in the receiver A, substantially as described.

DENNING P. KEATING.

Witnesses:

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 C. SEDGWICK.