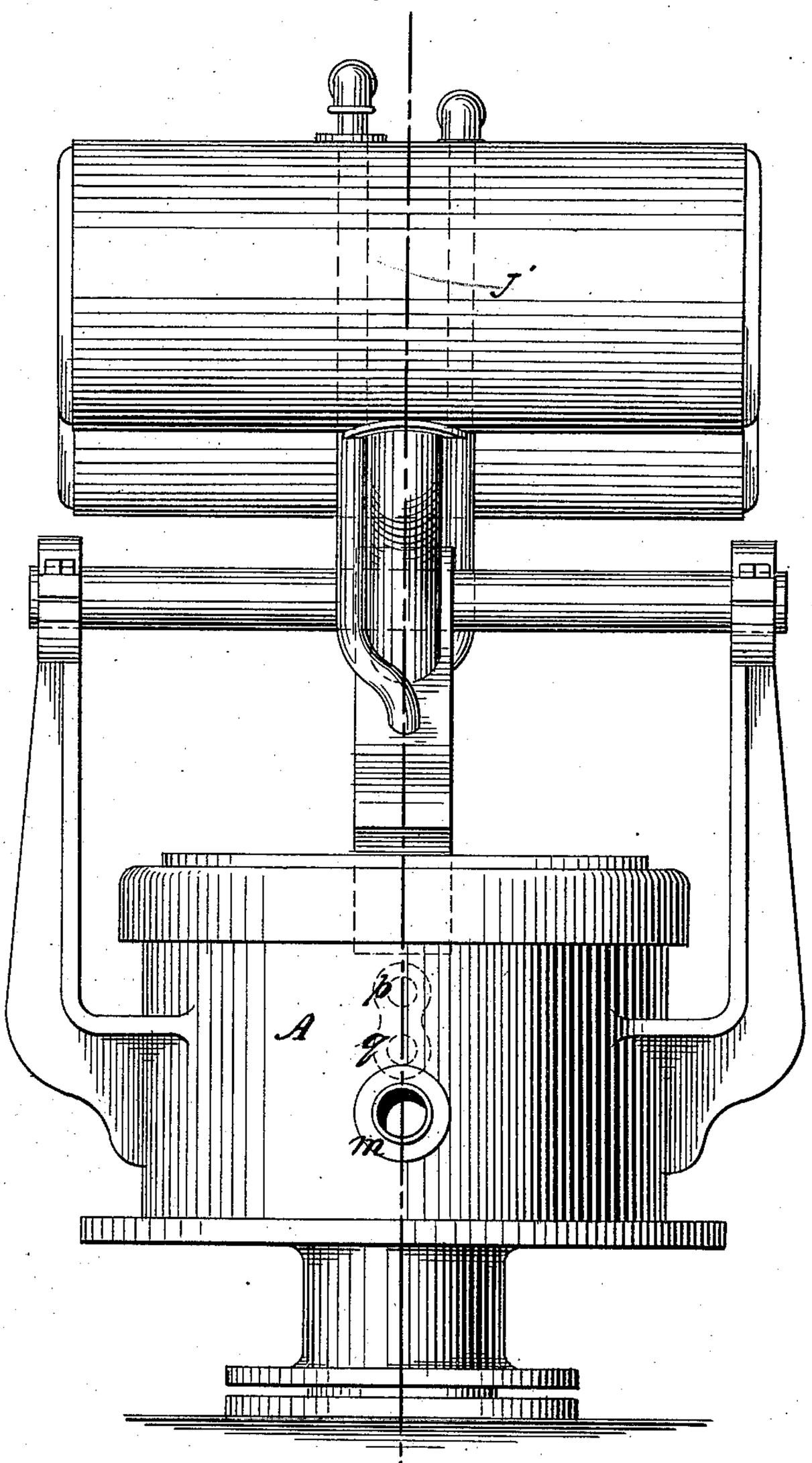
(No Model.) 3 Sheets—Sheet 1.

C. A. LOCKWOOD.

SELF REGULATING BOILER FEEDER.

No. 351,451. Patented Oct. 26, 1886.

Fig. 1.



Witnesses.
H. F. Parker.
Aug. Greeling "

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(No Model.) 3 Sheets—Sheet 2.

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Fig. 2.

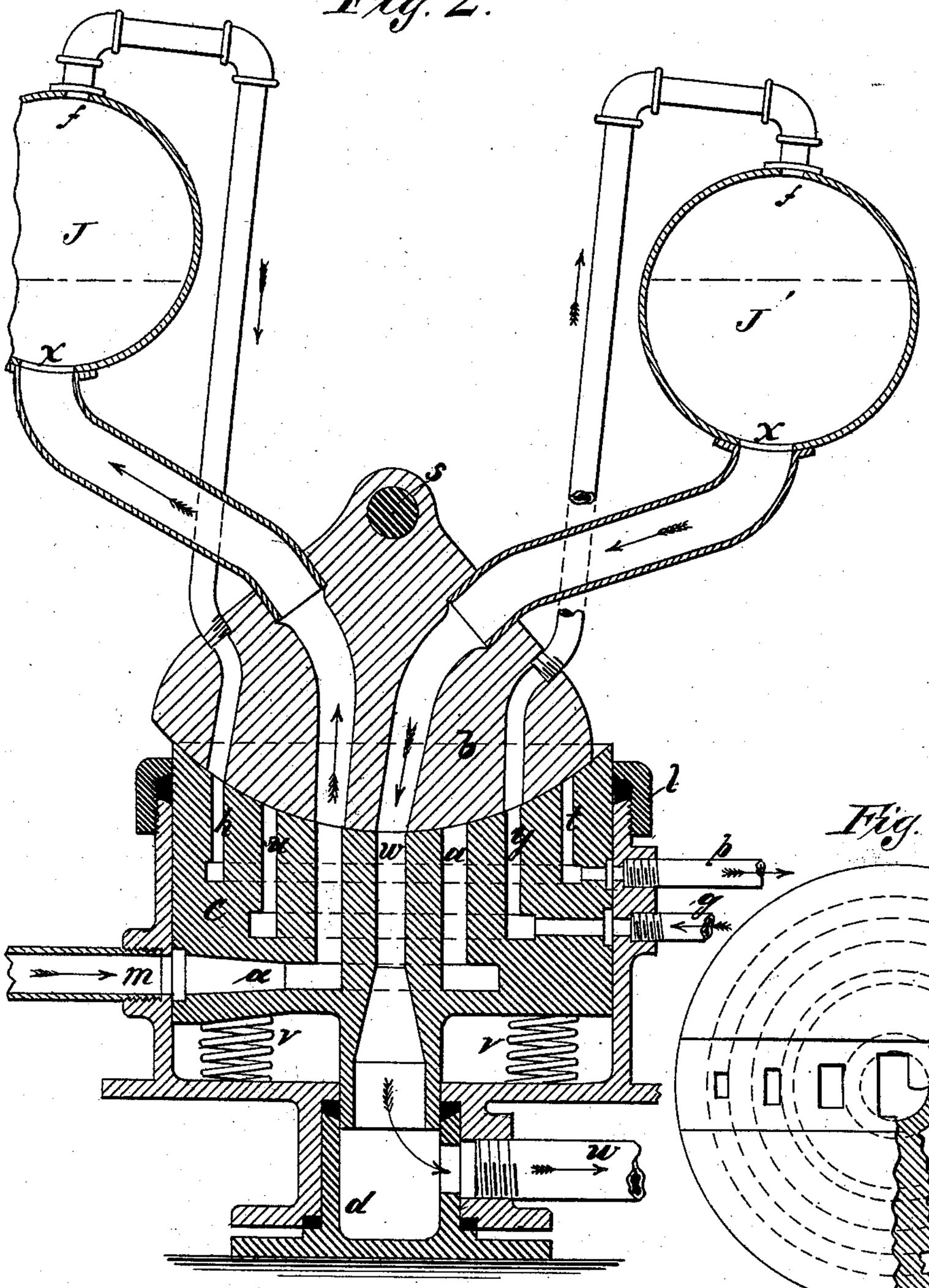

Fig. 3.

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SELF REGULATING BOILER FEEDER.

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Fig. 4.

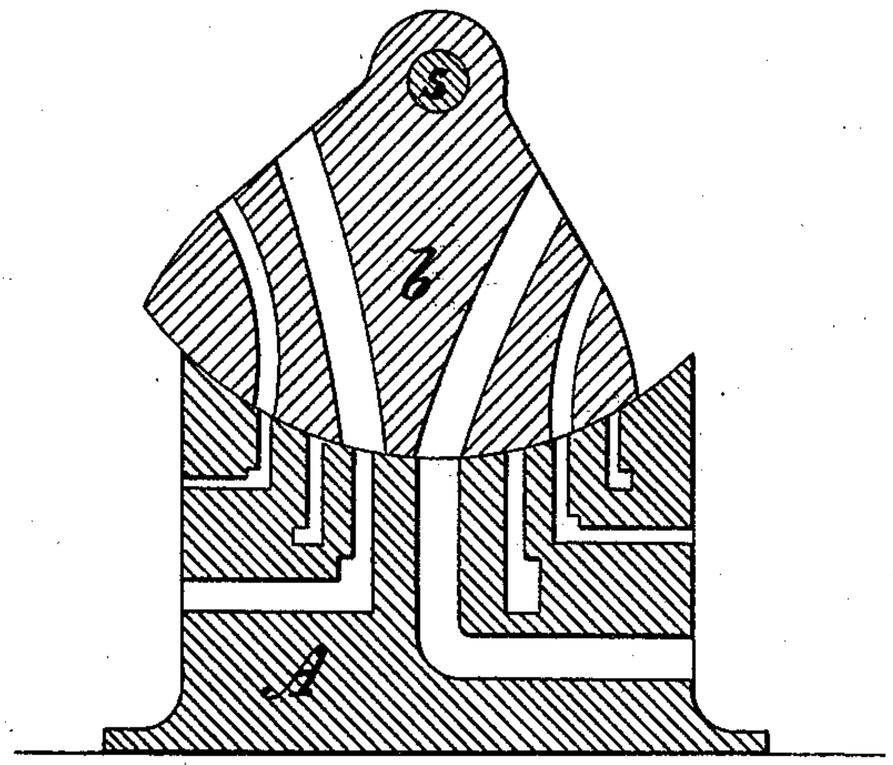


Fig. 5.

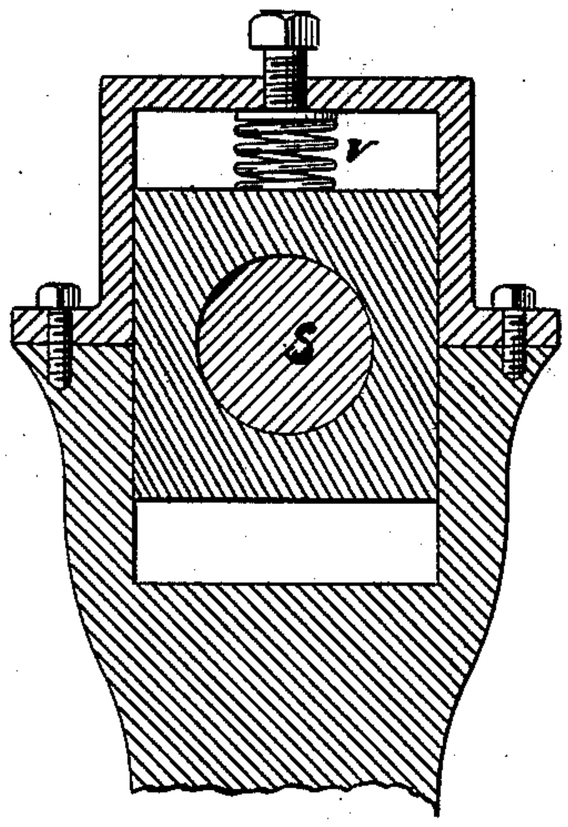
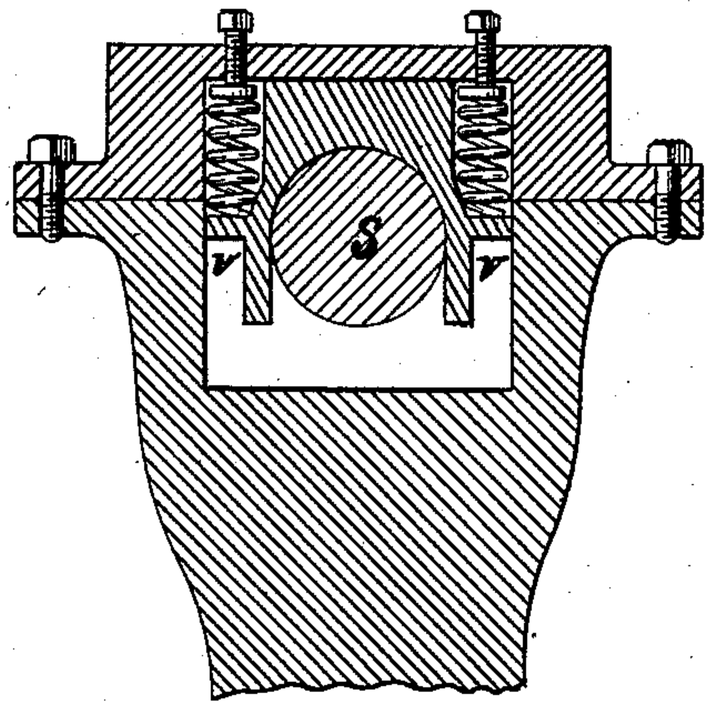


Fig. 6.



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UNITED STATES PATENT OFFICE.

CHARLES AUGUSTUS LOCKWOOD, OF FAR ROCKAWAY, ASSIGNOR OF ONE-THIRD TO GEORGE W. LOCKWOOD, OF NEW YORK, N. Y.

SELF-REGULATING BOILER-FEEDER.

SPECIFICATION forming part of Letters Patent No. 351,451, dated October 26, 1886.

Application filed April 1, 1886. Serial No. 197,369. (No model.)

To all whom it may concern:

Be it known that I, CHARLES AUGUSTUS LOCKWOOD, a citizen of the United States, residing at Far Rockaway, in the county of Queens and State of New York, have invented a new and useful Improvement in Automatic and Self-Regulating Boiler-Feeder and Return-Steam Traps, of which the following is a specification, reference being had to the accompanying drawings, forming a part of the same, in which—

Figure 1 is an elevation, Fig. 2 a central vertical section, and Fig. 3 a transverse section on the line *x x* of Fig. 2, of a device embodying my invention. Figs. 4, 5, and 6 represent modified arrangements of the springs for taking up lost motion between the valve and the seat.

Similar letters of reference indicate corresponding parts in the several figures.

This invention relates to that class of boiler-feeders and return-steam traps located adjacent to a boiler at about an even elevation with the water-level, and in which the feed-water is supplied, either by a natural flow or through the medium of a pump, and communication with its inlet then made with the water and steam space of a boiler, whereby an equilibrium of pressure is established in the feeder and the confined feed-water carried to the boiler by gravitation.

The invention consists in an automatic self-regulating device located near the boiler, coincident with the normal water-line and communicating therewith and with the source of supply, that will feed the boiler in sufficient quantity and at such time only when the water in the boiler falls below the normal water-line; and in order that others may understand and practice my invention, I will first proceed to describe the same, and subsequently to point out its novel features in the claim.

In the drawings, A represents a valve-chest provided with exterior inlet-openings designed to connect with a water-supply, as at *m*, and a steam-supply, as at *g*, and also provided with exit-openings communicating at *w* with the water-space and at *p* with the atmosphere. This valve-chest A may be constructed in a solid block, as shown in Fig. 4, or with a movable central portion, C, made in a separate piece, as shown in Fig. 2. The central portion, C, is provided with a series of annular steam and water passages or chambers (shown in the sectional views, Figs. 2 and 4, and plan view, Fig. 3) that lead from its top surface to the respective inlet and exit openings in the chest A, the central water passage leading to the connection with the water-space of the boiler, and the adjacent water-passage *a* to the connected water inlet or supply *m*.

g is a steam-inlet passage and *p* a steam exit or exhaust passage that communicate, respectively, with the steam-space of the boiler and the atmosphere.

The top surface, C, of the chest A is made concave, as shown, and forms a seat to a valve, *b*, having a convex surface or face of corresponding degree to form a ground-joint. This valve is pivoted at *s* to oscillate on its seat, and is provided with steam and water ports or passages arranged to alternately register with the corresponding steam and water passages of the chest A when oscillated. These valve-ports pass through the valve in a vertical direction, as shown, and connect with pipes leading to and supporting chambers J J′, located above the valve and upon opposite sides of its pivot. The ports *x x* connect with the pipes that lead to the base of the chambers and the ports *f f* with the pipes leading to the top of said chambers, the respective pipes being securely connected to the valve and to the chambers in a direction and manner to sustain the latter in place. At the face of the valve and in the position shown the ports *x x* register with the water-passages *w*, and the ports *f f* with the steam-passages *h y*.

In order to preserve a proper working-surface between the valve-face and its seat and to compensate for wear, I have shown in Fig. 2 a valve-chest composed of two parts, consisting of a casing inclosing a movable valve-seat, resting on springs *v v*, and provided at its base with a central hub that forms a water passage and chamber communicating with the water-space of the boiler, suitable stuffing-boxes, *l* and *d*, being provided to render the movable seat steam-tight. In this construction the

springs are constantly forcing the valve-seat against its face, and a close working-joint is thereby maintained. In this arrangement the water and steam passages should be somewhat enlarged at the point of communication with the openings in the casing A, to avoid obstruction that would be occasioned from wear in a change in the relative position of the adjacent part. I do not, however, regard the construction shown and described essential to the practical working of my invention, as the valve-seat and casing may be made in a single piece and other expedients adopted to compensate for the wear of the surfaces at the valve-seat. For instance, the valve itself may be permitted to rest exclusively on its seat and its pivot allowed a vertical movement in a guideway, or the bearings for supporting the valve-trunnions suspended to or upon springs, as shown in Figs. 5 and 6.

The operation of the device is as follows: The instrument being in the position shown at Fig. 2 of the drawings, the water enters the passage *m*, and rises through the passage *a* and port *x*, and fills the chamber J to the point represented in dotted lines, which is about an equal elevation with the water-line of the boiler, the steam-port *f* being at the same time in communication with the steam-escape passage *h*, and the water-port *x*, leading from the chamber J′, in communication with the water-passage *w*, leading to the boiler, and the inlet-steam port *f* in communication with the steam-passage *y*, leading from the steam-space of the boiler. The chamber J having exhausted its water, the weight of water that fills the chamber J′ causes the valve *b* to oscillate on its seat and on the pivot *s*, which transfers the ports *f x*, leading from the chamber, from *h* to *u* and *a* to *w*, and the ports *x f*, leading from the chamber J′, from *y* to *t* and from *w* to *a*. The communication being now open between the boiler and the chamber J′, and an equilibrium of pressure established, the water contained in this chamber gravitates to the boiler, while the communication of the chamber J with the water-supply passage *m*, through the ports *x*, and with the steam-exhaust passage *p*, through the port *t*, allows the chamber J to fill, and when filled to the point indicated by the dotted line a reverse movement is given to the valve *b*, and the operation is thus automatically repeated.

It will be observed that the feeder will only act when the water in the boiler falls below its normal water-line, for the reason that the chambers J J′ are located at about the same level, and the water in the boiler must be below such line before the water in the chamber will gravitate thereto.

I am aware that a self-regulating boiler-feeder consisting of a chest provided with water inlet and exit passages and steam inlet and exhaust passages, in combination with an oscillating valve provided with water and steam ports, that register alternately with the water and steam inlet and exit passages of the chest, and connected to reservoir-chambers located upon each side of its pivot to produce the automatic movement of said valve, is not new; and I am also aware that an automatic trap or boiler-feeder having an oscillating valve carrying water-chambers, arranged on opposite sides of its axis of vibration, whereby an alternate filling of said chamber operates said valve, is well known; but

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

In a self-regulating automatic trap and boiler-feeder, the combination of an oscillating valve having yielding bearings, and provided with steam and water ports, and rigidly-connected water-chambers located upon the opposite sides of and above the valve-trunnions, with a yielding chest or seat having steam and water ports that register alternately with the inlet and exit passages and with the corresponding ports in the valve, substantially as described.

CHARLES AUGUSTUS LOCKWOOD.

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CHAS. W. FORBES.