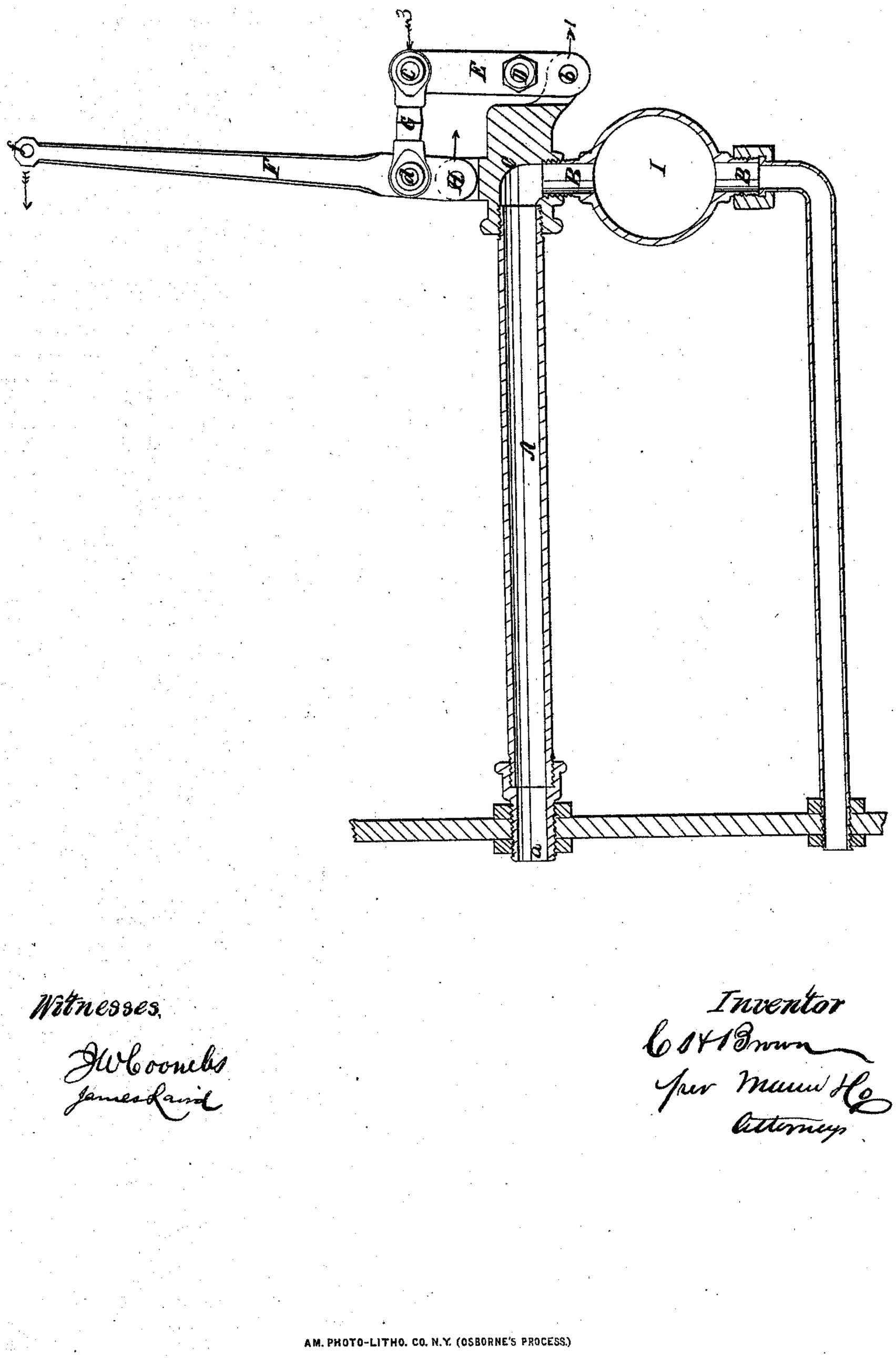
C. H. Brown,

Steam-Boiler Water-Feeder,

No. 35,584. Patented June 17, 1862.



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CHARLES H. BROWN, OF FITCHBURG, MASSACHUSETTS.

IMPROVEMENT IN FEED-REGULATORS FOR STEAM-BOILERS.

Specification forming part of Letters Patent No. **35,584**, dated June 17, 1862.

To all whom it may concern:

Be it known that I, CHARLES H. BROWN, of Fitchburg, in the county of Worcester and State of Massachusetts, have invented a new and useful Improvement in Feed-Regulators for Steam-Boilers; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawing, forming part of this specification, said drawing representing a central vertical section of a feed-regulator constructed according to my invention.

This invention relates to that class of boiler feed-regulators which effect the movement necessary to set the feed-pump in operation or produce the suspension of its operation by means of the expansion and contraction of a pipe which is arranged at the intended water-level of the boiler, and which receives from the boiler either steam or water, according as the water therein is above or below a certain level.

To enable others skilled in the art to make and use my invention, I will proceed to describe its construction and operation.

A is the expanding and contracting pipe arranged in a horizontal position, connected at one end, *a*, with the boiler at the intended water-level, and furnished at the other end with an elbow, C, which has a downward direction for the connection of a pipe, B, which is connected with the water-space of the boiler some distance below where A is connected. The pipe B is made of brass, or some other metal which has great capability of expanding by heat.

D is a stationary fulcrum-pin attached to any suitable fixed support and having arranged to work upon it a lever, E, of the first order, which has its shorter arm connected by a pin, *b*, with the elbow C, and its longer arm connected by a pin, *c*, link G, and pin *d*, with a second lever, F, of the second order, the fulcrum H of which is secured to the elbow C, and the opposite end, *f*, of which is connected with a belt-shipper for throwing the feed-pump into and out of gear with a steam-engine, with a stop cock or valve in the suction-pipe of the pump, or with a stop-cock in the steam-pipe of the pump, in case of a steam-pump being used for feeding the boiler.

The level of the water in the pipes A B always corresponds with that in the boiler. When the level in the boiler is up to or above the top of the pipe A, the levers E and F are in such positions that the lever F keeps the feed-pump out of gear or closes the stop-cock or valve, by which its operation is suspended; but when the said level gets near or below the bottom of the said pipe the said pipe expands by the heat imparted to it from the steam and moves the pin *b* and fulcrum H in the direction of the arrows 1 and 2, (shown near them in the drawings,) and by this means the upper end of the lever E and the link G are moved in the direction of the arrow 3, and the upper end of the lever F is moved in the direction of the arrow 4, and so caused to throw the feed-pump into gear or open the valve or cock by which the said pump is put in operation; but when the level of the water in the boiler again gets up to or above the top of the pipe A, the water in the said pipe, being out of circulation, cools, and the pipe getting cooler contracts and produces a movement of the levers precisely the reverse of that above described, and causes the lever F to throw the pump out of gear or close the stop-cock or valve, and thereby stop its operation.

The above-described movement of the upper end of the lever F is produced in part by the action of the pipe A at *b* upon the lever E, which action is transmitted by the link G to the lever F, and in part by the action of the said pipe at H upon the lever F, and hence a very much greater movement of the upper part of the latter lever is produced than could be produced by the action of the pipe upon the single lever of the same length.

It will be observed that with my arrangement the fulcrum D of the short lever E is exactly on a line with the center of the expanding-pipe, and the short arm of the short lever is connected with the pipe on one side, and the short arm of the long lever is connected with the pipe on its opposite side and at equal distances from the center of the pipe. This combination not only increases the motion of the long lever just one-third, but equalizes the strain, bringing it into the center of the pipe, instead of on one side, as in other devices for the same purpose. In shifting a belt from a tight and loose pulley to stop and start a pump it is requisite in ordinary cases to get a motion of from three to four inches, and to obtain this motion from an expanding pipe by a combination of levers it is necessary to have all the

parts constructed and combined in the most firm and unyielding character. The expansion of the pipe being so very little, the least springing of its parts destroys the motion that would otherwise be produced and renders the whole apparatus unreliable and worthless. When the fulcrum of the levers is placed on one side and at a distance from the center of the pipe, and the short arm of the lever is connected with the expanding pipe on the same side, the resistance is generally so great that the pipe and other parts are apt to spring to such a degree as to cause the long lever to fail to operate. This objection is entirely obviated in my improvement.

The contrivance for producing the copious flow of water into the pipe A to cool it and produce its contraction as the level of the water in the boiler rises consists of a large chamber or reservoir, I, in the pipe B. This chamber contains a considerable quantity of water. When the circulation of the water in the said pipe ceases, owing to the filling up of the pipe A with water, the temperature of the water in the chamber I, as well as that in the pipe B, is soon reduced by the exposure of the said chamber and pipe to the atmosphere. When the level in the boiler rises, the water flows therefrom into B, and through it toward the outer end of the pipe A; but the water which has been retained in the pipe B and reservoir I is forced upward therefrom into the pipe A before any of the hotter water from the boiler itself can enter the latter pipe, and hence by having retained a larger quantity of water between the lower part of the boiler and the outer end of the pipe A than could have been retained in the pipe I without the reservoir a larger quantity of cool water is supplied to the pipe A, and it is cooled more quickly and caused more quickly to effect the stoppage of the action of the feed-pump.

The pipe B should be flexible enough to yield to the expansion and contraction of the pipe A, or be provided with a slip-joint which will accommodate itself to such expansion and contraction.

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

1. Having both of the levers E F jointed separately to the expanding pipe A, said joints being arranged upon opposite sides of said pipe, in combination with the fulcrum D and the link G, as and for the purpose herein shown and described.

2. The employment of the cold-water reservoir I, in combination with the expanding pipe A and lever F, substantially as and for the purpose herein shown and described.

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Witnesses:
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