

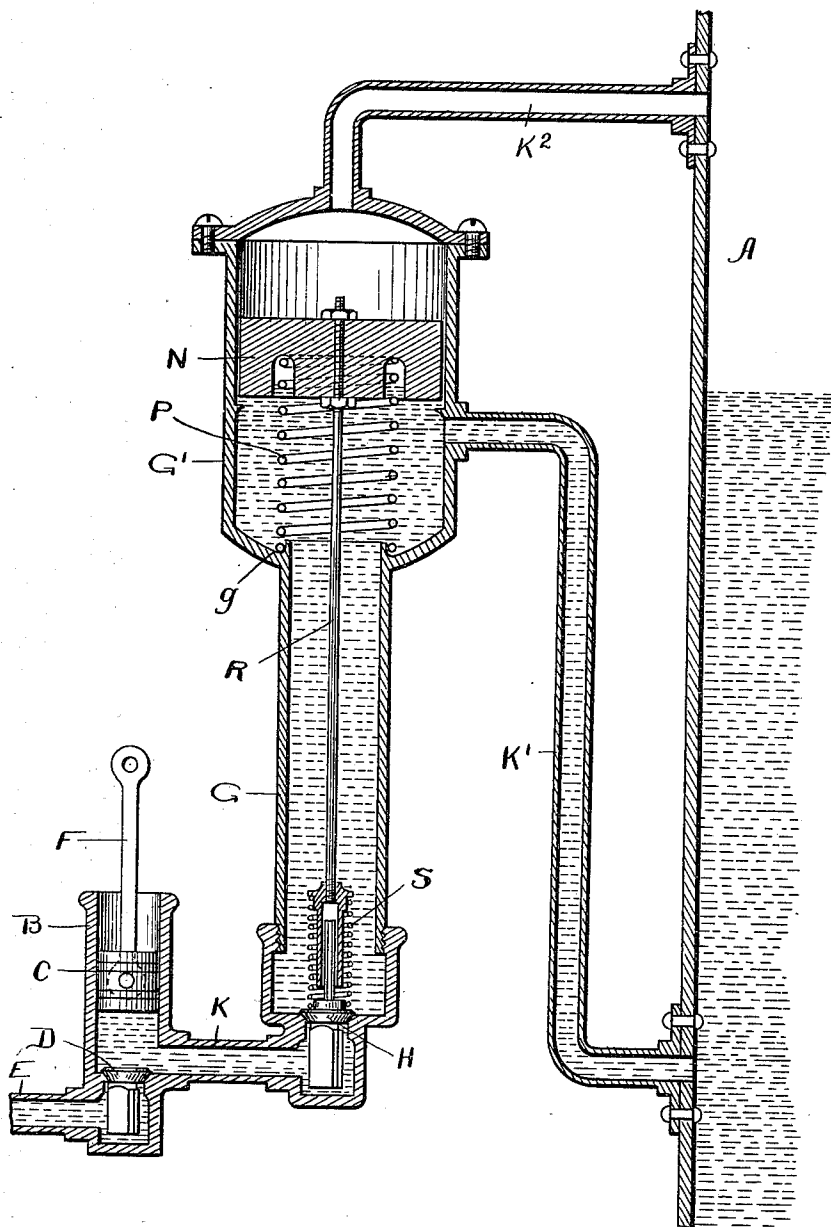
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C. A. ANDERSON, E. A. ERICKSON & J. WICKSTROM.
AUTOMATIC WATER FEED REGULATOR FOR STEAM BOILERS.

(No Model.)

(Application filed Apr. 10, 1900.)



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UNITED STATES PATENT OFFICE.

CHARLES A. ANDERSON, ERICK A. ERICKSON, AND JOHN WICKSTROM, OF CHICAGO, ILLINOIS, ASSIGNORS OF ONE-HALF TO CHARLES DICKINSON, LEON F. DOUGLASS, AND HENRY B. BABSON, OF SAME PLACE.

AUTOMATIC WATER-FEED REGULATOR FOR STEAM-BOILERS.

SPECIFICATION forming part of Letters Patent No. 669,611, dated March 12, 1901.

Application filed April 10, 1900. Serial No. 12,305. (No model.)

To all whom it may concern:

Be it known that we, CHARLES A. ANDERSON, ERICK A. ERICKSON, and JOHN WICKSTROM, citizens of the United States, residing in Chicago, in the county of Cook and State of Illinois, have invented a new and useful Improvement in Automatic Water-Feed Regulators for Steam-Boilers, of which the following is a specification.

Our invention relates to improvements in devices for regulating and controlling the feed-water to steam-boilers.

The object of our invention is to provide a device or apparatus of a simple, efficient, and durable construction by means of which the feeding of water to a steam-boiler may be automatically regulated or controlled, so as to keep the water in the boiler always at about the same level, whatever may be the rate at which steam is being generated by the boiler and whether a great or small amount of steam is being used or generated.

Our invention consists in the means we employ to practically accomplish this important result—that is to say, it consists, in connection with a steam-boiler and the feed-water pump by which the feed-water is forced into the boiler under pressure existing in the boiler, of a feed-water-regulating vessel between the pump and boiler furnished with a lift-valve or check-valve which is or serves as one of the check-valves of the pump and the operation of which is controlled to permit the water to feed or not to feed into the boiler, as required under action of the feed-pump, by means of a body or float in the upper part of said vessel and connected with said valve, and the action of which body or float upon the valve is governed by the level of water in the boiler, said regulating vessel having a water communication with the boiler and also a steam communication with the boiler. In practice we make the regulation vessel high or deep enough to prevent by the depth of water therein and the natural tendency of the heated water to keep to the top by reason of its less specific gravity than the cold any danger of superheated water or water mingled with steam passing from the boiler into the pump when the lift or check valve is held open

or out of action by the body or float. By this simple means of a regulating vessel interposed between the pump and boiler and provided with a check-valve serving as one of the valves of the pump and whose operation is controlled by a body or float, the position of which is governed by the level of water in the boiler, we are enabled always to keep the level of water in the boiler the same, whether much or little steam is generated or used, while at the same time the pump may be driven or operated continuously, the pump of course having no effect in feeding or forcing water into the boiler when the check-valve and regulating vessel are held out of action or open by the float, owing to the water-level in the boiler being already sufficiently high.

In the accompanying drawing, forming a part of this specification, we have shown in central vertical section a feed-water-regulating device embodying our invention.

In said drawing, A represents a steam-boiler, and B a feed-water-pump cylinder, furnished with a piston C and a check-valve or lift-valve D, which permits the water to enter through the supply-pipe E into the pump-cylinder when the piston moves upward or outward. The pump is continuously operated from any suitable source of power through the connecting-rod F.

G is the water-feed-regulating vessel, the same being preferably of considerable length and of larger size or diameter at its upper portion G' than its lower portion. This regulating vessel G is interposed between the pump and boiler and is connected with the pump-cylinder by a water pipe or passage K and with the boiler by a water pipe or passage K', which enters the boiler at the lower part thereof or at a point below the desired level of water therein. The regulating vessel G is also connected with the boiler by a steam pipe or passage K², which enters the vessel G at the upper end of the enlarged portion G' thereof and which enters the boiler A at the upper part thereof or at a point considerably above the desired level of the water therein. The regulating vessel G is provided with a check-valve or lift-valve H, which forms one or serves as one of the check-valves

of the pump and which when in action or operation permits water to be forced into the regulating vessel G by the pump and prevents its escape or movement back from the regulating vessel G into the pump-cylinder, and thus enables the pump to force water into the boiler A. This check-valve, however, when out of operation or held open back and forth into and out of the regulating vessel without forcing any water whatever into the boiler. The operation of the check-valve H is controlled by a body or float N, the position of which is governed by the level of the water in the boiler A, as the regulating vessel has a water connection K' with the boiler. This body or float N rests upon and its weight is counterbalanced by a spring P, the lower end of which rests upon a shoulder g on the vessel G, and the body or float N is connected to the check or lift valve H by a connecting-rod R and coiled spring S. The coiled spring S is inserted in the connection between the body or float N and the valve H in order to permit the float to be raised to a slight extent by the change of water-level before affecting the operation of the check-valve.

The operation is as follows: When the pump-piston moves upward or outward, water will be drawn through the supply-pipe into the pump-cylinder, the check-valve D opening to permit the inflow. When the pump-piston moves in the opposite direction, the check-valve D closes and the water is forced into the regulating vessel G, opening the check-valve H, which valve again closing prevents the water flowing back into the pump from the regulating vessel, and thus causing the water to flow from the regulating vessel in the boiler if the water in the boiler is below its normal level. As the spring under the body or float N balances the same the body or float N does not at this time or when the water is needed to enter the boiler to maintain its proper level interfere with the operation of the valve, and the spring S, interposed in the connection between the body or float N and valve H, also permits the valve H to seat itself quickly in its operation. When, however, the water in the boiler rises above its normal level, the body or float N will be partly immersed by reason of the higher level of water in the regulating vessel G, and the buoyancy effect of this, added to the tension of the spring P, upon which the body of float N rests, will cause the body or float to rise, thereby creating a tension on the spring S, which in turn, acting on the valve H, connected therewith, will after a certain tension in said spring has been reached cause the valve H after being forced open by the inflowing water from the pump to be held in its open position and prevented from again seating itself, so that the water just forced into the regulating vessel by the downward movement of the pump-piston will again be drawn out by the upward move-

ment of the pump-piston, and said valve H will thus be held open or out of operation until the water-level in the boiler A falls below its normal or desired level, and thus permits the body or float N to descend, when the valve H will again seat itself and its normal function as a check-valve will then again be resumed. It will of course be readily understood that while the valve H is thus held suspended, open, or out of operation as a check-valve by the action of the body or float N, because of there being already a too high level of water in the boiler, the pump cannot deliver any additional water into the regulating vessel G or boiler A, the water simply passing back and forth between the pump-cylinder and regulating vessel, as the steam-pressure of the boiler thus rests the whole time on the pump-valve D, until the valve G is again permitted to seat itself, and thus shut off the pump-cylinder from the boiler-pressure. It will also be understood that the body or float N, by reason of the water and steam communications between the regulating vessel and the boiler, is acted upon by the boiler-pressure on both sides, and is thus in equilibrium. It will also be understood that in our invention we depend upon the force or pressure from the pump-piston to open the valve H of the regulating vessel against the pressure of the boiler, and the body or float N has thus only to counterbalance or carry the weight of the valve H, which permits us to make the float or body N of much smaller cubic contents than would be the case if the body or float had by its buoyancy to lift the valve H against the boiler-pressure. The water-pipe or communication between the boiler and regulating vessel should enter the regulating vessel at the upper part thereof, as in this way we prevent superheated water from the boiler entering the pump-cylinder during the time the check-valve H is suspended or held open, because the heated water being of less specific gravity than cold will remain at the upper portion of the vessel G, and thus be prevented by the water in the lower part of the vessel G, which would be of some considerable length or depth, from intermingling with the cold water which passes back and forth between the pump-cylinder and the lower portion of said vessel G when said valve H is open or suspended.

We claim—

1. The automatic feed-water regulator for steam-boilers, consisting in combination a feed-water pump, a regulating vessel between the pump and steam-boiler, having a water communication with the pump, and having a water communication and a steam communication with the boiler, and provided with a check or lift valve serving as one of the check-valves of the pump, and a body or float having a spring connection with said valve and controlling its operation by the level of water in the boiler, whereby the water-level in the boiler is maintained the same whether steam

is generated therein rapidly or slowly, substantially as specified.

2. The combination with a steam-boiler and feed-water pump, of a feed-water-regulating vessel interposed between the pump and boiler and having a water communication with the pump, a water communication with the boiler and a steam communication with the boiler, said regulating vessel being provided with a check-valve, a body or float connected with said check-valve and controlling its operation by the level of water in the boiler, and a spring counterbalancing the said body or float, said check-valve in the regulating vessel being opened against the pressure of the boiler by the pump, the connection between the said body or float and said

check-valve having a spring interposed therein, substantially as specified.

3. In an automatic feed-water regulator, a regulating vessel having a float or body therein actuated by the difference in specific gravity of vapor and liquid, and means connecting said float or body with one of the check-valves of a feed-pump and a spring interposed in said connecting means, substantially as specified.

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