

C. O. BERGMARK.
 FEED WATER REGULATOR.
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997,734.

Patented July 11, 1911.

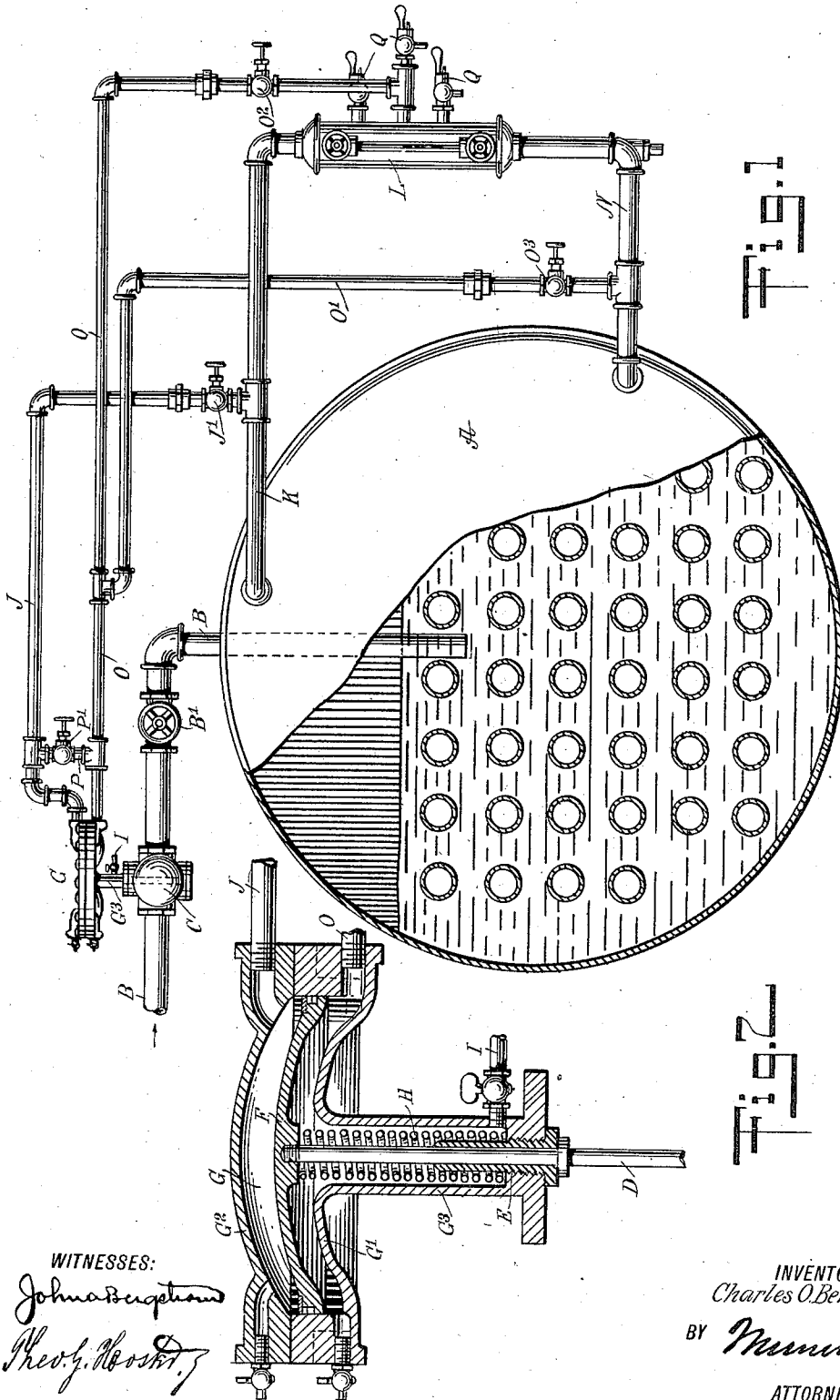


Fig. 1

Fig. 2

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CHARLES OSKAR BERGMARK, OF CHICAGO, ILLINOIS.

FEED-WATER REGULATOR.

997,734.

Specification of Letters Patent. Patented July 11, 1911.

Application filed May 3, 1910. Serial No. 559,083.

To all whom it may concern:

Be it known that I, CHARLES O. BERGMARK, a citizen of the United States, and a resident of Chicago, in the county of Cook and State of Illinois, have invented a new and Improved Feed-Water Regulator, of which the following is a full, clear, and exact description.

The invention relates to feed water regulators, such as shown and described in the application for Letters Patent of the United States, Serial No. 517,806, filed by me on September 15, 1909.

The object of the invention is to provide a new and improved feed water regulator, for use on steam boilers, to regulate the flow of the feed water automatically, with a view to maintain the feed water at an approximately uniform level, and to allow of filling the boiler beyond the normal level whenever desired.

In order to accomplish the desired result, use is made of a cylinder containing a piston connected with a valve in the feed water supply pipe, one end of the cylinder being directly connected with the steam compartment of the boiler, and the other cylinder end being connected with a controlling chamber and with a return pipe for conducting the water of condensation to the boiler.

A practical embodiment of the invention is represented in the accompanying drawings forming a part of this specification, in which similar characters of reference indicate corresponding parts in both views.

Figure 1 is a side elevation of the feed water regulator as applied to a horizontal boiler, part of the latter being shown in section; and Fig. 2 is an enlarged sectional side elevation of the cylinder and its spring-pressed piston for controlling the valve in the feed water supply pipe.

Water is supplied to the boiler A by a feed pipe B, connected with a pump or other source of water supply. The flow of the water through the feed pipe is controlled by a valve C, of any approved construction, and connected with a stem D, mounted to slide in a sleeve E and attached to a piston F mounted to slide in a cylinder G, having arch-shaped heads G', G², to correspond to the arch-shaped piston F, as plainly indicated in Fig. 2. From the head G' depends a boss G³, attached to the body of the valve C, and in the said boss is screwed or other-

wise secured the sleeve E, and a spring H extends within the boss G³ and presses with its upper end against the under side of the piston F, to move the latter upward, with a view to hold the valve C normally in an open position, to allow water to flow through the feed pipe B into the boiler A, to fill the same to a predetermined level, as hereinafter more fully explained. A drain cock I is attached to the boss G³, to drain the latter of water and extraneous matter that may pass into the boss G³ from the lower end of the cylinder G.

The upper end of the cylinder G is connected by a pipe J, having a valve J', with a pipe K leading into the steam compartment of the boiler A, so that steam can pass from the boiler A by way of the pipes K and J into the upper end of the cylinder G. The pipe J also connects with the upper end of a controlling chamber L, connected at its lower end by a pipe N with the water compartment of the boiler A, the said controlling chamber being arranged outside the boiler, so that the controlling chamber is filled with water from the boiler A to the same level as that of the water in the boiler A, and the water in the controlling chamber L rises and falls with the water in the boiler A. The lower end of the cylinder G connects by a pipe O with the controlling chamber L at a point corresponding to the normal or predetermined level of the water in the boiler A and the chamber L, and the pipe O is connected, by a branch pipe O', with the pipe N previously mentioned. The pipes O and O' are provided with valves O², O³, which, however, are normally open, the same as the valve J' in the pipe J and the valve B' in the pipe B.

As long as the water in the controlling chamber L uncovers the end of the pipe O, it is evident that steam passes from the boiler A by way of the pipe K, upper portion of the controlling chamber L and the pipe O to the lower end of the cylinder G, so that the steam pressure on both sides of the piston F is equal, as both ends of the cylinder G are now directly connected with the steam compartment of the boiler A, and as the spring H presses against the under side of the piston F, it is evident that the piston F is moved into an uppermost position, thus holding the valve C open to allow the water to flow through the feed pipe B into the boiler A. Now, as the water rises in the

boiler A it also rises in the chamber L and finally submerges the entrance end of the pipe O, so that the latter is cut off from the direct steam supply of the boiler A, and as the steam in the lower or condensation end of the cylinder G and in the pipe O now condenses, it is evident that the pressure is reduced in the lower end of the cylinder G, so that a preponderance of pressure in the upper end of the cylinder G forces the piston F downward against the tension of the spring H and thus moves the valve C into a closed position, thereby cutting off the water supply from the boiler A. When the level of the water in the boiler A and the chamber L falls until the entrance end of the pipe O is uncovered, then steam from the boiler A can pass by way of the pipe O into the lower end of the cylinder G, thus equalizing the steam pressure on the piston F and thereby allowing the spring H to move the piston F back into an uppermost position, to again open the valve C, as previously explained. From the foregoing it will be seen that by the arrangement described, the valve C is held normally open for filling the boiler A with water, and when the predetermined level is reached the valve is automatically closed as the preponderance of steam pressure in the upper end of the cylinder G causes the downward movement of the piston F, as before explained, and when the steam pressures are again equalized in the cylinder G, then the piston F is returned to normal position by the action of the spring H, the piston F then moving the valve C into open position.

When the boiler is not in use, say overnight, it is desirable to fill the boiler with water to a distance above the normal level, and in order to accomplish this result the pipes J and O are connected with each other by a pipe P having a valve P' normally closed. Now when it is desired to fill the boiler beyond the normal, the valve P' is opened, so that the steam pressure in the cylinder G is equalized on both sides of the piston F, and consequently the latter is held in an upward position by the action of the spring H, to allow the water to flow through the feed pipe B and its open valve C into the boiler A, to fill the latter to the desired height. When this has been done, the valve P' is closed, and as soon as the steam in the lower end of the cylinder G and the pipe O condenses, the piston F is moved downward to close the valve C by the action of the preponderance of steam pressure in the upper end of the cylinder G. During the time that the boiler is not used, the valve B' in the pipe B may be closed.

The controlling chamber L and the entrance end of the pipe O into the said chamber L are provided with test cocks Q of any approved construction.

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

1. A feed water regulator, comprising a feed water supply, a normally open valve in the said feed water supply, a cylinder having a reciprocating piston connected with the said valve, one end of the cylinder being the pressure end and directly connected by a pipe with the steam compartment of the boiler, and the other end being the condenser end, a spring pressing the said piston toward the said pressure end, and a controlling chamber connected at the top with the steam compartment of the boiler and at the bottom by a pipe with the water compartment of the boiler, a pipe connected with the condenser end of the said cylinder and with the said controlling chamber at a point at which the level of the water in the boiler is to be maintained, a valved connection between the said pipe and the pipe connecting the pressure end of the cylinder with the steam compartment of the boiler, and a water condensation pipe connected with the pipe leading from the condenser end of the cylinder and with the pipe leading from the bottom of the controlling chamber to the water compartment of the boiler.

2. A feed water regulator, comprising a feed water supply, a normally open valve in the said feed water supply, a cylinder, a piston reciprocating in the said cylinder and having its stem connected with the said valve, a spring pressing the said piston in one direction, a controlling chamber connected at the top with the steam compartment of the boiler and at the bottom with the water compartment of the boiler, a pipe connecting one end of the said cylinder with the steam compartment of the boiler, a pipe leading from the other end of the said cylinder and connected with the water compartment of the boiler and with the said controlling chamber at a point at which the level of the water is to be maintained in the boiler, and a valved connection between the said pipes, to allow of directly connecting both ends of the cylinder with the steam compartment of the boiler.

3. A feed water regulator, comprising a feed water supply, a normally open valve in the said feed water supply, a cylinder, a piston mounted to slide vertically in the said cylinder and having a depending stem connected with the said valve, a spring pressing the said piston in the upward direction, a controlling chamber, a pipe connecting the controlling chamber at the top with the steam compartment of the boiler, a pipe connecting the controlling chamber at the bottom with the water compartment of the boiler, a valve controlled pipe connecting the upper end of said cylinder with the first mentioned pipe, a valve controlled pipe

leading from the lower end of the cylinder
and connected with the controlling chamber
at a point at which the level of the water is
to be maintained in the boiler, a valve con-
5 trolled pipe connecting the last mentioned
pipe with the pipe extending between the
bottom of the controlling chamber and the
water compartment of the boiler, and a
valve controlled connection between the two

pipes leading from the upper and lower ends 10
of the cylinder.

In testimony whereof I have signed my
name to this specification in the presence of
two subscribing witnesses.

CHARLES OSKAR BERGMARK.

Witnesses:

OSCAR MALM,
EMILIO MATTEL.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents,
Washington, D. C."
