2 Sheets—Sheet 1.

J. H. BLESSING.

Pump Regulating Valve.

No. 207,485. Patented Aug. 27, 1878.

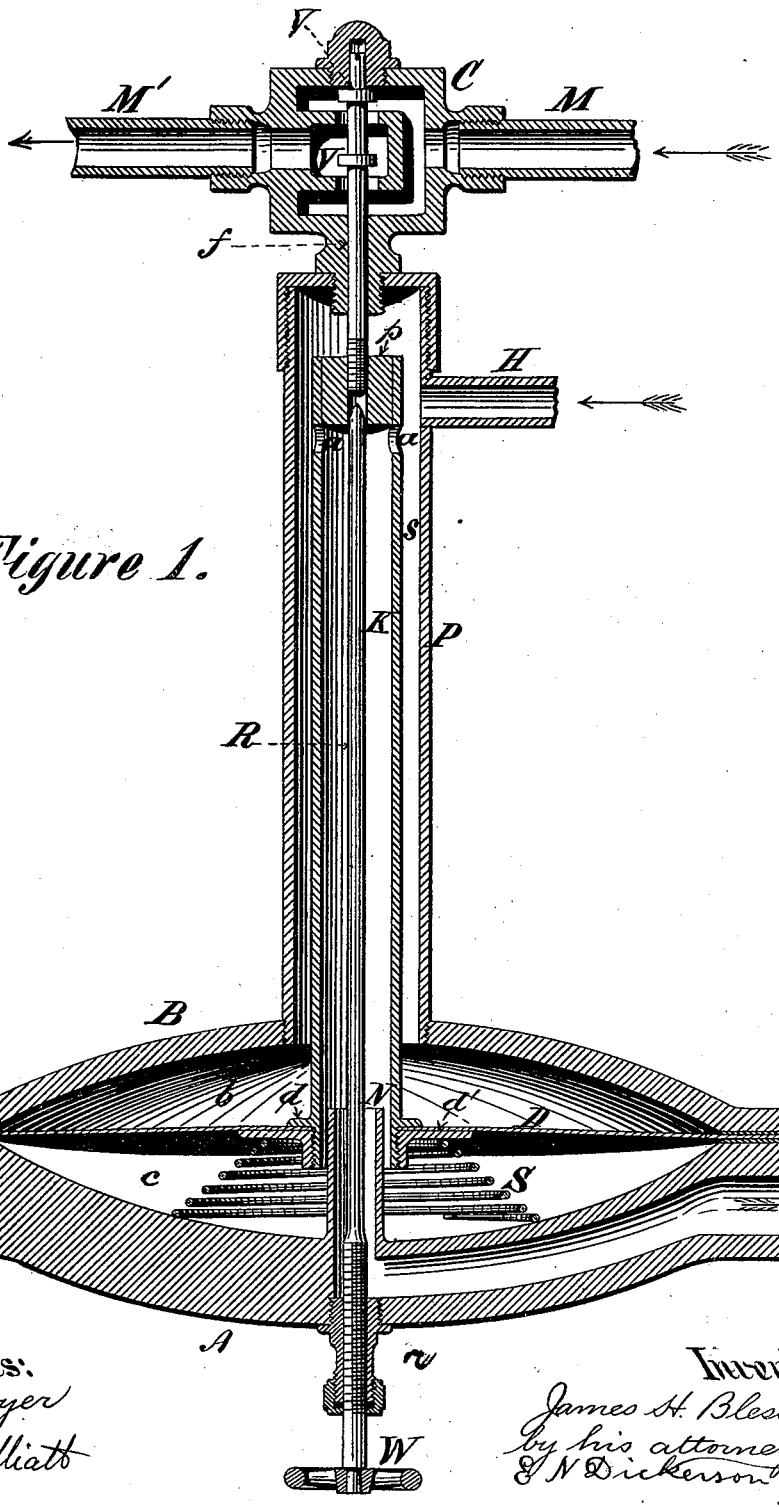

Figure 1.

Witnesses:
Wm. J. Sawyer
Geo. H. Miatt

Inventor:
James H. Blessing
by his attorney
J. N. Dickerson Jr.

THE NATIONAL LITHOGRAPHING COMPANY,
WASHINGTON, D. C.

2 Sheets—Sheet 2

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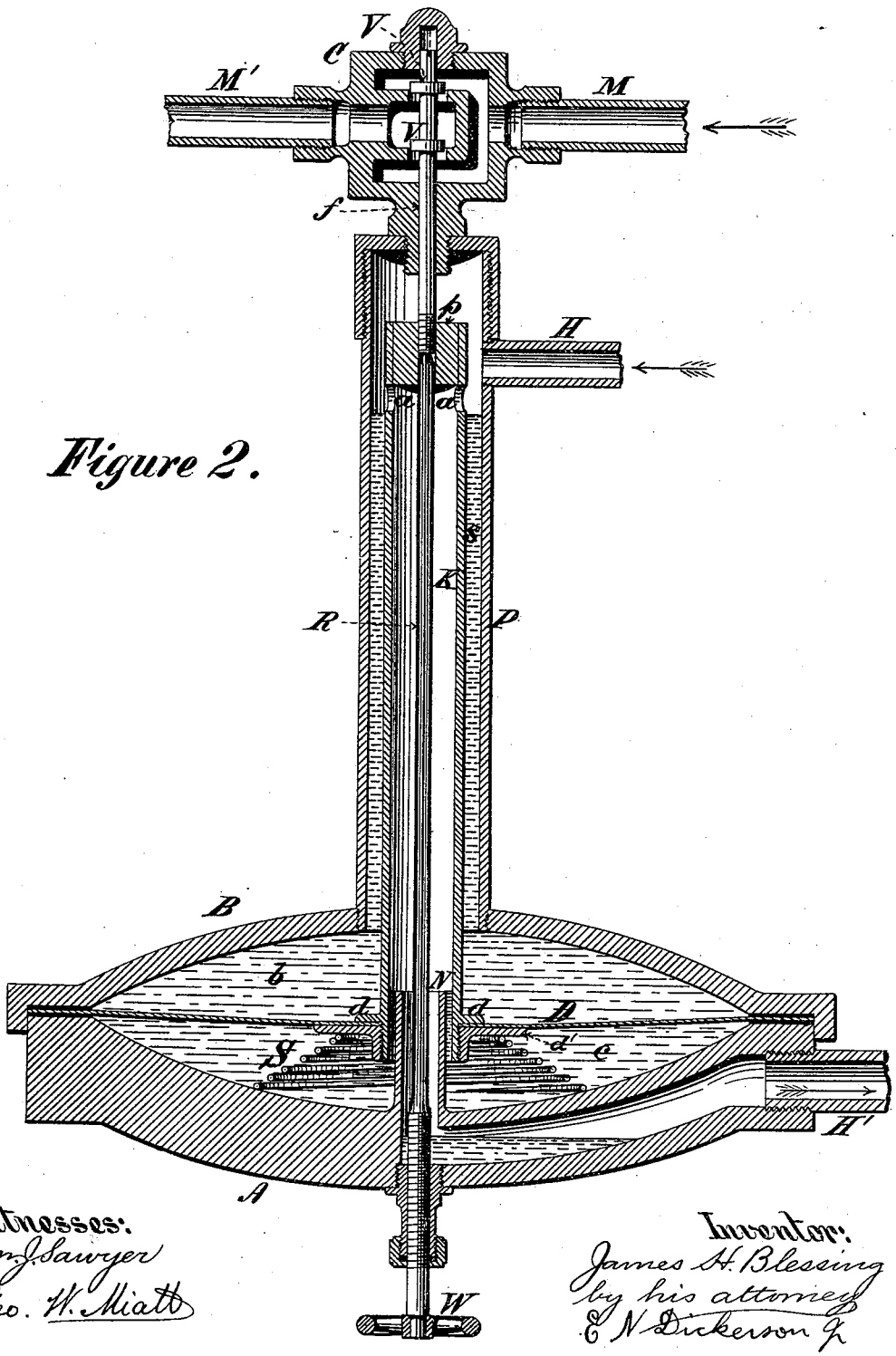

Figure 2.

Witnesses:
Wm. J. Sawyer
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THE NATIONAL LITHOGRAPHING COMPANY,
WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

JAMES H. BLESSING, OF ALBANY, NEW YORK.

IMPROVEMENT IN PUMP-REGULATING VALVES.

Specification forming part of Letters Patent No. **207,485**, dated August 27, 1878; application filed January 15, 1878.

To all whom it may concern:

Be it known that I, JAMES H. BLESSING, of the city of Albany and State of New York, have invented a new and useful Improvement in Pump-Regulating Valves, of which the following is a full, true, and exact description, reference being had to accompanying drawings.

The object of my invention is to regulate the action of a boiler-feed pump by means of the quantity of water which is fed to such pump, so that said pump will only operate when supplied with water, and will practically cease to operate when the water-supply is stopped.

My invention is particularly useful in feed-water pumps, which return to steam-boilers the water of condensation from heating-coils in buildings.

It is customary in buildings which are not provided with an automatic return to allow the water from the coils to drain into a tank, from which tank it is forced back to the boiler by means of a force-pump, and it has heretofore required the presence of an engineer to regulate said pump, since, the flow of the return-water being a variable one, if the throttle-valve of the pump were set at any particular point, it might follow that, owing to the decrease in the supply of the return-water, the pump would exhaust such return-tank, and, having no water to act upon, would attain a great velocity, and thereby destroy itself. It has therefore been customary to stop the pump to allow water to return into the tank from the coils, and then at intervals to operate the pump and return all the drain-water into the boiler, and then to stop the pump until its next operation. My contrivance is intended to accomplish this result automatically, and I use the return-water itself as a means of regulating the speed of the pump, so that the pump will only operate when supplied with water, and will stop, or practically stop, when the supply ceases. I thereby dispense with the attendance of a controlling engineer, and render the apparatus entirely automatic.

My invention is clearly shown in the accompanying drawings, in which similar letters refer to similar parts.

Figure 1 represents a cross-section of my apparatus, no water being present in it. Fig. 2 represents the same partially filled with water, showing the pump-regulating valve shut off.

My apparatus consists, generally, of two dish-shaped vessels, A and B, which are held together by their flanges. Between these flanges is inserted a diaphragm, D, preferably of Muntz metal, and is packed between these flanges by means of packing, as shown.

Attached to the upper vessel, B, is the stand-pipe P, provided with the inlet-pipe H, into which the return-water from the coils enters. Concentric with the pipe P is the inner movable pipe, K. This inner pipe, K, is fast to the center of the diaphragm D by means of the flanges or screw-plates *d* and *d'*.

Bearing against the lower flange, and against the lower vessel, A, is the coiled spring S. Cast in the lower vessel, A, is the outlet-pipe H' and the short stand-pipe N, which enters the movable pipe R. Through the axis of the apparatus, central to the pipes N, K, and P, passes the screw-rod *r*, which can be elevated and depressed by means of a screw-thread cut in it and in the vessel A. This rod is turned by the hand-wheel W.

The top of the pipe K is plugged with the plug *p*, and the rod bears against this plug or against a rod which is screwed into it. Beneath this plug *p* are the two holes or ports *a*, connecting the interior of the pipe K with the annular space between the pipes K and P, which I designate by the letter *s*. This space *s* communicates with the space *b* between the upper vessel, B, and the diaphragm D. The space *c* below this diaphragm communicates with the interior of the pipe K, and also with the outlet water-pipe H', which is connected to the short pipe N, as is clearly shown.

Screwed into the plug *p* is a rod, *f*, which controls the pump-regulating steam-valve V. Screwed into the top of the pipe P is the valve-chamber C, which is provided with a balanced piston-valve, though I do not limit myself to the use of this particular kind of valve; a puppet or slide valve could be used instead. But as it is not necessary that this valve V should be perfectly tight, I prefer to use a balanced valve, which takes little power to move it and renders the action of the machine more certain. This double valve V is controlled by means of the valve-stem *f*, which is screwed into the pipe K. Steam is admit-

ted to the pump by means of the inlet and outlet pipes M and M′, and passes through them in the direction shown by the arrow.

As the apparatus is shown in Fig. 1, steam enters by the pipe M, passes readily by the double valve, escapes through the pipe M′, and operates the pump. The water from the return-coils is admitted either direct or through the intervention of a return water-tank by means of the pipe H, and leaves the apparatus by the pipe H′, which communicates with the suction-pipe, and the pump is exclusively supplied by means of this pipe H′. Supposing water to enter my pump regulating-valve by means of the pipe H, then it is evident that it will first fill the spaces *b* and *s*, thereby throwing down the diaphragm D, the pipe K, and closing the valve V. The spring S is so adjusted as to be compressed by the additional weight upon it when the spaces *b* and *s* are filled with water; but it is sufficiently strong to raise the pipe K when the apparatus is empty. This condition of the apparatus is shown in Fig. 2. If water now continues to enter through the pipe H, it will pass into the pipe K through the port *a*, and will continue to fill said pipe until the upward pressure which it exerts on the diaphragm D, together with the upward pressure of the spring, will be able to float the diaphragm and elevate the pipe K and open the valve V, thereby admitting steam to the steam-pump, when said pump will begin to operate and withdraw the water from the apparatus by means of the pipe H′. Should the pump operate too rapidly and return more water than is being supplied to it through the pipes H and H′, then it is evident that the water-level in the pipe K will fall, and that the water in the annular space would throw down the diaphragm D and close the valve V, and thereby stop the pump until the water-supply had again raised the level in the interior of the pipe K.

It is found as a matter of fact that, by proper adjustment, the valve V will be opened sufficiently far to enable the pump to return the water which is flowing through the pipe H, and that as this flow increases the valve V will be opened wider and the pump action be more rapid; but if the water-supply through the pipe H should cease, the valve V would instantly close, thereby shutting off the steam from the pump, so that the pump can never "get away from" the water, as the expression is.

The pipe N is provided for the purpose of retaining sufficient water to fill the chamber *c*, so that it is not necessary to fill both the chamber *c* and the pipe K before the valve will be opened; but a little water only entering the apparatus will fill or partially fill the pipe K, when the valve will be opened.

The purpose of the rod *r* is to prevent, under certain circumstances, the absolute closing of the valve V. In direct-acting pumps this contrivance would not be required, since such pumps start of themselves on the admission of steam; but in crank-pumps it is desirable, because such pumps, if once stopped, have to be started by hand. If the valve V were entirely shut, such pumps would come to rest, and the opening of the valve V would not again start them.

By means of the hand-wheel W, I adjust the point of the rod *r* to such a position as to keep the valve open, even when the diaphragm D is weighed down by the water in the annular space *s*, and to hang up, as it were, the pipe K and the diaphragm upon the point of the rod *r*. It is advisable with crank-pumps to keep this rod just sufficiently open to keep the pump running very slowly, even when there is no water in the pipe K.

It will now be seen that, by means of this apparatus, the water supplied to a pump regulates exactly its action, so that if more water be supplied the pump will operate faster, if less water is supplied the pump will operate slower, and if no water be returned the pump will stop entirely, unless it is desired to keep it in slow operation.

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

1. An apparatus constructed substantially as described, whereby the amount of water supplied to a pump regulates the operation of said pump.

2. A pump-regulating apparatus constructed substantially as described, and placed intermediate between the water and the pump, whereby the water passing to such regulating apparatus opens the steam-valve of the pump, which valve is closed on the cessation of the water-supply.

3. A pump-regulating apparatus constructed substantially as described, and provided with two chambers and an intermediate diaphragm, which diaphragm controls the steam-valve of the pump, and is elevated or depressed by means of the presence of water in one of the chambers, the upper surface of the diaphragm being acted on by a pressure of water of constant height, the lower surface by the water which is being fed to the pump, whereby the varying amount of the water-supply determines and regulates the action of the steam-pump.

4. The combination, in an apparatus constructed substantially as described, of a steam-valve and a diaphragm controlling it, which valve is elevated or depressed by the presence of water, thereby regulating the steam-supply of the pump.

5. In a pump-regulating apparatus whereby the steam-supply of such pump can be increased or diminished by means of the supply of water to such pump, a means, substantially as specified, for keeping the steam-valve of the pump constantly open, whereby said pump is prevented from stopping.

JAMES H. BLESSING.

Witnesses:
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WM. J. SAWYER.