

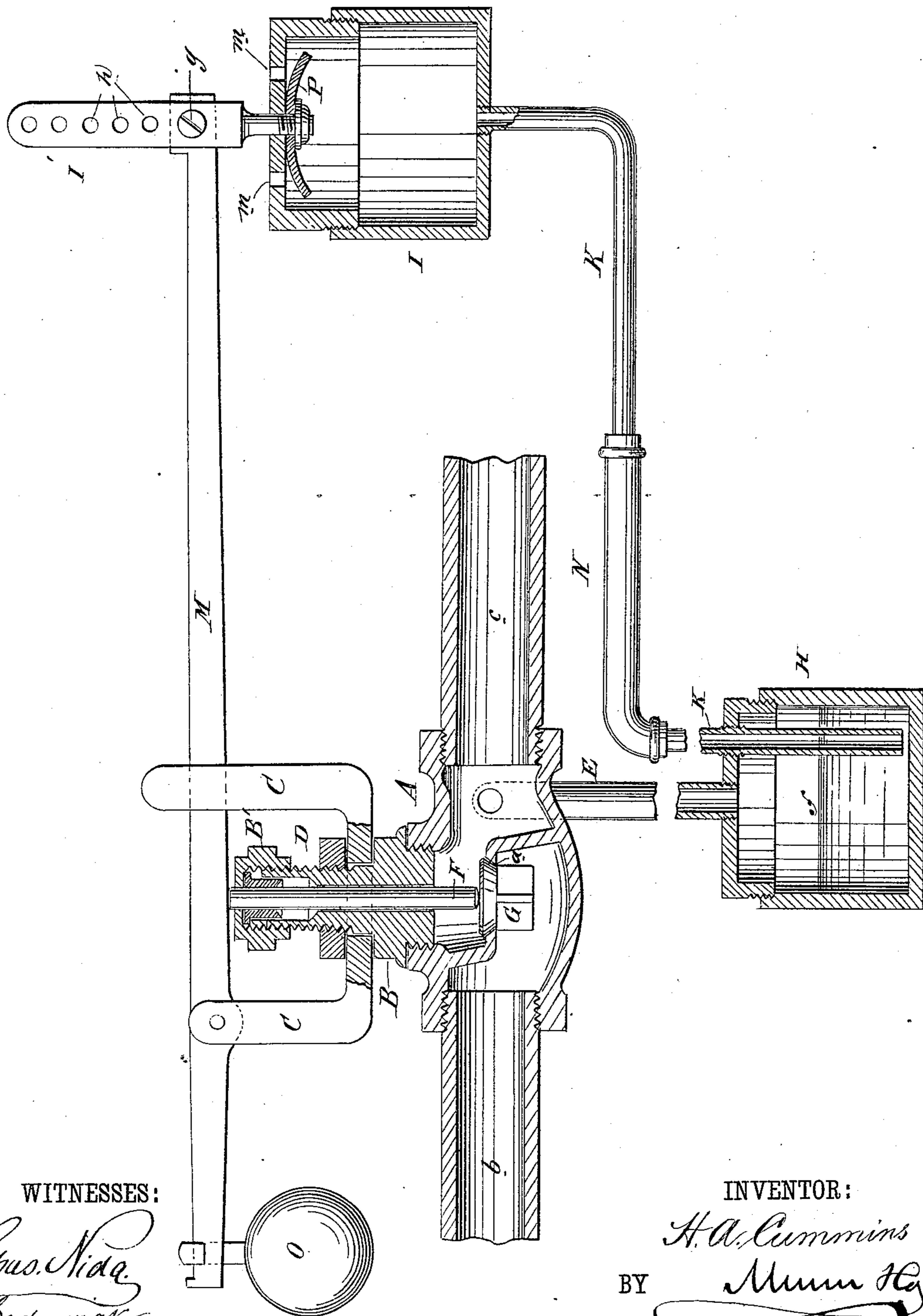
(No Model.)

H. A. CUMMINS.

## STEAM PRESSURE REGULATOR.

No. 246,468.

Patented Aug. 30, 1881.



WITNESSES:

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# UNITED STATES PATENT OFFICE.

HOWELL A. CUMMINS, OF CONNEAUT, OHIO.

## STEAM-PRESSURE REGULATOR.

SPECIFICATION forming part of Letters Patent No. 246,468, dated August 30, 1881.

Application filed May 25, 1881. (No model.)

*To all whom it may concern:*

Be it known that I, HOWELL A. CUMMINS, of Conneaut, in the county of Ashtabula and State of Ohio, have invented a new and Improved Steam-Pressure Regulator, of which the following is a full, clear, and accurate description.

The object of this invention is to provide a device for more accurately and quickly controlling the steam-pressure from a boiler.

The invention consists, in combination with the valved steam-pipe leading from a boiler, of a lever connected with the valve-stem, and weighted at one end with a ball and at the other end with an empty tank or box nearly balanced by the ball; and, further, of a box or tank containing mercury, connected with the steam-pipe outlet and with the lever tank or box by tubular connections, so that when there is an excess of steam-pressure in the steam-pipe outlet steam therefrom will enter the mercury-tank and force a portion of the contents thereof into the lever-tank, thereby drawing down the long end of the lever and closing or partly closing the valve and correspondingly cutting off the steam. Then, when the steam-pressure at the steam-pipe outlet falls, the mercury flows back from the lever-tank into the mercury-tank, and, restoring the equilibrium of the lever, permits the valve to open and the steam to have free passage again, all the variations between a fully-closed and a fully-opened valve being promptly regulated by this device.

The drawing represents a partly-sectional front elevation of the device in position.

In the drawing, A represents the valve-casing, lengthened to permit the pipe E to enter its side, as shown. Into the top of the casing A is screwed the cap B, that is provided with a stuffing-box, B', through which the vertical valve-stem F passes, carrying on its lower end the valve G. The lever fulcrum and guide C is slipped over this stuffing-box B' onto the cap B, and is held in place thereon by a screw-nut, D. The valve-stem F rests on the back of the valve G, instead of being cast with it, thus allowing the said valve G to always find its seat at *a* within the casing A, and the upper end of said valve-stem F is connected with the lever M. H and I are iron tanks, connected with each other by the pipes K K and intermedi-

ate flexible pipe, N, said pipes K N extending from near the bottom of the tank H into the bottom of the tank I. The flexible pipe or tube N allows the tank I to rise and fall with the lever M, from one end of which it is suspended, being counterbalanced by a weight, O, on the other end of said lever M.

If the tank H be nearly filled with mercury, as indicated at *f*, and the proper connection made with the inlet-pipe *b* and the outlet-pipe *c* of the valve-case A, and steam be supplied from the boiler, (not shown,) the action of the device will be as follows: As the weight of the tank I is nearly or quite balanced by the weight O, a slight steam-pressure on the lower side of the valve G throws it wide open and allows the steam to pass freely, said valve G remaining wide open until the pressure in the outlet end of the valve-casing A and tank H forces a portion of the mercury contained in the latter up through the pipe K N into the tank I, which weight, added to the tank I, tends to draw down the long end of the lever M, and thereby close the valve G. As the pressure increases the mercury continues to flow into the tank I from the tank H until the valve G is closed enough to reduce the pressure somewhat in the outlet end of the valve-case A and the tank H, which reduction allows a little of the mercury to flow from tank I back into the tank H, thereby decreasing the weight on the long arm of the lever M, and allowing the valve G to open a little. Thus the mercury flowing in and out of the tank I increases and decreases the weight on the lever M, thus maintaining a steady pressure in the outlet end of the valve-case A.

It is evident that the difference of level between the tanks H I has much to do with the regulation of the steam-pressure.

The regulator may be adjusted to different pressures in two ways—first, by lengthening the flexible tube N, which will permit the tank I to be elevated, as shown in the drawing, and secured on the lever M by a screw or pin, *g*, passed through any of the holes *h* of its support or hanger I'; and, secondly, by changing the length of the pipes E K, thus raising or lowering the tank H.

This device works quickly and keeps the steam-pressure steady, and no stop-valve is required between it and the boiler, for by hang-

ing the weight O on the lever M near the tank I, it holds the valve G closed, so that access can be had to the working parts beyond the said valve G for alteration or repair. In fact, the device can be used as a stop-valve. Any dirt or sediment that will pass a stop-valve will pass this. When using this no vacuum-valve is required, as on some regulators, for as soon as a vacuum is formed in the outlet of the casing A air will be drawn in through the openings *m m* in the tank I down the pipe K N to tank H, and up pipe E, thus filling the vacuum. Hence the device serves as a vacuum-valve.

If the steam-pressure should from any cause chance to go above that to which the regulator is adjusted the mercury will all be forced out of the tank H into the tank I, and steam will pass up the pipe K N through the mercury and blow through the openings *m m*, thereby sounding an alarm, the diaphragm P, fixed within the tank I beneath the openings *m m*, preventing the mercury from being blown out of said openings *m m*.

Thus it is seen that this regulator is a combined regulator, stop-valve, vacuum-valve, and alarm.

I am aware that devices of a somewhat similar character have been employed; but these will not operate promptly and quickly, because in the outlet the mercury commences to rise in the pipe as soon as there is the least pressure, thus reducing the weight on the lever, which tends to close the valve. Hence it

will be seen that, as in diaphragm-regulators, the action is retarded. On the contrary, in my device, as the mercury is forced up in the pipes K N, it does not tend to close the valve until the required pressure is nearly reached, and the mercury flows along the horizontal part of the pipe into the lever-tank, so as to close the valve very quickly. Hence,

What I claim as new and of my invention is—

1. The combination, with the case A and valve G, having stem F, of the weighted lever M, the tank I, suspended at one end of lever M, and counterbalanced by a weight at the other, and the tank H, connected with tank I by pipes K N, and with the case A by pipe E, as shown and described.

2. In a steam-pressure regulator, the combination, with the mercury-tank H and the connecting-pipe K N, of the tank I, adjustably suspended from one end of the weighted lever M, and provided with the openings *m* in its cover, substantially as and for the purpose set forth.

3. In a steam-pressure regulator, the combination, with the mercury-tank H and the connecting-pipe K N, of the tank I, adjustably suspended from one end of the weighted lever M, and provided with the openings *m*, and the curved diaphragm secured to its cover, substantially as and for the purpose set forth.

HOWELL ADIN CUMMINS.

Witnesses:

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