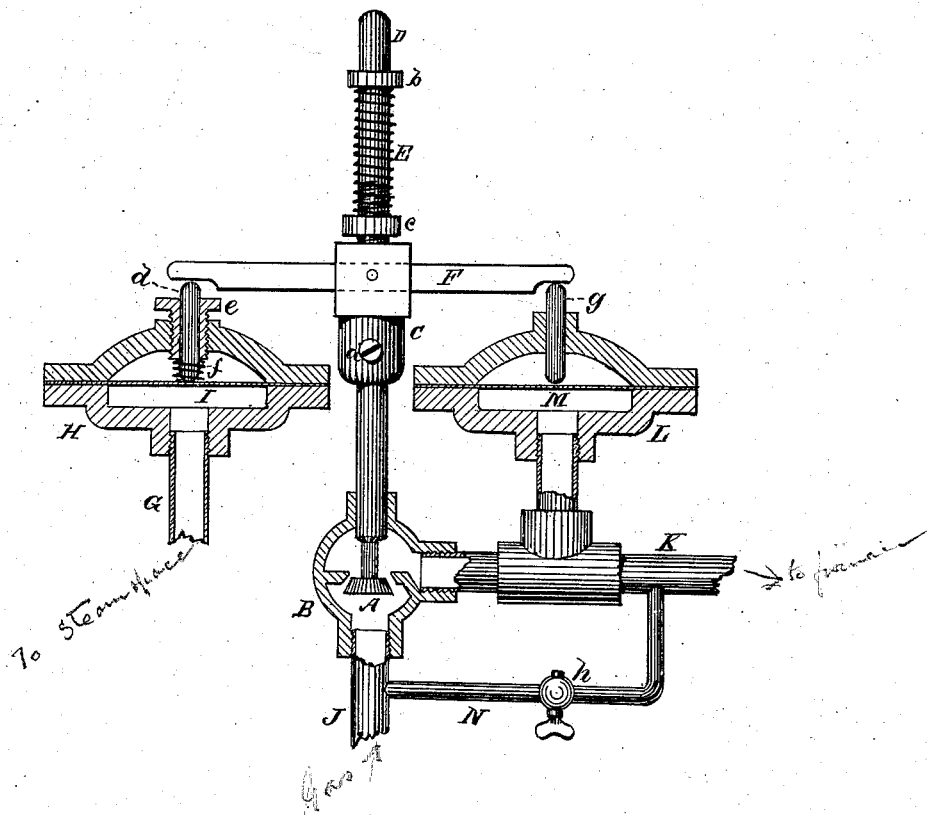


G. M. HOPKINS.
 REGULATORS FOR CONTROLLING THE FLOW OF GAS TO FURNACES.

No. 194,775.

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WITNESSES:
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UNITED STATES PATENT OFFICE.

GEORGE M. HOPKINS, OF BROOKLYN, NEW YORK.

IMPROVEMENT IN REGULATORS FOR CONTROLLING THE FLOW OF GAS TO FURNACES.

Specification forming part of Letters Patent No. **194,775**, dated September 4, 1877; application filed March 9, 1877.

To all whom it may concern:

Be it known that I, GEORGE M. HOPKINS, of Brooklyn, in the county of Kings and State of New York, have invented an Improved Gas-Regulator for Steam-Boilers, of which the following is a specification:

The object of my invention is to regulate the supply of gas burned as fuel under steam-boilers, so as to control the steam-pressure in the boiler.

Heretofore the maintenance of a uniform pressure in steam-boilers using gas as fuel has been attended with trouble and uncertainty, especially where natural gas from wells is used, as the gas-pressure varies constantly and the boiler requires continual attention.

To obviate these difficulties a valve is placed in the gas-pipe, to the stem of which a lever having equal arms is pivoted, which is moved by two diaphragms, one of which is acted upon by steam-pressure and the other by the pressure of the gas in the pipe which leads from the valve in the gas-pipe to the fire-box of the boiler. An increase of either steam or gas pressure closes the valve in the gas-pipe more or less. A diminution of steam or gas pressure opens the valve.

Referring to the drawing, which is a vertical section, A is a valve placed in the casing B, and is arranged to open downward. The stem of the valve A extends upward through the casing B, and is fitted to the casting C, which is bored to receive it. The casting C is provided with a screw, *a*, for binding the valve-stem, and with a rod, D, that extends through a guide, *b*. The rod D is threaded above the casting C to receive a nut, *c*, between which and the guide *b* upon the rod D a coil-spring, E, is placed. This spring serves to force the valve A open. The casting C is mortised to receive the lever F, which is pivoted centrally in the said casting.

G is a pipe, connected with the water or steam space of the boiler, and with a casing, H, which contains a diaphragm, I, of any ordinary construction. Upon this diaphragm a pin, *d*, rests, which extends upward through a tubular screw, *e*, which passes through the upper portion of the casing H. The said pin touches one of the arms of the lever F. A spring, *f*, surrounds the lower end of the pin

d and rests upon the diaphragm I, and is adjusted by the tubular screw *e*, so as to offer more or less resistance to the upward motion of the diaphragm I.

The casing B of the valve A is connected with the pipe J that leads from the well or gasometer. The pipe K leads from the valve-casing B to the fire-box of the boiler, and in it is placed a T, with which is connected a casing, L, containing a diaphragm, M, upon which rests a pin, *g*, which extends upward through the upper portion of the casing L, and touches the end of the lever F.

A small pipe, N, having the stop-cock *h*, connects the pipes J and K, and is designed to conduct sufficient gas by the valve A to prevent the flame in the fire-box from becoming extinguished should the valve A be entirely closed.

By connecting the apparatus above described with a small boiler it may be used for regulating gas for household and other purposes, the boiler being only of sufficient size to generate steam to operate the diaphragm.

The operation is as follows: Gas is taken through the pipe J and through the valve-casing B and pipe K to the fire-box of the boiler. When the gas-pressure is normal the diaphragm M is unmoved, and an increase in gas-pressure in the pipe K raises the said diaphragm, moving the lever F and closing the valve A, and reducing the gas-supply to just the amount required to maintain a flame of given size. Should the steam-pressure increase, the diaphragm I is raised, moving the lever F and closing the valve A sufficiently to prevent any material increase in the steam-pressure in the boiler. Should the gas or steam pressure diminish, the action of the diaphragms and valve is reversed. By the compound action of the two diaphragms upon the gas-valve both the gas-supply and the gas-pressure are regulated, so that an unvarying steam-pressure is maintained in the boiler.

I do not confine the improvement to the form herein described, as it may be varied without departing from the invention. For example, there are many well-known mechanical devices which may be substituted for the lever F for transmitting the motion of the diaphragms to the valve.

The valve in the gas-supply pipe may be a balanced valve. By making a small aperture in the valve or valve-seat, the pipe N and stop-cock *h* may be dispensed with.

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

The combination of a valve and two diaphragms, one of which is, by suitable connec-

tions, adapted to be acted upon by gas-pressure and the other by steam-pressure, and a device for transmitting motion from either or both of the said diaphragms to the valve, substantially as herein shown and described.

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Witnesses:

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