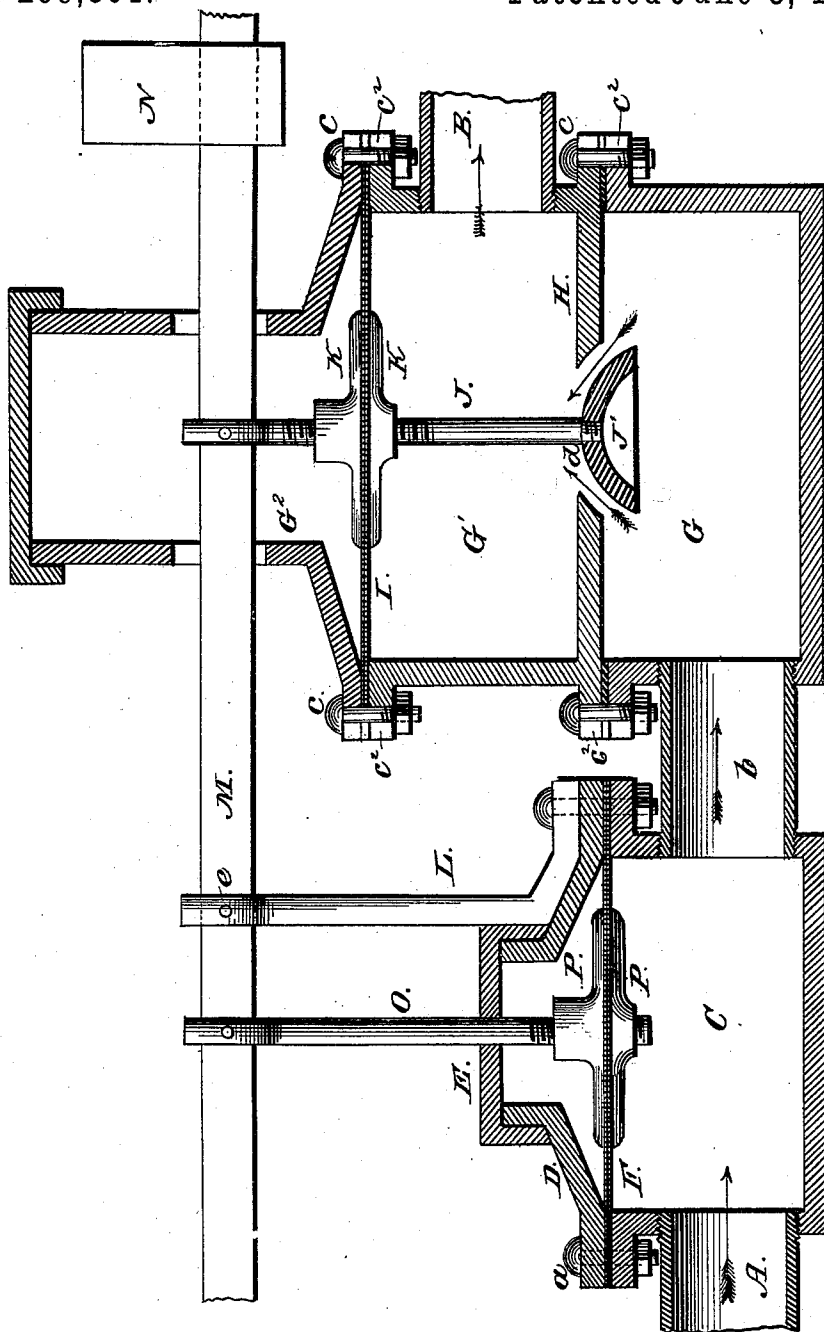


(No Model.)

C. S. KING.
GAS REGULATOR.

No. 299,801.

Patented June 3, 1884.



WITNESSES:

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UNITED STATES PATENT OFFICE.

CHESTER S. KING, OF SMETHPORT, PENNSYLVANIA.

GAS-REGULATOR.

SPECIFICATION forming part of Letters Patent No. 299,801, dated June 3, 1884.

Application filed January 19, 1884. (No model.)

To all whom it may concern:

Be it known that I, CHESTER S. KING, a citizen of the United States, residing at Smethport, in the county of McKean and State of Pennsylvania, have invented certain new and useful Improvements in Gas-Regulators, of which the following is a description.

The figure is a vertical longitudinal section.

Numerous forms of gas-regulators have heretofore been patented which were designed to render the flow of gas uniform in its passage from the mains of the street to the distributing-pipes of a building. The regulation of the flow of artificial gas is not particularly difficult, for the reason that its variations of pressure are but slight. When, however, the ordinary forms of regulators are applied to the regulation of the flow of natural gas as it comes from the oil-wells and is distributed to the buildings, the usual forms of regulators are insufficient, for the reason that the pressure of the gas varies from a few ounces to as much as twenty pounds by reason of variation in consumption and flow, and this, when the pressure is suddenly increased, causes the valves of the regulators to shut and stay shut from the great pressure of the gas. My invention provides a means for preventing this contingency, which means effect a perfect balancing of the valve for all pressures, as hereinafter fully described.

In the drawing, A represents the inlet and B the outlet pipe from my regulator. The inlet-pipe A leads into a box-like chamber, C, which has a cover, D, and a cap, E, and between which cover and the chamber is clamped a substantial diaphragm, F, of rubber or other flexible material by bolts *a*. The chamber C communicates by a short pipe, *b*, with the lower chamber of a three-compartment chamber, G G' G², composed of three sections bolted together by bolts *c*. The lower chambers G G' are separated by a rigid horizontal partition, H, having in its center an opening, *d*, through it, forming a valve-seat. Between the flanges of the upper chambers G' G² is secured a flexible diaphragm, I, which is attached to a central stem, J, bearing valve J', by screw-threaded clamp-disks K, the stem extending through the hole in partition H, and the valve being affixed to the stem below the said partition. Upon the chamber C is

mounted a standard, L, to which is fulcrumed, at *e*, a horizontal lever, M, which lever is jointed to the upper end of valve-stem J, and bears an adjustable weight, N, on one side of the fulcrum, and on the other side of the fulcrum is jointed to a stem, O, that passes through a cap on chamber C and is connected by a screw-thread to the clamp-disks P, which attach it to the diaphragm F.

Now, in the operation of the valve J', diaphragm I, and two chambers, G G', when the gas passing up through hole *d* exceeds in pressure the normal, this pressure, acting against diaphragm I, raises the same and with it raises valve J' and correspondingly closes the hole *d*, diminishing the flow of gas escaping through pipe B to the burners. When, however, the pressure in G' and the pipe B falls below the normal, the diaphragm I in falling opens the valve J' and increases the flow.

As so far described, my invention works upon a principle already known and made use of; but when such a regulator is subjected to great variations of pressure, and the pressure is (from any cause, such as increased flow or a shutting off of burners by somebody else) suddenly increased, it has been found that this pressure, acting on the under side of the valve J', closes it tightly against the valve-seat or hole *d*, and this pressure beneath it maintains it closed, allowing all of the burners to go out. To counteract this is the purpose of the diaphragm F, stem O, and lever M, for when the pressure is increased the lifting action of diaphragm F by the reverse action of lever M produces a downward pressure on the valve J', that holds it always in perfect balance for all variations of pressure. It is essential for the most sensitive action, however, that the area of the diaphragm F should bear a certain definite relation to that of the lower side of valve J'—i. e., if the fulcrum *e* of lever M should be exactly half-way between the valve J' and diaphragm F, then the area of the diaphragm F and valve J' must be equal, in order to balance. If, however, the diaphragm F is larger than the valve J', as I prefer it, and as is shown, then the fulcrum-point *e* of the lever must be moved as much nearer the diaphragm as the latter is larger in area than the valve, so as to preserve always a perfect bal-

ance. This prevents the variation of pressure from permanently closing the valve, and yet allows the latter to have a sensitive automatic movement from the action of the other and larger diaphragm, I.

5 In fastening the chambers G G' G² together, the bolts c do not pass through holes, but through open slots c² in the flanges of these parts, which permit the bolts to be loosened and taken out sidewise; and these slots are all the same distance apart, so that the chamber G' may be turned around and bolted in any position in order to bring the outlet-pipe B into the proper relation to the pipe of the house.

15 To open or close the opening d more or less, the stem J may be disconnected from the lever and screwed up or down through the disks K, and the weight N may be adjusted to put more or less downward pressure on the valve.

20 Having thus described my invention, what I claim as new is—

1. The combination, with a gas-regulator consisting of a suspended valve, a valve-stem, 25 a diaphragm, and a valve-seat located above

the valve, of a separate diaphragm arranged nearer the source of supply than the valve, and an external lever connected to both this diaphragm and the valve, to balance the latter against variations of pressure, substantially as shown and described. 30

2. The chambers G G' G², having flanges at their edges, with open slots in the same at regular intervals, in combination with bolts c, diaphragm I, the valve, valve-stem, and valve-seat, as and for the purpose described. 35

3. The combination of the chamber C, pipe b, the connected chambers G G' G², with perforated partition H and diaphragm I, valve and valve-stem J J', lever M, standard L, stem O, and diaphragm F, as and for the purpose described. 40

The above specification of my invention signed by me in the presence of two subscribing witnesses.

CHESTER S. KING.

Witnesses:

EDWD. W. BYRN,
CHAS. A. PETTIT.