

A. HICKENLOOPER.
Gas-Regulator.

No. 160,430.

Patented March 2, 1875.

FIG. 1.

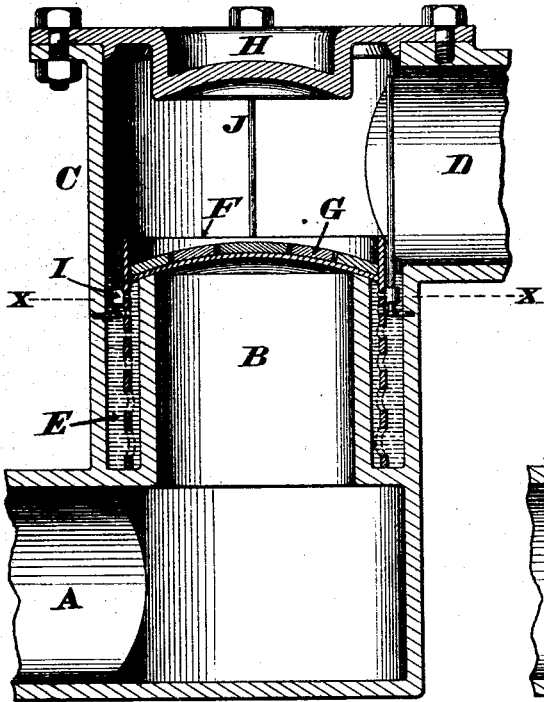


FIG. 2.

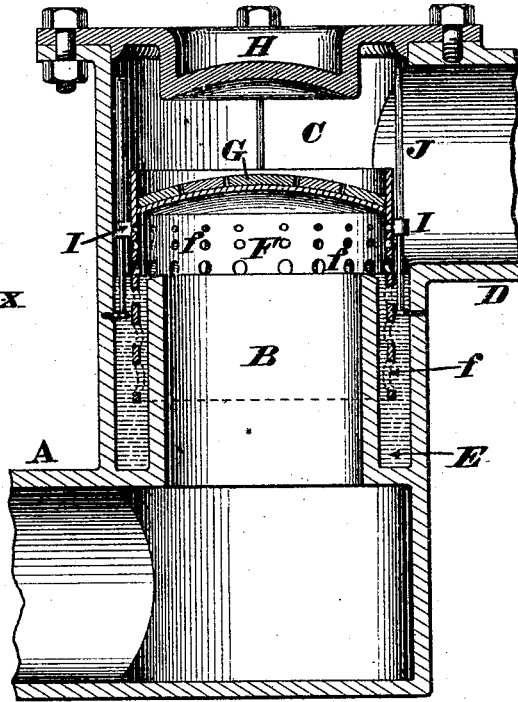


FIG. 3.

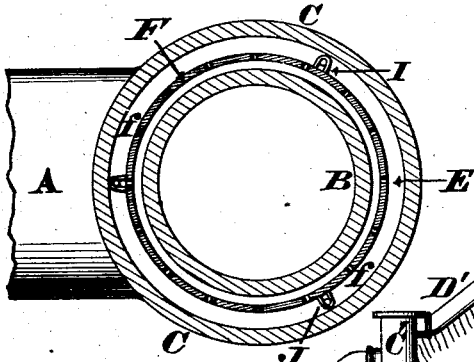
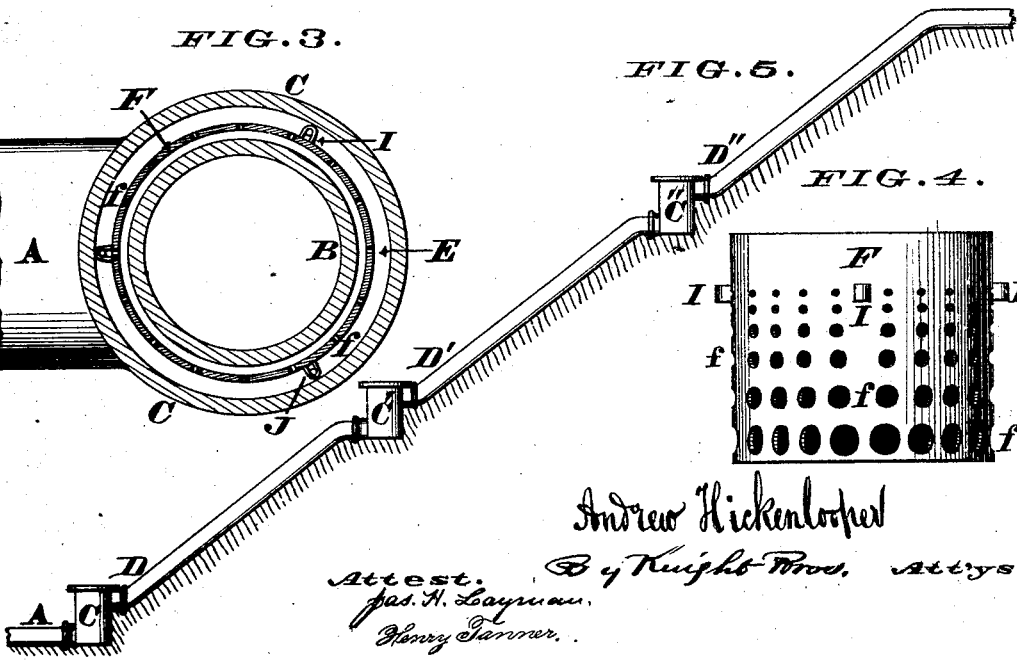
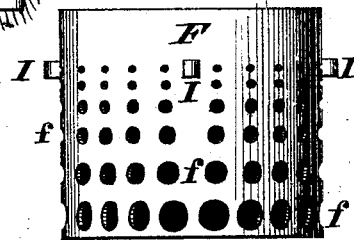


FIG. 5.

FIG. 4.



UNITED STATES PATENT OFFICE.

ANDREW HICKENLOOPER, OF CINCINNATI, OHIO.

IMPROVEMENT IN GAS-REGULATORS.

Specification forming part of Letters Patent No. **160,430**, dated March 2, 1875; application filed September 28, 1874.

To all whom it may concern:

Be it known that I, ANDREW HICKENLOOPER, of Cincinnati, Hamilton county, Ohio, have invented a new and useful device for equalizing the pressure of gas at different elevations, of which the following is a specification:

My invention is designed wholly for use in, or application to, ascending gas-mains, for the purpose of counteracting in successive steps the pressure-increasing tendency due to the buoyancy of the gas in such ascending mains.

Every gas company incurs a loss of from ten to twenty-five per cent. by leakage from street-mains and service-connections. This leakage is in proportion to pressure. It becomes, therefore, a matter of considerable importance to decrease the pressure during day-time, or when little or no gas is being consumed. This can easily be done throughout districts nearly on same level with works by increasing or decreasing the initial pressure; but from the natural tendency of gas to ascend it becomes impossible to do so on higher levels, the pressure increasing at the rate of one inch for every one hundred feet in height (= column of water one inch in height.) The hill districts of Cincinnati are about four hundred feet above the level of the works, and therefore there is produced at all times an extra pressure of four inches on such mains, without any ability to decrease the same. It therefore becomes important to place on the mains leading to such districts some contrivance by which the flow of gas will be retarded at successive intervals in elevation to counteract the effect of buoyancy; and it is essential that such contrivance shall be of such construction as will permit its free exposure for cleaning and regulation or repairs without disturbance of the mains.

All these requirements have been provided for by my device, which consists of a case or shell containing an annular liquid-chamber, in which a perforated sealing and regulating valve moves and operates to control the passage of gas, the case or shell being constructed with side pipes to connect with the mains, and a separate detachable cap or top to permit the introduction or removal of the valve, or the replenishing or cleaning of the liquid-chamber,

or the adjustment of the weight of the valve, all without disturbance of the joints of the mains.

In the accompanying drawings, Figures 1 and 2 are vertical sections, representing my governor in the closed and open positions, respectively. Fig. 3 is a section in the plane X X. Fig. 4 is a side elevation of my holder detached. Fig. 5 represents my device applied at successive intervals in an ascending gas-main.

The case C, which forms a part of my regulator, is shown in enlarged sections in Figs. 1, 2, and 3, and is represented in smaller scale by letters C C' C'' at varying elevations in Fig. 5. This case is formed with a side pipe, A, for receiving, and a side pipe, D, for delivery, and these side pipes are designed to be permanently connected by the customary socket-joints to the mains D' D''. The case C is also formed with an upwardly-projecting neck, B, between which and the exterior of the case an annular liquid-chamber, E, is formed, in which the inverted cup-valve F is partly immersed. The valve is perforated, as indicated by the letter *f*; the perforations being of gradually-increasing diameter from the top downward, to compensate in flow of gas for the increased weight of the cup or valve F as it ascends. The cup, holder, or valve F may be variably loaded by the introduction of one or more weights, G, and is provided with ears I, adapted to slide on permanent rods J, to guide the valve in its vertical movement. The case C is adapted to receive all its interior operative parts through an opening at top, covered by a detachable cap or cover, H, and no exterior operative parts exist in this regulator.

The case C is a permanent fixture, as much so as the mains D' D''; and in order to remove the cup-valve F *f* and its slides, if necessary, or to clean or replenish the liquid-chamber E, or to add or remove weights from the valve F, it is simply necessary to remove the cap or cover H, the joints in the mains being, therefore, undisturbed in such operations.

Although I believe that I am the first to apply gas-pressure reducing devices at successive intervals in ascending gas-mains for the important purpose I have indicated, I do not

desire to claim this provision, broadly; but I do desire to claim, in connection with such ascending mains, that specific construction of regulator described by me, which provides for the exposure of all the operative parts without disturbance of the casing or the joints of the mains.

I claim—

In combination with the ascending mains D D' D'', the permanent case C B, side pipes A

D, liquid-chamber E, perforated valve F f, removable weights G, and detachable cap H, constructed and operating substantially as and for the purpose specified.

In testimony of which invention I hereunto set my hand.

ANDREW HICKENLOOPER.

Attest:

GEO. H. KNIGHT,
HARRY E. KNIGHT.