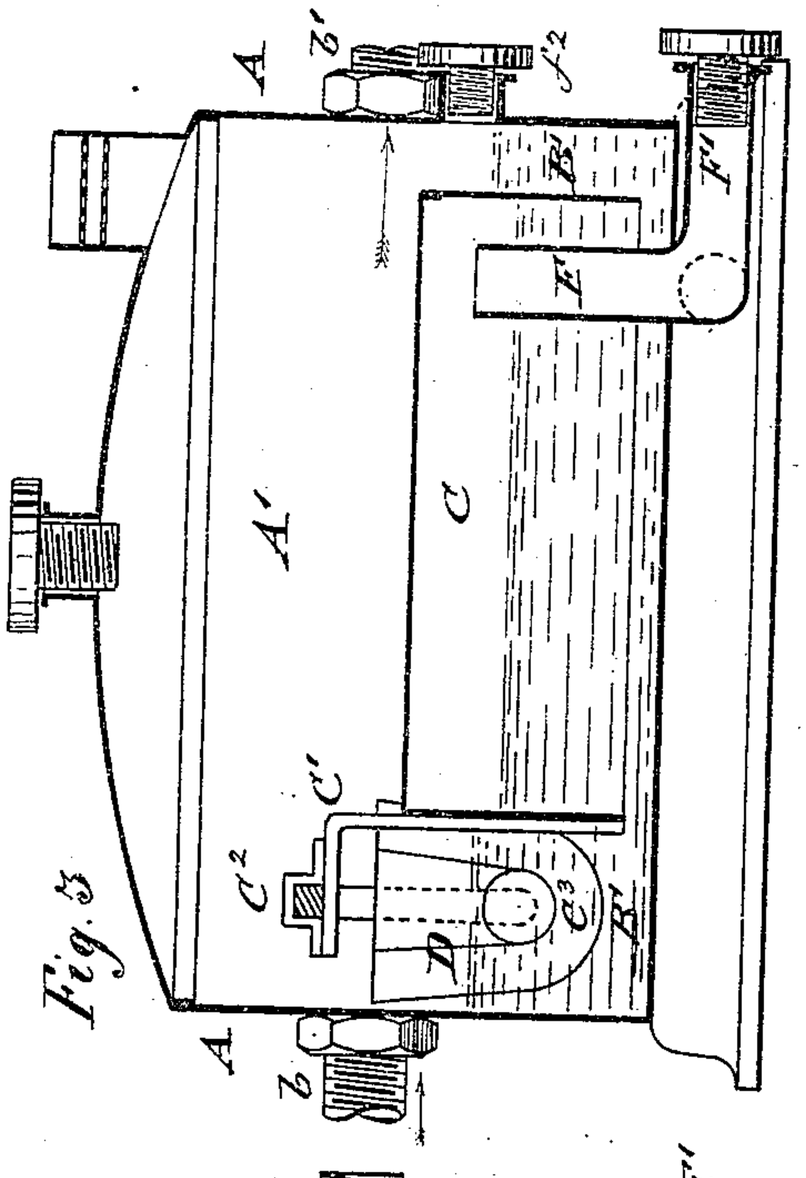
(No Model.)

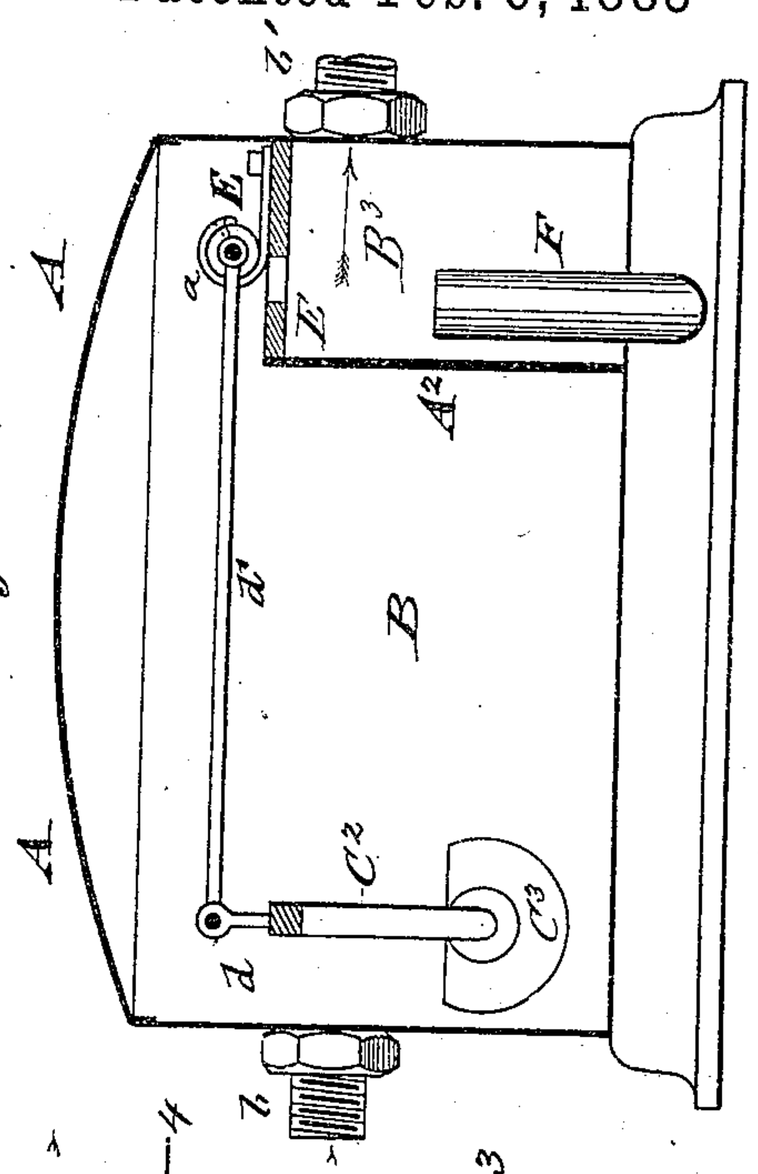
2 Sheets—Sheet 1.

F. PIPERSBERG.

GAS PRESSURE REGULATOR.

No. 271,735. Patented Feb. 6, 1883





WITNESSES:

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(No Model.) 2 Sheets—Sheet 2.

F. PIPERSBERG.

GAS PRESSURE REGULATOR.

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Fig. 5

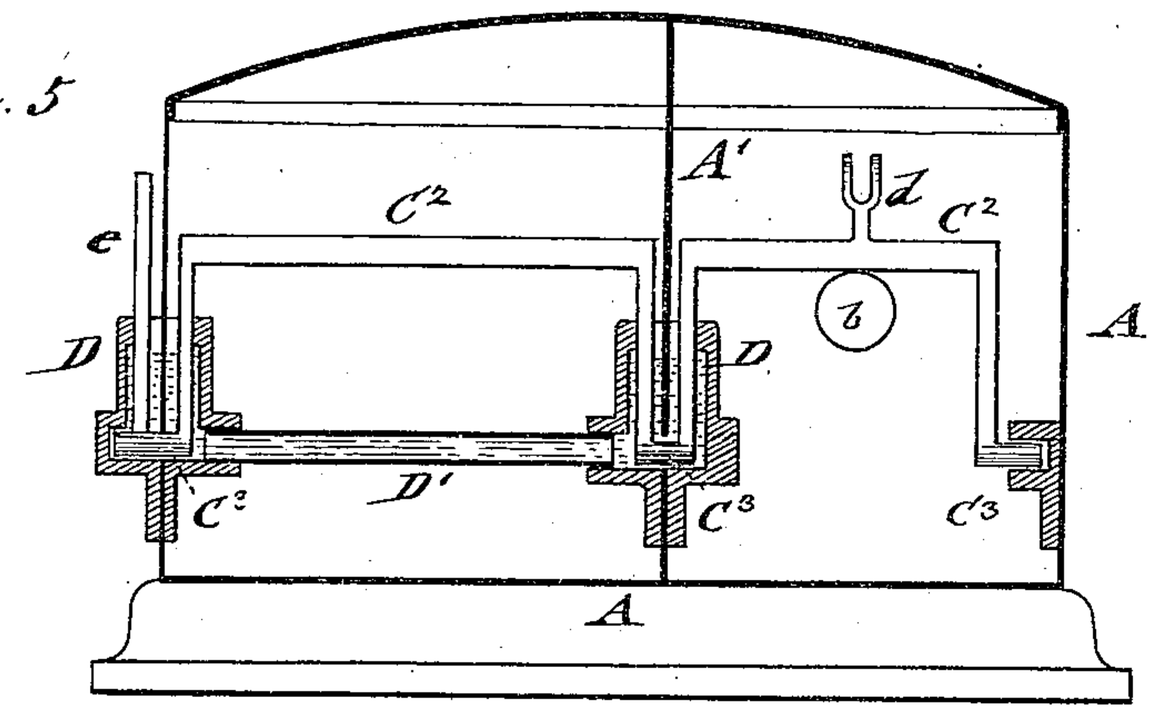


Fig. 6

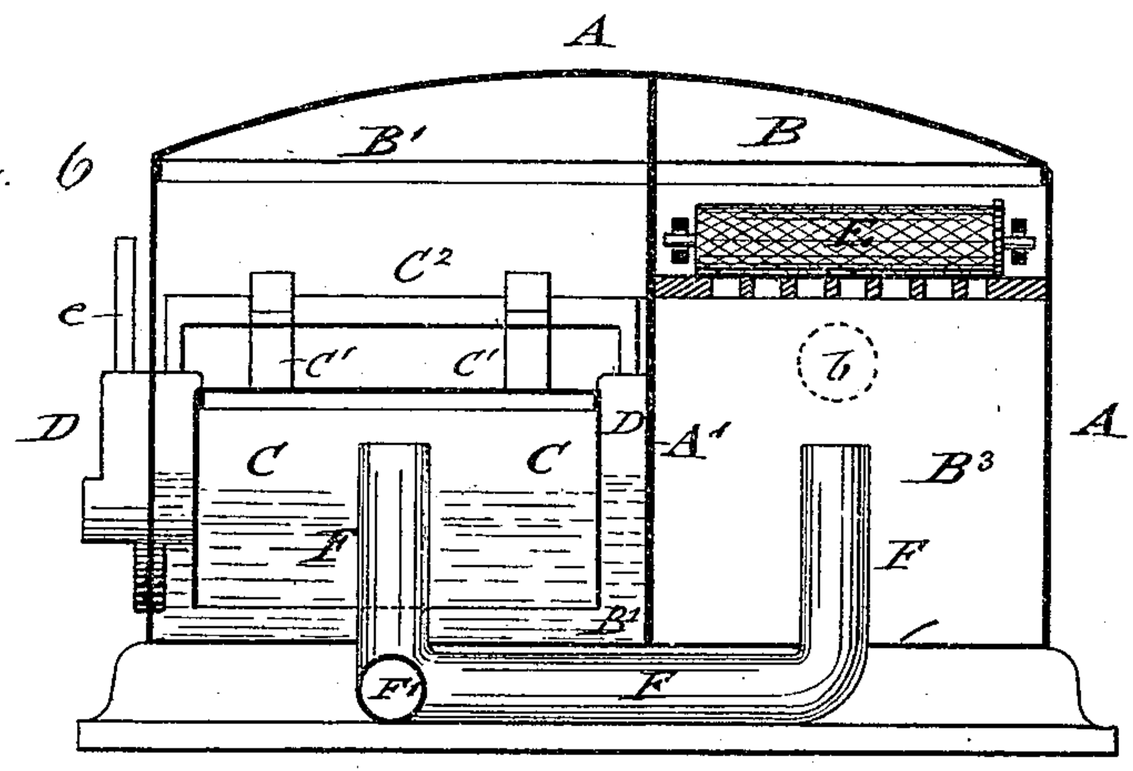


Fig. 7.

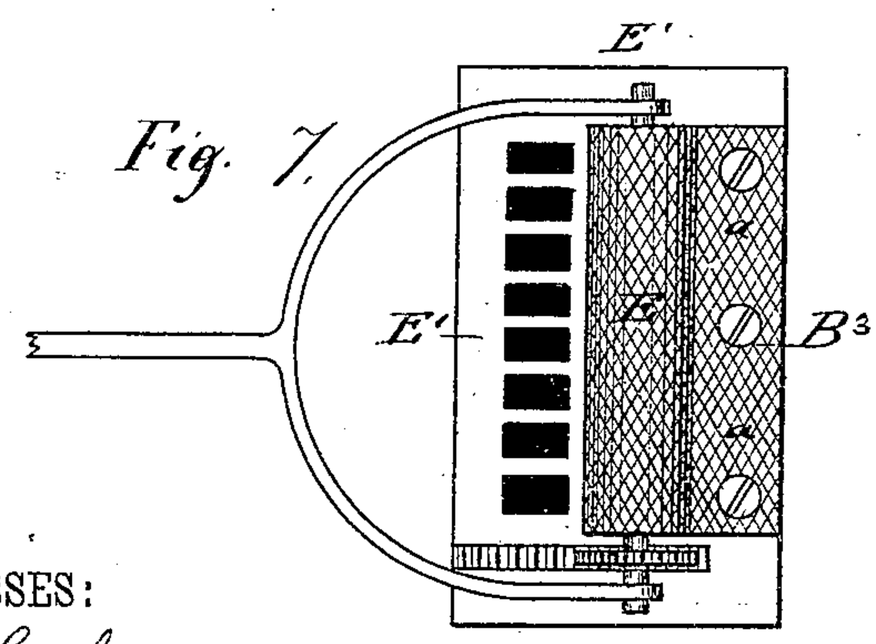
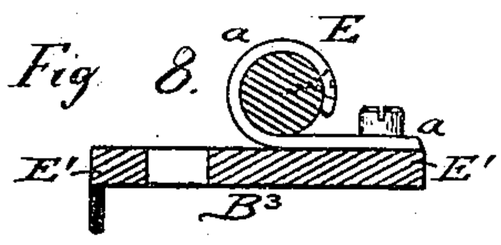


Fig 8.



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UNITED STATES PATENT OFFICE.

FRANZ PIPERSBERG, OF LÜTTRINGHAUSEN, PRUSSIA, GERMANY, ASSIGNOR TO HERMANN PIPERSBERG, OF PHILADELPHIA, PENNSYLVANIA.

GAS-PRESSURE REGULATOR.

SPECIFICATION forming part of Letters Patent No. 271,735, dated February 6, 1883.

Application filed July 24, 1882. (No model.) Patented in Germany October 23, 1877, No. 2,471, and March 8, 1879, No. 6,798; in France August 23, 1878, No. 126,222, and in Belgium August 31, 1878, No. 46,054.

To all whom it may concern:

Be it known that I, FRANZ PIPERSBERG, of Lüttringhausen, Prussia, in the Empire of Germany, have invented certain new and useful Improvements in Gas-Pressure Regulators, of which the following is a specification.

This invention has reference to an improved pneumatic gas-pressure regulator which works in a reliable and automatic manner and admits the admission of the gas to the burners at a uniform pressure; and the invention consists of a gas-pressure regulator which is divided by a vertical central partition into two chambers, of which one is connected with the gas induction and eduction pipes, and provided at the interior with a chamber that is opened or closed by means of a valve arranged at the upper part, said valve being worked by the rising and falling of an inverted-bell-shaped vessel, the space within which communicates with the valve-chamber by a U-shaped pipe. The chamber within which the regulating-vessel is arranged is filled with water or other liquid up to a certain level, the vessel and the lever-rod of the valve being applied to a crank-shaft, to which is also applied, at the exterior end of the shaft, an adjustable weight for balancing the interior vessel and the gas-regulating valve.

In the accompanying drawings, Figure 1 represents a side elevation of my improved gas-pressure regulator. Fig. 2 is a horizontal section on line 2 2, Fig. 1. Figs. 3 and 4 are respectively a vertical longitudinal section on line 3 3 of Fig. 2 and a vertical longitudinal section on line 4 4 of said figure. Fig. 5 is a vertical transverse section on line 5 5 of Fig. 2. Fig. 6 is a vertical transverse section on line 6 6 of Fig. 2. Fig. 7 is a top view of the improved regulating-valve of my gas-pressure regulator on an enlarged scale; and Fig. 8 is a transverse section through said valve and the seat thereof.

Similar letters of reference indicate corresponding parts.

The working parts of my improved gas-pressure regulator are contained within a square or oblong box or casing, A, which is divided by a central longitudinal partition, A′, into two chambers, B B′, of which the chamber B is provided with the gas induction and eduction pipes *b b′*. The second chamber, B′, is filled with water or other suitable liquid, a bell shaped vessel, C, which is closed at the top and open at the bottom, being arranged therein and connected by bracket-arms C′ to a crank-shaft, C^2, the journals of which turn in bearings C^3 of the side walls of the casing A and of the partition A′, the shaft passing at one end through the side wall of the casing to the outside, at which point, and at the point of passing through the partition A′, the bearings are hermetically sealed by mercury-vessels D. (Shown clearly in Fig. 2.) The hermetically-sealed bearings of one side wall of the casing A and of the partition A′ are connected by a transverse tube, D′, (see Fig. 5,) which extends from one bearing to the other below the crank-shaft C^2.

To that part of the crank-shaft C^2 which passes through the chamber B is applied a fixed arm, *d*, which connects by a forked connecting-rod, *d′*, with a slide-valve, E, that moves over a perforated top plate or seat, E′, of a third chamber, B^3, which is formed by a transverse partition, A^2, that extends from the central partition, A′, to the side wall of the casing A. The valve E may be a common slide or other valve. I prefer, however, to use a cylindrical valve which turns in the bearings at the ends of the fork-shaped lever *d′*, to which and the top plate of the chamber B^3 a piece of rubber, *a*, is applied, of sufficient dimensions to close the openings in the top plate when the roller is moved toward the shaft, as shown clearly in Figs. 5 and 6. When the roller moves in the opposite direction the sheet of rubber is wrapped around the roller, so as to open the gas-admission holes in the top of the chamber B^3. The chamber B^3 is connected by a U-shaped pipe, F, with the space above the liquid in the inverted vessel C, as shown in Fig. 4, said U-shaped pipe being extended by a plugged branch pipe, F′, to the outside, so as to draw off any moisture which is collected in the U-shaped connecting-pipe F.

To the outer end of the crank-shaft C^2 is furthermore applied a fixed arm, *e*, from which

extends a fixed lever, e', from which is suspended an adjustable weight, e^2, which weight serves to balance the slide-valve E and the inverted vessel C, so as to render the latter more sensitive to the varying gas-pressures within the apparatus.

The operation of the regulator is as follows: The gas enters through the induction-pipe b into the chamber B, passes then through the perforations of the top plate of the chamber B^3 to the interior of the latter, and through the U-shaped connecting-pipe F to the interior of the inverted vessel C. According to the higher or lower degree of pressure of the gas passing out through the eduction-pipe b', the inverted vessel is raised or lowered, whereby, owing to the connection of the vessel by the crank-shaft C^2 with the slide-valve E, the valve-openings are made smaller or larger, and thereby the supply of gas is diminished or augmented as required.

The size of the regulator has to be in proportion to the larger or smaller quantity of gas used per hour. I have found by a series of practical tests that when the area of the inverted vessel is equal to twenty-five times the area of the cross-section of the induction-pipe a very exact and sensitive regulating action takes place.

The top of the casing A is provided with an opening, f, for supplying water to the chamber B', as the quantity of water needs replenishing from time to time. It is also provided with an air-inlet opening, f', in the top part of the chamber B'. The chamber B' is furthermore provided with a plugged pipe, f^2, in the end wall of the casing A, by which the height of the water-level in the chamber B' is regulated.

My improved gas-pressure regulator is adapted for gas-factories as well as for private use. When the regulator is of large size it is preferably made of cast-iron, in which case the gas induction and eduction pipes are preferably connected to the bottom of the casing A.

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

1. In a gas-pressure regulator, the combination of a gas-chamber provided with an induction-pipe, a smaller gas-chamber within the former, provided with an eduction-pipe and with inlet-openings communicating with the larger chamber, a water-chamber adjoining the gas-chamber, an inverted vessel within said water-chamber, a U-shaped pipe connecting the smaller gas-chamber and the interior of the inverted vessel, a valve for partially closing the inlet-openings of the smaller gas-chamber, and mechanism connecting said valve with the inverted vessel, whereby the latter actuates the former automatically in accordance with the pressure of the gas, substantially as set forth.

2. In a gas-pressure regulator, the combination of a gas-chamber provided with an induction-pipe, a smaller gas-chamber within the former, provided with an eduction-pipe and with inlet-openings communicating with the larger chamber, a water-chamber adjoining the gas-chambers, an inverted vessel within said water-chamber, a U-shaped pipe connecting the smaller gas-chamber and the interior of the inverted vessel, a double-crank shaft extending transversely through the adjoining gas and water chambers, arms rigidly connecting the inverted vessel with said crank-shaft, and a valve adapted to partially close the inlet-openings of the smaller gas-chamber, and connected by a rod with said crank-shaft, substantially as described.

3. In a gas-pressure regulator, the combination of the partitioned casing A, having gas-chambers B B^3 and a water-chamber, B', a slide-valve, E, on the top of the gas-chamber B^3, and an inverted vessel, C, arranged in the water-chamber B', the connecting-rods of the slide-valve and of the inverted vessel being attached to a double-crank shaft, C^2, and counterbalanced by an exterior weight, the journals of the crank-shaft C^2 being inclosed in mercury-sealed bearings D at the side wall and interior partition, so as to prevent the passage of gas into the water-chamber and the leakage of water, substantially as and for the purpose set forth.

In testimony that I claim the foregoing as my invention I have signed my name in presence of two subscribing witnesses.

FRANZ PIPERSBERG.

Witnesses:

CARL MARKMAN,

EDUARD KNEISE.