

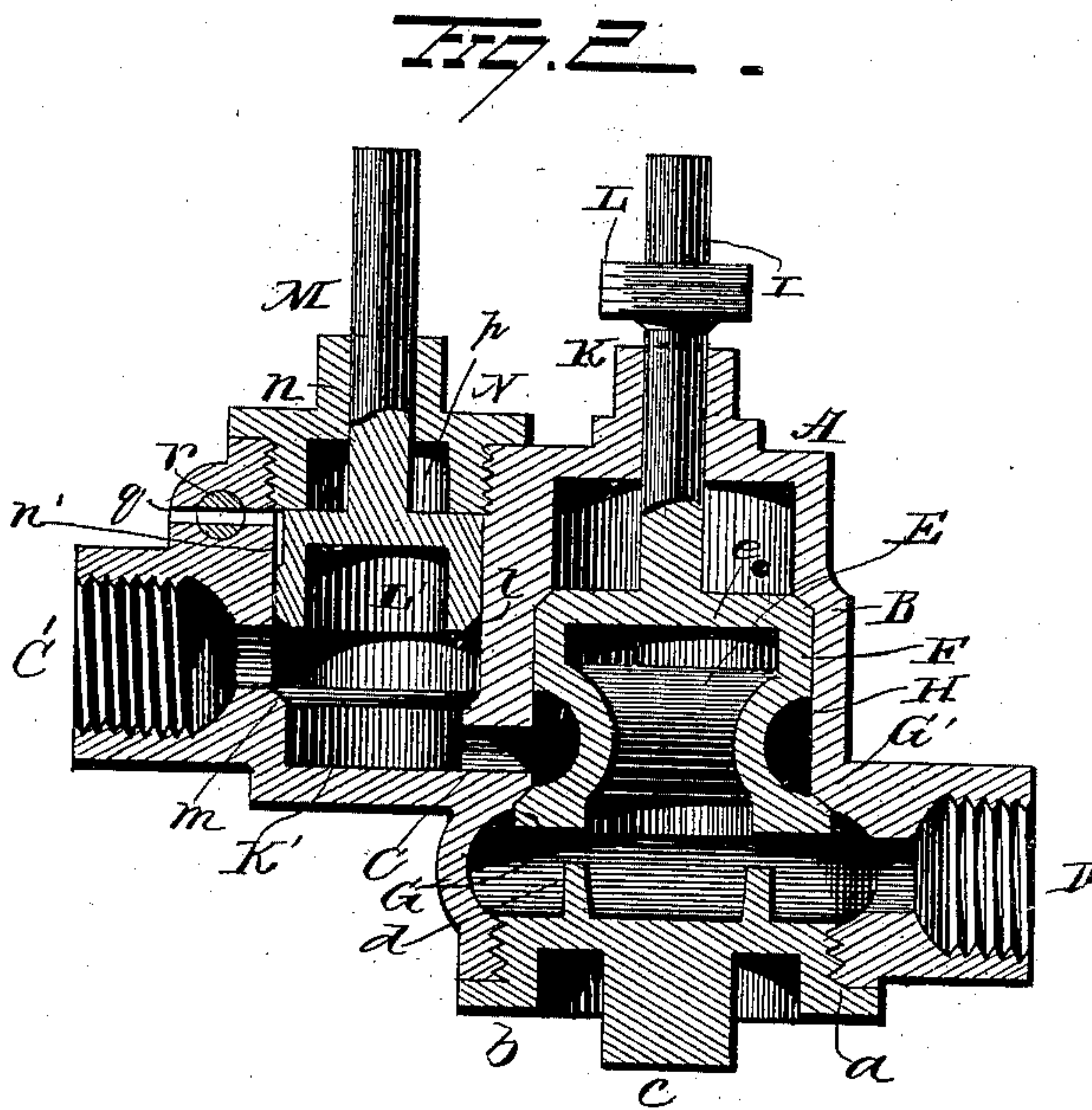
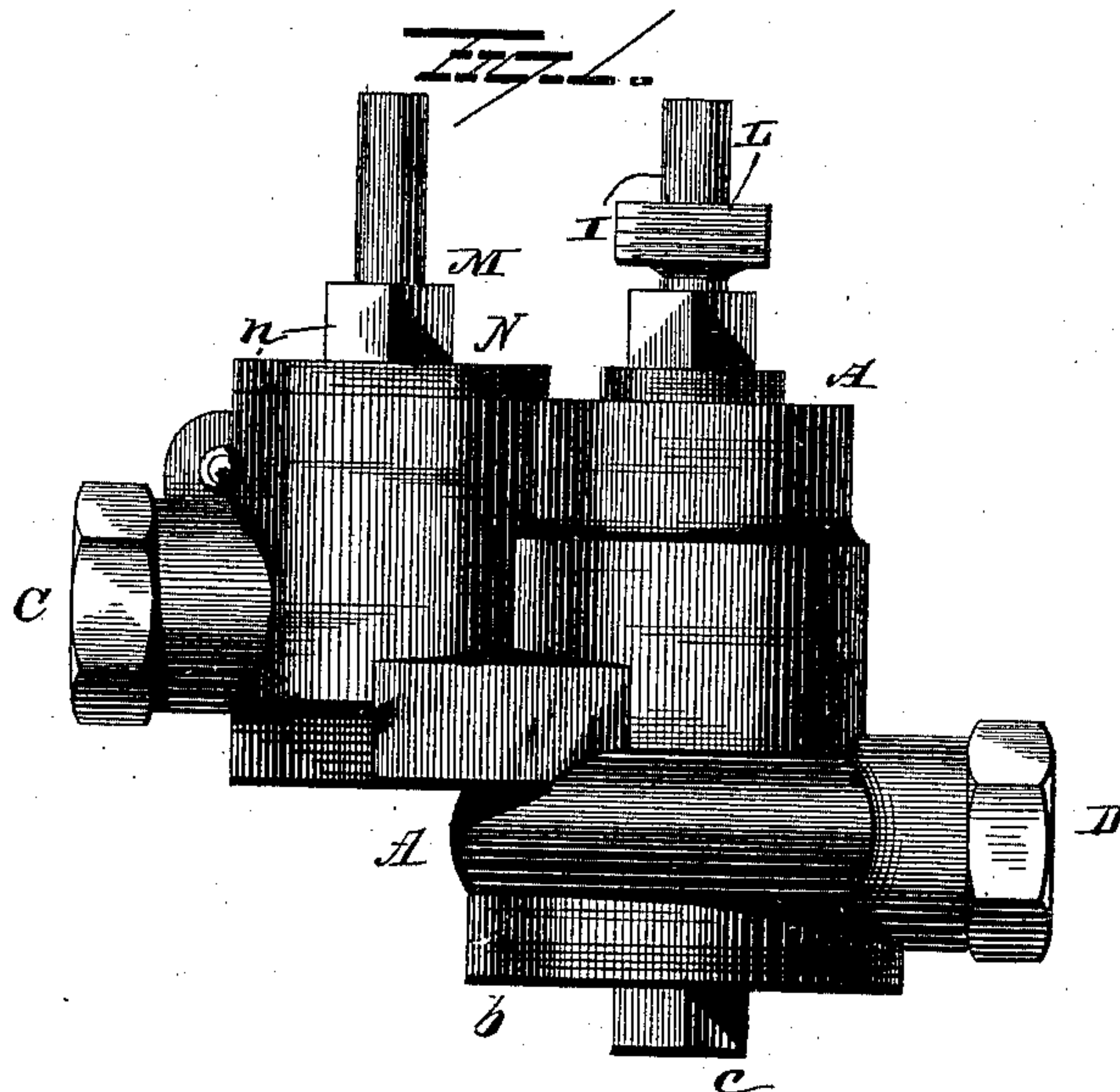
(No Model.)

A. G. HOHENSTEIN.

AUTOMATIC PRESSURE REGULATOR AND SAFETY VALVE.

No. 383,226.

Patented May 22, 1888.



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# UNITED STATES PATENT OFFICE.

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## AUTOMATIC PRESSURE-REGULATOR AND SAFETY-VALVE.

SPECIFICATION forming part of Letters Patent No. 383,226, dated May 22, 1888.

Application filed September 13, 1887. Serial No. 249,533. (No model.)

*To all whom it may concern:*

Be it known that I, ARCHIE G. HOHENSTEIN, of Brooklyn, in the county of Kings and State of New York, have invented certain  
5 new and useful Improvements in Automatic Pressure-Regulators and Safety-Valves; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to  
10 which it appertains to make and use the same.

My invention relates to an improvement in automatic pressure-regulators and safety-valves, the object being to provide a combined pressure-regulator and safety-valve which  
15 shall be capable of automatically controlling and reducing the high-pressure gas, steam, or water supply to any predetermined lower degree of service-pressure, and maintaining practically constant such lower degree of pressure  
20 in the service pipes or mains.

A further object is to provide an automatic pressure-regulator with an automatic safety-valve which will operate to shut off the supply of gas, water, or steam to the pressure-  
25 regulator whenever the pressure in the supply main or pipe falls below a predetermined amount, and prevent any further supply to the service mains or pipes until the safety-valve has been manually raised and reset.

30 With these ends in view my invention consists, first, in an automatic pressure-regulator, the combination, with a valve-casing having supply and exit passages or ports, of a balanced valve consisting of a hollow piston-valve constructed with an annular chamber  
35 in its periphery, within which the supply is received and the pressure is exerted in both directions to balance the valve, the lower end of the piston-valve being provided with a conical seat, which engages a correspondingly-  
40 formed seat on the valve-casing, and weights or a spring for adjusting the valve.

My invention further consists in the combination, with an automatic pressure-regulator,  
45 of an automatic safety-valve constructed and arranged to be held open by the pressure in the supply main or pipe, and to be automatically closed whenever the pressure is reduced to a predetermined amount.

50 The invention further consists in certain

other features of construction and combinations of parts, as will be hereinafter described, and pointed out in the claims.

In the accompanying drawings, Figure 1 is a view in side elevation of my improvement, 55 and Fig. 2 is a longitudinal vertical section of the same.

A is the pressure-regulator and valve-casing, which are preferably made of a single casting. 60

B is the cylinder of the pressure-regulator, which is bored out and finished through the opening in the lower part of the casing, which is screw-threaded at *a* and has a removable cap, *b*, screwed therein. This cap is provided 65 with an extension, *c*, which is of angular shape in cross-section for the attachment of a wrench for removing or replacing it; also, it has cast thereon on its upper face the projections *d*, which serve to limit the downward movement 70 of the regulator-valve.

Cylinder B is provided with an inlet-port, C, which is located nearly midway between its upper and lower end, and with an outlet-port, D, which is situated at its lower end. 75

Within cylinder B is located the balanced valve E, which is made from a single hollow casting, the upper end, F, of which constitutes a piston-valve and snugly fits within that portion of the cylinder which is situated above 80 the inlet-port C. The lower end of the balanced valve is provided with a conical valve, G, which seats upwardly against a conical seat, G', formed on the under side of a ledge on the valve-casing. Between the piston-valve F and 85 conical valve G is formed an annular chamber, H, into which gas, steam, or water enters from the inlet-port C and exerts its pressure upwardly against the lower end of the piston-valve and downwardly upon the upper face of 90 the conical valve, and as the areas of the two pistons are equal the valve is balanced by the supply-pressure. Back-pressure from the outlet-port enters the interior of the balanced valve and exerts an upward pressure against 95 its closed upper end, *e*.

A stem, I, is constructed integral with or is made separate from and connected with the balanced valve, and extends upwardly through a suitable stuffing-box, K, in the valve-casing. 100



Suitable weights, L, are secured to the outwardly-projecting end of the stem, (or a spring may be used in lieu of weights,) which exert a downward force on the balanced valve, the weight applied to the valve-stem being of such an amount as will insure a predetermined degree of pressure in the service main or pipe.

In explaining the operation of my improvement as thus far described I will assume that it is used as an automatic gas-pressure regulator, as it is specially adapted and valuable for such use. Natural gas at high pressure enters the inlet-port C and flows into the annular chamber around the valve, and serves to balance the valve by exerting an equal pressure upwardly against the piston-valve and downwardly against the conical valve; hence the valve E, balanced as it is, is not affected by the high-pressure supply, and is free to be sensitively affected and adjusted by variations of pressure in the service main or pipe. The weights on the stem of the balanced valve, together with the weight of the valve and stem, serve to force it downwardly and allow the gas to flow from the supply inlet or port past the conical valve and outwardly through the exit-port to the service pipes or main. Whenever the pressure of gas in the service-pipe exceeds a predetermined amount, which amount is indicated by the weight on the stem of the valve, the back-pressure or the excess of pressure so caused will exert itself within the interior of the hollow balanced valve and against its closed upper end and overcome the downward force of the weight, thereby raising the valve to its seat and shutting off the supply of gas to the service-pipe. The valve will remain in this closed position until the pressure in the service-pipe has fallen to or below the desired or the predetermined service-pressure, when the valve will drop and allow gas to again enter the service-pipes. In this manner the pressure in the service-pipe is automatically regulated and controlled and maintained uniform at any predetermined degree of pressure, and this is effected by a device of exceeding simplicity in its construction, and which is not liable to get out of order in its operation. Whenever it is desired to clean the valve, it may be quickly done by removing the cap, taking the valve out and cleaning it, and then replacing it again and fastening the cap in place.

I will now proceed to describe another important feature of my invention, which consists in a safety-valve in combination with the pressure-regulator.

K' is a supplemental cylinder located beside the pressure-regulator cylinder and communicating therewith by the port C, while the cylinder communicates with the safety main or pipe by the port C'. Within cylinder K' is placed a piston-valve, L', which is provided on its lower end with a conical face, l, which seats upon the conical valve-seat m, formed on the valve-casing. A stem, M, is formed as a

part of the valve L, or is connected therewith and extends upwardly through the stuffing-box n, attached to the removable cap N. In the periphery of the valve is formed a port or channel, n', which is cut off from communication with the inlet-port C' when the valve is in its raised and opened position, but which when the valve is closed and on its seat forms a communication between the inlet-port and the space p in the cylinder above the valve. A passage-way, q, is formed in the upper part of the valve-casing and establishes a communication between the interior of the upper portion of valve-cylinder and the outside of the casing. A cock or valve, r, is employed for opening and closing this passage. When the pressure in the supply-main is normal, it will retain the safety-valve in its raised and open position and allow the gas to flow to and through the pressure-regulator to the service pipe or main. In the event that the pressure in the supply-main should be cut off or for any reason should cease for an instant the flame at the different burners on the service mains or pipes would be instantly extinguished. Now, in the event that the pressure of gas in the main should return, in whole or in part, gas would flow into the service-mains and escape from the different burners connected therewith into rooms, closed perhaps, rendering disastrous results from explosions exceedingly liable, as experience has already demonstrated, unless some provision be made for automatically shutting off the supply to the service-pipes in such an emergency. In my improvement, whenever the pressure in the supply-main falls below a predetermined amount, the safety-valve drops and instantly establishes a passage-way for the flow of gas into the cylinder above the valve, thereby insuring a downward pressure on the safety-valve, which causes it to snugly engage its seat and prevent any leakage of gas past it into the regulator and service-mains. In order to again raise the valve, the cock r must be first opened to relieve the pressure from the upper side of the valve and allow it to be raised by hand. It will thus be seen that by providing the pressure-regulator with my improved safety-valve I obviate all danger of explosions due to a leakage or escape of gas from the burners caused in the manner described.

It is evident that many slight changes in the construction and relative arrangement of parts might be resorted to without departing from the spirit or scope of my invention, and hence I would have it understood that I do not restrict myself to the particular construction and arrangement of parts shown and described; but,

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

1. The combination, with a balanced valve adapted to move away from its seat by its



gravity, of a safety-valve located between the supply-pipe and balanced valve, and constructed and arranged to automatically shut off the supply of gas to the balanced valve 5 when the pressure in the supply main or pipe falls below a predetermined amount and remain closed until opened manually, substantially as set forth.

2. The combination, with a gas main or pipe, 10 of a safety-valve constructed to be upheld by the pressure of gas in the main, said valve being provided with suitable passage or port to convey gas to the upper ends of the valve to hold it against its seat when the valve is closed, 15 substantially as set forth.

3. The combination, with a valve-chamber having inlet and outlet ports, and a balanced valve adapted to move away from its seat by its gravity, and having a conical valve at one 20 end and an annular chamber at a point above said conical valve, the said annular chamber adapted to register with the inlet-port, of a safety-valve interposed between the supply-pipe and inlet-port to balanced valve and

adapted to automatically shut off the supply 25 of gas to the balanced valve when the pressure in the supply main or pipe falls below a predetermined amount and remain closed until opened manually, substantially as set forth.

4. The combination, with a single casting 30 having two communicating cylinders, of a balanced valve located in one of said cylinders and adapted to move away from its seat by gravity, and a safety-valve located within the other cylinder and between the supply-pipe 35 and balanced valve, and constructed and arranged to automatically shut off the supply of gas to the balanced valve when the pressure in the supply main or pipe falls below a predetermined amount, substantially as set forth. 40

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

ARCHIE G. HOHENSTEIN.

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