J. C. HAGAN.

HYDRANT AND PRESSURE REGULATOR.

No. 108,904. Patented Nov. 1, 1870.

FIG. 1

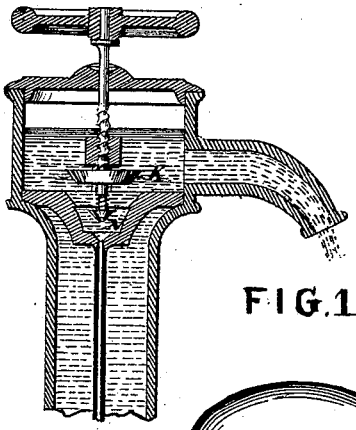
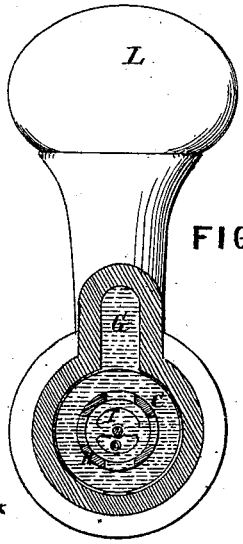


FIG. 3.



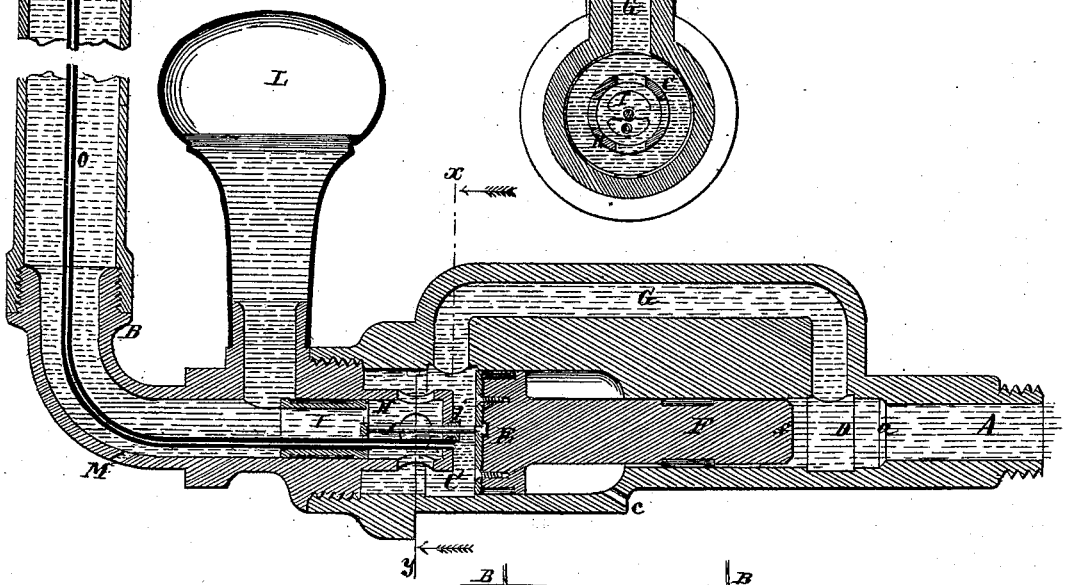


FIG. 4.

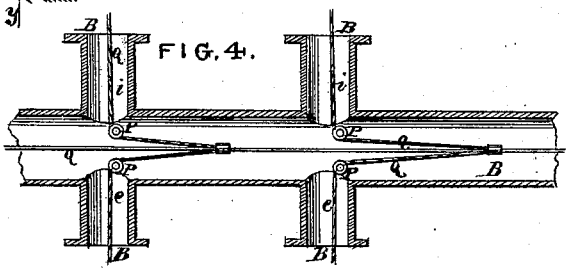


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FIG. 2.



WITNESSES

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# United States Patent Office.

JOHN C. HAGAN, OF NASHVILLE, TENNESSEE.

Letters Patent No. 108,904, dated November 1, 1870.

## IMPROVEMENT IN PRESSURE-REGULATORS FOR WATER AND STEAM APPARATUS.

The Schedule referred to in these Letters Patent and making part of the same.

I, JOHN C. HAGAN, of Nashville, in the county of Davidson and State of Tennessee, have invented certain new and useful Improvements in Cocks and Pressure-Regulators for Water and Steam Apparatus, of which the following is a specification.

### *Nature and Objects of the Invention.*

My invention consists—

First, in a device by which, on the closure of a discharge-cock or valve, the pressure of fluid will be automatically cut off from said cock or valve, or from the pipe to which it is attached.

This I effect by means of a piston carrying a stem, the end of which closes as a valve on a seat to which it is fitted.

A passage is provided to carry the fluid around the chamber in which the piston and its stem work, and into contact with the face of the piston, so that, while the discharge continues, the port will remain open; but when the discharge is stopped, the pressure upon the valve being overcome by the same pressure applied in the opposite direction to the much larger area of the piston, the valve will be instantly closed, and will so remain until the piston is again relieved of pressure by the opening of the discharge-cock.

Second, I apply in front of the piston, and connected therewith, a second valve, which, when the piston is closed, will cut off communication between the chamber or cylinder in which the first-named piston and valve work and the chamber in which the discharge-cock is applied, or any desirable length of service-pipes connected with such chamber. By this means I am enabled to relieve the service-pipes entirely from "dead pressure," or from any pressure whatever, except during the period of discharge.

In the case of a hydrant I can thus use at any proper point a common drip or waste-way, to empty the said hydrant when the discharge is closed; and in the case of a try-cock or gauge-cock for boilers, or in many other forms of steam-cocks to which my invention is equally applicable, I can provide similar means for emptying the said steam-cock, and thus prevent any accumulation of sediment, which is a well-known and fruitful cause of the destruction of such cocks and valves.

Third, the first escape of fluid from the chamber of the automatic piston-valve, which escape is necessary to permit the opening of said valve, may be provided for either by opening a small valve in the head of the secondary valve-chamber through the medium of a wire or wire-cord attached to the discharge-faucet, so as to be pulled by the opening of said faucet and released by closing it; or the communication may be made through a small tube opening through the head of the secondary valve-chamber, extending to a point near the discharge-cock, and there guarded by a valve attached to the said cock, or otherwise arranged, so as to be opened by the opening of the latter, or it may be operated independently.

The device last referred to for this purpose may be found best adapted for steam apparatus, and the former for water, but each may be successfully used with either fluid.

In order that my invention may be more fully and clearly understood, I will proceed to describe a mode of applying it to hydrants. Its applicability to other water apparatus and to steam-pipes and cocks will clearly appear in the sequel.

### *Description of the Accompanying Drawing.*

Figure 1 is a longitudinal section of the apparatus applied as a hydrant and pressure-regulator therefor. This shows the hydrant open, and represents the tubular connection between the cock and the chamber of the automatic valve.

Figure 2 is a section in the same plane, showing the hydrant closed, and representing a cord connecting the cock with a spring-valve in the secondary valve-chamber.

Figure 3 is a transverse section in the planes indicated by the lines *x y*, fig. 1.

Figure 4 is a sectional view, illustrating a mode of applying a portion of my invention to branch pipes, as hereinafter explained.

### *General Description.*

A may represent a branch of a main or service-pipe, adapted to withstand any necessary amount of pressure.

B may represent a service-pipe connected with a hydrant, or with a simple faucet or other outlet.

In order to protect the service-pipe B and any of the pipes within a building from too great or continuous pressure, I introduce between A and B a compound valve-chamber, C D, formed with two cylinders of unequal diameter.

A piston, E, fits within the larger cylinder C, and a stem, F, formed in one piece with or securely attached to the said piston, fits and fills the smaller cylinder D.

Elastic rings, *e e*, or other convenient and common means may be employed to pack the piston E and stem F, and make them water or steam-tight within their respective cylinders.

The end *f* of the stem F is ground in conical or taper shape to form a valve, and is fitted to a seat, *a*, in the pipe A.

A port or passage, G, extends from one end to the other of the chamber D C, so as to afford, when the

valve is open, as shown in fig. 1, free communication of water from the space behind the valve *f* to the space in front of the piston E.

H is a secondary valve-chamber, within which works a hollow cylindrical valve, I, connected with the piston E by a rod, J, working through a stuffing-box, *j*.

K is the discharge-cock of the hydrant, which may be of any proper form.

L represents an air-chamber, which may be used, if desired; but this is not regarded as essential to the successful working of the apparatus, owing to the cavity behind the piston in the cylinder C, which communicates with the atmosphere through any required number of apertures, *c*. The play of the piston itself thus prevents the possibility of any concussion within the service-pipes.

M represents a drip-aperture. This or any other well-known expedient may be employed, either with or without waste, to empty the upper part of the hydrant whenever the discharge-cock K and valve *f* are closed.

A small valve, N or N′, is provided to open a communication through the secondary valve-chamber H when it is desired to permit the movement of the piston E and consequent opening of the valve *f*.

The valve N may be seated at the outer end of a tube, O, communicating with the interior of the cylinder C, as shown in fig. 1, the said valve being operated either by connection with the cock K, or independently thereof.

Or, if preferred, a valve, N′, may be seated in the head of the valve-chamber H, the said valve being held to its seat by a spiral spring, as shown in fig. 2, and retracted by a wire or wire-cord, Q, passing around a pulley, P, at each elbow or bend of the pipe, and either attached to the discharge-cock K or operated independently thereof, as preferred.

Fig. 4 shows how any number of these wires or cords may be connected in branching pipes, so that a single automatic piston-valve, E F *f*, may be controlled—*i. e.*, permitted to open—by any one of any number of discharge-cocks.

A similar arrangement of the tubes O may be provided when the said tubes are employed.

*Operation.*

The parts being in the closed condition represented in fig. 2, if it is desired to make the water flow, the cock K and valve N or N′ are opened, permitting water to escape from the chamber in front of the piston E. The said piston being thus relieved of pressure, is moved forward, with the stem F, by the pressure of water in the pipe A against the valve *f*. The ports of the valves *f* and I are thus opened simultaneously, permitting a free flow of water through the apparatus from the mains and pipe A.

It will be apparent that whichever of the branch wires Q Q is drawn on to open the valve N′, or whichever branch of the tubes O may be opened by the lifting of its valve N, the effect will be the same upon the piston E, and the opening of the valve *f* will follow, causing the filling of as many of the service-branches B B as the regulator E F G may be employed to control. Any other cocks being opened while the first is flowing, will operate precisely as if they only were opened at the time, so that the opening or closing of any cock, or any number together, does not affect the others.

Whenever all the cocks are closed so that the flow stops, the reaction of the water against the face of the piston E, overcoming the pressure against the smaller area of the valve *f*, forces said valve back upon its seat, and at the same time the valve H is drawn back so as to close its ports in the chamber I. The pressure is thus cut off from the service-pipes B B, and in the case of the hydrant shown in figs. 1 and 2, the water may be allowed to pass out or below the level of the ground, as before explained.

When the apparatus is used simply as a pressure-regulator, the valve and chamber H I and the valve N or N′ and its connections may be entirely dispensed with.

The piston-valve E F will then open whenever the discharge-cock is opened, and close when the latter is closed, and will at all times automatically reduce the pressure in the service-pipes B in relation to that in the pipe A in the inverse ratio of the areas of the piston E and valve *f*.

*Claims.*

I claim as my invention—

1. The automatic pressure-regulator E F G, adapted to operate substantially as herein set forth.

2. The combination of the secondary valve I with the compound piston-valve E F, substantially as and for the purposes explained.

3. The combination of a minute valve, N or N′, operated either with or without the branch connections O or Q, in combination with the combined piston-valve E F, for permitting the latter to open in the manner described.

4. The valve N′, of any required size, when operated by wires Q, substantially as herein explained.

JOHN C. HAGAN.

Witnesses:

OCTAVIUS KNIGHT,
H. C. ELLIOTT.