(No Model.)

F. M. LIVINGSTON.

PRESSURE REGULATOR.

No. 357,720. Patented Feb. 15, 1887.

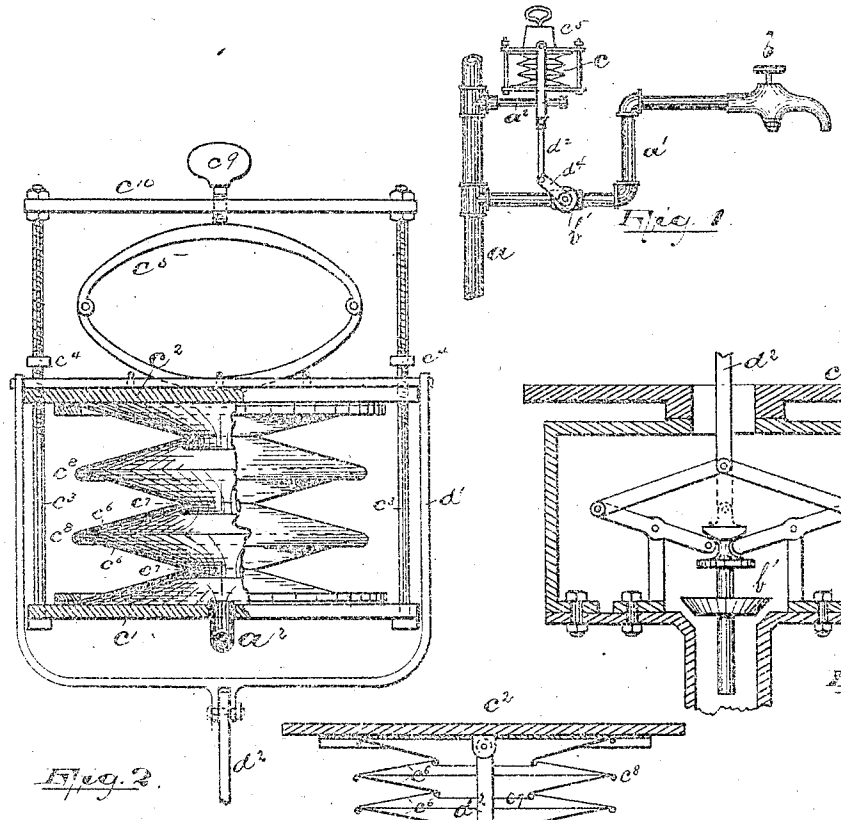


Fig. 1.

Fig. 2.

Fig. 3.

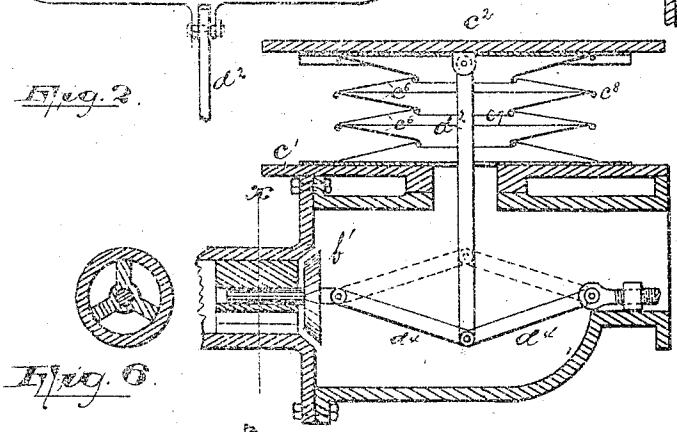


Fig. 4.

Fig. 6.

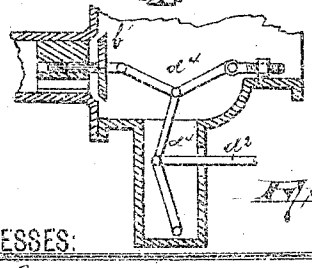


Fig. 5.

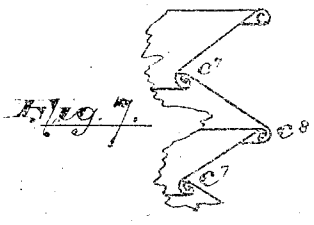


Fig. 7.

WITNESSES:

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UNITED STATES PATENT OFFICE.

FRANCIS M. LIVINGSTON, OF NEWARK, NEW JERSEY.

PRESSURE-REGULATOR.

SPECIFICATION forming part of Letters Patent No. 367,720, dated February 15, 1887.

Application filed April 28, 1886. Serial No. 200,431. (No model.)

To all whom it may concern:

Be it known that I, FRANCIS MORTON LIVINGSTON, a citizen of the United States, residing at Newark, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Pressure-Regulators for Water and Gas Supply Pipes; 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 which it appertains to make and use the same, reference being had to the accompanying drawings, and to letters of reference marked thereon, which form a part of this specification.

The object of this invention is to regulate or modify the pressure of water or gas in supply-pipes so that it will not pass from the open faucet or cock with excessive force, to maintain a more uniform pressure in adjacent pipes, and in some instances to secure a differential pressure in the same pipe.

The invention consists in the arrangements and combinations of parts, general and specific, substantially as will be hereinafter set forth, and finally embodied in the clauses of the claim.

Referring to the accompanying drawings, in which like letters indicate corresponding parts in each of the several figures, Figure 1 is a view in side elevation, showing the relation of the faucet, supply or stand pipe, and the regulating mechanism. Fig. 2 is a sectional view of a bellows-like structure by means of which a regulating-valve is operated automatically. Fig. 3 is a view illustrating a valve which is connected to the said bellows-like structure by means of intervening levers arranged in the same box or pipe with said pipe, and by means of which the said valve is held partly closed against a great pressure. Figs. 4 and 5 illustrate modifications in the arrangement of the levers. Fig. 6 is a sectional view taken through line *x*, and Fig. 7 illustrates more fully one preferred construction of an inflatable or expansible bellows.

In said drawings, *a* indicates a stand-pipe adapted to connect two or more faucets arranged on the corresponding floors of a building.

b indicates one of said faucets connected to said stand-pipe by means of a pipe, *a'*. A little above the said pipe *a'* is a second pipe, *a²*, which connects with a bellows-like device, *c*, preferably entering the bottom thereof, as shown in Fig. 2, the water entering directly into the chamber formed by the plates, so that the necessity for a second water-tight outer casing is avoided, and the cost of the device is materially reduced. Said bottom consists preferably of a fixed bottom plate, *c'*, arranged in or on the wall of the house, or in any other suitable position, and between it and a movable top plate, *c²*, is arranged the inflatable or expansible parts, which consist preferably of a series of centrally-perforated annular plates, *c³ c³*, which are united at their inner and outer edges in the alternate manner shown more clearly in Figs. 2, 4, and 7. The joints *c⁴ c⁵* are preferably formed by turning the edges as in Fig. 7, and soldering the parts securely together, so that there will be no movement of one part on the other, the inflation of the bellows being obtained by means of the spring action of the plates, as will be understood.

I am aware that in the Patent No. 82,276, of September 22, 1868, a regulator is illustrated showing annular plates riveted together to form a bellows, the joints being packed with rubber to secure a tight joint. By the construction above described the use of rubber, to which objections may be urged, is avoided and a more perfect and durable joint is obtained.

The movable plate *c²* is connected to a rod or rods, *d' d²*, properly hinged or linked together and to said movable plate, whereby the latter may be moved under the influence of the water without being turned or tilted under the influence of the connecting-rods. Said rods *d' d²* are connected to a lever or series of levers, *d*, arranged either on the outside of the pipe or a suitable box thereof, or within said pipe or box, both methods or arrangements being shown, so that as said plate *c²* moves under the expanding influence of the water the valve *b'* will be actuated either to more fully open the same, to allow an increased or more free flow of water, or to partially or wholly close the valve, and thus limit the flow.

The movement of the plate *c²* is guided or controlled by the guide-rods *c⁶*, and limited by nuts or other suitable stops, *c⁷*, and the movement of the movable plate is controlled by

means of a spring or springs, c^5, or an equivalent means, such as a weight (Shown in Fig. 1.) When the spring is employed the stress of the same may be controlled by a set-screw, c^9, carried in suitable bearings, c^{10}.

In operating the device, the water entering the expansible receptacle under pressure causes the same to move to the rod d^2, lever d^4, and operate the valve b'.

It is evident that many variations other than those shown can be made in the construction of the device; and I do not, therefore, wish to be understood as limiting myself by any positive statements in the descriptions. The device may also be employed in the process of regulating the pressure of gas.

What I claim as new is—

1. In a pressure-regulating device, the combination, with the stand-pipe a, pipe a', faucet b, and a valve for limiting the flow of water to said faucet, of an expansible receptacle, c, communicating with the stand-pipe and connected with and adapted to actuate the said valve to automatically limit or control the flow of water to said faucet, substantially as herein set forth.

2. In a pressure-regulating device, the combination of bottom and top plates, one of which is movable, annular plates alternately connected at their edges and forming with said bottom and top plates a chamber to receive the liquid under pressure, a pipe or duct to lead the water into said chamber, a valve, and linked or pivoted rods connecting said valve and movable plate, substantially as set forth.

3. In combination, the pipes a a' a^2, one of which is provided with a regulating-valve, a fixed and movable plate and an intermediate bellows-like structure, and a connecting-rod connecting said movable plate with said valve, substantially as set forth.

4. In combination, the bottom and top plates, c' c^2, the annular plates c^6, united at their edges alternately, as shown, the pipe a^2, leading into the chamber formod by said annular plates, the guides c^3, rods d' d^2, and lever d^4, for operating the valve, all said parts being arranged and operating in combination, substantially as and for the purposes set forth.

In testimony that I claim the foregoing I have hereunto set my hand this 24th day of April, 1886.

FRANCIS M. LIVINGSTON.

Witnesses:
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