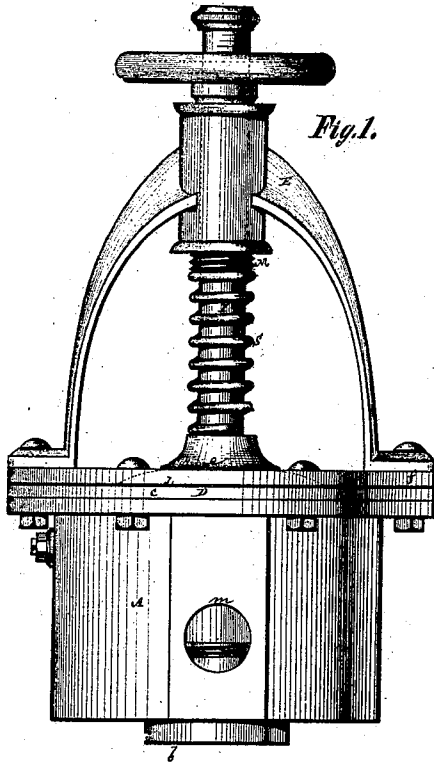


*M. C. Locke,*

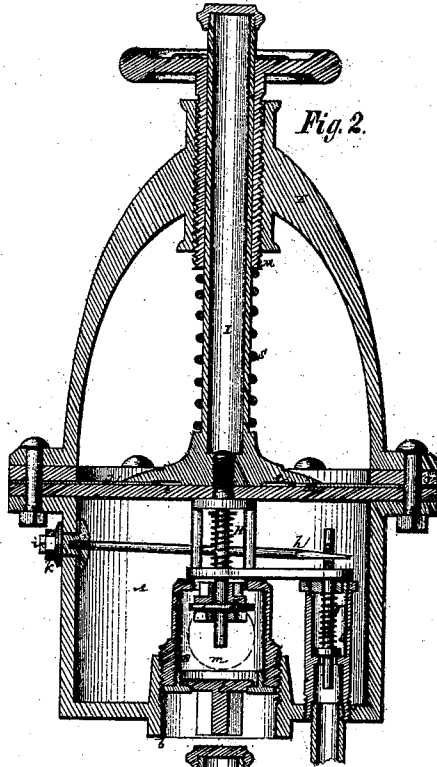
*Governer Valve.*

*No. 113,069.*

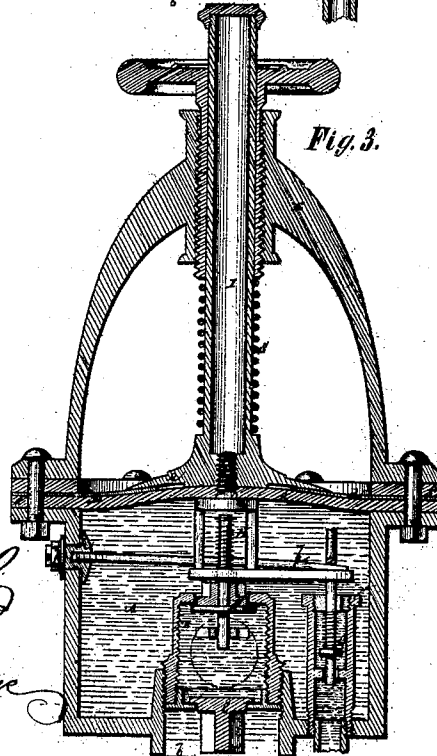
*Patented Mar. 28, 1871.*



*Fig. 1.*



*Fig. 2.*



*Fig. 3.*

*Witnesses:*  
*Fred. Haynes*  
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# UNITED STATES PATENT OFFICE.

NATHANIEL C. LOCKE, OF SALEM, MASSACHUSETTS.

## IMPROVEMENT IN STEAM AND WATER PRESSURE REGULATORS.

Specification forming part of Letters Patent No. **113,069**, dated March 28, 1871.

*To all whom it may concern:*

Be it known that I, NATHANIEL C. LOCKE, of Salem, in the county of Essex and State of Massachusetts, have invented certain new and useful Improvements in Steam and Water Pressure Regulators, of which the following is a full, clear, and exact description, reference being had to the accompanying drawing, forming part of this specification, and in which—

Figure 1 represents an elevation of a pressure-regulator constructed in accordance with my invention; and Figs. 2 and 3, vertical sections of the same, with certain of the valves and working parts in different portions.

Similar letters of reference indicate corresponding parts.

This invention, while applicable to pressure-regulators irrespective of the nature of the fluid which may pass through them, is mainly designed to be used for regulating the supply, at a reduced and uniform pressure, of steam and water, but more particularly the latter, as in the case of water supplied from street-mains to the interior of buildings for various purposes, and in which it is an object to keep the pressure of said supply lower than it is in the main.

The improvements comprised by this invention on such regulators consist, first, in a combination, with the supply-valve of the receiver, and loaded diaphragm or piston controlling the same, of an independent safety or relief valve, and an elastic connection or device interposed between said diaphragm and supply-valve, for the operation of the safety-valve through the instrumentality of the diaphragm, said safety-valve providing against excess of pressure within the receiver by leakage through the supply-valve.

The invention also includes a combination of such relief-valve and elastic connection with a check-valve, C, supply-valve, the loaded diaphragm, and receiver, whereby a more complete action is obtained for the regulator.

The invention likewise embraces an arrangement, within the receiver, of the safety-valve, adjustable from the exterior, thereby providing for the immediate relief of the receiver under a variable or any desired fixed excess of pressure.

Furthermore, the invention comprises a pe-

culiar and flexible construction of the diaphragm in part of rubber or other like material and in part of sheet metal, for the better protection of the diaphragm and to prevent leakage through it; likewise a combination of an adjusting box or nut with a graduated stem and spring, for varying the load on the diaphragm.

Referring to the accompanying drawing, A represents the receiver of a water-pressure regulator, designed to be connected with a street-main, and to which *b* is the inlet. Said inlet communicates with a valve-box, B, which is fitted with a check-valve, C, to prevent return of water to the main or emptying and possible collapse of the pipes and their attachments in the building when flooding or drawing off the water from the main, which device has been made the subject of a previous application for patent by me. The valve-box B is also provided above the check-valve with a supply-valve, F, opening downward or against the current through the valve-box, and which is opened and closed by the action of the loaded piston or diaphragm D of the regulator, accordingly as the pressure of the water is increased or diminished on the diaphragm. This diaphragm D it is preferred to construct, in part, of a sheet or disk, *c*, of rubber or other like material, and in part of sheet metal, *d*, which latter is applied as a covering to the rubber to protect it from injury and to seal the rubber against leakage, said sheet metal working in common with the rubber, and being clamped internally or at its center by a base-piece, *e*, on the rising-and-falling stem I, and externally by a ring, *f*, which establishes the joint of the diaphragm with the receiver.

S is the spring by which the diaphragm D is loaded to its required pressure. Said spring is coiled around the stem I, and acts upon the diaphragm to keep it down, by its arrangement between the base-piece *e* and an adjusting nut or box, M, which fits, by a screw-thread on its exterior, through a frame, E, made fast to the receiver. The stem I is fitted to slide up and down through this adjusting-box M, and is graduated or marked with figures denoting different pressures, as seen in Fig. 1, so that by turning the box M to the right or left the spring S is more or less compressed,

and is made to act with a force on the diaphragm D, corresponding to the indicating-marks on the stem, as either one of them is brought in line with the upper surface of the box, or with a pointer thereon. Such devices form a simple means for varying the action of the pressure-regulator to shut off the supply to it at any desired or given pressure.

The stem I is connected with the supply-valve F, to enable the diaphragm D to control it, by a yielding connection, H, interposed between said valve and the diaphragm, said connection consisting of a yoke carried by or attached to the stem, and in gear with the supply-valve through a spring wound around the valve-stem, which latter is free to slide through the yoke.

By the use of such an interposed elastic connection I make the diaphragm D not only control in an easy manner the supply-valve F, but also cause it to operate a safety or relief valve, G, arranged within the receiver, and which provides for the escape of surplus water produced by leakage through the valves C and F, when closed, which surplus water, by adding to the pressure in the receiver, would, in course of time, neutralize the action of the regulator, as regards its maintaining a lower pressure than that of the water in the main. Thus the yoke of the yielding connection H, when the regulator is working in the regular manner, lifts on the supply-valve F, to close it by the action of the water on the under side of the diaphragm, till the requisite pressure has been reached in the receiver, after which, should there be any further accumulation of water in the receiver, and a consequent increase by pressure by leakage of water from the main through the closed valve F, then the yoke of the yielding connection H is lifted against the pressure of its spring, and, in thus being lifted independently of the valve F, operates upon the safety-valve G to open it and allow of the surplus water passing off. This safety or relief valve G is kept closed by a spring, *g*, and is opened by the yoke of the yielding connection H being made to lift upon an elastic wedge, *h*, fitting through a slot in the stem of the safety-valve, and adjustable from the ex-

terior of the receiver by a screw-box, *i*, on which may be screwed a locking-nut, *k*, the turning of the screw-box *i* when the locking-nut *k* is slackened serving to project the elastic wedge *h* more or less through the slot in the stem of the valve G, whereby the timely action of said valve relatively to the diaphragm to give speedier or tardier relief may be varied.

By thus providing for the adjustment of the safety-valve from the outside of the receiver, the breaking of the diaphragm-joint to effect adjustment of the valve is avoided.

The receiver A may have any number of outlets, *m*, by which the fluid under a uniform and reduced pressure is taken or supplied to the pipes.

What is here claimed, and desired to be secured by Letters Patent, is—

1. The combination, with the supply-valve of the receiver and loaded diaphragm controlling the same, of an independent safety or relief valve and an elastic connection or device interposed between the diaphragm and supply-valve, for operation of said safety-valve, substantially as specified.

2. The combination of the check-valve C, the supply-valve F, the receiver A, the loaded diaphragm D, the relief-valve G, and the yielding connection H, essentially as herein set forth.

3. The combination with and arrangement within the receiver A of the safety or relief valve G, operated by the yoke of the yielding connection H, substantially as specified.

4. The diaphragm D, composed in part of rubber and in part of sheet metal, for operation in combination with or as applied to a water-pressure regulator, essentially as described.

5. The combination of the adjusting nut or box M with the graduated stem I, the spring S, and diaphragm D of the regulator, substantially as specified.

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Witnesses:

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S. LINCOLN, Jr.