A. MAYER.

Automatic Relief-Valves for Steam Fire-Engines.

No. 135,437. Patented Feb. 4, 1873.

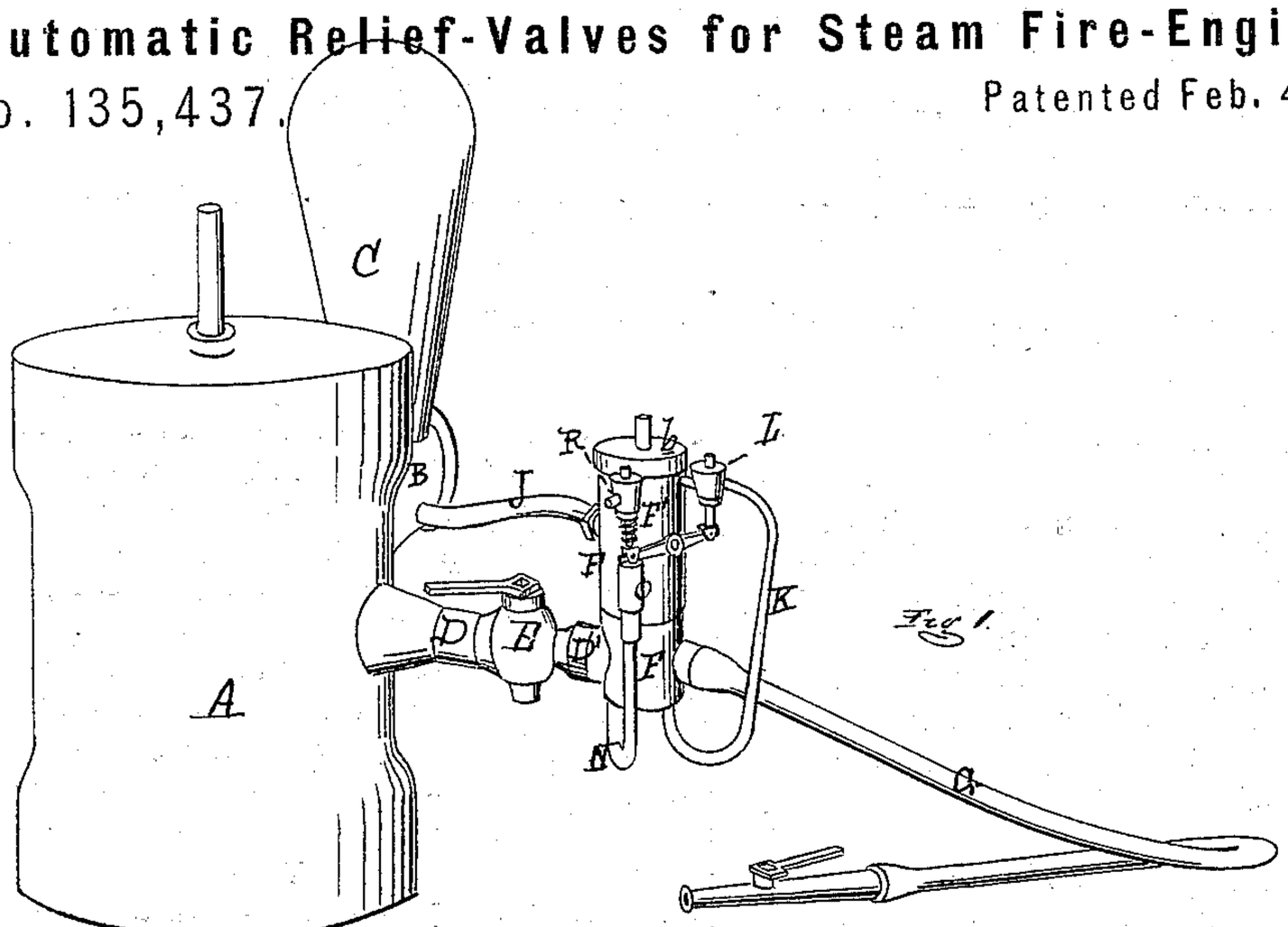

Fig 1.

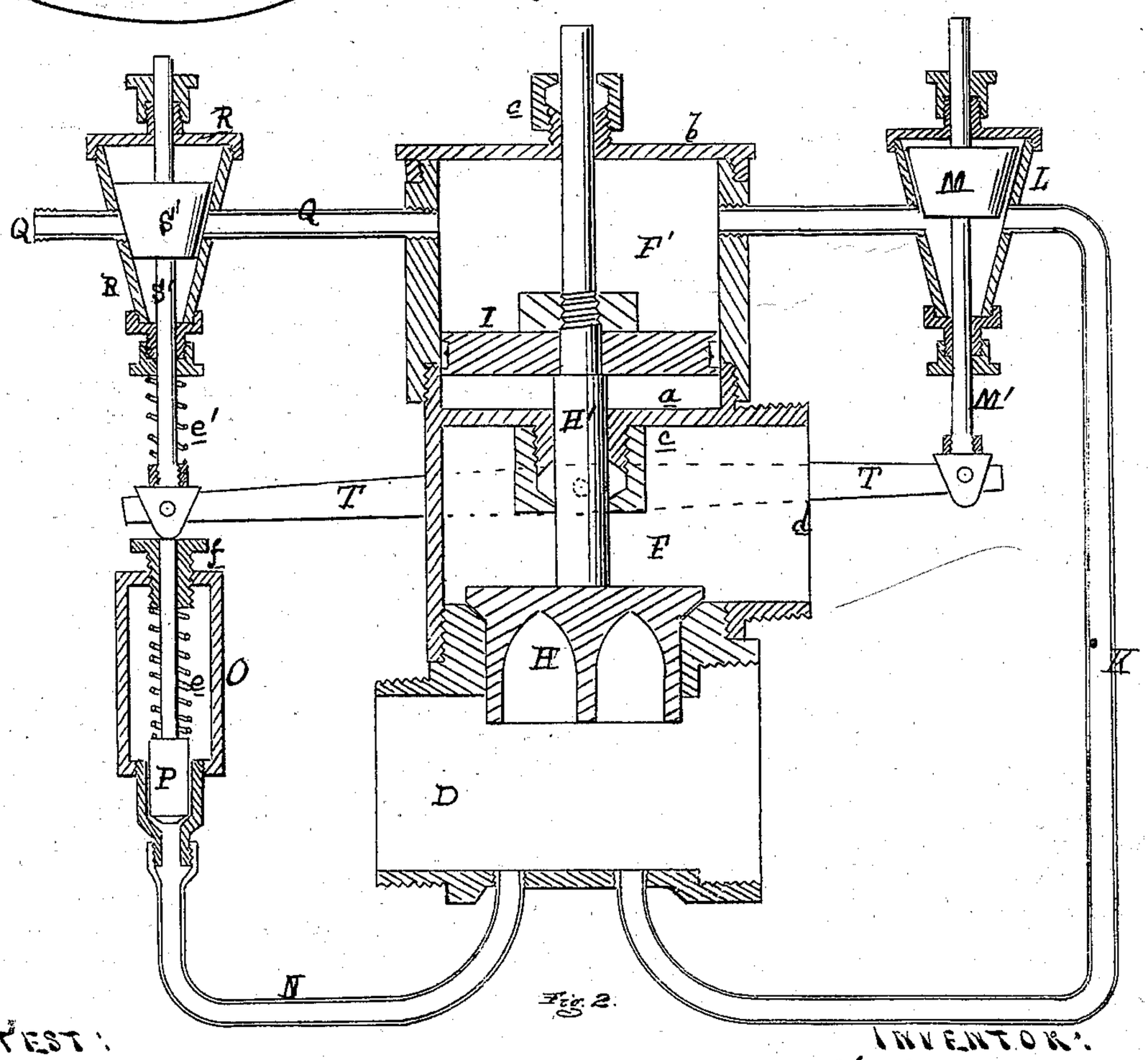

Fig 2.

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ALVARADO MAYER, OF DETROIT, MICHIGAN.

IMPROVEMENT IN AUTOMATIC RELIEF-VALVES FOR STEAM FIRE-ENGINES.

Specification forming part of Letters Patent No. **135,437**, dated February 4, 1873.

To all whom it may concern:

Be it known that I, ALVARADO MAYER, of Detroit, in the county of Wayne and State of Michigan, have invented a new and useful Improvement in an Automatic Relief-Valve for Fire-Engines; and I do declare that the following is a true and accurate description thereof, reference being had to the accompanying drawing and to the letters of reference marked thereon and being a part of this specification, in which—

Figure 1 is a perspective view of my device as applied to the double-acting pump of a steam fire-engine. Fig. 2 is an enlarged vertical section of the device.

This invention has for its object to furnish one of the hose-gates of a fire-engine with a relief-valve, which will automatically open when the pressure of the water in the hose exceeds a given limit, and thus allow a part or all of the water forced from the pump to return into the suction-pipe, and circulate in that way as long as the pump is at work, for the purpose of allowing the firemen to use a pipe fitted with a stop-cock, which they may close when to throw water would cause unnecessary damage. By means of this relief valve the water can be shut down at the pipe at any moment, while the engine is at work, without danger of bursting the hose. The invention consists in a peculiarly constructed and arranged relief-valve, having a balanced piston playing in a cylinder above the relief-valve, which is placed at the end of a hose-gate; and, in connection therewith, an adjustable pressure-gage actuating an equilibrium-valve through an intermediate lever and certain connecting-pipes, all arranged and operating as more fully hereinafter set forth.

In the drawing, A represents the cylinder of a double-acting pump; B, its suction-pipe; and C, the vacuum-chamber, as commonly constructed in reciprocating steam fire-engines; D is one of the discharge-gates, having the usual stop-cock E. Where a hose-butt would be coupled to the discharge-gate D I screw on it the water-way D′ formed at the bottom of the cylinder F of my device. To the outer end of this water-way the hose G may be coupled in the usual manner. The pipe or nozzle of the hose is fitted with a stop-cock, as seen in Fig. 1. Above the cylinder F there is another cylinder, F′, the two being separated by a diaphragm, *a*, the upper cylinder being closed at the top by a head, *b*, Fig. 2. In the upper part of the water-way D there is a circular opening, in which is seated a wing-valve, H, from which rises a stem, H′, passing through stuffing-boxes *c c′* in the diaphragm *a* and head *b*, respectively. In the cylinder F′ a piston, I, is secured to the stem H′. *d* is an opening in the side of the cylinder F, above the relief-valve H, which is connected, by a pipe, J, to the suction B of the pump. K is a pipe connecting the water-way D′ with the upper part of the cylinder F′ above the piston I, but first passing through the chamber L, in which is a conical plug-valve M, whose stem M′ plays through stuffing-boxes at the top and bottom of the chamber. This valve I term the equilibrium-valve. N is another pipe connected at one end to the water-way D′, its other end carrying a small vertical chamber, O, in the lower part of which is seated a valve, P, whose stem P′ plays through a screw-threaded gland, *f*, tapped through the top of the chamber O. Between the gland and valve a spring, *e*, is spirally coiled about the stem. By screwing the gland down, and thus compressing the spring, the pressure at which the valve P will open or rise is determined. Q is a waste-pipe leading out of the top of the cylinder F′, but passing through a chamber, R, in which is a plug-valve, S, whose stem S′ plays through stuffing-boxes at top and bottom of said chamber. The lower end of the stem S′ rests upon the head of the stem P′. A spring, *e′*, may be coiled about the stem S′ to insure a quick closure of the valve S. T is an equalizing-lever, pivoted at its middle to the outer wall of the cylinder F, one end being pivoted in a slot in the lower end of the stem P′, and the other end pivoted in like manner to the lower end of the stem S′. The piston I may be packed with hemp or other material, so that it will move freely in its cylinder, but yet be water-tight.

The operation of the device is as follows: We will suppose that the spring *e* is adjusted to keep the valve P seated at any pressure less than one hundred pounds to the square inch on its under surface. The valves H, P, and S will be closed and the valve M open. The engine being at work, the water passes through the way D′ into the hose, exerting an upward

pressure under the relief-valve H and test-valve P, and a downward pressure on the piston I. Inasmuch as the piston has a greater area than the relief-valve, it is evident that the latter will be kept closed. Now, by turning the cock in the hose-pipe to shut off the exit of the water from the hose, the pressure in the hose and elsewhere will be suddenly increased, causing the valve P to lift, opening the valve S, which allows the water above the piston I to flow away, and at the same time the lever T closes the valve M, to prevent the ingress of more water to the piston, which is then free to rise from the pressure under the valve H, which rises and allows the water to flow through the pipe J back into the suction, and, as long as the pump is at work, will circulate in this way.

Steam fire-engines are usually fitted with several gates opening from a common forcing-channel, and but one relief-valve is necessary for the several gates, which will return any excess of water above the pressure determined by the spring to the suction, so that when playing one or more streams, one or all of them may be backed down or shut off without danger of bursting the hose, the engine continuing to work.

The working-pressure may be changed in a moment by adjusting the screw-gland *f*, and, once set, the pressure cannot be exceeded by accident or design, thereby preventing the too frequent bursting of the hose when at work.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. In pumping-engines, the combination of a relief-valve with an adjustable pressure-gage and valve, substantially in the manner shown and described.

2. In pumping-engines, a relief-valve, H, having a piston, I, of greater area secured to its stem, but working in a separate cylinder, and so arranged as to keep the relief-valve closed by the pressure of the fluid upon both, in connection with independent valves *m* S′ *p* for relieving the piston from pressure, when the pressure under the relief-valve exceeds a given limit, substantially as shown and set forth.

3. The device described, consisting of water-way D′, cylinders F F′, separated by the diaphragm *a*, relief-valve H, stem H′, piston I, return-pipe J, equilibrium-pipe K, chamber L, equilibrium-valve M, pipe N, chamber O, pressure-valve P, spring *e*, adjustable pressure-gland *f*, waste-pipe Q, chamber R, waste-valve S, stem S′, and equalizing-lever T, arranged as shown and described, and for the purposes set forth.

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Witnesses:
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