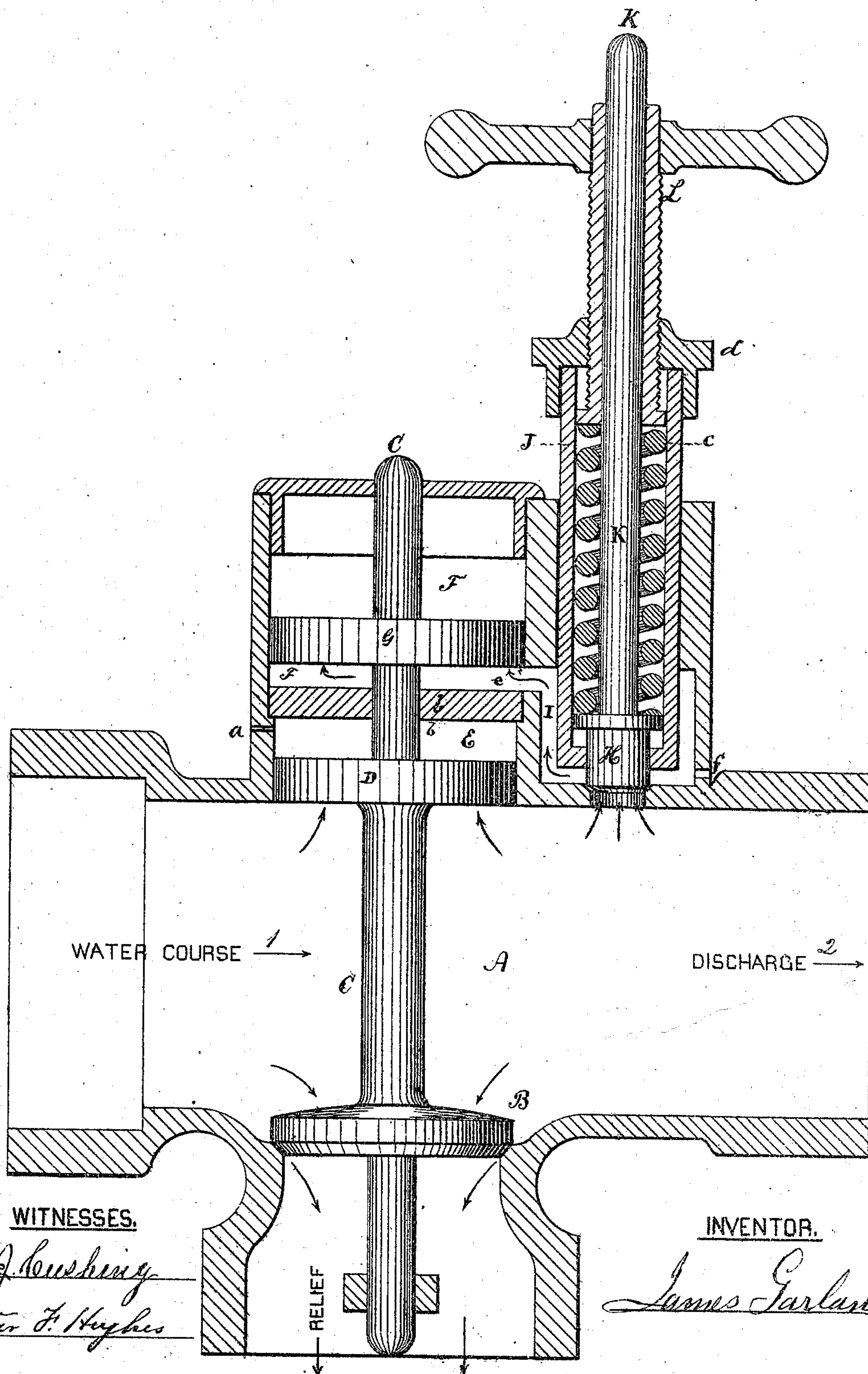


JAMES GARLAND.

Improvement in Relief Valves.

No. 120,958.

Patented Nov. 14, 1871.





# UNITED STATES PATENT OFFICE.

JAMES GARLAND, OF PROVIDENCE, RHODE ISLAND, ASSIGNOR, BY MESNE ASSIGNMENTS, TO HIMSELF AND HEBER LE FAVOUR, OF SAME PLACE.

## IMPROVEMENT IN AUTOMATIC RELIEF-VALVES.

Specification forming part of Letters Patent No. 120,958, dated November 14, 1871.

*To all whom it may concern:*

Be it known that I, JAMES GARLAND, of the city and county of Providence, in the State of Rhode Island, have invented a new and useful Improvement in Automatic Relief-Valves; and I do hereby declare that the following specification, taken in connection with the drawing making a part thereof, is a full, clear, and exact description of the same.

The drawing represents in longitudinal vertical section one of my full-sized valves.

The invention relates to that class of valves which, when properly placed between a force-pump and the point of delivery, will, when the flow of water or other fluid under pressure from the pump is from any cause suddenly checked, automatically open and relieve the pressure, which will otherwise increase rapidly in the hose or conducting-pipe, while the pump continues its action. Valves possessing this quality are important in many relations, but are especially useful as attachments to engines for extinguishing fires, enabling the hoseman to close the discharge-nozzle while seeking in a burning building for the location of the fire, instead of allowing the stream to play at random through fear of bursting the leading hose. The invention is exhibited in an organization which consists in the combination of a balance-valve governing a discharge-orifice, a cylinder and piston appropriate for such valve, and a safety-valve to be opened by the pressure of the water, when the same is excessive, and allow a stream to actuate the relief-valve.

In the drawing, A is a chamber, within which the relief-valve is located. Its left entrance communicates directly with the pumps from which water is forced in the direction indicated by the arrows 1 and 2. The right-hand opening communicates directly with a conducting-pipe or line of hose. The valve B, which is a single puppet-valve, covers the relief-outlet. This valve is balanced by means of the piston D attached to the valve-stem C, and is fitted to work without leaking in the cylinder E, which surmounts the chamber A. One or more small orifices, *a*, through the side of the cylinder E, near its top, allow the air within the cylinder above the piston to escape when the relief-valve and its appendages are lifting. A second cylinder, F, surmounts the cylinder E, and which, in this instance, is separated

by the partition *b* from the cylinder E. To this cylinder a piston, G, is properly fitted and secured to the valve-rod C, which is extended upward through the partition *b*. H is a safety-valve covering an orifice in the side of the chamber A. This valve is intended to remain seated while the pressure of water in the chamber is not in excess of the prescribed limit by the force of a spring, *c*, which, in this instance, is coiled around the valve-stem K, and located within a tube, J, which is closed by a cap, *d*. An adjusting-screw, L, should be arranged to vary the force exerted by the spring *c* at pleasure. Near the bottom of the side of the cylinder F is a port, *e*, which, by suitably-formed passages I, (a convenient arrangement for which is shown in the drawing,) connects with the pressure-chamber A, so that, when the safety-valve H lifts, a stream of water under pressure will rush into the cylinder F and, driving upward the piston G, raise the relief-valve B.

The operation of the apparatus will be readily understood to be as follows: Assuming that it is intended that the pressure upon the hose shall not exceed forty pounds to the square inch the spring safety-valve H is set so that it will open when the pressure reaches that limit. This condition happening the stream of water which, upon the opening of the valve H, flows through the passages I into the cylinder F before the piston G, will instantly drive the piston upward and open the relief-valve (which may be of any preferred size) to its full capacity. By means of one or more small orifices made in the side of the cylinder F, near the top, which will be covered by the piston when it is near the upper end of the cylinder, a vent for an air-escape will exist at all times, except when the piston has covered the orifices, when an air-cushion will be formed back of the piston to prevent undue shocks in working. So soon as the pressure is relieved by the escape of a sufficient quantity of water through the discharge-valve the spring-valve H will close, and thereupon the valve B, from its weight and that of its appendages, and the suction of the stream passing through the relief-aperture, will shut. The water which is contained in the cylinder F is, upon the descent of the piston G, allowed to escape through an orifice or exhaust-port, *f*.

The advantage of this apparatus over a simple spring safety-valve of the same superficial area



as the relief-valve B is, that the relief-valve as here arranged in opening to its full capacity is unaccompanied with that increase of resistance to which it would be subjected were it governed by a pressure-spring.

On account of the extreme and sudden variations of pressure in conducting-pipes, which are incident to the working of a steam-pump, it is necessary for the relief-valve to open at once to its full capacity whenever a necessity for its opening at all arises; otherwise, while the valve is being retarded in opening by the increasing resistance of the spring, which the pressure in the hose must overcome, a strain upon the hose, which would be at once relieved could the valve be opened wide, will cause the hose to burst, because the relief-orifice is only partially opened. While it is true that the spring-valve H in open-

ing wide works under the disadvantages mentioned, yet if it is varied from its seat at all it will allow a force to be applied to the piston G sufficient to fully open the relief-valve.

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

The combination of the valve B, arranged to work under an equilibrium of pressure, the cylinder and piston appropriate to operate such valve and the safety-valve opening by the pressure to be relieved and enabling such pressure to work the relief-valve, the whole constituting an automatic relief apparatus, substantially as described.

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Witnesses:

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