J. M. HARTMAN.

AUTOMATIC RELIEF VALVES FOR STEAM CYLINDERS.

No. 190,757. Patented May 15, 1877.

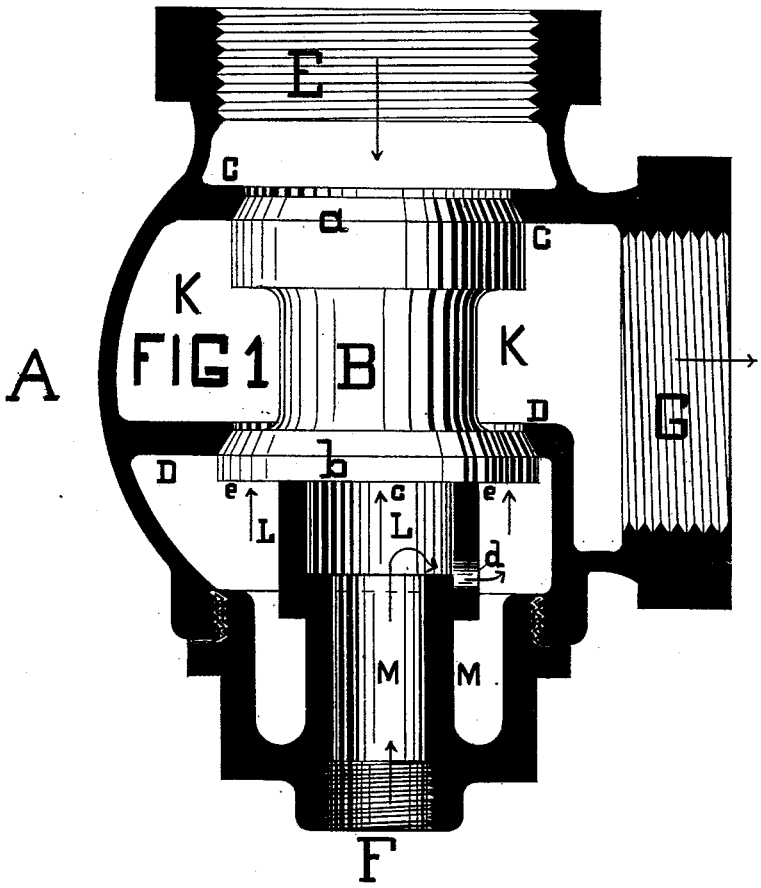
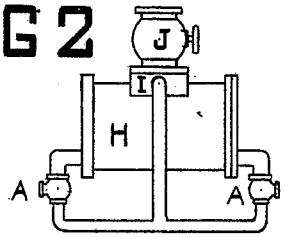


FIG 2



WITNESSES

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UNITED STATES PATENT OFFICE.

JOHN M. HARTMAN, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO TAWS & HARTMAN, OF SAME PLACE.

IMPROVEMENT IN AUTOMATIC RELIEF-VALVES FOR STEAM-CYLINDERS.

Specification forming part of Letters Patent No. **190,757**, dated May 15, 1877; application filed September 22, 1874.

To all whom it may concern:

Be it known that I, JOHN M. HARTMAN, of the city and county of Philadelphia, and State of Pennsylvania, have invented an Automatic Relief-Valve for Steam-Cylinders, which is fully set forth in the following specification, reference being had to the accompanying drawings.

The invention consists of an unbalanced double-beat valve for relieving the cylinder and steam-chest of an engine of the water of condensation. It operates automatically, and is constructed to present the larger area of the valve to the pressure of the steam from the steam-chest, or other suitable place, and the smaller area to the pressure caused by the resistance of the water of condensation in the steam-cylinder to the travel of the piston. It cushions on the steam from the steam-chest, to prevent its being broken when suddenly opening to relieve the steam-cylinder of a shot of water—the result of boiler-priming. A guide or guides accurately and quickly adjusts the valves in their seats.

Figure 1 is a diametrical vertical section of a relief-valve embodying the invention. Fig. 2 shows the valve in place at the ends of the cylinder.

A is a shell, in which works an unbalanced double-beat valve, B, seated in the top and bottom valve-seats C D. It has three nozzle-openings, of which E, the relief-nozzle, leads to the steam-cylinder H; F, the steam-nozzle, forms connection with the steam-chest I, below the stop-valve J, Fig. 2; G, the exhaust-nozzle, empties the chamber K, between the valve-seats C D, of the water of condensation from the steam-cylinder.

The valves *a b*, which compose the double-beat valve B, are of unequal diameters. The larger and lower one, *b*, compensates for the weight of the valve by its additional steam-area. It has a cylindrical attachment, L, which moves loosely over a hollow guide-stem and prolongation, M, of the steam-nozzle F, through which steam is delivered to the valve *b* at *c*, within the sleeve L, and to that part, *e*, of it situated without the sleeve, by passing through the port *d*, by which both valves *a b*, composing the double-beat valve B, are held in their seats.

The sleeve L and extension M serve to guide and retain the valve in its right-line motion.

When the water of condensation accumulates in the cylinder H, and offers resistance to the stroke of the piston, the greater area of the piston to that of the valve *b*, and of consequence the greater steam-pressure exerted, causes the piston to force the water of condensation into the shell A and open the valve B, which admits it to the space K, from which it is taken through the nozzle G. After the cylinder has been cleared, the steam from the steam-chest acts upon the valve B, and closes the valves *a b* in their seats.

When the priming of the boiler flows water into the cylinder H, the piston, by forcing it out and suddenly opening the valve B, would break it, or that part on which it strikes, if the steam from the steam-chest did not form a cushion on the under side of the valve *b*, and thus moderate the concussive force.

The steam delivered to the bottom valve *b*, through the sleeve L and the stem M, should, when possible, be taken from a low point of the steam-chest, for then it can be drained of any water of condensation, and also, when the engine is at rest, the steam-pressure will be taken from the valve B, which will drop open by its gravity, and allow the water to run from the cylinder into the chamber K.

I claim as my invention—

1. A relief-valve consisting of a shell, A, with seats C D and a sleeve, L, and a double-beat valve, B, which presents its lesser area to the pressure caused by the water of condensation in the steam-cylinder, and its greater area to the pressure of steam from the steam-chest, or other suitable place, substantially as described.

2. A relief-valve in which a steam-cushion is formed on the under side of the unbalanced double-beat valve B, to moderate the concussive force caused by the sudden opening of the valve, as herein shown and described.

In testimony whereof I hereunto sign my name in presence of two subscribing witnesses.

JOHN M. HARTMAN.

Witnesses:

MICHAEL MALOY,

B. W. CAMPBELL.