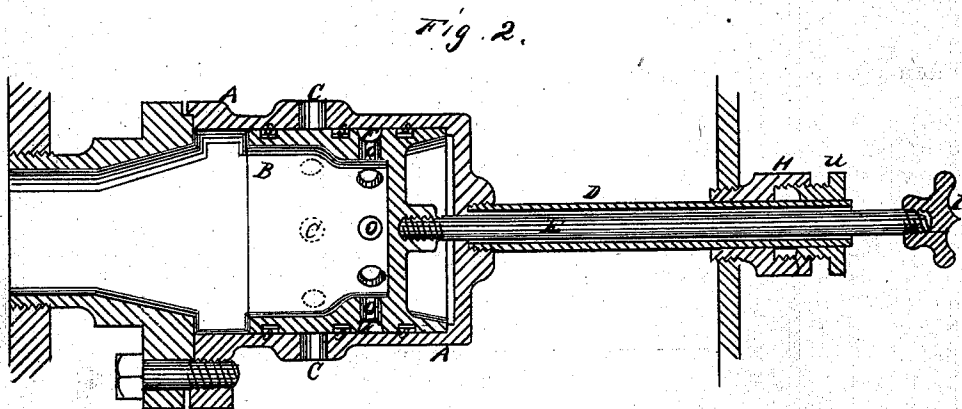
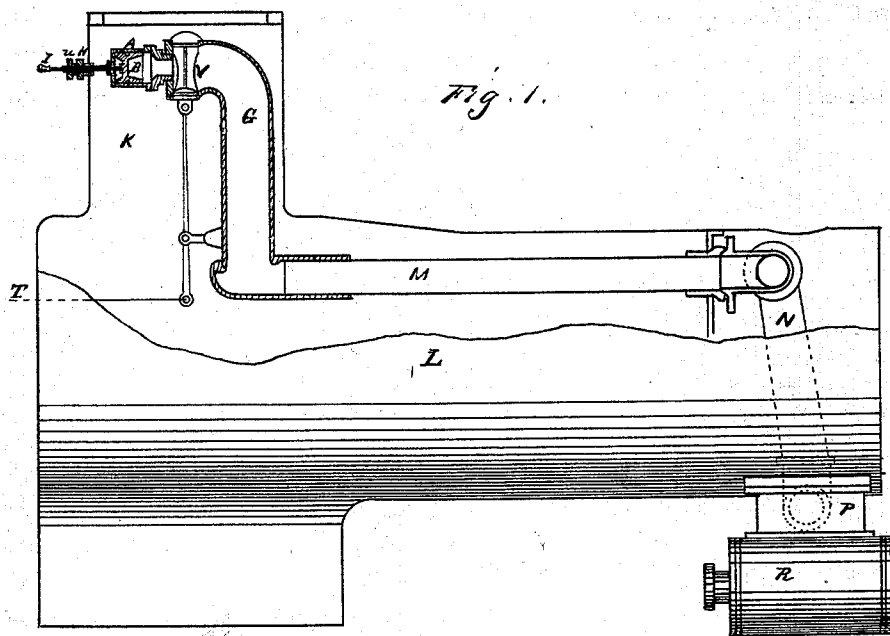


A. J. STEVENS

Vacuum Relief-Valves for Steam-Cylinders.

No. 146,617.

Patented Jan. 20, 1874.



Witnesses

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UNITED STATES PATENT OFFICE.

ANDREW J. STEVENS, OF SACRAMENTO, CALIFORNIA.

IMPROVEMENT IN VACUUM RELIEF-VALVES FOR STEAM-CYLINDERS.

Specification forming part of Letters Patent No. **146,617**, dated January 20, 1874; application filed September 22, 1873.

To all whom it may concern:

Be it known that I, ANDREW J. STEVENS, of Sacramento city and county, State of California, have invented a Vacuum Relief-Valve for Steam-Cylinders; and I do hereby declare the following description and accompanying drawings are sufficient to enable any person skilled in the art or science to which it most nearly appertains to make and use my said invention without further invention or experiment.

The object of my invention is to relieve the vacuum which is produced in the cylinders of locomotive-engines when the engine is running upon a down-grade with the throttle-valve closed. My improvement consists in attaching a valve to the steam-pipe inside of the dome of the boiler, which will remain closed as long as a steam-pressure is kept up in the steam-pipe, but which will open when a suction or back pressure is created inside of the steam-pipe by the pumping action of the piston when the locomotive is moving without steam, so as to admit a quantity of steam at each stroke of the piston, and thus relieve the vacuum and lubricate the piston.

To more fully illustrate and explain my invention reference is had to the accompanying drawings forming a part of this specification, in which—

Figure 1 is a sectional elevation of a boiler and one cylinder, showing my invention. Fig. 2 is an enlarged view of my device.

L is a steam-boiler, such as is used upon locomotive-engines; and K is the steam-dome. G M N is the steam-pipe which conducts the steam from the steam-space in the dome K to the steam-chest P and cylinder R; and V is the throttle-valve, which is operated by the throttle-stem T to admit the steam into, or shut it off from, the steam-pipe.

The pumping action of the pistons of locomotive-engines, when the locomotive is moving down an inclined plane with the throttle-valve closed, is too well known to require explanation in this specification.

This pumping action creates a vacuum at each stroke of the piston; and it is the object of my invention to destroy this vacuum by providing an arrangement by which the suction or back pressure created by the vacuum

will open a valve and admit a sufficient quantity of steam to the cylinder at each stroke of the piston to relieve the vacuum and lubricate the piston.

My relief-valve I attach to the end of the steam-pipe inside of the dome. This valve consists of a shell, A, one end of which is open, and secured in the end of the steam-pipe, so as to communicate with its interior. The opposite end of the shell is closed, with the exception of an opening which communicates with the interior of a tube, D. This tube is secured to the end of the shell, and passes out through a fixed nut, H, and packing-nut U on the side of the dome, by which the joint is made steam-tight. Inside of the shell A is a cup-shaped piston, B, to which one end of a stem, E, is attached. This stem passes through the tube D, so that its opposite end projects outside of the dome. One or more openings or ports, C C, are made in the shell A in the same vertical line. A corresponding number of ports, O, are made through the shell of the cup-shaped piston B in such a position that, when the piston is drawn inward by the suction or back pressure in the steam-pipe, the ports in the shell A and piston B will come opposite each other, and admit steam from the dome into the steam-pipe. A groove or channel, F, is made around the shell of the piston, outside of the ports O, for the purpose of insuring the free passage of steam, in case the piston should be rotated, so as to carry the ports out of the same line. The ports O in the piston-shell are of somewhat greater diameter than the ports C in the outer shell, so that all the steam which passes the ports C will be admitted into the interior of the shell, and thus avoid any liability of its being forced between the piston and shell A. Packing-rings S S S are applied around the piston, between the two shells, upon each side of the ports, when they are closed to prevent the entrance or leakage of steam.

Now, in running upon a down grade, with the throttle-valve closed, the vacuum created by each stroke of the piston in the cylinder of the engine will draw the piston B forward until the ports C O come opposite each other, and steam will be admitted automatically into the steam-pipe, so as to destroy the vacuum and lubricate the piston.

I is a thumb-nut on the end of the stem E, outside of the dome. This stem E serves as an indicator, to tell when the relief-valve is working properly; and also serves as a means of enabling the engineer to control the action of the valve, as he can readily open or close the ports at will, by means of the stem E.

Having thus described my invention, what I claim, and desire to secure by Letters Patent, is—

1. A relief-valve attachment to the steam-pipes of locomotive and equivalent engines, by which the vacuum or back pressure caused by the pumping action of the engine-piston will automatically furnish steam from the steam-dome to relieve said vacuum and lubricate the piston, substantially as above described.

2. The improved automatic relief-valve above described, consisting of the shell A, with its ports C, and shell or cup-shaped piston, with its ports O, groove F, and packing-rings S S S, substantially as and for the purpose above described.

3. In combination with the piston of a vacuum relief-valve, the indicating and operating stem E, when applied substantially in the manner described.

In witness whereof I hereunto set my hand and seal.

A. J. STEVENS. [L. S.]

Witnesses:

W. H. MILLIKEN.

JOHN RAFFERTY.