

(No Model.)

J. M. KEITH.
MECHANISM FOR STEAM ENGINE CYLINDERS.

No. 537,776.

Patented Apr. 16, 1895.

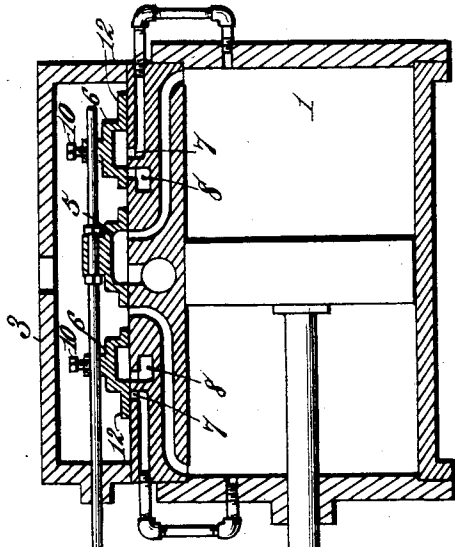


Fig. 1.

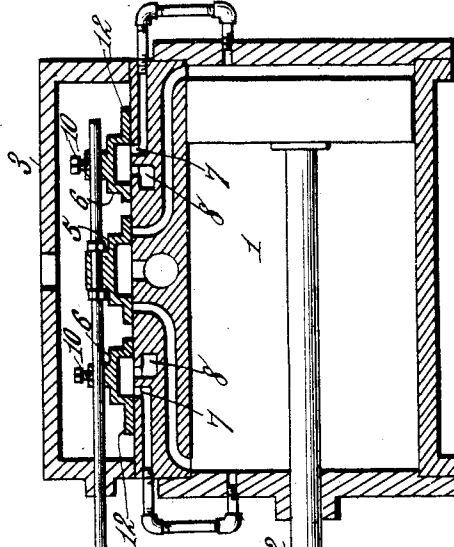


Fig. 2.

Witnesses.
John M. Keith.
L. W. Rea.

Inventor.
John M. Keith.
By *James L. Norris*
Atty.

UNITED STATES PATENT OFFICE.

JOHN M. KEITH, OF RETALHULEN, GUATEMALA.

MECHANISM FOR STEAM-ENGINE CYLINDERS.

SPECIFICATION forming part of Letters Patent No. 537,776, dated April 16, 1895.

Application filed November 23, 1894. Serial No. 529,747. (No model.)

To all whom it may concern:

Be it known that I, JOHN M. KEITH, a citizen of the United States, residing at Retalhulen, Guatemala, have invented new and useful Improvements in Relief Mechanism for Steam-Engine Cylinders, of which the following is a specification.

My invention relates to means for relieving the back-pressure in the cylinders of steam engines, the purpose being to provide simple mechanism whereby the piston of the steam cylinder shall be relieved of back-pressure due to its being, at each end of its stroke, cushioned by a stratum of steam, the escape of which, by way of the ordinary exhaust, is cut off a moment before the completion of the stroke, whereby the final movement of the piston, in the steam-cylinder, can only be made by compressing the body of steam which is trapped in the end of the cylinder, causing great strain to the mechanism as well as a large sacrifice of power.

It is the purpose of my invention to avoid these difficulties by means of simple, automatic, relief-valves, operated by the main valve-stem in such manner as to provide free egress at each end of the cylinder for any steam remaining therein after the exhaust-port is closed, and to close upon the completion of the stroke and at or before the instant of opening the live steam port.

The invention consists in relief mechanism for steam engine cylinders, having the novel features of construction and new combinations of parts, hereinafter fully described and then more particularly pointed out and defined in the claims which form part of this specification.

To enable others skilled in the art to which my said invention pertains to fully understand and to make, construct, and use the same, I will now proceed to describe said invention in detail, reference being had, for this purpose, to the accompanying drawings, in which—

Figure 1, is a sectional diagram of a steam-cylinder of any known, or preferred, construction, having my invention connected thereto; showing the main valve and relief-valves, and the piston, the said parts being at their proper

relative positions. Fig. 2, is a diagram showing the same parts in a different position.

In the drawings the reference-numeral 1 indicates the steam cylinder of a locomotive, or other engine, having a piston-rod 2, which is reciprocated by a piston of the usual form. Mounted upon the steam-cylinder 1 is a steam-chest 3, through which passes a valve-stem 4, having any ordinary connection to the power-shaft, by which its reciprocation is effected, such, for example, as an eccentric 2^a, of ordinary construction. Within the valve-chest, or steam-chest 3 is arranged the steam valve 5, which is of the ordinary form, or type of construction, such, for example, as the well known D-valve, or slide-valve.

In each end of the steam-chest 3 is a relief-valve 6, arranged to cover and uncover an exhaust-port 7. For the sake of convenience in illustration, I have arranged the valve-ports in the relief-chests in the same straight line with the steam and exhaust-ports, since by this arrangement the movements of the different valves, in covering and uncovering their ports, will be more easily followed. Each relief-valve 6 is suitably connected to the valve-stem 4, in such manner that said relief-valves may be opened alternately, at such an instant that the steam remaining in the steam-cylinder, after closing the exhaust port, may be released and pass out of the cylinder, thereby removing all resistance to the completion of the stroke of the piston.

Each of the relief-exhaust ports 7, preferably has communication with an escape port 8, and the relief-valves are preferably made adjustable upon the valve-stem 4 in such manner that their action may be regulated as circumstances may require. This connection may be made in various ways, but ordinarily a sliding adjustment upon the stem 4, with a set-screw 10 to lock each relief valve thereon at any point to which it may be adjusted, will answer every purpose.

The relief-valves 6 are preferably similar to the ordinary D-valves, differing therefrom only in having an extended lap 12, upon the outer end of each. The arrangement of the several ports is such that when the main steam-valve is at half-stroke, the relief-ports

7, will both be uncovered by the relief-valves 6, while at full stroke of the main valve, the relief-valve upon the exhaust-side of the piston will have closed the escape-port 8, the extended lap 12, on the other relief-valve, lying over and closing the relief-port 7, on the live-steam side. As the main valve moves in the opposite direction, the relief-valve which has opened the relief-port up to the extreme end of the stroke of the piston, closes said relief-port an instant before the main valve opens the live steam port and thus prevents all escape of the steam during its period of work. These results are made possible by the extended lap 12, on each relief-valve and the adjustability of the latter upon the valve-stem 4 makes it possible to arrange the relief-valves in such manner that their proper relations to the main steam-valve shall be preserved at all times.

By this invention I am able to remove all steam from the exhaust side of the piston, and thereby prevent the severe strain caused by the piston cushioning upon small bodies of steam remaining in the ends of the cylinder after the exhaust port closes.

What I claim is—

1. In a steam engine, the combination with the ordinary steam-chest having live steam and exhaust-ports, of a steam-valve and two independent relief-valves arranged at or near

the ends of the steam-cylinder, each being separately adjustable upon the main valve-stem, substantially as described.

2. In a steam-engine, the combination with the steam chest and steam valve, of relief-valves adapted to cover and uncover relief-ports communicating with the ends of the cylinder, each of said relief valves being provided with an extended lap upon its outer end, and adjustably mounted on the main valve stem, substantially as described.

3. In a steam engine, the combination with a steam-chest having a central steam valve, of relief-valves arranged in the same steam-chest near the ends of the cylinder, said relief-valves being separately adjustable on the valve-stem operating the steam-valve, and provided with extended laps on their outer ends, each relief-valve being adapted to cover and uncover relief-ports communicating with the ends of the cylinder and with passages leading to the exhaust, substantially as described.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

JOHN M. KEITH.

Witnesses:

SAMUEL F. LORD,
A. MERO.