

W. PATTERSON.
Steam-Brake.

2 Sheets—Sheet 1.

No. 211,775.

Patented Jan. 28, 1879.

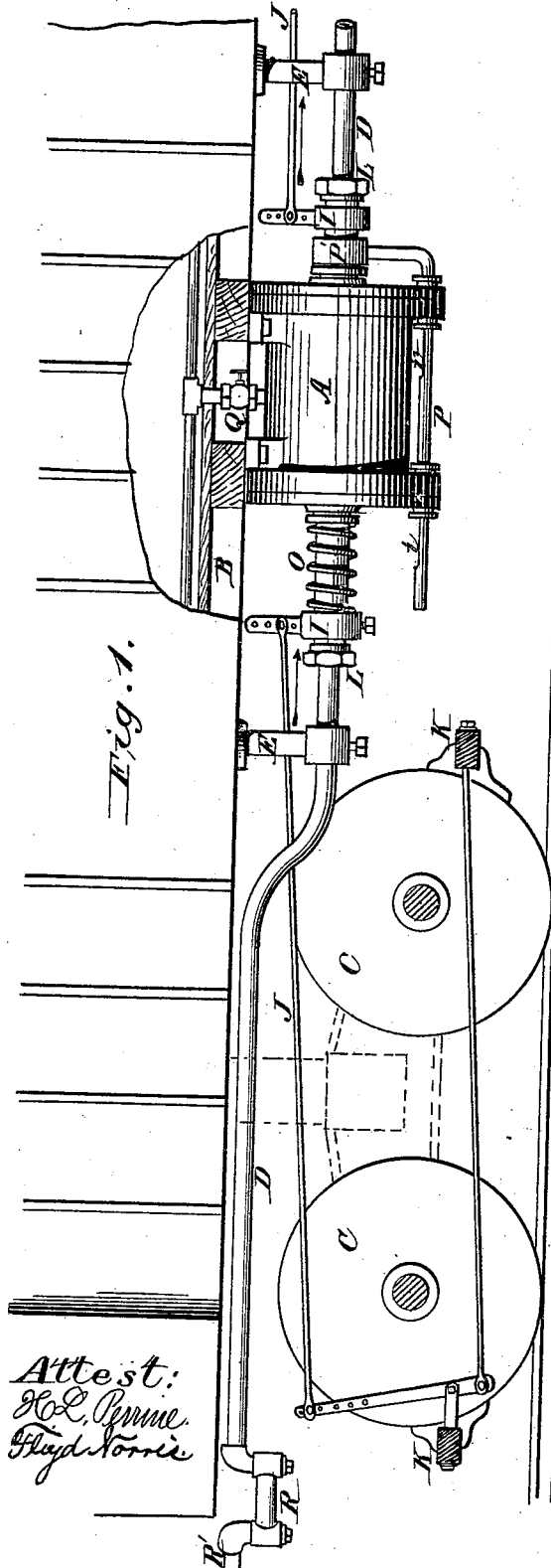


Fig. 1.

Attest:
H. L. Payne
Notary Public

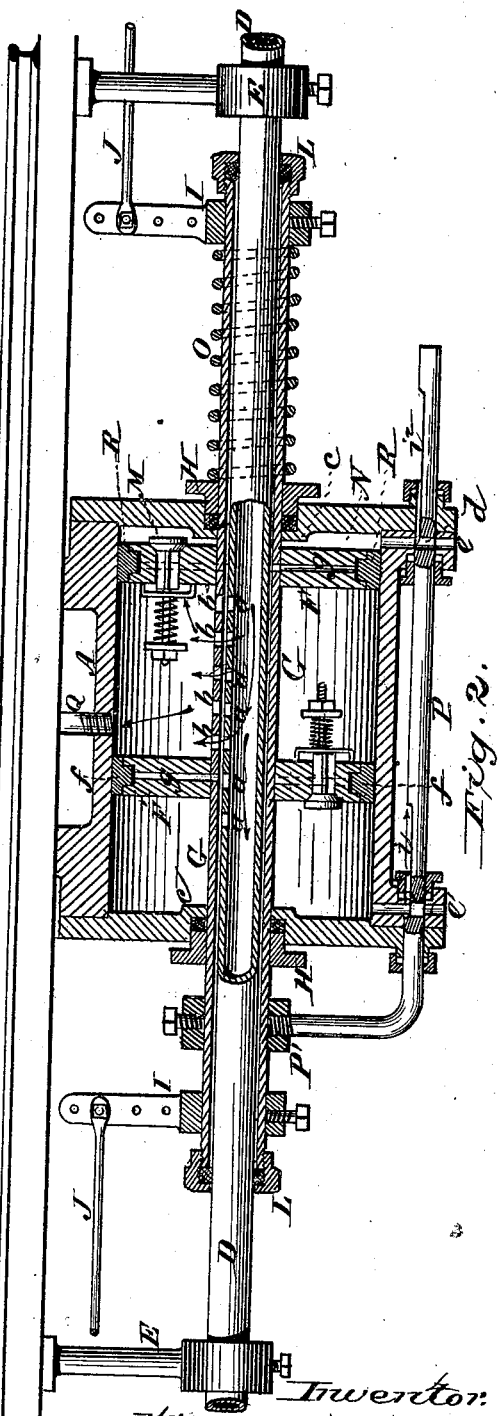


Fig. 2.

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UNITED STATES PATENT OFFICE.

WILLIAM PATTERSON, OF CONSTANTINE, MICHIGAN.

IMPROVEMENT IN STEAM-BRAKES.

Specification forming part of Letters Patent No. **211,775**, dated January 28, 1879; application filed June 21, 1878.

To all whom it may concern:

Be it known that I, WILLIAM PATTERSON, of Constantine, in the county of St. Joseph and State of Michigan, have invented certain new and useful Improvements in Steam-Brakes; and I do hereby declare that the following is a full, clear, and exact description of the invention, which will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to letters of reference marked thereon, which form a part of this specification.

In my improved steam-brake for railway-cars I use a single steam-cylinder beneath the floor of each car, with a double piston, adapted to work within said cylinder, in connection with a fixed steam-supply pipe passing through both heads of said cylinder, and fitted with couplings at each end of the car. The double piston is carried by a hollow piston-rod, fitted to work upon the fixed steam-supply pipe, and, passing through the cylinder-heads, projects therefrom a short distance, to connect with and operate the brakes through suitable brake-connecting devices.

The fixed steam-supply pipe and the hollow piston-rod have coincident openings, arranged to admit the steam within the cylinder between the pistons, one of which has a valve which is adjusted to open under a certain pressure of steam in the cylinder, between the pistons, and allow the steam to pass from between said pistons into a space between the cylinder-head and the valved piston, and thereby operate the latter to put on the brakes. An interior projection on the cylinder-head serves to form this space; otherwise the valve could not be opened against the inner side of the cylinder-head. In this way I employ a fixed steam-supply pipe, in combination with a short hollow piston-rod, to make the brake-connections, while the cylinder-chamber between the double piston serves as a steam-supply chest, from which, by means of branch valved pipes, the cars are heated in the winter season and the pistons prevented from freezing. The pressure of the steam in the cylinder for this purpose being less than that required to open the piston-valve, the engineer can always adapt said pressure for heat-

ing the cars or operating the brakes by means of this steam-chest, formed by the double piston in the cylinder, so that no separate attachments for heating the cars are required.

A spiral spring is applied directly upon one end of the hollow piston-rod, so as to act upon the cylinder-head, and a collar on said hollow piston-rod, to return the double piston and the brake appliances to their proper positions when the steam is cut off from the brake-cylinder.

An exhaust-valve is connected with and operated by the hollow piston, to allow the escape of the steam from the space between the cylinder-head and the piston when the brakes are off, and to allow for the inlet and outlet of air at the other end. The steam-supply pipes are coupled by gas bracket-pipe jointings, united by female-screw-nut union at the end of each car, whereby the couplings conform to the movements of the cars.

Each end of the short hollow piston-rod is provided with a stuffing-box, to make its jointings with the steam-supply pipe steam-tight. The fixed steam-supply pipe, at the point where the steam enters the cylinder through the openings in the hollow piston-rod, is reduced in diameter, to allow ample space all around the supply-pipe for the escape of the steam therefrom, and not interfere with the full supply for the cylinder.

I utilize the short hollow piston-rod as the means of supplying steam to expand metallic-ring packing of the pistons, by radial channels leading from beneath said packing-rings and opening into the space between said hollow piston-rod and the fixed steam-supply pipe. The packing-ring for this purpose has a concentric tongue or tongues on its inner surface fitting into a corresponding groove or grooves in the piston periphery, and thereby obtains a wide bearing and packing surface for the pistons.

To admit of the expansion of the packing-ring, it is cut and an I-shaped metallic joint-closing device inserted between its abutting ends.

A hollow steam-supply pipe fixed beneath the floor of a car is not new in connection with double steam-cylinders provided with separate pistons for operating the brake de-

vices of railway-cars; nor is a long steam-supply pipe fitted with a piston to move in a cylinder, and provided with openings, through which the steam escapes from said long movable supply-pipe into said cylinder to operate said piston, new; but my improved steam-brake differs from such in construction and combination, by which I overcome many difficulties to the successful operations of such brakes.

Referring to the drawings, Figure 1 represents a side view of a steam-brake applied to the floor of a car, and showing one of the trucks thereof; Fig. 2, a vertical section through the steam-cylinder, its short hollow movable piston-rod and a portion of the fixed steam-supply pipe in the positions the several parts occupy when the brakes are off; Fig. 3, a similar section, showing the parts in the positions they occupy when the brakes are on; Fig. 4, detail view of the piston and its packing-ring in connection with the hollow short movable piston-rod; Fig. 5, the packing-ring and its joint-closing I-shaped metallic device; and Fig. 6, top and side views of the metal joint-pipes for coupling the fixed steam-supply pipes of two cars.

The steam-cylinder A is secured in any suitable manner to the floor B of the car between the trucks, one of which, C, only is shown. The fixed steam-supply pipe D passes through the cylinder, extends from one end of the car to the other, and is suspended to the floor by hangers E, arranged at suitable distances apart. This pipe is provided with metal couplings at each end, to make the connections with the several cars and with the boiler of the locomotive.

Within the cylinder, and upon the fixed steam-supply pipe, double pistons F F' are arranged upon a hollow piston-rod, G, the ends of which extend through stuffing-boxes H H at each end of the cylinder, and connect by armed collars I I with rods J J, which connect with the brake-bars K K by any suitable arrangement of rods uniting with said brakes, so that they can be applied and released by the action of the short hollow piston-rod, which is provided with stuffing-boxes L L at each end outside of the cylinder-heads, to render its connection with the fixed steam-supply pipe steam-tight.

The steam, when put on by the engineer, is admitted into the cylinder between the pistons by means of openings a, Fig. 2, in the fixed supply-pipe and coincident openings b in the hollow piston-rod, and the piston is provided with a spring-valve, M, which is opened by the pressure of the steam in the cylinder, to allow the steam to pass out from between the pistons into a space, N, between one of said pistons and the cylinder-head, and thus force the double piston back toward the other cylinder-head, and thereby apply the brakes. An interior cylinder-head projection, c, serves to keep the piston from closing against said head, and thereby allow the spring-valve to be

opened. This spring-valve is adjusted to be opened when the pressure of the steam is sufficient to apply the brakes, which can be determined by the engineer's gage.

The diameter of the fixed supply-pipe is less than that of the interior of the hollow piston-rod, (see Fig. 2,) to form a space between them, to allow the free escape of the steam through the openings a b into the cylinder. The cylinder is of a length to allow of sufficient movement of the double piston and its short hollow rod to properly apply the brakes, and when the steam is cut off from the locomotive the return of the double piston and the release of the brakes are effected by means of a spiral spring, O, arranged upon one end of the hollow piston-rod, so as to bear upon the cylinder stuffing-box and a collar on said hollow piston-rod. This action of the spring also operates an exhaust-valve, P, formed by a rod connected with the collar P' on the opposite outside end of said hollow piston-rod, and passing through openings in the flanges of the cylinder, so as to bring an opening, d, in said valve-rod coincident with an opening, e, in one of said flanges, which communicates with the interior of the cylinder for the escape of the exhaust-steam and the water therefrom, and this is the normal position of said valve when the brakes are off.

I utilize the steam-cylinder as a chest for supplying steam to heat the cars in cold weather by means of a valved pipe, Q, leading from the space between the double piston up through the car-floor and joining with suitable heating-pipes.

This construction also allows the steam to be kept in the heating supply-chest, to prevent freezing, and at such pressure as will not open the piston-valve. The valve Q allows the steam to be cut off when not needed for this purpose.

Either of the pistons may have the spring-valve, in order to allow the double piston to be operated from either end of the cylinder, if desired, in which case the returning-spring must be correspondingly arranged.

The couplings for the fixed steam-supply pipes for the cars of the train consist of short joint-pipes R R R' R', similar to gas-bracket joinings, the sections R' being coupled by a union, S, Fig. 6, fitted with suitable packing. This construction allows the coupling-sections to stand in a zigzag line to each other and to the line of the cars, so as to accommodate for the longitudinal play of the cars, while they also allow of the lateral play of the cars, and thus maintain the communication between the fixed steam-supply pipes of all the cars with the locomotive-boiler. This gives a simple and durable metallic coupling, although I am aware that a metallic coupling for the purpose is not broadly new; but coupling sections with the fixed steam-supply pipes, as I have arranged and adapted them for the purpose, is effective and free from the complicated metal couplings heretofore designed. I utilize the

hollow piston-rod, in connection with the fixed steam-supply pipe, as the means of making communication with the packing-rings *f*, Figs. 4 and 5, of the double piston, to render the said packing-rings steam-tight. This is effected by radial openings *g*, Figs. 2 and 4, in the pistons, communicating with the space between the fixed steam-supply pipe and the hollow piston-rod and with one or more annular channels, Fig. 2, in the circumference of the piston-heads. The packing-rings *f* are provided with one or more annular ribs, *h*, Fig. 5, adapted to fit within said channels, and these ribs are cut to admit of being expanded when the steam is let on, and an I-shaped joint-closing metal device, *T*, is inserted between the cut ends to close the opening which would otherwise be formed between said ends, thereby obtaining a broad bearing and perfect packing for the pistons, made steam-tight through the communication with the fixed steam-supply pipe, and in this connection only such piston-packing is claimed in a steam-operating brake.

If desired, the double pistons may be connected by a shell having openings to admit the steam in an annular space between it and the inner wall of the cylinder, and thereby form the steam-chest from which to supply the heating-steam for the car, and to prevent the freezing of the working parts.

The end of the fixed steam-pipe on the last car is closed by a cap. The exhaust-valve is flattened at *i*, Figs. 2 and 3, for the purpose of making a perpetual communication, *e'*, between the piston *F'*, the cylinder-head, and the outer air, to allow of the escape of the air in applying the brakes, and of its admission in releasing the brakes; and the flattened part *i*² of said valve allows the steam to escape slowly when the brake is being operated, so that when the steam is cut off the brakes can be released.

I claim—

1. In a steam-brake, the combination, with the cylinder, of a double piston, one of which has a spring-valve, a short hollow piston-rod connecting with the brake devices, and the fixed steam-supply pipe communicating with the cylinder through coincident openings in the hollow piston-rod, for operation as set forth.

2. In a steam-car brake, the combination, with the cylinder, a fixed steam-supply pipe, and a hollow piston-rod working thereon, with coincident openings communicating with the cylinder, substantially as described, of the exhaust-valve, operated by the hollow piston-rod, substantially as herein set forth.

3. In a steam-brake, the combination, with the cylinder, a fixed steam-supply pipe, and a hollow piston-rod working thereon, and having communicating openings, substantially as herein set forth, of a spring arranged upon said hollow piston-rod between an adjustable collar thereon and the cylinder-head, whereby the return movement of the double piston and its hollow piston-rod is effected to release the brakes connected therewith, substantially as herein set forth.

4. In a steam-brake, the combination, with the cylinder, a fixed steam-supply pipe, and a hollow piston-rod working thereon, carrying a double piston, and having coincident communications, substantially as set forth, of a valved pipe leading from the cylinder-space between said double pistons to the car above, whereby the cylinder forms a steam-supply chest for heating the car whether the brakes be on or off, substantially as herein described.

5. The fixed steam-supply pipe of less diameter than the interior of the hollow piston-rod which works thereon, and having coincident openings communicating with the cylinder, whereby to give free escape of steam from the fixed supply-pipe into the cylinder, substantially as herein set forth.

6. The combination, with the fixed steam-supply pipe and the hollow piston-rod working thereon, and having coincident openings communicating with the cylinder-space between double pistons, of the channels *g* in said piston-head, the packing-ring *f* adapted to a groove or grooves in said cylinder communicating with the fixed steam-supply pipe through said hollow piston-rod, for the purpose herein set forth.

7. The combination, with the fixed supply-pipes *D D* of a steam-brake constructed substantially as described, of the horizontal jointed connecting-sections *R R*, the cross-section *R' R'*, and the union *S* thereof, arranged between the platforms of the cars, substantially as herein set forth.

8. The exhaust-valves *P*, having the recesses *i i*² and the openings *d*, in combination with the cylinder-openings *e e'* and the double piston *F F'*, for the purpose stated.

In testimony that I claim the foregoing I have affixed my signature in the presence of two witnesses.

WILLIAM PATTERSON.

Witnesses:

CHAS. H. BARRY, Jr.,
E. THORNE.