

W. M. HENDERSON.
Hydraulic Railway Car-Brakes.

No. 141,790.

Patented August 12, 1873.

Fig 1.

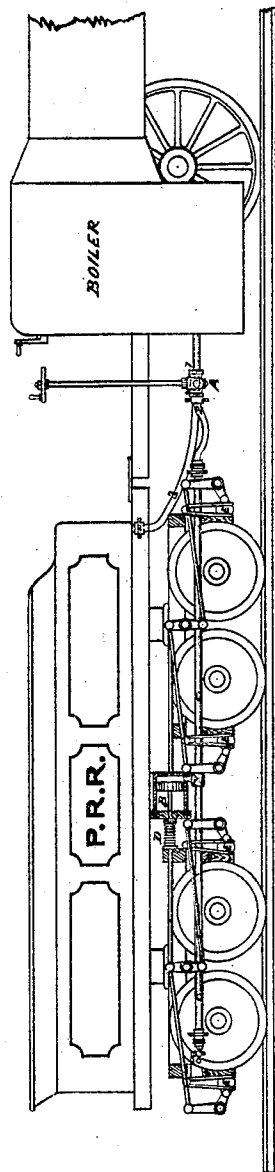


Fig 3.

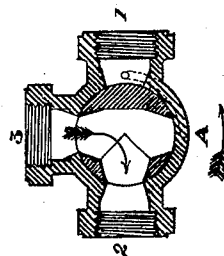


Fig 4.

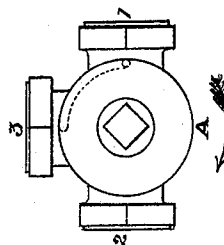
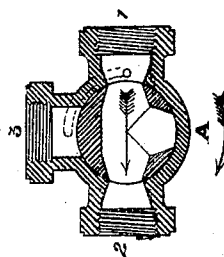


Fig 2.



Witnesses.

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WILLIAM M. HENDERSON, OF PHILADELPHIA, PENNSYLVANIA.

IMPROVEMENT IN HYDRAULIC RAILROAD-CAR BRAKES.

Specification forming part of Letters Patent No. **141,790**, dated August 12, 1873; application filed April 4, 1873.

To all whom it may concern:

Be it known that I, WILLIAM M. HENDERSON, of the city of Philadelphia and State of Pennsylvania, have invented certain Improvements in Hydraulic Railway-Car Brakes, of which the following is a specification:

This invention relates to that class of car-brakes controlled from the engine and operated by hydraulic pressure. The nature of my said invention consists in a series of brake blocks or shoes pressed by elastic cushions or springs against the faces of the wheels, which springs or cushions are operated by hydraulic pressure exerted upon pistons or flexible diaphragms or expansible vessels, to which it is transmitted through suitable tubing from the boiler of the locomotive, and embraces a system of tubes controlled by a valve or cock so constructed and connected by tubes with the water-tank, the brake-cylinder, and the boiler as to be easily operated without risk of mistake on the part of the engineer, and with a minimum expenditure of water and steam.

I will now proceed to describe the manner in which the said invention is to be made and operated, referring in so doing to the drawings annexed and letters of reference marked thereon.

Figure 1 is a longitudinal elevation, showing a general view of the invention. Figs. 2 and 3 are enlarged detail.

The same letters of reference apply to the same parts in the several figures.

A is a three-branch cock placed underneath the foot-plate of the engine, the plug of which cock is actuated by a stem carried up through the foot-plate and furnished with a hand-wheel or crank-handle at the top placed conveniently to the hand of the engineer. The nozzle, marked 1, is connected by a piece of wrought-iron pipe directly to the water-space of the boiler. The opposite nozzle, marked 2, is connected by wrought-iron pipe and flexible hose-connections furnished with suitable couplings between the cars, and leads directly to the brake-operating cylinders B, one or more of which are provided beneath the body of each car. The working piston of such cylinder being connected with a system of levers, as shown, for applying the brakes, the third nozzle of the three-branched cock, marked 3, is

connected directly to the water-tank supplying the boiler with water. At the end of the main tube C is a small air-cock, as shown.

The operation of the apparatus is as follows: Steam being up in the boiler, and the connections of the tubes being all coupled between the several cars, the engineer turns the plug of the three-branch cock so as to establish a communication between the water-tank and the main tube. He then passes to the rear end of the tubes and opens the air-cock, and allows the water to travel to the extreme end, which it will do by virtue of the head of water contained in the tank. The air will be expelled through the cock, and when he finds that the water commences to issue therefrom closes it and returns to the engine prepared to start. The train being in motion, and the engineer desiring to apply the brakes, he turns the plug of the three-branched cock so as to make a communication between the boiler and the main, as shown by Fig. 2. In doing this he shuts off communication with the water-tank. The pressure in the boiler will exert itself with its full force upon the water-column in the main, and produce a hydraulic pressure equal to the pressure within the boiler upon each of the brake-operating pistons when fully turned on, or the pressure to be applied can be moderated by partially opening the cock. A special provision may be made in the form of opening in the cock to produce graduated pressure. The boiler is the reservoir of pressure, and is employed to apply the brakes instead of auxiliary machinery. To relieve the pressure from the pistons the engineer turns the plug of the three-branch cock again, so as to open a communication with the water-tank, as shown in Fig. 3. This same operation will also shut off communication with the boiler and relieve the hydraulic pressure. It will also be observed that there are stops arranged on the body of the three-branched cock and its plug in such manner that the plug can never be turned so as to open a communication between the boiler and the tank.

The pressure being relieved, springs D are arranged, acting on the brake-rods, to draw the brakes off and carry the pistons of the brake-operating cylinders back to the end of the cylinders. The surplus water, owing to

the return of the brake-operating pistons, is discharged into the water-tank without waste. The pipe leading from the cock to the boiler should be short, in order to avoid loss of temperature. The main will thus be charged to near its whole extent with water from the tank, reducing the quantity required from the boiler to the minimum required to impel the pistons of the brake-operating cylinders. By this arrangement the heat abstracted from the boiler is imparted to the feed-water in the tank, less the amount used in operating the brakes. Between the brake-shoes and the levers operating them are placed springs or elastic cushions E, made preferably of rubber, whose functions are to moderate the shocks of applying the brakes, which would otherwise, from the inelastic nature of the fluid, be quite abrupt, and also adapt the brake-shoes to any accidental inaccuracies or imperfections in circular form of the wheels, and thus equalize the action of the brakes thereon. The pipe connecting the brake-operating cylinders with the main may also be of such form as to constitute an air-trap in such manner that the pistons shall be directly operated by air compressed by means of hydraulic pressure derived from the boiler, as I have explained.

While I prefer the connections beneath the steam-line to avoid loss by condensation, it is evident that the steam above the water-line can be used. In either case the power employed to operate the brakes is the elastic force of the steam within the boiler.

I am aware that springs have been proposed, in combination with brake-shoes operated by the momentum of the train pressing upon connected buffer-rods, to moderate the concussion

between the brake blocks and the mechanism operating them; also, that it has been proposed to operate railway-brakes by hydraulic pressure transmitted from the boiler of a locomotive to pistons connected directly to rigid brakes or brake-levers, and controlled by a series of separate cocks or valves. Said arrangement is liable to accident through inadvertence on the part of the engineer, or the sticking of one of the cocks, to empty the boiler or to waste the water in the tank, and the number of cocks to be turned in proper succession necessitated delay in operation, and the unyielding nature of the fluid and connected mechanism produced injurious shocks in the use of such devices. This, therefore, I distinctly disclaim; but

What I do claim is—

1. The three-branched cock or valve A, combined with a water-tank, a steam-boiler, and hydraulic brake-operating cylinders, so that in one adjustment of the cock A the brake-cylinders B may fill or empty from the tank, and in the other adjustment of said cock the pressure within the boiler is transmitted to the fluid operating the brake-pistons, substantially in the manner set forth and described.

2. The three-branched cock or valve A, combined with a water-tank, a steam-boiler, and hydraulic brake-operating cylinders, with the springs E interposed between the brake-shoes, and the pistons operating the same by pressure of an inelastic fluid, substantially as herein described and set forth.

WILLIAM M. HENDERSON.

Witnesses:

JOHN B. DEVINE,
JAMES P. PETIT.