

G. WESTINGHOUSE, Jr.
Locomotive Air-Brakes.

No. 144,005.

Patented Oct. 28, 1873.

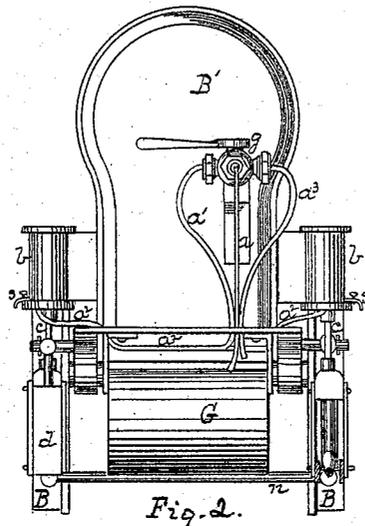


Fig. 2.

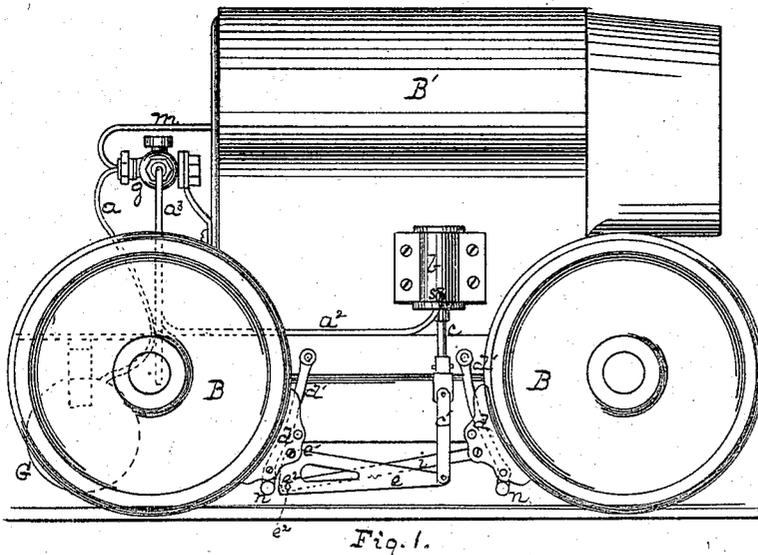


Fig. 1.

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UNITED STATES PATENT OFFICE

GEORGE WESTINGHOUSE, JR., OF PITTSBURG, PENNSYLVANIA.

IMPROVEMENT IN LOCOMOTIVE AIR-BRAKES.

Specification forming part of Letters Patent No. 144,005, dated October 28, 1873; application filed July 18, 1873.

To all whom it may concern:

Be it known that I, GEORGE WESTINGHOUSE, Jr., of Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Locomotive Air-Brake; and I do hereby declare the following to be a full, clear, and exact description thereof, reference being had to the accompanying drawings making a part of this specification, in which—

Figure 1 is a side elevation of the drive-wheels of a locomotive with the representation of a boiler in position, and also showing my improvement as applied thereto; and Fig. 2 is a rear-end elevation of the same, except that the rear drive-wheels are omitted and the brake-shoe on one side.

Like letters of reference indicate like parts in each.

Power car-brake apparatus operated by atmospheric or air pressure has been devised and used in connection with the brakes of cars and tenders of locomotives, as described in various patents granted to me heretofore; and, while such apparatus is applicable in many respects to actuating brake-shoes on locomotive drive-wheels, I have devised what I believe to be an improvement particularly applicable to such use, and which I will proceed to describe, in order that others skilled in the art may be enabled to make and use the same.

The ordinary driving-wheels of a locomotive are shown at B B, and the boiler is represented at B'. The receiver for containing compressed air is represented at G. The three-way cock, such as is already in use, is shown at *g*, and the pipe *a* leads from the reservoir through the three-way cock *g*, and, by an air-pipe, *a*¹, leading therefrom, conveys the compressed air through the branch-pipes *a*² to the upright or vertical brake-cylinders *b*, one of which is arranged on each side of the locomotive and preferably at any suitable point between the driving-wheels B B. The escape-pipe is represented at *a*³. The brake-shoes *d* are of the usual or any convenient construction, and are hung forward of their center of gravity, by means of the hangers *d*¹, in such a way that, when not held up against the wheels, in the manner presently to be described, they will, by their own gravity, swing clear and disengage

the wheels; and for this purpose—that is, being conveniently hung, they are recessed on the rear face, as shown in Fig. 1, so that the lower ends of the hangers may play in such recesses. To keep them from spreading apart, they are connected with each other by cross-tie rods *n*. The piston-rod *c* of each brake-cylinder *b* extends downward, as shown, and, by means of a stirrup, *c*¹, it is connected with what is mechanically a bent lever, *e*. This bent lever is pivoted, as at *e*¹, to one of the brake-shoes, such pivoting-point being preferably at the end of the shorter arm of the lever. At the angle *e*² of the lever *e* this lever is pivoted to the end of an arm, *i*, which at its other end is attached to the opposite brake-shoe, as represented in Fig. 1. It will now be obvious that, with the upward stroke of the pistons in each of the brake-cylinders *b*, which is effected by the introduction of compressed air, through the pipes *a*², into such cylinders and below the pistons, the bent lever *e* will be so shifted in position as to throw both the brake-shoes *d* outwardly and against the peripheries of the driving-wheels B; and also that at the beginning of the upward stroke this motion will be rapid, and, as the shoes engage the wheels, it will act with greater power, and the power will be greater with any given pressure in proportion as the pivoting-point *e*² approaches or comes into line with the points at which attachment is made with the brake-shoes, at the moment when the shoes are applied to the wheels.

The operation of the devices for admitting air to the brake-cylinders and providing for its escape therefrom will be readily understood by those skilled in the art.

For the purposes described, I do not limit myself to the use of compressed air, since the same result may be secured by exhausting the air from above the pistons in the brake-cylinders *b*, which exhaustion may be effected in any of the ways known to the art; nor is the vertical position of the brake-cylinders *b* essential, since that may be placed horizontal or be arranged at any other desired point on the locomotive and be connected with the brake-shoes by means of any suitable arrangement of levers which shall constitute the mechanical equivalent of the lever described and have a like operation; also, the brake-shoes *d*, instead

of being between the wheels, may be outside of them, and a lever-connection be made from one to the other, so that, by the operation of the pistons of the brake-cylinders, such brake-shoes shall be applied to the wheels, substantially in the manner set forth, simultaneously and by a lever action.

Instead of compressed air, any suitable elastic fluid may be employed; and, where it is desired to employ steam, it may be done by substituting for the air-pipe *a* a steam-pipe, *m*, leading from the boiler to the three-way cock. In such case an escape-cock, *s*, should be arranged on each cylinder in such position that it may be opened and closed by the engineer through the intervention of the usual stem connection, whenever it may be desired to let off the water of condensation; or an automatically-acting valve may be substituted therefor.

I am aware that it has been proposed to use a wedge on the end of a piston-stem, which wedge, acting on the brake-beams midway between their ends, was intended to be operative in applying the brakes. This device is hereby disclaimed. I regard it as practically inoperative, for the reason that when the brakes are applied with great force there must be some elasticity or "give," to avoid danger of breaking the apparatus. The wedge so applied will not give or yield. By the interposition of a system of levers, as described, the elastic fluid

in the brake-cylinders forms a cushion to take up or provide for irregularities in the brakes or wheels or in their operation, when in contact under great pressure.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. In combination with the drive-wheels of a locomotive, the brake-shoes *d*, a brake-cylinder with a pipe-connection from the main reservoir, and a piston-stem connection to the levers which actuate the shoes, substantially as set forth.

2. The brake-cylinder *b* operating by atmospheric pressure, the locomotive drive-wheels *B*, and brake-shoes *d*, in combination with each other and with the interposed piston-stem and bent-lever connections, substantially as set forth.

3. In combination with a locomotive-boiler and drive-wheels, the steam-pipe *n*, three-way cock *g*, double pipe *a*², brake-cylinders *b*, cocks *s*, and lever-connections to the brake-shoes, substantially as set forth.

In testimony whereof I, the said GEORGE WESTINGHOUSE, Jr., have hereunto set my hand.

GEORGE WESTINGHOUSE, JR.

Witnesses:

E. T. CASSIDY,
G. H. CHRISTY.