2 Sheets—Sheet 1.

F. W. EAMES.

Vacuum-Brake.

No. 208,895. Patented Oct. 15, 1878.

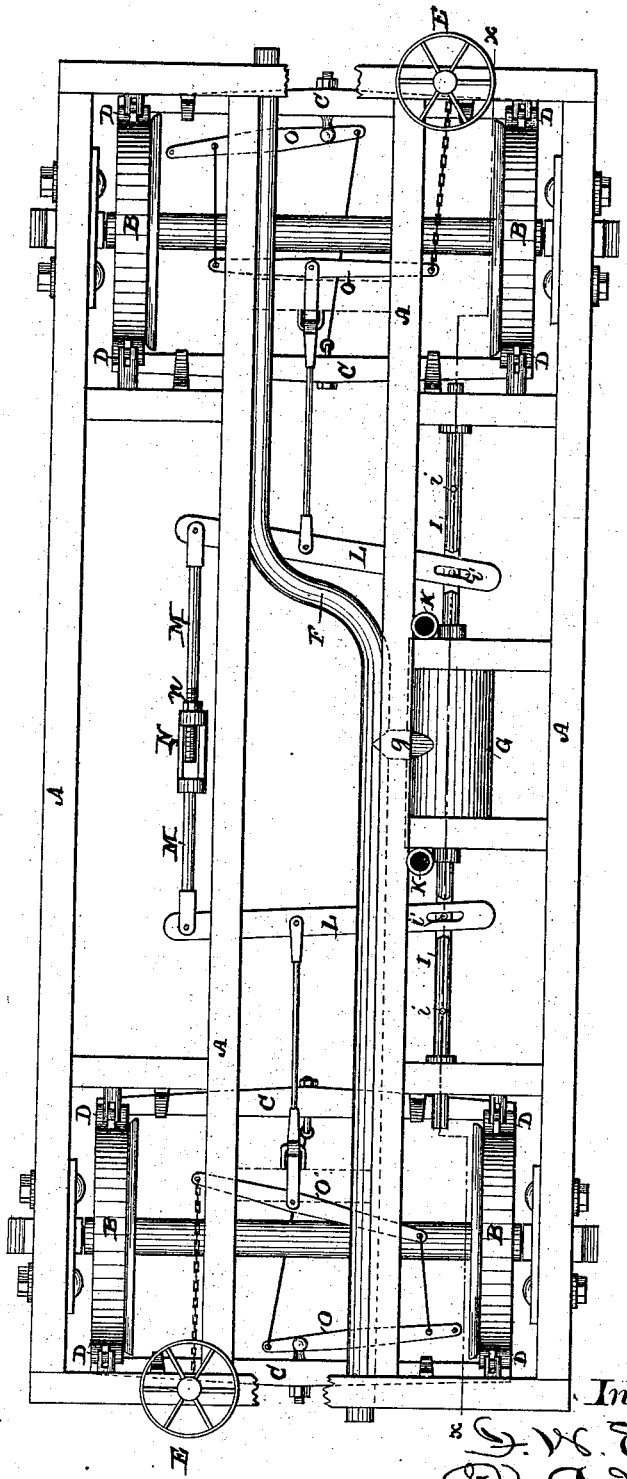

Fig. 1.

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2 Sheets—Sheet 2.

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Fig. 2.

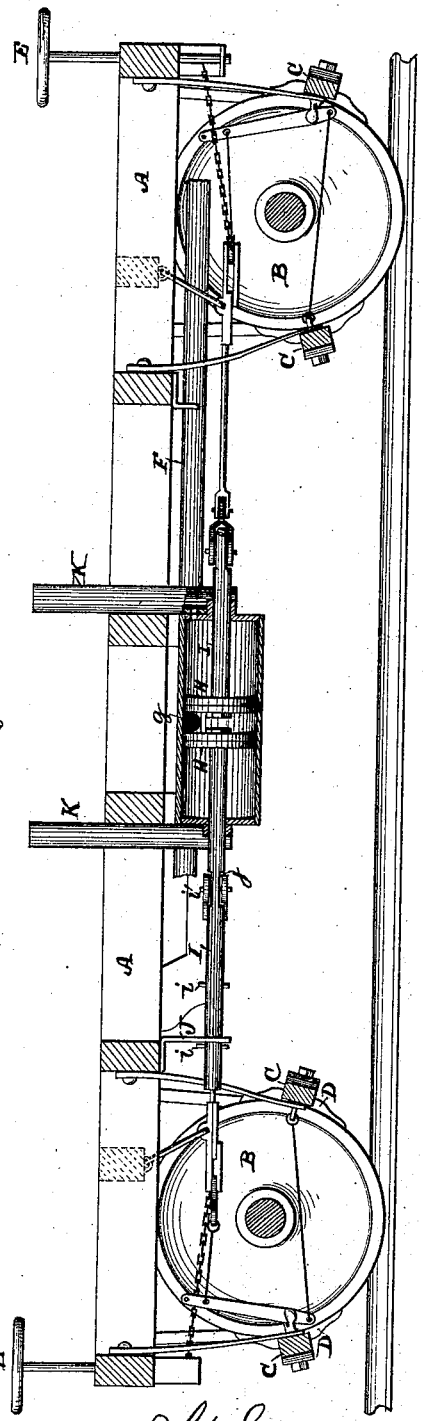
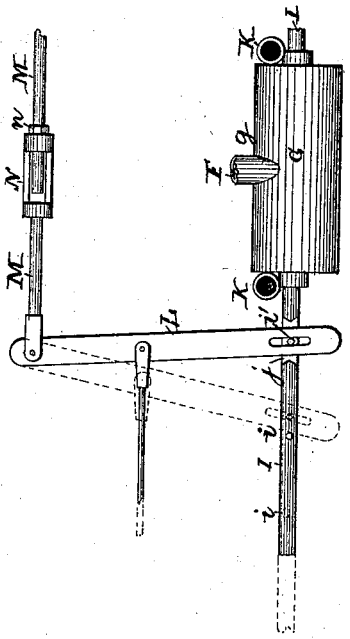


Fig. 3.



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UNITED STATES PATENT OFFICE.

FREDERICK W. EAMES, OF WATERTOWN, NEW YORK.

IMPROVEMENT IN VACUUM-BRAKES.

Specification forming part of Letters Patent No. **208,895**, dated October 15, 1878; application filed February 11, 1878.

To all whom it may concern:

Be it known that I, FREDERICK W. EAMES, of Watertown, in the county of Jefferson and State of New York, have invented certain new and useful Improvements in Vacuum-Brakes; and I do hereby declare that the following is a full, clear, and exact description thereof, 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 the letters of reference marked thereon, which form a part of this specification.

My invention relates to railroad-car brakes, more particularly to power-brakes which are operated by the natural pressure of the atmosphere as opposed to a vacuum, and commonly known as "vacuum-brakes." Such an apparatus usually consists of cylinders or chambers attached to each car, and all connected by pipes led throughout the length of the train.

Each chamber may be fitted with a piston or pistons, the rods of which connect with the brake-levers; or one end of the cylinders or chambers may be in the form of a flexible diaphragm, to which the rod is secured. In either case the withdrawal of the air in the connecting pipes and cylinders, which may be effected by an air ejector or pump located on the locomotive, creates a partial vacuum on one side of the piston or diaphragm, whereupon the natural pressure of the atmosphere on the other side of the piston or diaphragm causes it to move and apply the brakes. The destruction of the vacuum in the pipes and cylinders restores the equilibrium of pressure and releases the brakes.

With such a contrivance, and in order to obtain the best results, I have found that it is highly important that the air which leaks or is drawn into the cylinders should be perfectly dry, particularly so during cold weather, as air which is damp when it enters the cylinders is liable to part with its moisture and leave a deposit of ice within the cylinders, which will, of course, materially affect and impair the working the pistons, if it does not entirely destroy the efficiency of the apparatus.

To correct this defect in the operation of such devices I have devised a means of supplying the cylinders with dry air drawn from the interior of the cars or coaches, which, during the winter months, are generally kept warm enough to heat and expel the moisture from the most humid air.

To accomplish this result, I make the ends of the cylinders or diaphragms which are exposed to the external atmosphere perfectly air-tight, and connect the same with pipes which pass up into the body of the car or coach, as hereinafter more fully set forth.

My invention further consists in certain new devices and combinations of devices. The stroke of the piston-rod is confined within certain limits, so as not to become injured or broken through forcible contact, all as hereinafter more fully set forth.

In the accompanying drawings, Figure 1 is plan view of a car-body, showing my improved vacuum-brake apparatus. Fig. 2 is a vertical sectional view of the same, taken on the line *x x*, Fig. 1. Fig. 3 is a detached view, showing the construction and arrangement of the mechanism for taking up the "slack."

Referring to the parts by letters, A represents the frame-work or car-bed; B, the wheels; C, the brake-bars; D, the brake-shoes, and E the brake-windlasses.

The car shown by the drawings is without trucks; but the arrangement of the parts would be substantially the same in truck-cars.

F represents the air-pipe, secured to and beneath the car-body, and made preferably of the form shown—that is to say, with a bend—so as bring its ends to one side of the center, so as not to interfere or be in the way of the coupling devices. These pipes are to be connected between the cars by means of flexible tubes and hose-couplings, which need not be here described, as they form the subject of other Letters Patent heretofore granted to me.

G is a cylinder, which is also firmly secured to and beneath the frame of the car, and with which the air-pipe F connects, as shown at *g* in the drawings.

H H are two pistons, fitted within the cylinder, and which, being provided with suitable packing, practically divide the interior of the cylinder into three compartments, the relative area of which, of course, varies as the pistons move. The piston-rods I I pass through

the heads or ends of the cylinder, and connect with the brake-levers, as hereinafter described, proper stuffing-boxes being provided, so as to render the cylinder-heads as perfectly close or air-tight as possible.

K K are tubes attached to the ends or heads of the cylinder, and which communicate with the interior thereof by openings *k* formed through the heads. The upper ends of these tubes or pipes K are open, and project into the interior of the car in any suitable or convenient manner.

With such arrangement it will be obvious that the air which gets into the interior of the cylinder must pass in through the pipes K, and is then drawn from the dry air in the interior of the car.

The outer extremities of the piston-rods I pass through supporting-brackets J, which serve both as guides and supports for the rods. The rods I are provided with pins *i i*, arranged at proper distances apart, so that said pins, by coming in contact with the brackets J, act as stops to limit the motion of the rods and prevent the pistons from moving too far in either direction.

The rods I are also formed with grooves *j*, having beveled ends or faces, as clearly shown by Fig. 3 of the drawings, so as to form bearings for the forked or bifurcated ends of the levers L and permit of their oscillation. The ends of said levers next to the rods are slotted longitudinally, as shown by Figs. 1 and 3 of the drawings, and pins *i'*, secured to the rods, pass through the slots of the levers, thereby connecting the rods and levers together without interfering with the motion of either. The other ends of levers L are connected together by means of pivoted rods M, which are coupled together by means of a turn-buckle or male and female screw-coupler, N, and nut *n*.

O represents the brake-levers, which are connected by suitable rods, chains, &c., with the brake-bars, the brake-windlasses, and with the levers L, so that all the brakes are applied simultaneously, either by hand through the use of the windlasses, or through the movement of the piston-rods I, neither method of operation interfering with the other.

When vacuum-power is employed to apply the brakes, the ejector or air-pump withdraws the air from the pipe F and also from that portion of the interior of the cylinder between the pistons. As a result, the natural pressure of the air on the opposite sides of the pistons, which, as before explained, has free admission through the pipes K, forces them inward toward each other, thereby, through their connection with the rods I, drawing the slotted ends of the levers L toward the cylinders, and, through their connection with the brake-levers, bring the brake-shoes into contact with the wheels. The destruction of the vacuum in the pipe F and central portion of the cylinder equalizes the pressure on both sides of the pistons, and thereby releases the brakes.

Now it will be evident to those skilled in the art that, if the relative arrangement of the parts were fixed and unchangeable, the wearing of the brake-shoes, through frictional contact with the wheels, might in time prevent their coming into sufficiently close contact to retard the motion of the wheels.

It is necessary, therefore, to provide means for taking up the "slack," as it is termed, and this I accomplish by adjusting or changing the distance between the ends of the levers L by means of the male and female screw and nut which connect the rods M. When new shoes are provided the distance between the levers L requires to be again adjusted, and this readjustment is at once effected by turning the nut *n*.

I am aware that other and more complex devices have heretofore been used for accomplishing this adjustment, and do not, therefore, broadly claim to be the first to accomplish such adjustment; but I do claim that the same result has never before been accomplished by so simple and efficient means.

I am also aware that railroad-brakes operated by the movement of the pistons in cylinders, the movement of the pistons being caused by the pressure of air, are old and well-known devices; but I am not aware that such devices have before my invention been contrived so as to draw the air from the interior of the car or coach and prevent the admission of the external air to the interior of the cylinders.

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

1. In vacuum-brake apparatus, the arrangement of the air-pipes connected with the operating cylinders or chambers attached to the cars, so that the supply of air is drawn from the interior of the car, substantially as and for the purpose specified.

2. The combination of the stops *i* on the rods I with the brackets J, the latter also serving as supports and guides for the rods, substantially as and for the purpose specified.

In testimony that I claim the foregoing as my own I affix my signature in presence of two witnesses.

FREDERICK W. EAMES.

Witnesses:

D. G. STUART.

EDWIN M. FRAZEE.