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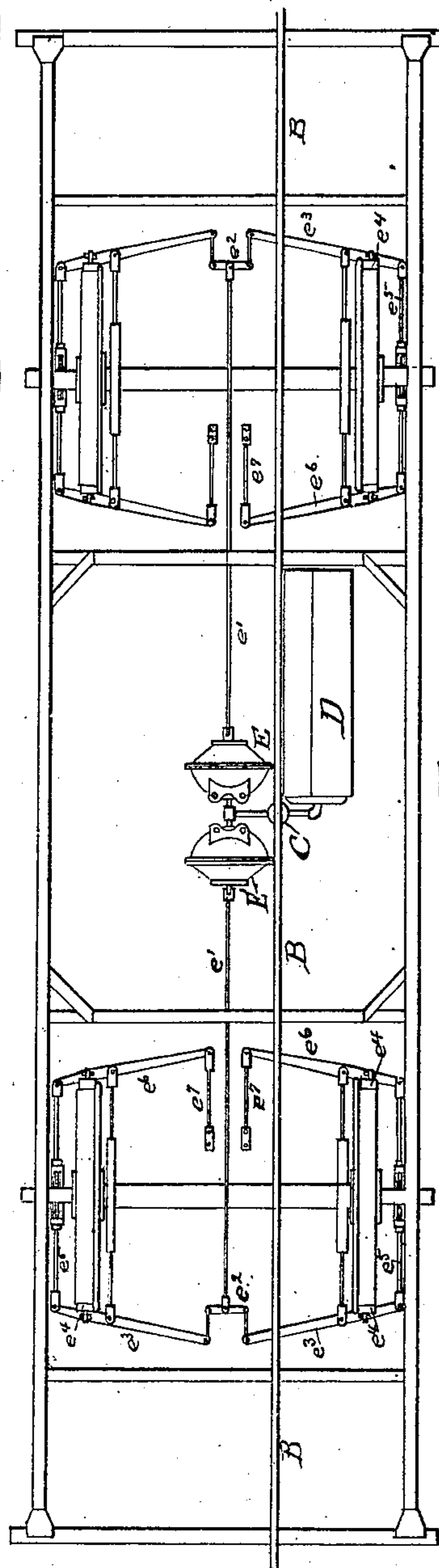
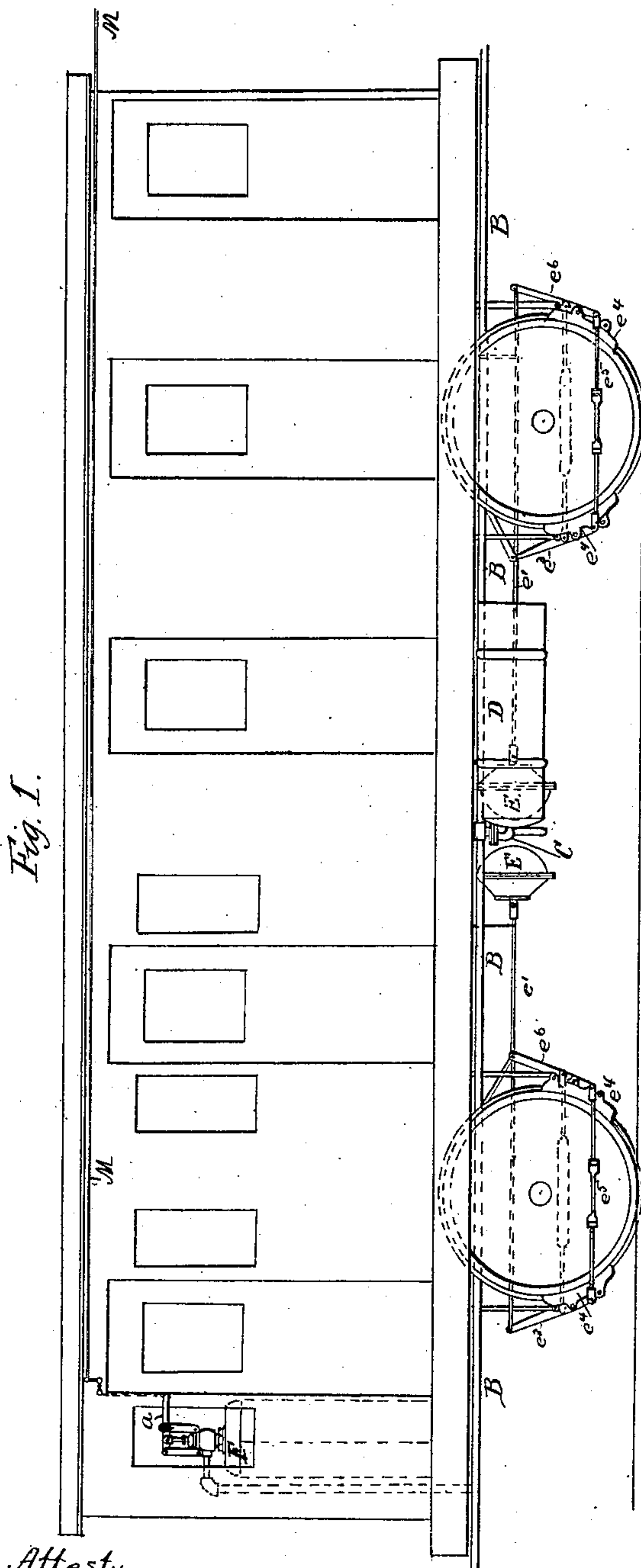
2 Sheets—Sheet 1.

F. W. EAMES.

Vacuum Brake Apparatus.

No. 241,329.

Patented May 10, 1881.



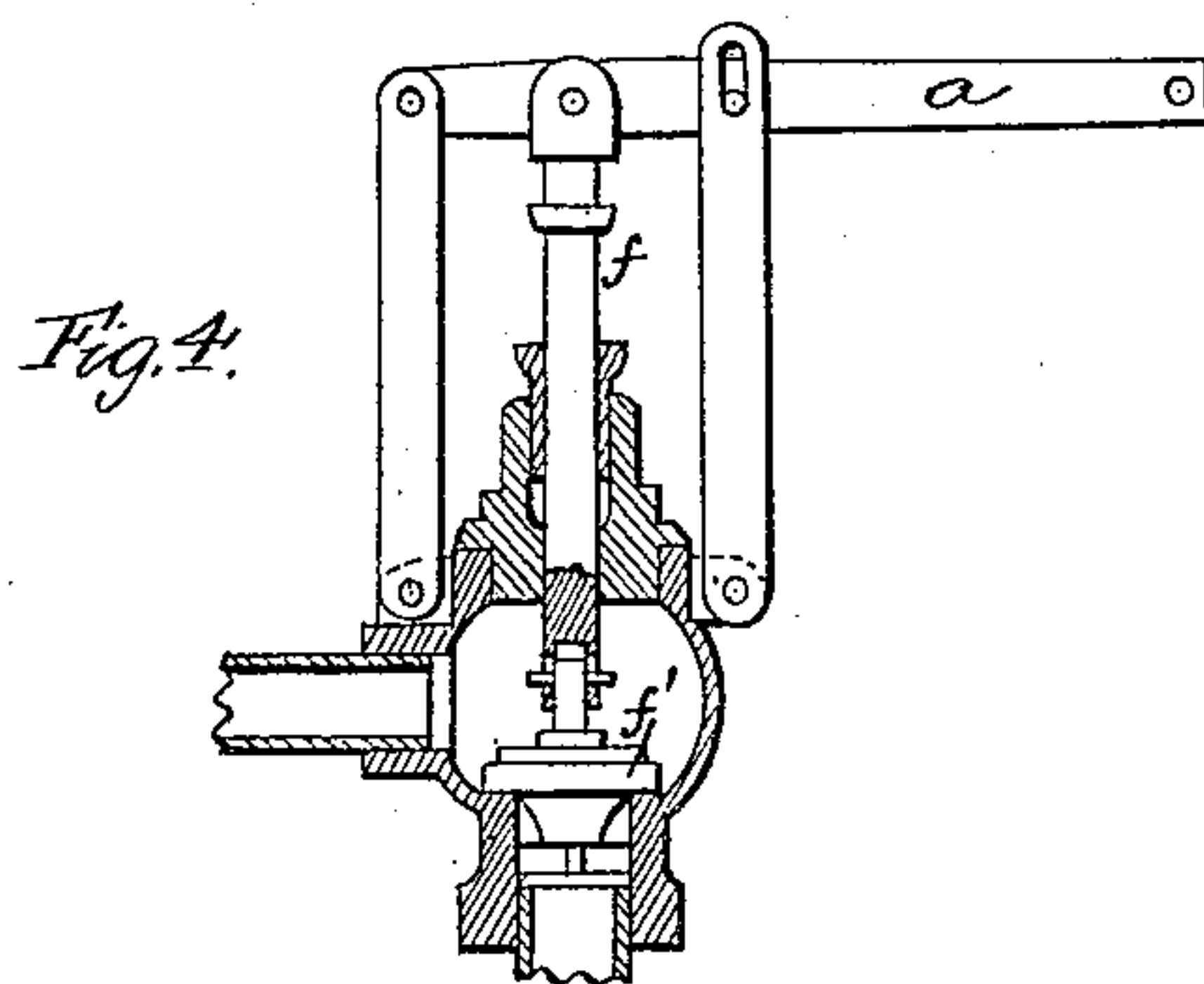
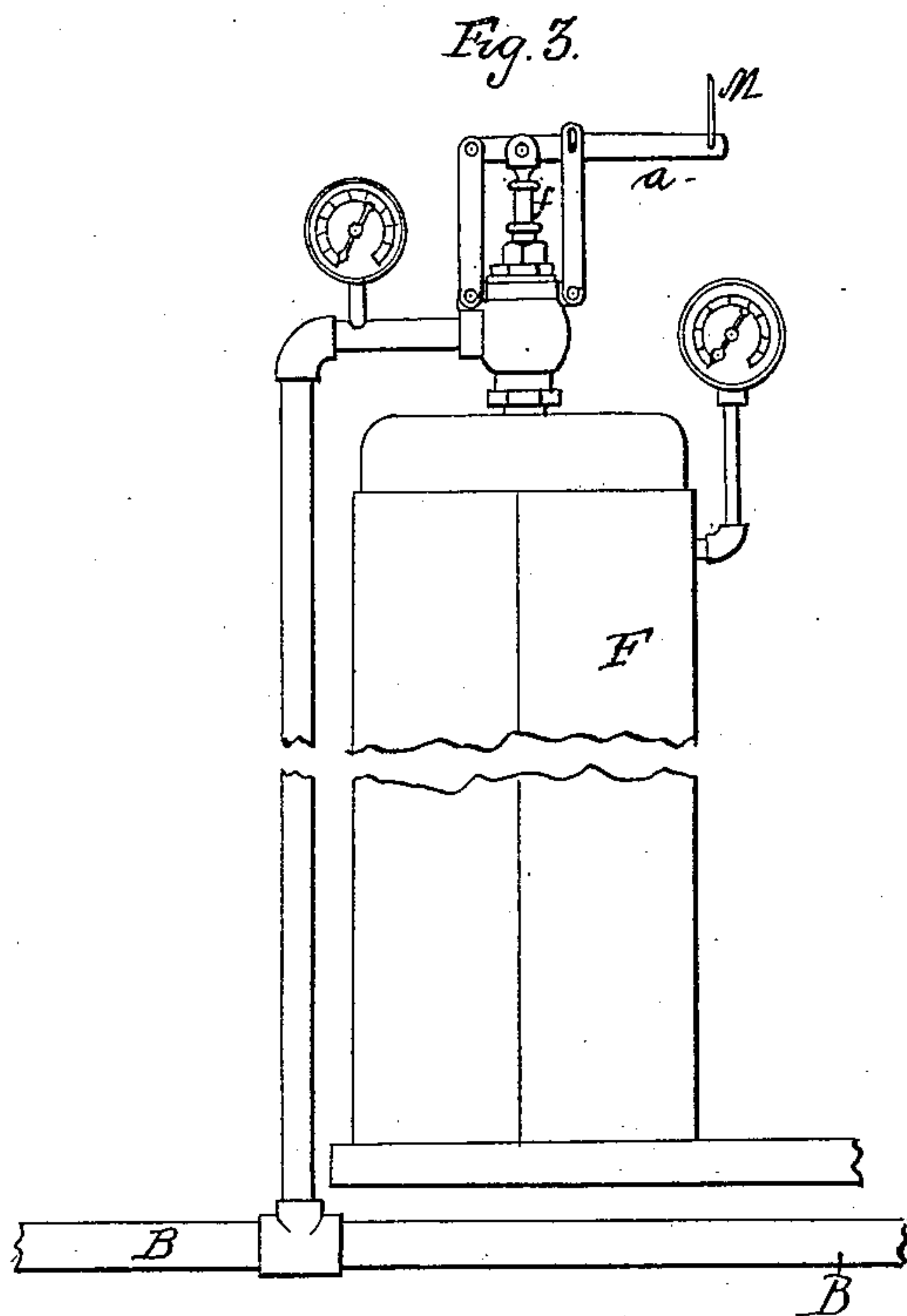
Attest:  
*James O. Marston*  
*R. L. Hamay*

Inventor:  
*F. W. Eames*  
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Attys.

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2 Sheets—Sheet 2.

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Attest:

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# UNITED STATES PATENT OFFICE.

FREDERICK W. EAMES, OF WATERTOWN, NEW YORK.

## VACUUM-BRAKE APPARATUS.

SPECIFICATION forming part of Letters Patent No. 241,329, dated May 10, 1881.

Application filed October 29, 1880. (No model.) Patented in England October 19, 1878.

*To all whom it may concern:*

Be it known that I, FREDERICK W. EAMES, a citizen of the United States, residing at Watertown, in the county of Jefferson and State of New York, have invented certain new and useful Improvements in Vacuum-Brake Apparatus, (Case G;) and I do hereby declare the following to be a full, clear, and exact description of the invention, such as 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 or figures of reference marked thereon, which form a part of this specification, the same having been patented to me by the government of Great Britain by Letters Patent No. 4,172, dated October 19, 1878.

My invention relates to railroad-car brakes and the means for operating them.

My present invention consists, for these purposes, in a novel construction and arrangement for setting the brake-shoes in action.

My invention also consists in a reservoir for the storing of vacuum-power upon one of the cars in the rear of the train, and provided with a valve communicating with the brake-pipe and a cord running throughout the train, whereby a vacuum or partial vacuum will be produced in the brake-pipe (when it is desired to set the brakes) sufficient to bring into communication, through a peculiarly-constructed valve, the vacuum-chamber and flexible or collapsible vessels under each car of the train, whereby the brakes will be applied. This action will take place either when the cord is brought under tension by a passenger or train-man, or automatically through the severance of the train.

Figure 1 represents a side elevation of a car to which my improvements have been applied, and Fig. 2 a plan view of the same, the body of the car being removed. Fig. 3 represents an elevation of the reservoir or large vacuum-chamber, situated at or near the rear of the train. Fig. 4 represents a central vertical section of the valve controlling communication with the reservoir indicated in the last figure.

In the drawings, B represents the brake-pipe, which, by means of flexible coupling-pieces, is made continuous throughout the train, and it communicates at the one end with

an ejector located on the locomotive, and at the other end to the reservoir F, shortly to be described. The pipe B of each car is fitted with a valve, C, which is so constructed as to open up a passage between the pipe B and the vacuum-chamber D, and likewise to bring into communication with pipe B a pair of flexible vessels or cylinders, E E', to each of which is connected the levers of the brake apparatus. The valve C, moreover, opens a communication between the vacuum D and the vessels E E', and it is by the opening of this communication that the brakes are put in immediate action. The motions of the diaphragms of the flexible vessels E E' (produced by exhaustion) are transmitted to the brake-shoes which engage the wheels, as follows: A rod, e', from the flexible vessel E', extends longitudinally of the car to a yoke, e<sup>2</sup>, each end of which being connected to a rock-lever, e<sup>3</sup>, which is pivoted to a pendent brake-block, e<sup>4</sup>. Each of these levers e<sup>3</sup> is coupled at its outer end by an adjustable tension-rod, e<sup>5</sup>, to the outer end of a corresponding lever, e<sup>6</sup>, also pivoted to a pendent brake-block, e<sup>4</sup>, which, with that just mentioned, forms a pair for gripping a running-wheel between them. The inner end of this second lever is linked to a frame of the car by a rod, e<sup>7</sup>. Thus (the like arrangement being provided for both sides of the car) the two pairs of brake-blocks will be connected with the flexible vessel E'.

Instead of each pair of brake-shoes having between them but a single wheel, the connecting-levers of the brake-shoes may be of sufficient length, and modified in their construction, so that the pair of brake-shoes may embrace two or more wheels in close proximity.

In order to provide for automatically or otherwise applying the brakes to that portion of the train which has been or may be disconnected from the engine, I fit in the guard's car, or in the rear car, an exhaust-chamber, F, which I connect with the exhaust-pipe B, and by means of a lever, a, as shown, which may be operated by the passengers or train-men, or automatically, I bring the brake apparatus into connection with this exhaust-chamber, and thus set the brakes in action. To the lever a is pivoted the stem of a puppet-valve, the raising of which will open communication between the



pipe B and the chamber F. By reference to Figs. 3 and 4 the action of this valve will be clearly understood.

In these figures  $f$  is the valve-stem, pivoted to the lever  $a$ , and  $f'$  the puppet-valve. This valve is connected to its stem by a slot-and-pin coupling, and the motions of the lever  $a$  are limited, so as to prevent the valve being held down to its seat by the valve-stem. By this arrangement the valve is free to rise and fall under the varying pressures of air in the chamber F and the pipe B, and thus secures the degree of exhaustion attained in the other parts of the brake apparatus by the inter-

mitted action of the exhaust apparatus. M is a cord attached to the lever  $a$  and running throughout the length of the train, the other end of which is attached to the hand-lever for turning on steam to the ejector, in such a manner that when brought under tension it will shift the valve to an open position and set the ejector in action. In like manner the valve  $f'$  attached to the lever  $a$  will be opened, when air will rush from the brake-pipe into reservoir F.

The operation is as follows: Under ordinary circumstances, when it is desired to apply the brakes the ejector on the engine is set in action. Immediately the effect of this exhaustion in the brake-pipe B is felt it opens communication between vacuum-chamber D and flexible vessels E, when the air from the vessels will rush into the vacuum-chamber, thereby causing an inward movement of the diaphragms of the vessels E. Thereupon its coupling-rod will cause the yoke to act upon the two levers connected therewith and simultaneously draw into action the brake-blocks to which those levers are pivoted. These brake-blocks will now form a fulcrum for the levers  $e^3$ , and the continued motion of the levers will, through their tension-rods, pull upon the levers upon the opposite sides of the wheels, and thereby bring the other brakes into action. So soon, however, as air is admitted to the collapsible vessels E E' the brakes will be released from pressure. The like effect, it will be understood, will take place throughout the length of the train, all the brakes being thrown into action simultaneously and simultaneously released. When, however, in cases where the train has been accidentally severed, as by the breaking of a coupling, the brakes will be automatically set in action to both portions of the detached train by the tension thus brought upon the cord M, the effect of which will be to lift valve  $f'$  and turn on steam to the exhaust-

on the locomotive, as before set forth. Immediately this action takes place the air in pipe B, in the rear portion of the train, will rush into reservoir F, causing a vacuum, or partial vacuum, in the pipe sufficient to operate valve C, so as to open up a passage between chamber D and vessels E, when the brakes are applied in the manner before set forth. In like manner that portion of the train to which the engine is attached having had its exhaust apparatus set in action, the same action and effect will take place as before indicated.

The cord M may be brought under tension by the passengers or train-men, when it is desired to stop the train, which act will also set the ejector in action and open communication with the reservoir F, when the same operation described will take place.

Having described my invention, what I claim is—

1. The reservoir F, located at or near the rear of the train, for the purposes described, and provided with a valve adapted to be operated by the vacuum in the brake-pipe, and also by a cord, M, running the length of the train, substantially as set forth.

2. The cord M, attached at one end to the valve of the ejector on the engine, and at the other to a valve communicating with the reservoir F on the rear of the train, whereby, in the event of the severance of the train, the brakes of both sections of the train will be automatically applied, substantially as set forth.

3. In a brake apparatus, the combination of the cord M, connected with the valves of the exhaust apparatus on the engine and the reservoir F, with cords or suitable apparatus for operation by hand, substantially as set forth.

4. In a brake apparatus, the valve  $f'$ , having its valve-stem provided with a slotted link-and-pin coupling, and its valve-lever  $a$ , having a limited motion, for the purpose substantially as herein set forth.

5. The brake-gear herein described, connected with a piston or diaphragm of a fluid-pressure-brake apparatus, consisting of rod  $e'$ , yoke  $e^2$ , levers  $e^3$ , brake-shoes  $e^4$ , tension-rods  $e^5$ , constructed as described, and levers  $a^6$ , all operating in the manner substantially as set forth.

In testimony whereof I affix my signature in presence of two witnesses.

FRED. W. EAMES.

Witnesses:

CHAS. D. BINGHAM,  
E. D. EAMES.