

(No Model.)

3 Sheets—Sheet 1.

F. W. EAMES.
Vacuum Brake Apparatus.
No. 241,327. Patented May 10, 1881.

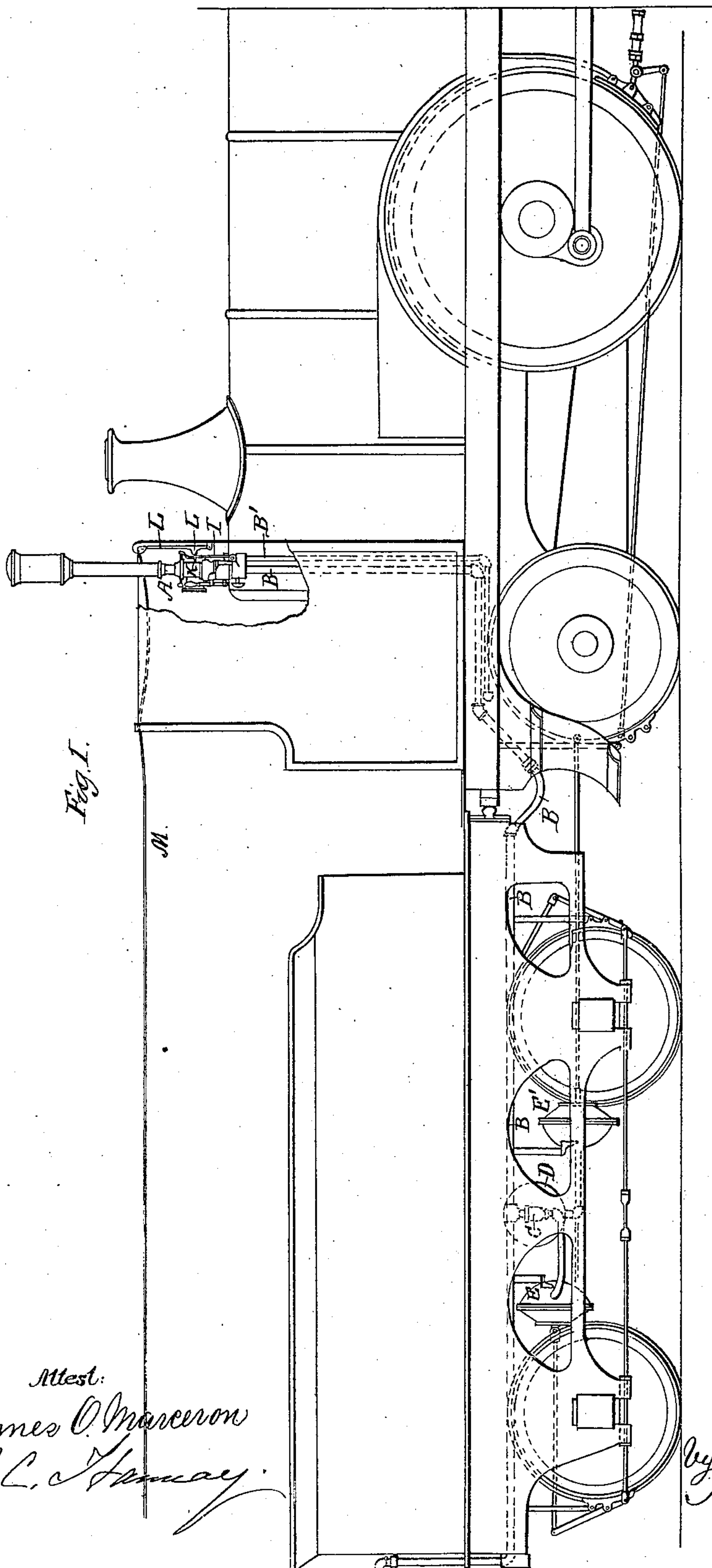
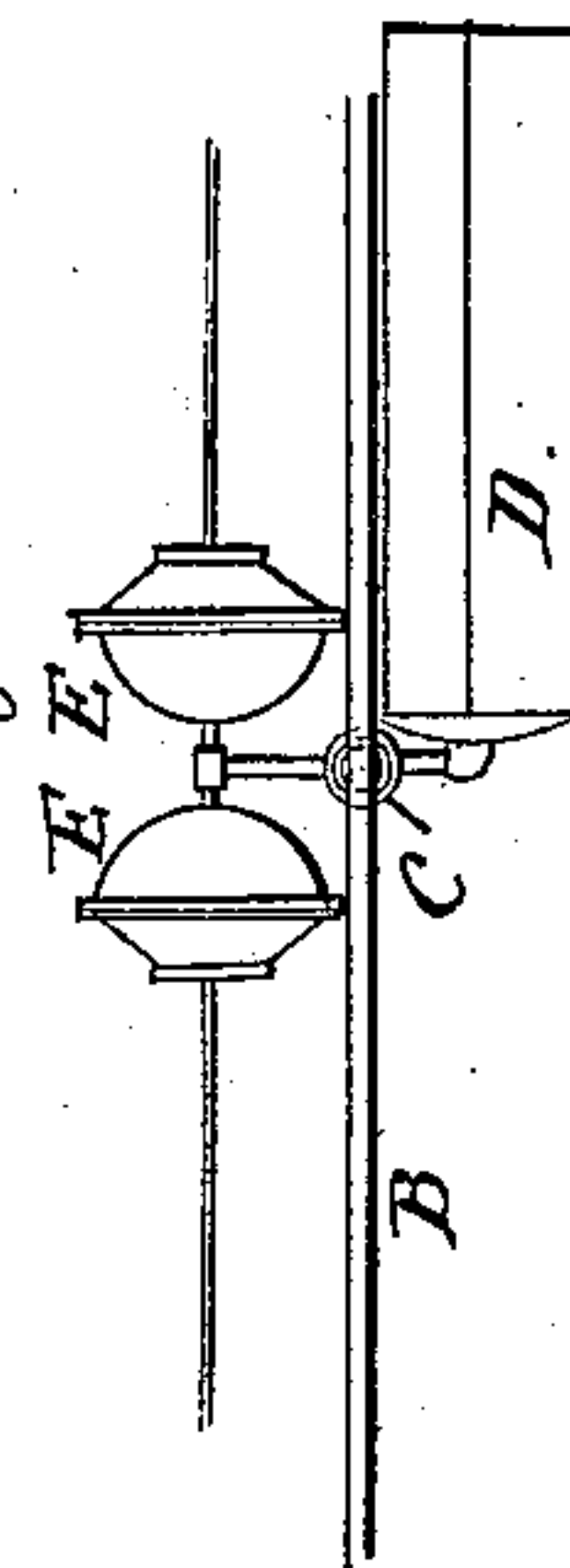


Fig. 1.

Fig. 8.



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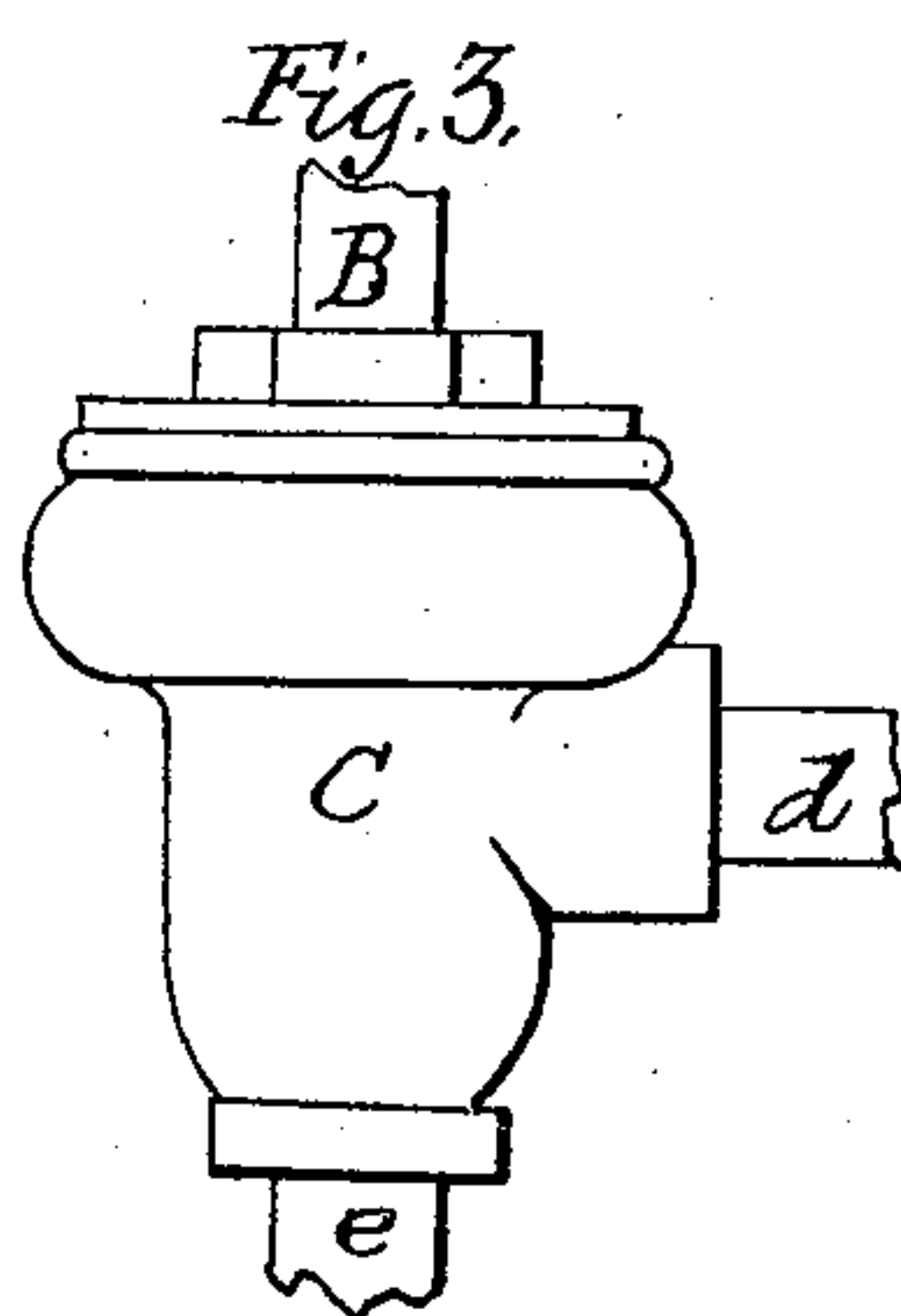


Fig. 2.

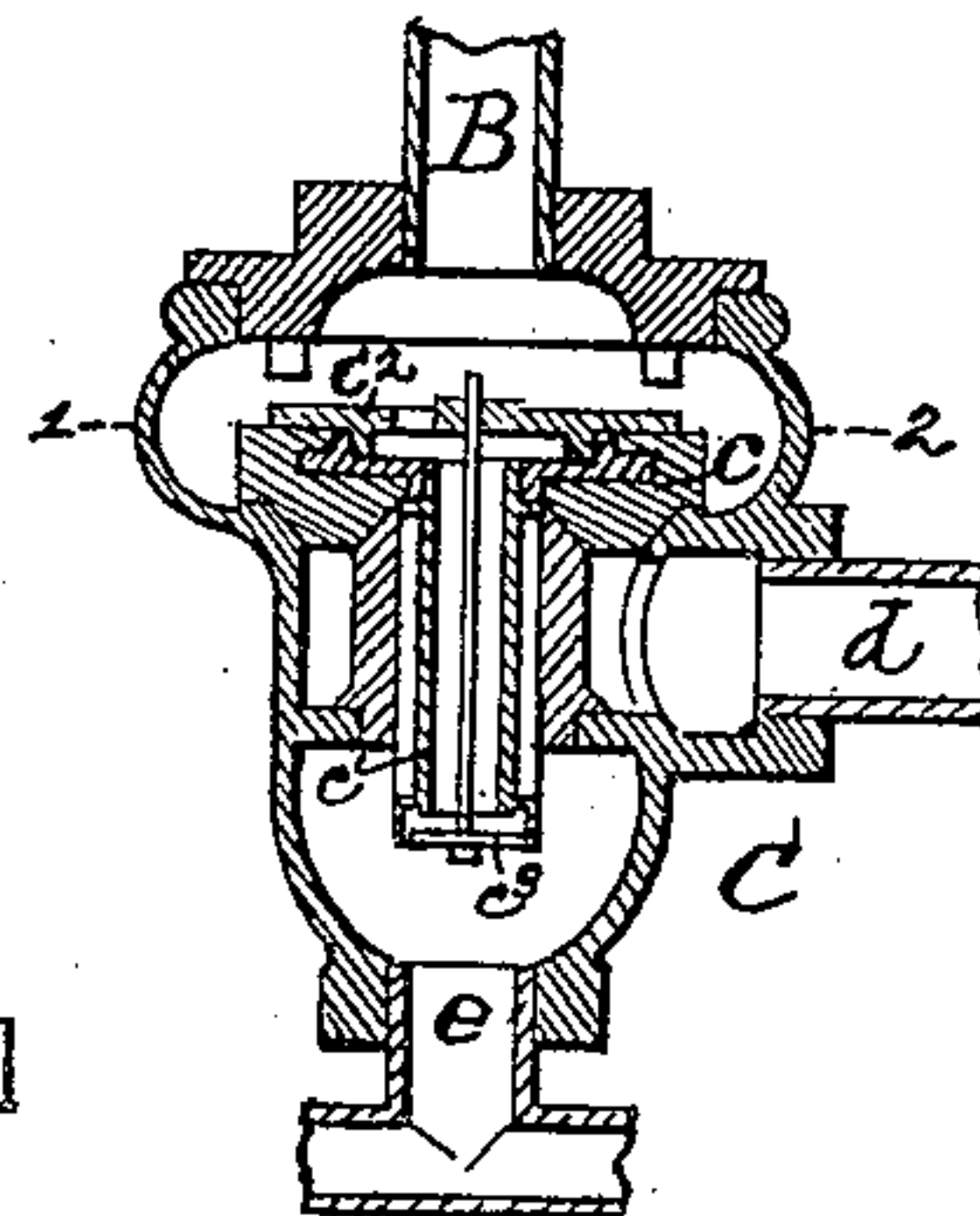
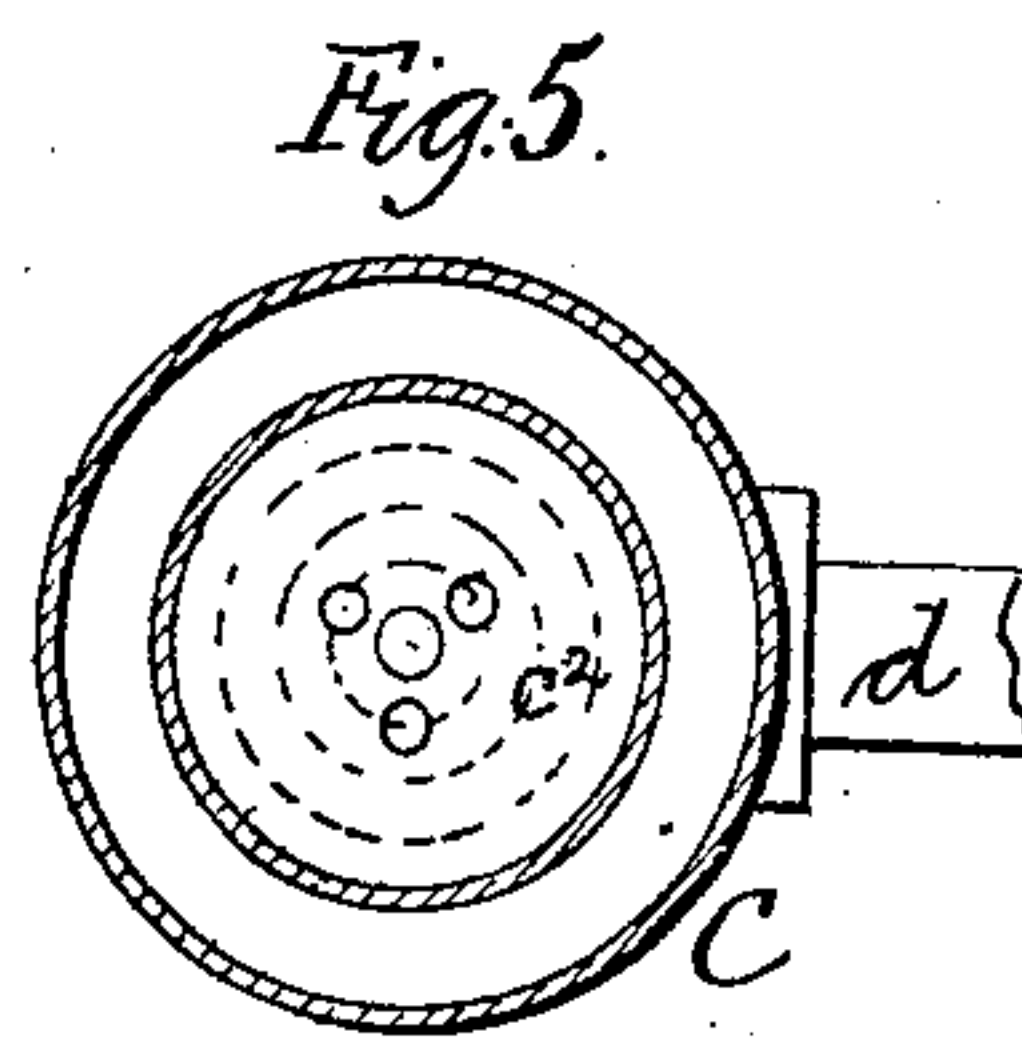
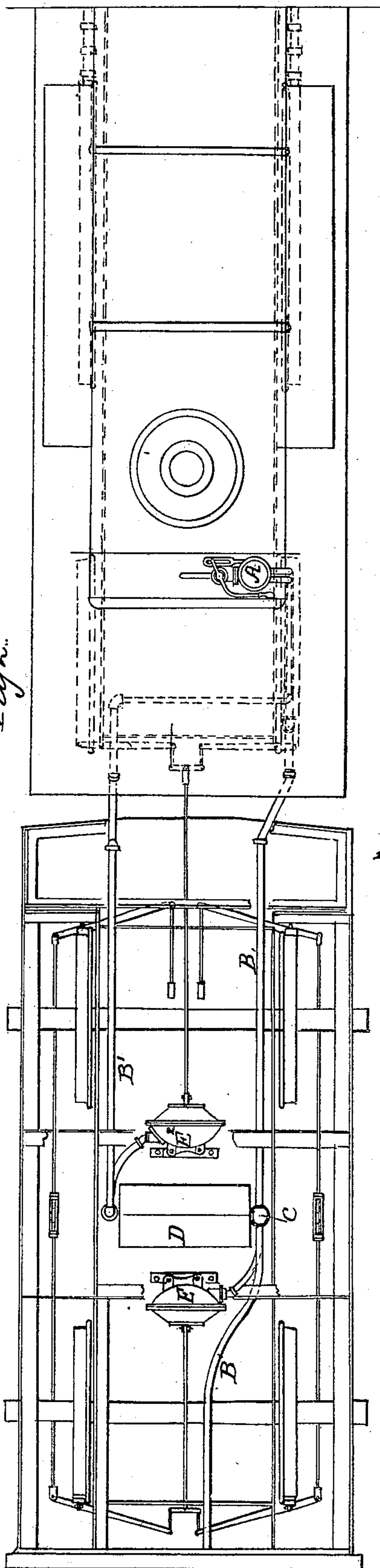


Fig. 4.

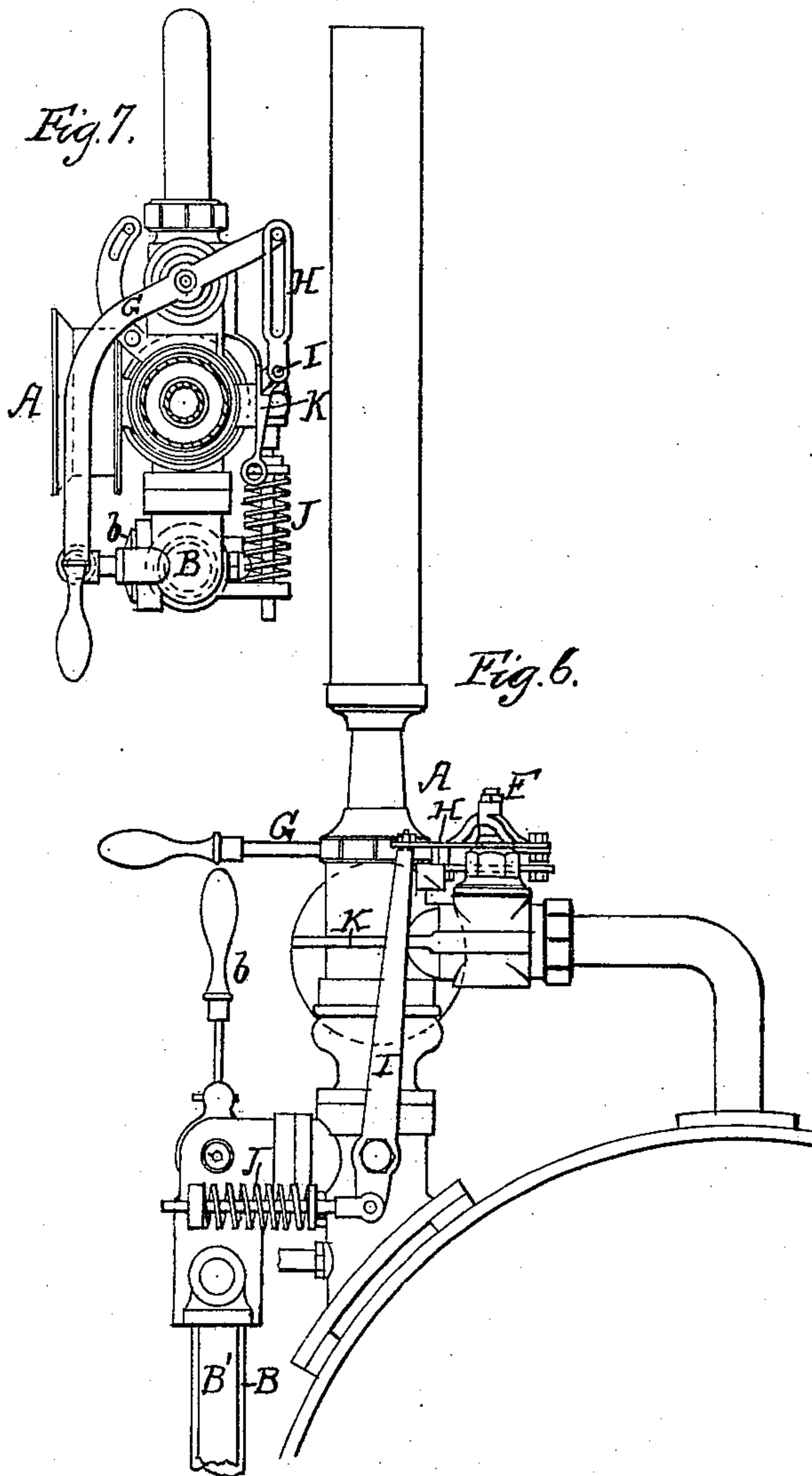
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3 Sheets—Sheet 3.

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No. 241,327. Patented May 10, 1881.



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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. 241,327, 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 E;) 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 vacuum-brake apparatus; and it consists in the arrangement of a series of vacuum-chambers in which a vacuum is constantly maintained, and having communication by means of a peculiarly-constructed valve with a collapsible vessel or vessels used to apply the brakes, and with an air-ejector through a continuous brake-pipe, the operation of which is such that after the vacuum-chamber has been charged and the ejector not in action the communication between the collapsible vessel and the brake-pipe is kept open and connection with the vacuum-chamber cut off, in which condition the brakes are out of action. When, however, it is desired to apply the brakes, the air-ejector of the brake-pipe is set in action to exhaust the air from the pipe, which action closes communication momentarily between the brake-pipe and the collapsible vessel, whereby a valve is unseated, throwing open communication between the vacuum-chamber and the collapsible vessel, and also with the brake-pipe, when the air contained in the flexible vessel rushes into the vacuum-chamber and the brakes are applied. Continued action of the ejector of the brake-pipe will again serve to exhaust the reservoir or vacuum-chamber, in readiness to again exhaust the collapsible vessel, and when air is admitted to the brake-pipe its action is such upon the valve as to cut off connection with the vacuum-chamber and open communication with the collapsible vessel, whereby the brakes are taken off and the parts are again in the same relative position first indicated.

My invention also consists in providing the controlling-valve of the air-ejector with a device by means of which it can be operated by the passengers or guard in any car of the train, or upon the accidental severance or derailment thereof, and at the same time without interfering with the proper manipulation of said valve by the engineer.

Figure 1 represents a side elevation of a locomotive-engine and tender to which my improvements have been applied; and Fig. 2, a plan view of the same, the body of the tender being removed. Fig. 3 represents an outside elevation of the valve controlling communication from the brake-pipe with the vacuum-chamber and collapsible vessel or vessels. Fig. 4 represents a vertical central section of the same, and Fig. 5 a horizontal section taken through the line 1 2 of Fig. 4. Fig. 6 represents an elevation of the ejector and the device for turning on steam automatically or by hand, and Fig. 7 a top-plan view and partial section of the same. Fig. 8 illustrates the arrangement of brake-pipe, reservoir, valve, and operating-vessels upon one of the cars.

In the drawings, A represents an air-ejector, by which a vacuum or partial vacuum is produced, and is mounted upon the engine within easy reach of the engineer. The ejector here shown is one heretofore patented to me; but any air-ejector suitable for the purpose may be employed, so that its valve-lever can be adapted to work in connection with my device for turning on steam independently of the control of the engineer. In connection with this exhaust apparatus or air-ejector A is a brake-pipe, B, which, by means of flexible couplings between the cars, is made continuous throughout the train. The pipe B of each car is fitted with a valve, C, which is so constructed as to open up a passage between pipe B and vacuum-chamber D, and likewise to bring into connection with pipe B a pair of flexible vessels, E E, to each of which are connected the two pairs of brake-blocks for acting upon the car-wheels. The valve C, moreover, opens communication between the vacuum-chamber D and flexible vessels E E, and it is by the opening of this communication that the brakes are applied. The valve C is constructed with an annular passage, which communicates laterally with the

exhaust or vacuum chamber D by a pipe, *d*. The upper part of this annular passage is open, and its lips are inclined, so as to form a seat for an annular double coned valve, *c*, and above the valve the exhaust-pipe B communicates therewith. The stem *c'* of this valve is hollow, and it is provided with feathers, which serve to guide it in its vertical motion, and forms air-passages on the outside of the valve-stem. Over the hollow valve-stem is fitted a cover, *c*², which is formed with holes. This cover forms a guide for a light pendent disk-valve, *c*³, which serves to cover the lower end of the valve-stem. Below this hollow valve-stem the valve communicates by a pipe, *e*, with the flexible or collapsible vessel or vessels E E. The annular valve *c* is, by preference, faced with india-rubber to secure an air-tight fit, and its normal position is upon its seat, as shown in Fig. 4. The light disk-valve *c*³, on the contrary, when not in action, leaves open an air-passage through the valve-stem to the exhaust-pipe B.

In Figs. 6 and 7 are represented, on an enlarged scale, the device used for turning on steam to the ejector by the passengers, trainmen, or through accidental severance or derailment of any one of the cars.

The supply of steam to the ejector is regulated by a valve attached to a spindle, F, which carries at its upper end a hand-lever, G; and for the purpose of working this ejector automatically, or without the assistance of the engineer, I provide the hand-lever G with a tail-piece extension, Figs. 6 and 7. From this tail end projects a pin, that enters and is free to play within a slotted horizontal link, H, which is jointed to the upper end of a vertical rock-lever, I, where it is capable of a limited horizontal oscillating movement. This rock-lever I has for its fulcrum a pin projecting from the ejector-casing. This lever I receives through its shorter arm, from a coiled spring, J, a tendency to pull upon the link H, and thereby to open the valve and admit steam to the ejector. To prevent this action a spring-latch, K, is provided, which serves to lock the lever I and hold it back against the pressure of its spring. Opposite this spring-latch K is mounted a vertical lever, L, (see Fig. 1,) formed with a projection which bears against the latch K, and when drawn forward will press the spring-latch out of action and allow the spring J to rock the lever I and turn on the steam. This lever L is pivoted to any convenient point, and its free end is connected with a cord, M, which is led along the train from car to car to the end of the train, where it is secured. At the end of the train a large reservoir may be located, if desired, stored with vacuum-power, and communicating with the pipe B by a valve. This valve may be attached to the cord M, whereby, in case of dismemberment of the train accidentally, the cord M will shift both the steam-valve of the ejector A and the valve of the reservoir at the rear of the train, whereby a vacuum or partial vacuum will be created in both sections

of the dismembered train, such as will be sufficient to operate valve C so as to open communication between chamber D and vessels E E, as before described. This vacuum-chamber at the rear of the train is more particularly pointed out in another application for a patent now pending.

B' represents a brake-pipe adapted especially to apply a system of brakes to the wheels of the locomotive-engine. This pipe B' communicates with the ejector A at one end and with the flexible vessel E' at the other, and is provided at its junction with the ejector with a valve, by means of which connection with the ejector can be closed or opened at pleasure by the engine-driver. The flexible vessel E', which actuates the locomotive-brakes, is operated, in the usual way, by being exhausted directly from the ejector.

The operation of my invention is as follows: When it is desired to put on the brakes the exhaust apparatus or ejector A is set in action. This will cause the air to be drawn through the pipe *e* from the collapsible vessels E E, in connection with the brakes; but immediately this action is felt the disk-valve *c*³ will be closed and the annular valve *c* will rise from its seat. This rising of the annular valve will bring the collapsible vessels into direct communication with the vacuum-reservoir D, the air from vessels E passing up outside the hollow stem into the annular passage before mentioned, and thence by the pipe *d* to the exhaust-chamber D, the effect of which will be to apply the brakes instantly, and the continued action of the exhaust apparatus will restore and maintain the vacuum in the chamber D. The like effect will be produced simultaneously in the brake apparatus of each car of the train. For throwing off the brakes it will only be necessary for the engine-driver to admit air to the brake-pipe through a valve, *b*, for that purpose, and to stop the action of the air-ejector. The annular valve C will then drop onto its seat, thereby cutting off communication between the chamber D and vessels E E, and air will pass down the hollow stem *c'* of the valve to the vessels E E. Supposing, now, the engine, through the breaking of a coupling or other cause, to part from a portion of the train, tension will thereby be put upon the cord M sufficient to draw back the spring-latch K and release the lever I with its slotted link H. The lever I being now free to follow the impulse of its spring J, it will through the link act upon the hand-lever G, before described, and set the ejector in action, thereby bringing the brakes of those cars which are still attached to the engine into contact with the running wheels. The like effect will be produced when tension is applied to the cord by a passenger or the guard who wishes from any cause to arrest the progress of the train.

Instead of employing the flexible vessels E, a cylinder and piston might be substituted.

Having described my invention, what I

claim as new, and desire to secure by Letters Patent, is—

1. In a vacuum-brake apparatus, the combination of chamber D, vessel or vessels E, pipe B, and valve C, so arranged with respect to each other that in the normal condition of the apparatus pipe B and vessels E communicate with each other and the chamber D is cut off, but upon the creation of a vacuum or partial vacuum in pipe B it will serve to open communication between chamber D and vessels E, for the purpose substantially as set forth.

2. In a brake apparatus, valve *c*, hollow valve-stem *c'*, and valve *c*³, arranged for operation in the manner and for the purposes set forth.

3. In a brake apparatus, valve C, consisting of valve *c*, seating downward, covering the annular passage leading to the pipe *d*, and provided with a hollow valve-stem, *c'*, having longitudinal air-passages on the outside and inside thereof, and the valve *c*³, seating upward and covering the passage through the valve-stem, substantially as set forth.

4. In a brake apparatus, the valve *c*, hollow valve-stem *c'*, having longitudinal air-passages on the inside and outside thereof, and valve *c*³, in combination with pipes B, *d*, and *e*, whereby the passages to said pipes are controlled in the manner substantially as set forth.

5. In a brake apparatus, the device for turning on steam to the ejector apparatus, consisting of hand-lever G, link H, lever I and its spring J, latch K, and cord M, substantially as specified.

6. In a brake apparatus, the device for turning steam onto the ejector apparatus, either automatically through the severance or derailment of the train or by the act of the passengers or train-men, consisting of hand-lever G, link H, lever I and its spring J, latch K, lever L, and cord M, substantially as specified.

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

FRED. W. EAMES.

Witnesses:

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