(No Model.)

E. D. EAMES.

EJECTOR FOR VACUUM BRAKES.

No. 341,894. Patented May 18, 1886.

Fig. 1.

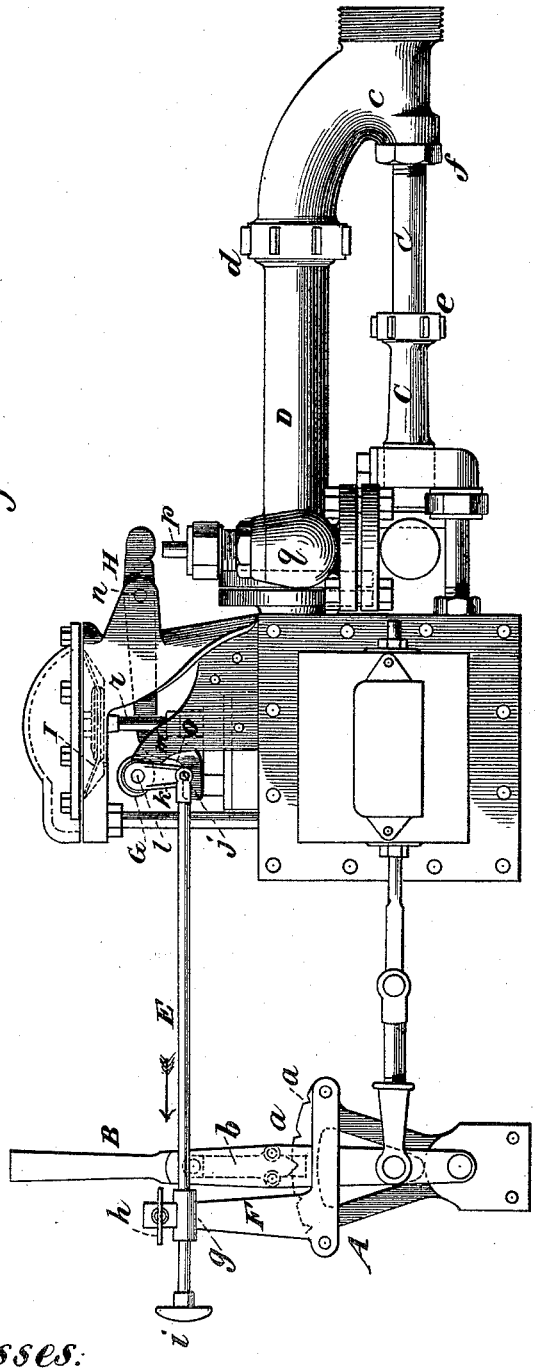
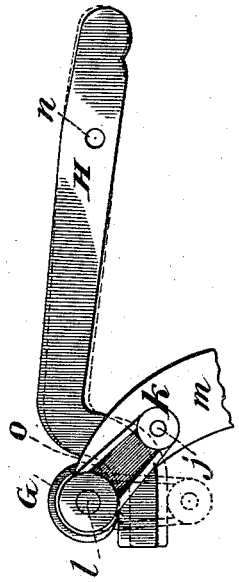


Fig. 2.



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UNITED STATES PATENT OFFICE.

ELISHA D. EAMES, OF WATERTOWN, NEW YORK.

EJECTOR FOR VACUUM-BRAKES.

SPECIFICATION forming part of Letters Patent No. 341,894, dated May 18, 1886.

Application filed August 31, 1885. Serial No. 175,780. (No model.)

To all whom it may concern:

Be it known that I, ELISHA D. EAMES, of Watertown, in the county of Jefferson and State of New York, have invented certain new and useful Improvements in Ejectors for Vacuum-Brakes, of which the following is a specification, reference being had to the accompanying drawings, and to the letters of reference marked thereon.

This invention relates to an improvement on the ejector described in Letters Patent No. 241,635, granted May 17, 1881, to F. W. Eames, to which reference should be had. In the use of the ejector described in that patent the valve which controls the admission of steam around the larger ejector-nozzle is connected indirectly to a diaphragm forming the lower part of a chamber in which, under some circumstances, a vacuum or partial vacuum is established, and when the air is exhausted from the said chamber the diaphragm is forced upward and inward, which effects the closing of the steam-valve. With this arrangement the said valve is either fully open or entirely closed, no means being described or shown in the patent whereby the engineer can control the lift of the valve or effect any adjustments. With my improvement, as hereinafter described, the lift of the said steam-valve may be adjusted so that the brake may be held on a long grade with the application of as much power as may be required, and no more.

In the accompanying drawings, forming a part hereof, Figure 1 is an exterior elevation of the ejector, and Fig. 2 is a detached detail on an enlarged scale.

Similar letters of reference indicate similar parts in the respective figures.

Instead of placing the ejector in the cab of the engine, as in the patent referred to, I place that device outside of the running-board of the engine, or in any convenient place. It was necessary to place the ejector of Patent No. 241,635 in the cab, and it has proved difficult to get the exhaust-steam away from the machine. In my ejector the steam and air leave the same in a line direct with the exhaust-tube and continue with but one turn into the smoke arch or stack of the locomotive, thus obviating all noise and relieving the apparatus freely from steam or water. The vacuum is not interfered with by abrupt turns in the pipe. By the arrangement described I avoid the use of a muffler and the cloud of steam which attend the use of an ejector blowing through the floor of a cab.

The quadrant A is placed in the cab, near the engineer's hand. The quadrant is provided with notches *a*, which are used, in connection with the catch *b* of the lever B, to set the valve (hereinafter described) in the proper position when the lever has been given the required throw.

C is the small ejector-tube which runs straight into the end *c* of the main escape-pipe D, which is curved to meet the small ejector-pipe C.

The object in curving the main escape-pipe and straightening out the small ejector-pipe is to prevent water of condensation remaining in the large ejector-tube and finding its way into the plain brake-pipe (not shown) under the train, and also to bring the main long exhaust-pipe down to the running-board of the engine, where it will be out of the way and easily secured. The curve of the main escape-pipe also facilitates the making of the necessary connections in this form of ejectors. The connection between the curved end *c* and the ejector-tube D, which forms the main escape-pipe, is made by means of a right and left spanner-nut, *d*. After the joint has been made by the nut *d* the threaded end of the tube C of the small ejector is turned or screwed back until the ends of the two parts of the pipe C meet, when the spanner-nut *e* of the small ejector-pipe is turned and the check-nut *f* tightened. By these means a tight joint is made, which can be broken at any time and easily restored.

My ejector-valve is of the ordinary flat "D" construction, and needs no description herein, and it has a valve-seat and ports, such as are found in the common steam-engine. The valve-seat is raised in the ordinary manner, thus making it possible to fit the valve-face to the valve several times without affecting the working parts, and when the valve-seat or valve is worn out either can be cheaply and easily renewed, it being understood that the valve-seat is entirely separate from the valve chest or casing of the ejector proper. Another advantage of separating the valve-seat from the casing is that while the

ejector proper is made of cast-iron the valve-seat can be of bronze nickel or other metal.

As the openings of the ports have to be accurately adjusted, it is much more convenient to use a separate plate. Another advantage is that by removing the cover of the valve-chest the action of the valve can be seen at once and suitably regulated.

The advantage of the slide-valve and its seat over the rotary valve and its seat, as described in Patent No. 241,635, will be therefore apparent.

E is a rod which passes through a sleeve, *g*, at the upper end of the standard F, forming a part of the stand of the quadrant A, and *h* is a thumb-nut to hold the rod E in any desired position. The inner end of the rod within the cab is provided with a button, *i*, while the outer end of the rod connects by a pin, *j*, with a crank, *k*. The crank *k* is mounted upon a shaft, *l*, supported in bearings *m*, attached to the valve chest or body of the ejector. The shaft *l* is provided with a cam G.

H is a lever pivoted at *n* in the body of the ejector, the inner or long arm of the lever H being curved, as shown at *o*, and passing under the cam G. The outer or short arm of the lever H is placed over the stem *p* of the steam-valve *q*, which valve is kept shut by the connection with the lever H of the stem *r* of the diaphragm I, as explained in Patent No. 241,635.

The general operation is as follows: When the steam-valve is shut, as above stated, by the vacuum maintained above the diaphragm I, the curved portion *o* of the long arm of the lever H will be in contact with the cam G, as shown in Fig. 2. When it is necessary to apply the brakes with less than their full force, the rod E is pulled in the direction of the arrow, when the cam G will operate to depress the long arm of the lever H, and so elevate the short arm to such an extent as may be desirable. The pressure of the steam will then open the valve *q* to the extent of the lift of the short arm of the lever H, and thus admit only a certain quantity of steam around the ejector-nozzle, which will tend to apply the brakes with less than full force. This operation will not in any manner interfere with the application of the brakes with their full force, as when the vacuum is destroyed above the diaphragm I, as described in Patent No. 241,635, the long arm of the lever H will fall away from the cam G, as shown in Fig. 1, and thus allow the valve *q* to open to its full extent.

I claim as my invention—

1. In an air-ejector apparatus, the valve which controls the discharge of steam around the ejector-nozzle, combined with a lever adjustable in position by means of a cam and acting in conjunction with the stem of the valve, as described, whereby the rapidity of air-discharge is controlled, substantially as specified.

2. In an air-ejector apparatus, the combination of an ejector-nozzle, a valve arranged to discharge steam around the said nozzle, a lever having its long arm connected to a diaphragm operated by the establishment of a vacuum above it, and its short arm situated over and adapted to limit the lift of the said valve, a cam to regulate the movement of the said lever, and means to effect the partial rotation of the cam, substantially as specified.

In testimony whereof I have hereunto set my hand and seal.

ELISHA D. EAMES. [L. S.]

Witnesses:

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