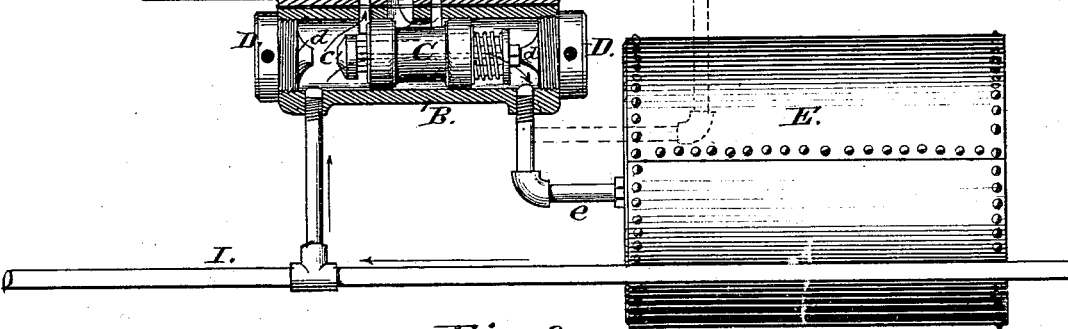
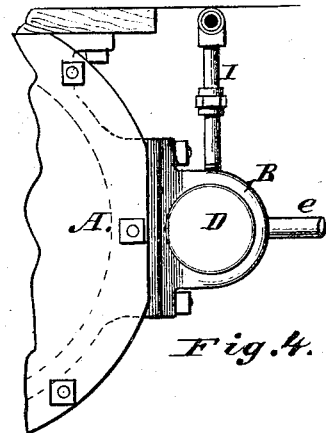
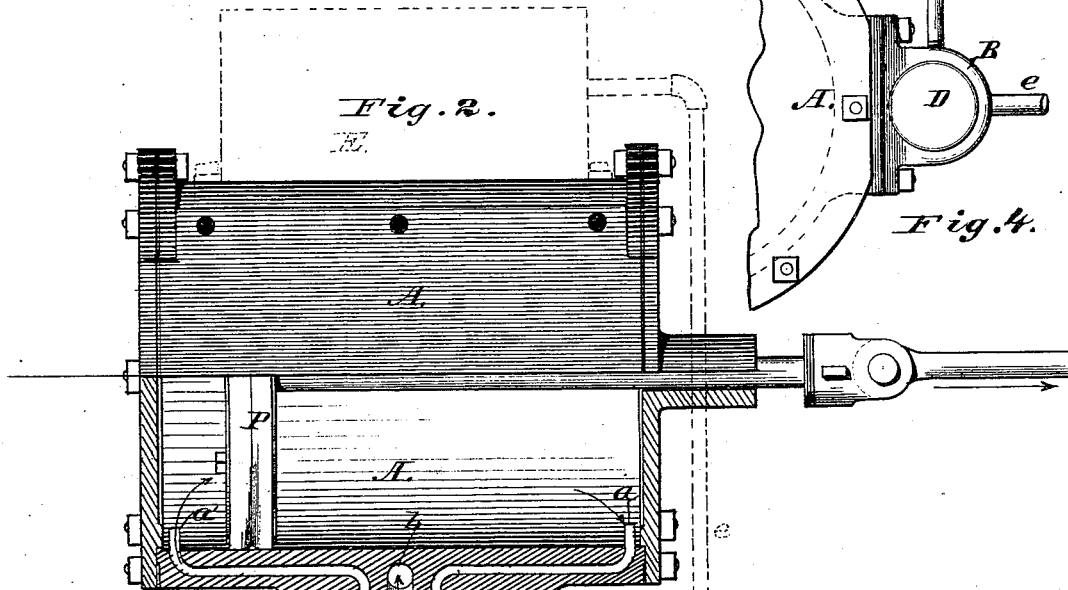
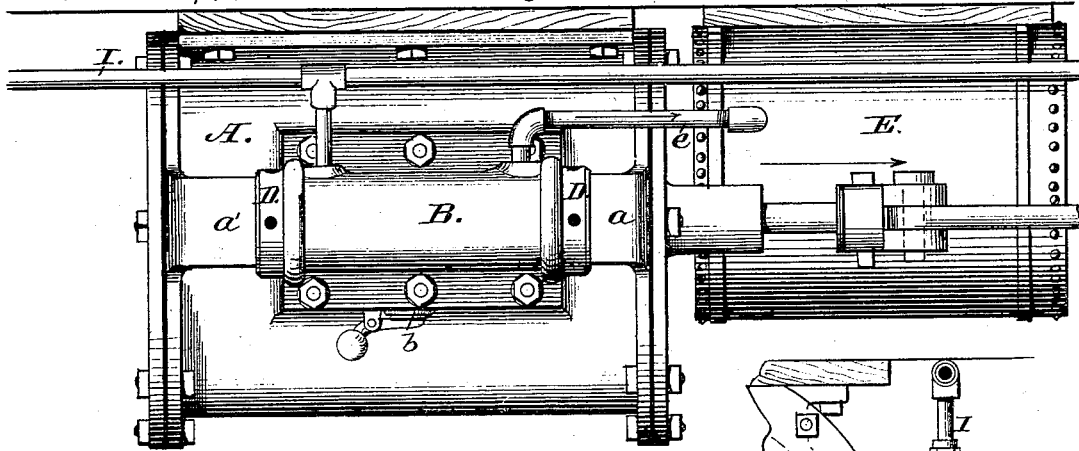


# H. L. PERRINE. Air-Brake.

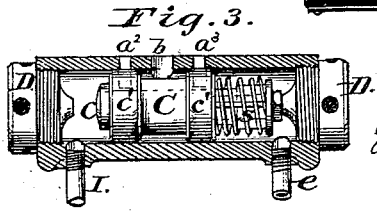
No. 166,406.

Fig. 1.

Patented Aug. 3, 1875.



Witnesses:  
 Mr. M. H. Houghm  
 Wm. H. Finckel



Inventor:  
 H. Lansing Perrine

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Air-Brake.

No. 166,406.

Patented Aug. 3, 1875.

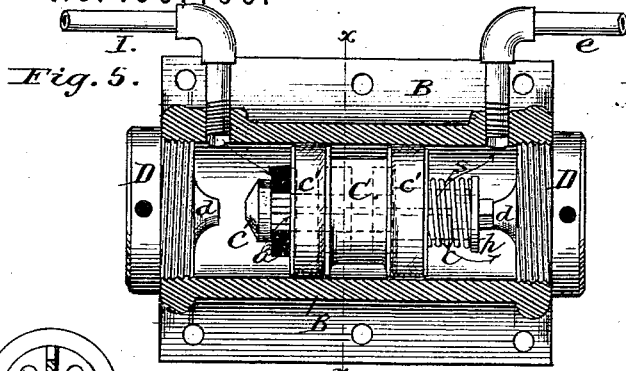


Fig. 5.

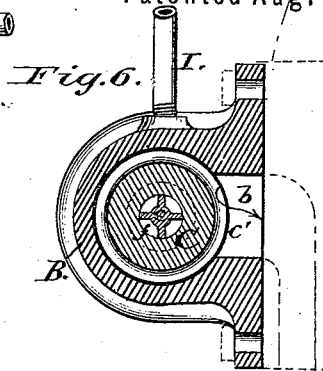


Fig. 6.

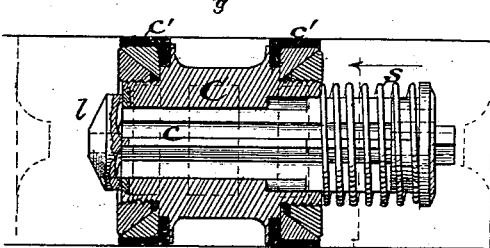
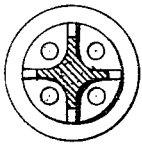


Fig. 7.

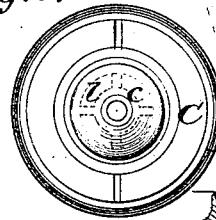


Fig. 10.

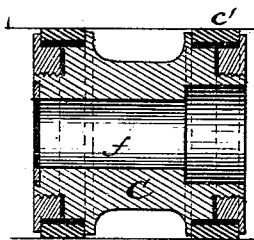


Fig. 8.

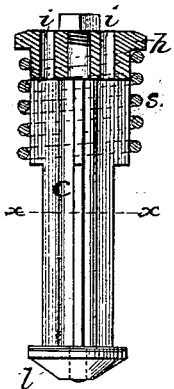
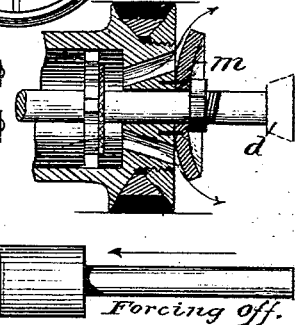
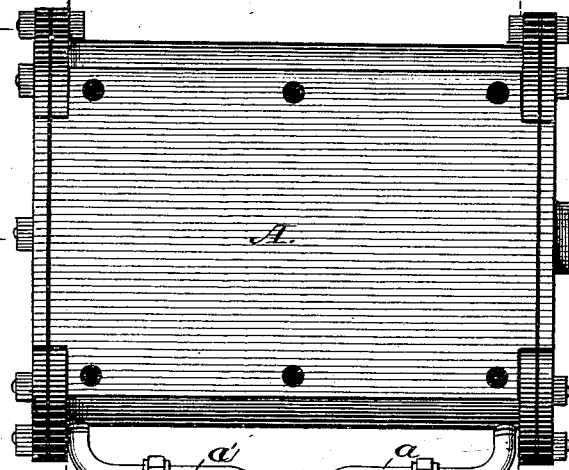
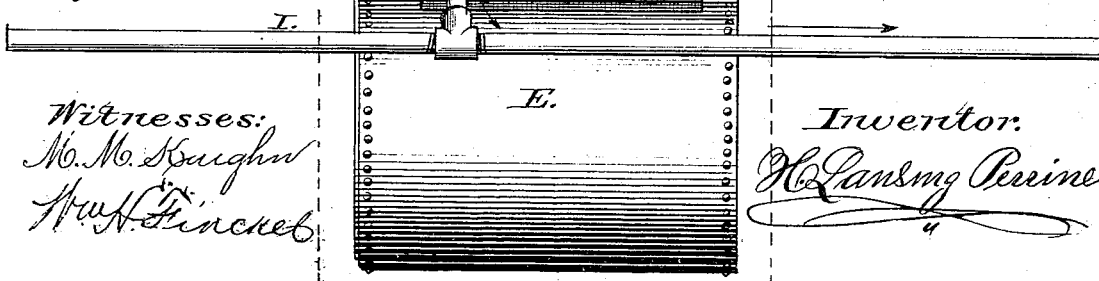


Fig. 9.



Forcing Off.



Witnesses:  
 Mr. M. Baughn  
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Inventor:  
 H. L. Perrine

# UNITED STATES PATENT OFFICE.

H. LANSING PERRINE, OF FREEHOLD, NEW JERSEY.

## IMPROVEMENT IN AIR-BRAKES.

Specification forming part of Letters Patent No. 166,406, dated August 3, 1875; application filed July 7, 1875.

To all whom it may concern :

Be it known that I, H. LANSING PERRINE, of Freehold, in the county of Monmouth and State of New Jersey, have invented certain new and useful Improvements in Air-Brakes, of which the following is a specification:

This invention is in the nature of an improvement in car-brake mechanism of the character shown in my former applications for Letters Patent, wherein the brakes are applied and released—that is to say, forced on and off—by means of the pressure of compressed air or equivalent motive power exerted directly upon the piston of the brake-cylinder; and the invention consists in an ordinary brake or steam-engine cylinder having induction, eduction, and exhaust ports combined with an auxiliary reservoir for storing the motive power, and an intermediate automatic valve connected with the motive-power generating and distributing apparatus by a single line of pipe, whereby the brake-operating piston is positively moved in either direction in applying and releasing the brakes, said valve operating to supply and exhaust the power at opposite ends of the cylinder simultaneously.

In the drawings illustrating my apparatus, Figure 1 is a side elevation thereof; and Fig. 2 is a top-plan and partly-sectional view, showing the use of an ordinary steam-engine cylinder. Fig. 3 is a sectional plan view of the valve detached; Fig. 4, an end view of valve and part of cylinder. Fig. 5 is a plan view of the interior of the valve, the casing being in cross-section; Fig. 6, a central cross-section of the valve; Figs. 7 and 8, view showing, in detail, the construction of the valve. Fig. 9 is a top or plan view of my apparatus as used with an ordinary air-brake cylinder.

A, Figs. 1 and 2, represents an ordinary steam-engine cylinder, having the piston P. E is an auxiliary plate-metal or other reservoir bolted to the car or cylinder. B is the valve secured to the cylinder, and connected with the reservoir E at one end by a pipe, *e*, and at the other end communicating with a single line of pipe, I, which supplies the motive power from the generating apparatus. If the ordinary brake-cylinder is used, as in Fig. 9, the valve B may be bolted to the auxiliary reservoir, and communicate directly therewith

through opening *e'*, and with the cylinder through pipes *a a'*. If a steam-engine cylinder is used the passages *a a'* serve alternately as induction and eduction ports, and the opening *b* as a common exhaust. In case of the use of the ordinary air-brake cylinder the casing of the valve will be made with ports opening into pipes *a a'* for alternate induction and eduction, and with the common exhaust-opening *b*. The valve-casing is preferably cylindrical, and has its ends closed by removable screw or other caps D D, the inner ends of which are pyramidal, or similarly shaped, so as to form stops *d d* for a valve or stem, *c*. C is a tubular piston or valve, having properly-packed or otherwise prepared bearing-surfaces *c'*, which slide over the ports *a<sup>2</sup> a<sup>3</sup>* in the casing. Within the recess *f* of this valve or piston is placed a winged stem, *e*, one portion of which is enlarged and square-shouldered to fit in a correspondingly-shouldered enlargement in the recess, and around this portion is placed a coiled spring, *s*, which is held in place by a flanged cap or nut, *h*. This stem is secured in the piston C by a nut, *l*. The cap *h* has perforations *i*, corresponding in number with, and opening into, the spaces formed by the wings on stem *e*. Said stem *e* is of somewhat greater length than the piston C, so that said valve or piston and stem may have independent movements, as hereinafter specified.

The operation of my apparatus is as follows: When the brakes are to be applied, the power, coming in in the direction indicated by the arrows, Fig. 2, drives the piston C past the port *a<sup>2</sup>*, so as to open said port and allow the air or other motive force to pass into the cylinder, and at the same time said piston will so far retreat from the nut *l* as to afford a passage for the air through recess *f* into the pipe *e* and reservoir E, thereby driving on the brakes and filling the reservoir simultaneously. The pressure in the cylinder and reservoir being equalized, the piston C assumes the position shown in Fig. 3—that is, both ports *a<sup>2</sup>* and *a<sup>3</sup>* being closed, so that when the engineer allows the supply of air to escape from the pipe at the locomotive, in order that the brakes may be released, the equilibrium is destroyed, and the piston C is driven past the ports *a<sup>2</sup> a<sup>3</sup>*

in the opposite direction, in which position the stem *c* forms a tight joint with the piston, so as to prevent escape of air through said piston, and the air from the reservoir passes directly into the cylinder, acting to force back piston *P*, while at the same time the air that has been used to force on the brakes exhausts through port *b*, as indicated in Figs. 5 and 9. In forcing on again, the forcing-off air escapes through passage *a* and port *a'* out of the exhaust *b*, as will be clearly seen.

In Fig. 10 I have shown the valve *C* made solid at one end and perforated, and provided with a stem that rests against the stop *d*. The perforations in said solid end are rendered valvular by a flap, *m*, which acts in substantially the same manner as stem *c* and valve *C*. It will be understood that the stops *d* limit the motion of the stem *c*, so as to render its action uniform and certain. No relief-valve is necessary in this apparatus, as the one valve *B* performs all and more than that valve might.

I am aware that it is not new in air-brakes to use a hollow piston-valve having an enclosed check-valve opening with the pressure, and therefore I make no claim to the same; but, Having thus described my invention, what

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

1. In an air-brake, a brake-cylinder having an exhaust and two ports, that alternately act as induction and eduction ports, and serve simultaneously one as an induction and the other as an eduction port, in combination with a chamber or reservoir containing air for use in forcing off the brakes, an intermediate valve, and a single line of supply-pipe, substantially as and for the purpose specified.

2. In an air or like brake, the combination of a storing chamber or reservoir, three-port brake-cylinder, an intermediate automatic valve, and a single line of supply-pipe, substantially as and for the purpose described.

3. In an air-brake mechanism, in which the brakes are positively applied and released, a valve, *B*, constructed with a hollow piston and an independently-movable valvular stem, co-operating automatically, for the purpose of supplying air to, and exhausting it from, opposite ends of the brake-cylinder simultaneously, substantially as described.

H. LANSING PERRINE.

Witnesses:

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WM. H. FINCKEL.