

(No Model.)

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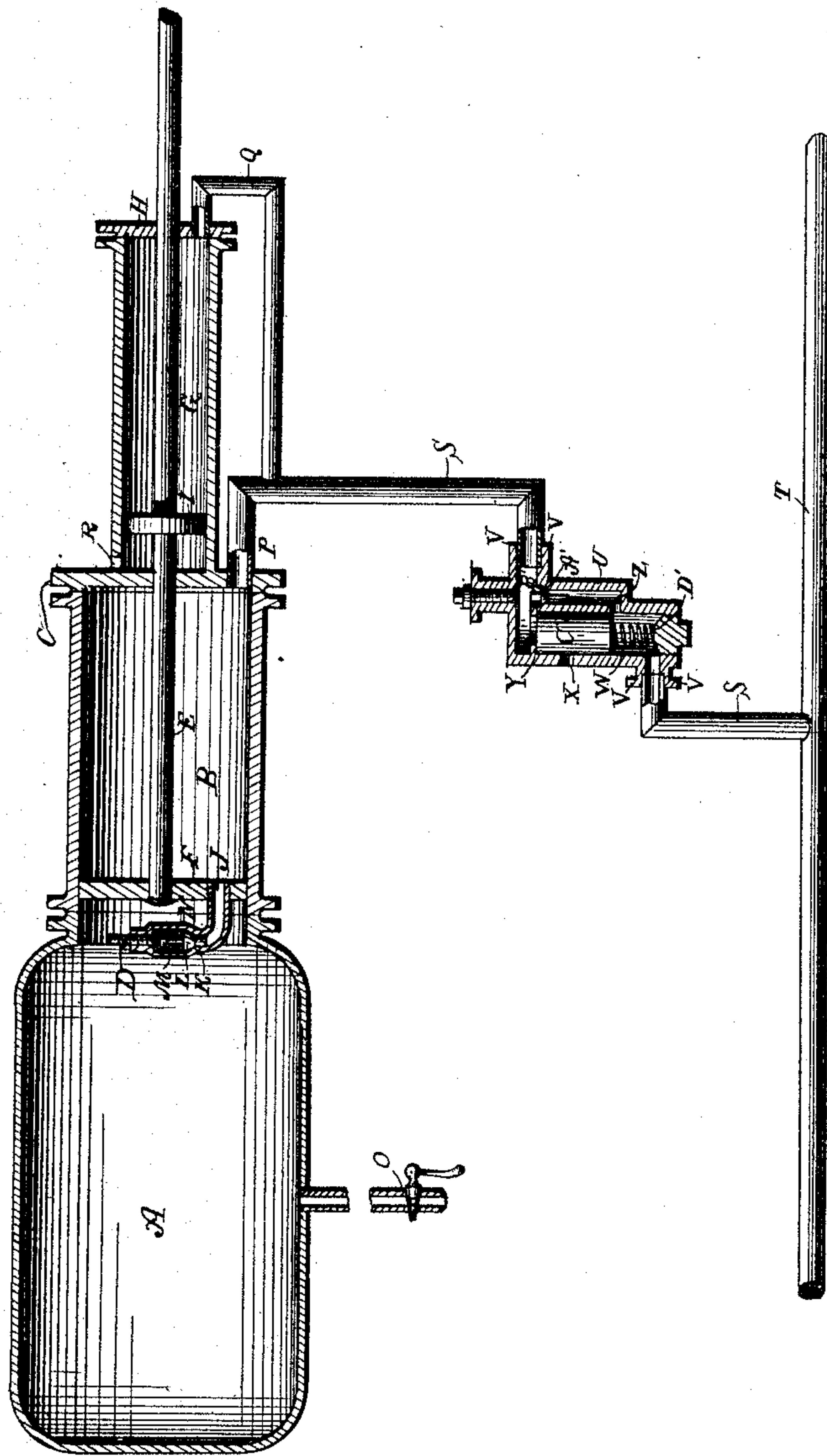
A. G. EASTON.

AIR BRAKE.

No. 354,014.

Patented Dec. 7, 1886.

Fig. 1—



WITNESSES

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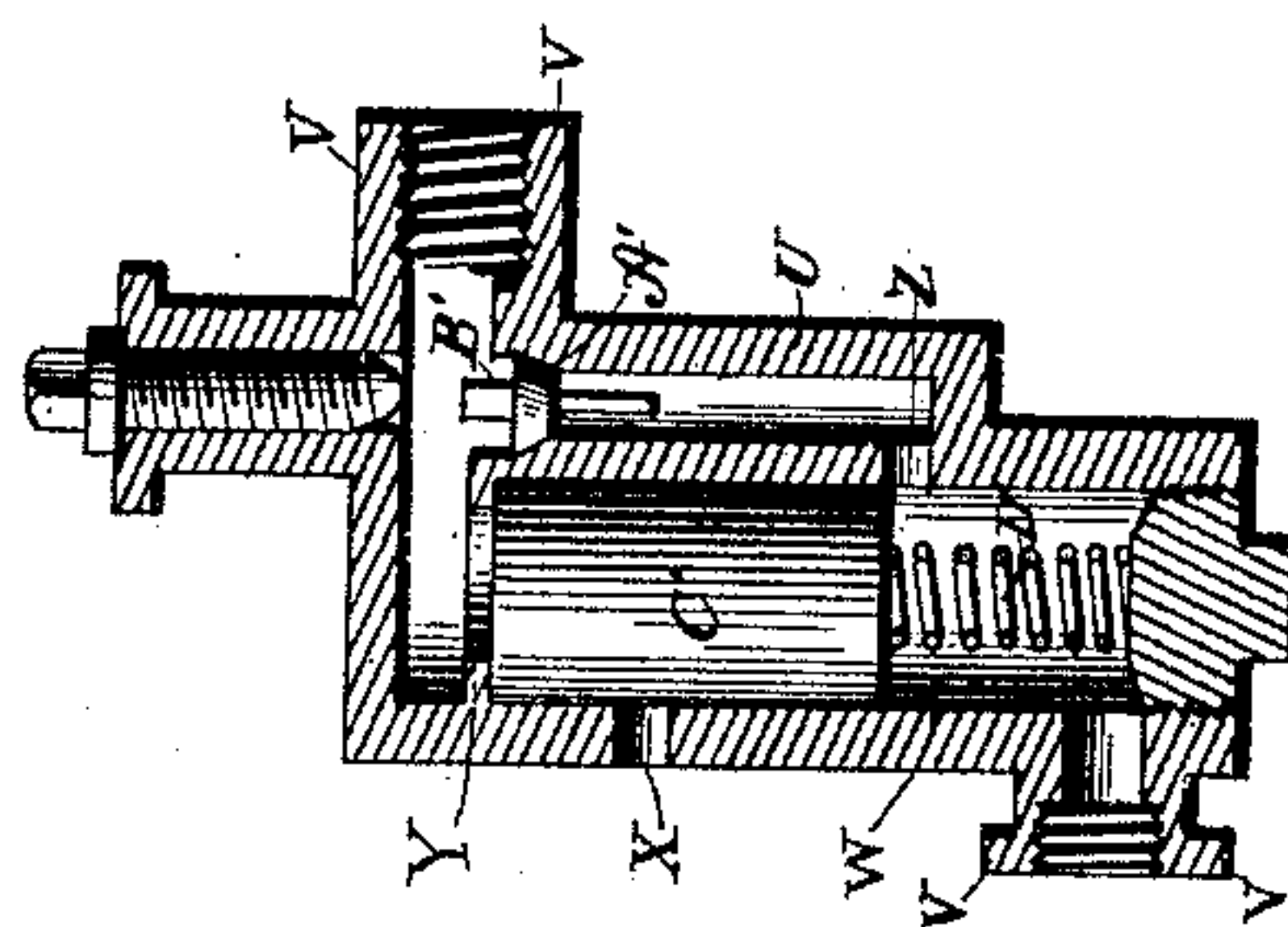
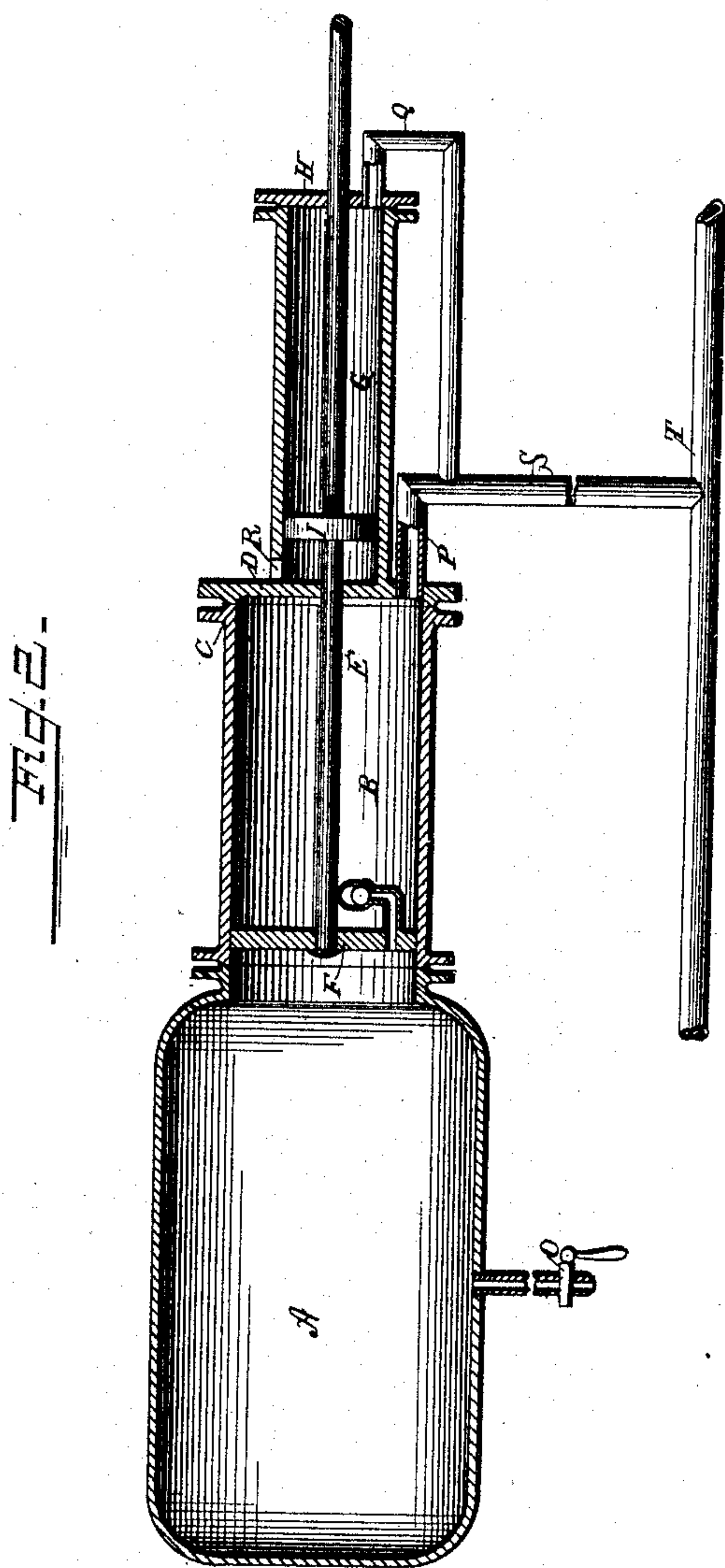
2 Sheets—Sheet 2.

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UNITED STATES PATENT OFFICE.

ARCHIBALD GAMBLE EASTON, OF ST. LOUIS, MISSOURI.

AIR-BRAKE.

SPECIFICATION forming part of Letters Patent No. 354,014, dated December 7, 1886.

Application filed March 20, 1885. Serial No. 195,915. (No model.)

To all whom it may concern:

Be it known that I, ARCHIBALD GAMBLE EASTON, a citizen of the United States, and a resident of St. Louis, in the county of St. Louis and State of Missouri, have invented certain new and useful Improvements in Air-Brakes; and I do hereby declare that the following is a full, clear, and exact description of the invention, 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, which form a part of this specification, and in which—

Figure 1 is a longitudinal vertical sectional view of my improved air-brake. Fig. 2 is a similar view of the apparatus, showing it adapted as a vacuum-brake; and Fig. 3 is a sectional view, on an enlarged scale, of the valve connecting the cylinders in the pressure-brake with the train-pipe.

Similar letters of reference indicate corresponding parts in all the figures.

My invention has relation to air-brakes; and it consists in the improved construction and combination of parts of an air-brake, which may with a few changes be used either as a pressure-brake or as a vacuum-brake, as hereinafter more fully described and claimed.

In the accompanying drawings, the letter A indicates a reservoir, one end of which is open and connecting with a cylinder, B, through the head C of which passes a piston-rod, E, provided with a piston, F, sliding in the cylinder. The cylinder G, of a somewhat smaller diameter than the former cylinder, is formed integral with the head of the said cylinder, and has the piston-rod passing through in its outer head, H, and the piston-rod is provided with a piston, I, which reciprocates within this cylinder.

The inner piston in the larger inner cylinder is provided with a tube, J, passing through it, and formed at its inner end with a valve-seat, K, upon which fits a valve, L, the stem of which slides in a cage, M, surrounding the valve, and has a spring, N, coiled around it, which bears against the body of the valve and against the cage, forcing it against its seat, the said spring having a screw, D, for adjusting its pressure upon the valve. This valve opens into the reservoir, allowing air to enter

the same from the cylinder, and for the purpose of letting out the air within the reservoir the latter is provided with a cock, O, which cock may either be at the end of a pipe extending into the car, or suitable connection may be made from the interior of the car to the cock for opening and closing the same.

Pipes P and Q enter the heads of the inner and outer cylinder, and the rear or inner end of the outer cylinder is provided with an aperture, R, communicating with the outside air. The pipes entering the heads of the cylinders are connected into a pipe, S, which again is connected to the train-pipe T, which passes from the air-tank of the locomotive under all the cars, having the usual couplings at the ends of the cars.

The pipe connecting the cylinders with the train-pipe is provided with a casing, U, formed with laterally-projecting nipples V at its ends, into which nipples the ends of the portions of the pipe are secured, and the interior of this casing is formed with a large bore, W, having an aperture, X, through the side of the casing, and having a stop or flange, Y, at its upper end, and with a smaller bore, Z, communicating at its lower end with the larger bore and formed with a valve-seat, A', at its upper end, passing up through the casing parallel to the larger bore. A valve, B', fits upon the valve-seat at the upper end of the narrow bore, opening upward, and a cylindrical plug, C', fits and slides within the larger bore, and has a spring, D', bearing against its lower end, forcing it upward, so as to bear against the flange, and to cover the aperture in the side of the casing and uncover the aperture through which the smaller bore communicates with the larger bore.

The brake mechanism is connected to the end of the piston-rod, placing the brakes on when the piston-rod is forced out and drawing the brakes off when the rod is drawn back.

When the brake is in operation and the train-pipe is connected to the air-tank of the locomotive, the said pipe is filled with compressed air from the tank, which air passes from the train-pipe into the communicating pipe and into the casing upon the same, where it raises the sliding plug and enters through the smaller bore, raising the valve at the end of the same,

passing into the cylinders through the pipes entering their heads and forcing the pistons back. This will draw the brakes off, allowing the train to move, and when it is desired to
 5 put the brakes on the three-way cock upon the pipe at the air-tank, or similar contrivance, is turned so as to allow the compressed air within the train-pipe, and consequently within the cylinders, to escape. The air which was forced
 10 into the reservoir through the valve in the inner piston will now expand and put on the brakes, the pressure within the reservoir being greatly in excess of the atmospheric pressure. The smaller outer cylinder and the piston within it serve to force the piston-rod
 15 back, because the air entering the large cylinder at the same time from the train-pipe equalizes the pressure on both sides of its piston, and the pressure on the smaller piston forces
 20 the larger back, the aperture in the inner end of the cylinder allowing any air which may have entered back of the piston to escape.

The valve upon the larger piston is preferably so adjusted that it will not open until the
 25 pressure in the cylinder exceeds the pressure within the reservoir by a certain number of pounds, which will cause the larger piston to be forced back if the brakes are on, and the compressed air from the tank is admitted into
 30 the pipes for the purpose of forcing the brakes off, the air acting upon the piston and the closed valve forcing the piston back until the pressure in the cylinder becomes sufficiently strong to raise the valve. By using this valve
 35 the outer cylinder might be dispensed with; but I prefer to use it, as it serves to make the action of the brakes in forcing them off more positive and quick. The valve will also allow
 40 air from the larger cylinder and from the pipes to enter the reservoir if the latter should have had its air-pressure reduced by leakage or by other causes, bringing the pressure in the reservoir back to the pressure in the cylinder less the amount of pressure required to
 45 raise the valve.

The casing upon the pipe connecting the cylinders with the train-pipe serves for the purpose of doing away with the necessity of having the air escape from the cylinders
 50 through the entire length of the train-pipe, which in the case of a long train would be a considerable length for the brakes upon the last car, while with this casing the air may escape through the aperture in the side of the
 55 same when the pressure in the train-pipe is reduced, the air in the cylinders forcing the sliding plug down, causing it to uncover the aperture. The spring will force the plug upward again when pressure is introduced into
 60 the train-pipe, and the compressed air will force the plug against the flange and hold it there, there being no possibility of the pressure from above upon the plug overcoming the pressure from below, as the area of the upper
 65 end of the plug exposed to the pressure is smaller than the area exposed at the lower end, the flange covering a portion of the plug.

When the apparatus is used with a vacuum, the valve upon the inner and larger piston opens outward, consisting, preferably, of a bent
 70 pipe having a valve-seat at its upper end and having a basket surrounding the said seat and a ball-valve playing upon it, as shown at E', and the casing upon the pipe connecting the cylinders with the train-pipe is removed. 75

The air in the train-pipe and in the cylinders is, as far as practicable, exhausted by any suitable means, creating a vacuum in the pipes and the cylinders, as well as in the reservoir, from which the air will pass out through the
 80 outwardly-opening valve in the piston. This action will draw the pistons and piston-rod outward, which in this case will force the brakes off, the action of the apparatus being reversed, and when the train-pipe is opened,
 85 to allow air to enter into it and into the cylinders, the pressure of the entering air in the large cylinder upon the piston against the vacuum in the reservoir will force the piston back with considerable force, forcing brakes
 90 on.

When the apparatus is used as a pressure-brake, the air within the reservoir may be let partially or entirely out through the cock upon the reservoir, as the pressure will at
 95 times be too great—as, for instance, if a car having its reservoir filled with compressed air is attached to a train in which the pressure in the train-pipe is not as high, when the force of the air in the reservoir would force the
 100 brakes on if sufficient air is not let out of the reservoir by means of the cock, equalizing the pressure.

The valve upon the inner piston may be a common hinged valve having a spring for
 105 closing it, and the casing upon the pipe connecting the cylinders with the train-pipe may be dispensed with, although it expedites the action of the apparatus, and, as before stated, the outer cylinder may be dispensed with for
 110 the sake of simplicity of construction, although it will affect the effectiveness of the apparatus.

Having thus described my invention, I claim and desire to secure by Letters Patent of the
 115 United States—

1. In an automatic air-brake, the combination of a reservoir, a cylinder secured to said reservoir and communicating therewith, a piston having a valve in it and having a piston-rod projecting through the head of the cylinder connected to the brake mechanism, and a train-pipe entering through the head of the cylinder, as and for the purpose shown and set forth. 125

2. In an automatic air-brake, the combination of a reservoir, a cylinder secured to said reservoir and communicating therewith, a concentric cylinder at the end of the other cylinder, having a smaller diameter and having an aperture at its rear end, a piston-rod passing through both cylinders and having a piston in each, the piston in the larger cylinder having a valve in it, and a train-pipe hav- 130

ing branches entering the heads of the two cylinders, as and for the purpose shown and set forth.

3. In an automatic air-brake, the combination of a reservoir, a cylinder secured to said reservoir and communicating therewith, a concentric cylinder of a smaller diameter secured to the head of the larger cylinder and having an aperture at its inner end, a piston-rod passing through both cylinders and having a piston in the smaller cylinder, and having a piston in the larger cylinder provided with an inwardly-opening valve, having a spring for closing it, and a train-pipe having branches entering the heads of the cylinders, as and for the purpose shown and set forth.

4. In an automatic air-brake, the combination of a reservoir, a cylinder secured to said reservoir and communicating therewith, a piston within the cylinder, having a piston-rod connected to the brake mechanism, and a valve playing upon a seat upon the inner side of the piston and having a spring bearing against it, and a screw adjusting the pressure of the spring, as and for the purpose shown and set forth.

5. In an automatic air-brake, the combination of a reservoir provided with a suitably-located outlet-cock, a cylinder secured to said reservoir and communicating therewith, a piston-rod having a piston within the cylinder, formed with a valve-opening inward and provided with a spring for closing it, and a train-pipe entering the head of the cylinder, as and for the purpose shown and set forth.

6. In an automatic air-brake, the combination, with the cylinder and train-pipe having portions of connecting-pipe, of a casing having nipples at both ends for the attachment of the said pipe portions and having a larger bore provided with an annular flange at the upper end, and a smaller bore opening with its lower end into the larger bore and having a valve-seat at its upper end, a valve playing upon the valve-seat, and a plug fitting and sliding within the larger bore having a spring forcing it upward, the said plug covering an aper-

ture in the side of the casing and uncovering the smaller bore when raised, and uncovering the said aperture and covering the end of the smaller bore when depressed, as and for the purpose shown and set forth.

7. In an automatic air-brake, the combination of a reservoir having a suitable outlet-cock, and having an open end, a cylinder secured with its open end upon the open end of the reservoir, a concentric cylinder of a smaller diameter secured to the head of the larger cylinder and having an aperture in the rear end of the cylinder, a piston-rod within the cylinders having a piston in the smaller cylinder and a piston in the larger cylinder provided with an inwardly-opening valve having a spring for closing it and means for adjusting the force of the spring, a train-pipe having a connecting-pipe, and branch pipes entering the heads of the cylinders, and a casing upon the connecting-pipe having an aperture in one side and formed with a larger bore having an annular flange at its upper end and a smaller bore entering the larger bore at its lower end and formed with a valve-seat at its upper end and provided with a valve upon the seat, and a cylindrical plug fitting and sliding within the larger bore and having a spring for forcing it upward, as and for the purpose shown and set forth.

8. In combination with the cylinder and train-pipe of a pressure air-brake, a casing upon the pipe connecting the cylinder and train-pipe, having a channel provided with an upwardly-opening valve and a channel with an aperture in its side, and a plug sliding downward in the channel with its lower end exposed to the incoming air, as and for the purpose shown and set forth.

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

ARCHIBALD GAMBLE EASTON.

Witnesses:

STANTON ENNES,
DAVID C. OWENS.