(No Model.) 2 Sheets—Sheet 1.

H. S. PARK.

AIR BRAKE.

No. 393,784. Patented Dec. 4, 1888.

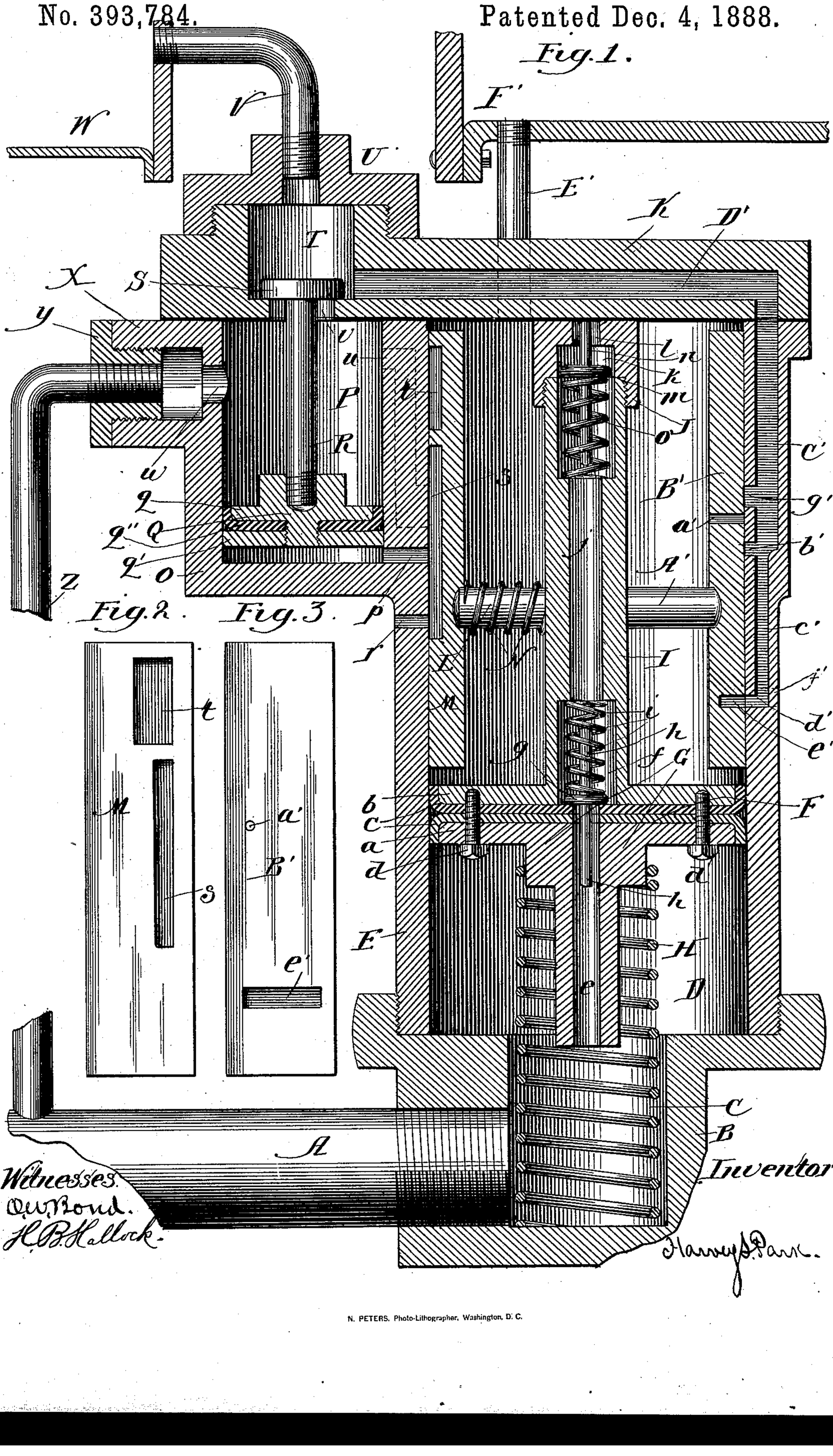

Fig. 1.

Fig. 2.

Fig. 3.

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(No Model.) 2 Sheets—Sheet 2.

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Fig. 4.

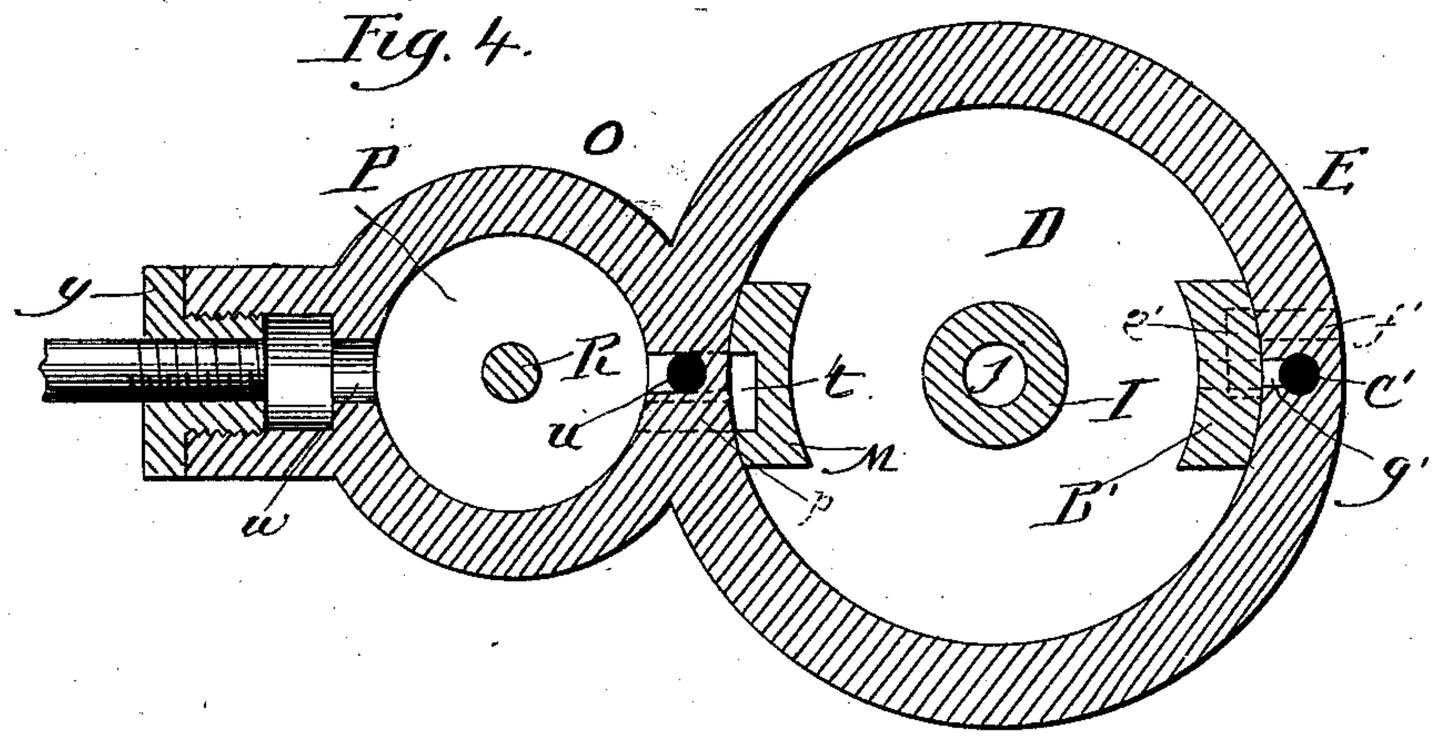


Fig. 5.

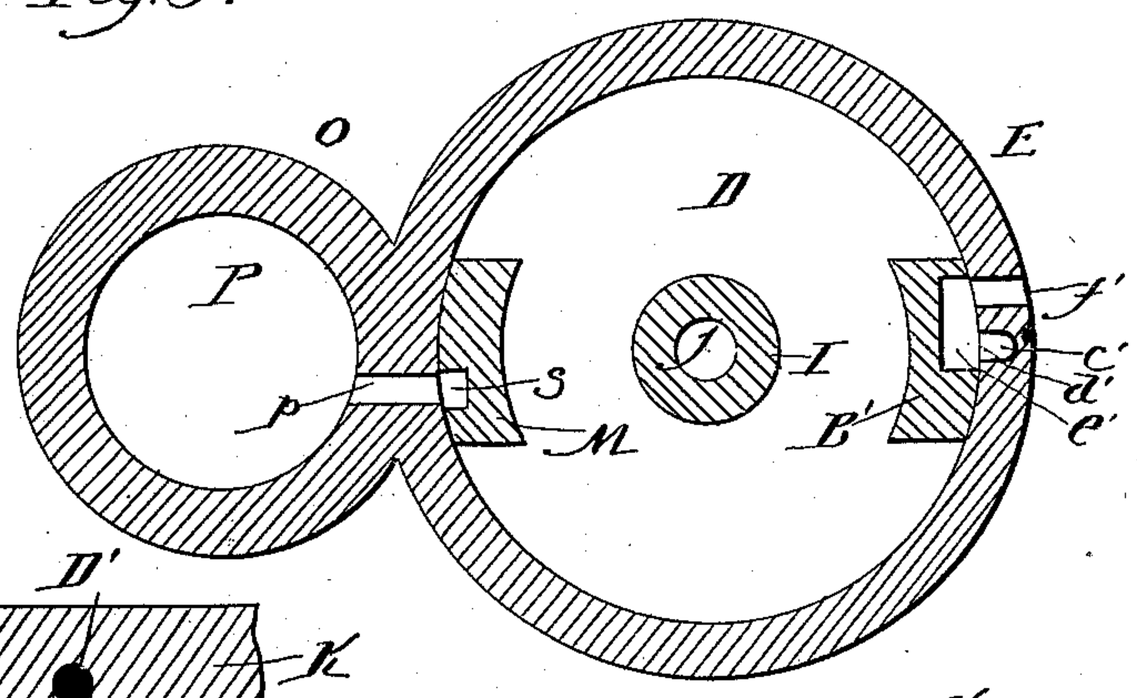


Fig. 6.

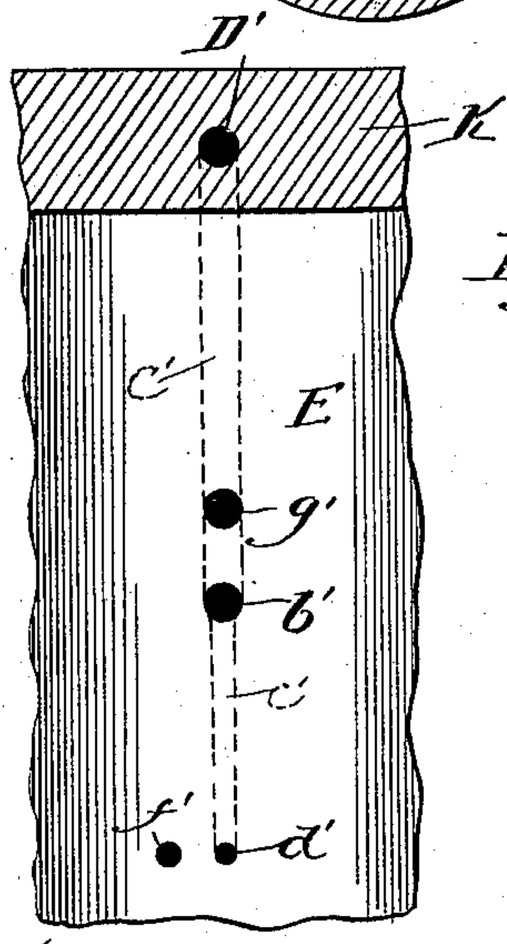
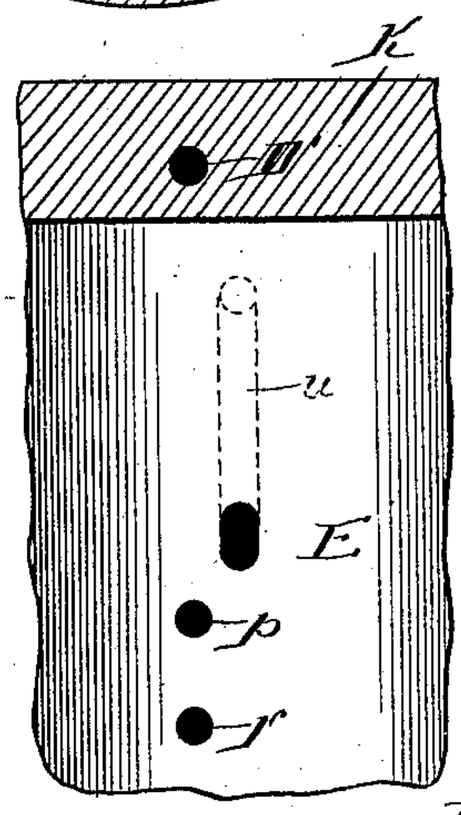


Fig. 7.



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UNITED STATES PATENT OFFICE.

HARVEY S. PARK, OF CHICAGO, ILLINOIS.

AIR-BRAKE.

SPECIFICATION forming part of Letters Patent No. 393,784, dated December 4, 1888.

Application filed June 1, 1888. Serial No. 275,721. (No model.)

To all whom it may concern:

Be it known that I, HARVEY S. PARK, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, has 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 pertains to make and use the same, reference being had to the accompanying drawings, forming a part hereof, in which—

Figure 1 is a sectional elevation. Fig. 2 is a face view of the valve controlling the equalizing passages for the piston. Fig. 3 is a face view of the valve controlling the supply from the car-reservoir. Fig. 4 is a cross-section through the valve as a whole, taken on lines passing through the cylinders from the port of the secondary chamber above the piston to the upper induction-port of the main valve-chamber. Fig. 5 is a cross-section through the valve as a whole, taken on lines passing through the port of the secondary chamber below the piston and the eduction-ports of the brake-cylinder; Fig. 6, a detail, being a face view of the main cylinder, showing the induction and eduction passages for the brake-cylinder; Fig. 7, a detail, being a face view of the main cylinder, showing the induction and eduction ports and passages therefor.

The object of this invention is to enable a better, quicker, and more certain action to be had of the pneumatic controlling devices for air-brakes for railroad-cars and improve generally the construction and operation of such devices and at the same time have the valve controlling the direct passage of the pressure from the train-pipe to the brake-cylinder under the direct action of the train-pipe pressure, enabling the train-pipe pressure to act and hold the valve to its seat, and also act to neutralize the valve admitting the pressure direct to the brake-cylinder from the train-pipe, and the nature of the invention consists in the several parts and combinations of parts hereinafter described, and pointed out in the claims as new.

In the drawings, A represents the train-pipe.

B is a cap or cover into which the end of the train-pipe is screw-threaded or otherwise secured, and this cap or cover has a circumferential flange with a rim screw-threaded on its interior in the construction shown.

C is a chamber in the cap or cover B, into which the openings for the train-pipe lead.

D is a chamber in which is located the main valve and with which the chamber or passage C communicates.

E is a cylinder or casing of the chamber D.

F is a piston, formed, as shown, of a disk, *a*, a disk, *b*, and an interposed packing, *c*, of cup-leather or other suitable material, to make an air-tight joint between the piston and cylinder E, the disks being secured together by suitable screws or bolts, *d*.

G is a stem with which is formed or to which is secured the disk *a*, the stem having a central longitudinal hole, *e*, which continues through the packing *c*.

H is a spring located around the stem G, between the disk *a* and the bottom of the chamber C, in the construction shown.

I is a stem, with which is formed or to which is secured the disk *b*, and this stem has a central chamber, *f*, with which the passage *e* communicates, and in this chamber *f* is a valve, *g*, which seats on the packing *c* around the passage *e*, and has a stem, *h*, projecting both sides of the valve, and in the chamber *f*, around the stem *h*, is a coiled spring, *i*, by which the valve is held seated. The stem I has a central passage, *j*, leading from the chamber *f* to a chamber, *k*.

J is a cap screw-threaded onto the end of the stem I and having an interior opening, forming a continuation of the chamber *k*, from which, through the end of the cap, leads a passage, *l*, which is closed by a valve, *m*, the stem of which, *n*, projects from both sides of the valve, and around the stem *n* in the chamber *k* is a coiled spring, *o*, by which the valve *m* is forced to its seat around the passage *l*, and the end of the stem *n*, which projects into the passage *l*, is longer than the passage, so that its extreme end, when the valve is seated, will project beyond the end of the cap J.

K is a cap or cover closing the end of the cylinder E and held in place by bolts or otherwise, and, as shown, between the end of the cylinder and the cap or cover K is a suitable packing to form an air-tight joint.

L is an arm projecting out from the stem I,

M is a slide-valve attached to the arm L and fitting the face of the cylinder E.

N is a spring encircling the arm L between the stem I and valve M, for holding the valve against pressure.

O is an extension of the cylinder or casing E.

P is a cylindrical chamber in the extension O, leading from which is a passage, *p*, communicating with a passage, *s*, in the valve M, which passage communicates with a passage, *r*, through the cylinder or casing E, and these passages *p*, *r*, and *s* form a communication between the chamber P and the atmosphere. The valve M has a passage or opening, *t*, and a passage, *u*, is formed in the cylinder or casing E, one end of which communicates with the chamber P and the other communicates with the passage *t* when the valve is lowered, and when the passage *u* is in communication with the passage *t* a communication is then formed by the passage *t* with the passage *p* for the pressure to pass from the chamber P through the passages *p*, *t*, and *u* back of the piston Q.

Q is a piston in the chamber P, formed of a disk, *q*, a disk, *q'*, and a cup-leather packing, *q''*, interposed between the disks, and, as shown, the disks *q* and *q'* are connected together by a screw-threaded stem on the disk *q'* entering a screw-threaded hole in the disk *q*.

R is a stem, screw-threaded or otherwise secured to the disk *q'*.

S is a valve on the end of the stem R, controlling a passage, *v*, leading from the chamber P.

T is a chamber in the cap K, with which communicates the passage leading from the chamber P.

U is a cap screw-threaded onto the cover K over the chamber T.

V is a pipe entering the cap U and extending to the brake-cylinder.

W is a brake-cylinder in which a piston travels, as usual.

X is an extension of the casing O.

Y is a plug or cap screw-threaded or otherwise entered into the extension X.

Z is a pipe entering the plug Y and leading to the train-pipe A.

The passage in the plug Y communicates with a passage or opening, *w*, leading into the chamber P. The piston F travels in the chamber D, and this travel of the piston through the stem I and arm L moves the valve M, and when the piston is at rest and the valve M in its normal position the pressure from the train-pipe A, passing through the pipe Z, enters the chamber P through the passage or opening *w* above the piston Q, and by the excess of pressure on the piston over the pressure on the under side of the valve S the valve S is held firmly to its seat, closing the passage *v*, leading from the chamber P to the chamber T, and when the valve M is in this position a free communication from the chamber P back of the piston is had through the passages *p*, *r*, and *s*, but communication is stopped through the passage *u*, which is closed by the valve M.

A lowering of the train-pipe pressure sufficient for the pressure in the chamber D above the piston to force the piston down brings the passage *t* in communication with the passage *u* and the passage *p* and allows the train-pipe pressure in the chamber P to pass through the passages *u*, *t*, and *p* back of the piston Q, equalizing the pressure on both sides of the piston, by which the piston is neutralized, and the train-pipe pressure through the pipe Z will act on the under side of the valve S, opening the valve and allowing the pressure to pass from the chamber P into the chamber T, and thence through the pipe V into the brake-cylinder W to set the brakes. The returning of the piston F by increasing the pressure on its under side returns the valve M to its normal position, closing the passage *u* and bringing the passages *p*, *r*, and *s* into communication for the air back of the piston Q to vent itself to the atmosphere, relieving the pressure on the back side of the piston and causing the train-pipe pressure in the chamber P to act on the piston and force or close down the valve S, closing the passage *v* between the chambers P and T against the train-pipe pressure from the pipe Z.

It will thus be seen that the valve S is controlled in both opening and closing by the train-pipe pressure, which is admitted into the chamber P above and below the piston, the pressure in the chamber P when the valve S is down holding the valve seated, and the dropping of the valve M for the pressure in the chamber P in front of the piston to pass back of the piston and neutralize it allowing the train-pipe pressure to open the valve S, and with this construction the train-pipe pressure performs the office of both opening and closing the valve, by which direct communication is had between the train-pipe and the brake-cylinder.

The control of the air from the chamber D to the brake-cylinder for ordinary use is had through a second valve, as follows:

A' is an arm extending out from the stem I on the opposite side of the arm L.

B' is a slide-valve connected with the arm A', and fitting the face of the cylinder or casing E, and having therein a port, *a'*.

C' is a passage in the cylinder or casing E, into which a port, *b'*, leads to coact with the port *a'*, and establish communication between the chamber D and passage C', and this passage C' has an extension or continuation forming a passage, *c'*, with which communicates a port, *d'*, leading into the chamber D, and this port, when the valve B' is in its normal position, communicates with a passage, *e'*, in the valve B', formed crosswise, which passage *e'* also communicates with a passage, *f'*, leading through the cylinder or casing E, and in the

wall of the cylinder or casing E is a port, g', communicating with the passage C′ and chamber D.

D′ is a passage in the cap or cover K communicating with the passage C′ and leading to the chamber T.

E′ is a pipe through the cap or cover K leading from the chamber D to the car-reservoir.

F′ is the car-reservoir.

The valve B′ when in its normal position has its passage e' in communication with the passage c' and passages f' and d', by which the air from the brake-cylinder is vented to release the brakes, and when the valve B′ is dropped slightly this communication is shut off by the passage e', passing the port d' and passage f', and with a little further drop of the valve B′ by lowering the train-pipe pressure, which allows the piston F to be forced down by the excess of pressure on its front side, brings the port a' into communication with the port b' for the pressure from the car-reservoir F′ to pass through the pipe E′ into the chamber G, and thence into the passage C′, entering the passage D′, and through the chamber T and pipe V, entering the brake-cylinder to operate the piston and set the brakes slightly, and a restoration of the train-pipe pressure sufficient to raise the port a' from communication with the port b', and not bring the passage e' into communication with the port d' and passage f', will hold the brakes set with the pressure admitted by the dropping of the valve B′, and if a little more pressure is required the train-pipe pressure can be again lowered to bring the valve d' down for the ports a' and b' to communicate and allow the air from the car-reservoir F′ to pass to the brake-cylinder, as before described, thus enabling a graded pressure to be applied to the brakes. The lowering of the train-pipe pressure still more will bring the valve B′ down to open the port g', allowing a greater pressure from the car-reservoir to enter the passage C′ and pass through the passage D′, chamber T, and pipe V to the brake-cylinder. The restoring of the valve B′ to its normal position closes the ports a' and b' and opens communication between the passage e', port d', and passage f' for the air to vent from the brake-cylinder to the atmosphere, and thus release the brakes.

The port a' and the port b' are in such relation to each other and to the port d', passage e', and port f' that an initial travel of the valve B′ from its normal position sufficient for the passage e' to pass the ports d' and f' will not bring the ports a' and b' into communication, requiring a little further dropping of the valve B′ to bring the ports a' and b' into communication, as the space traversed by the port a' to open communication is a little longer than the space traveled by the passage e' to pass the ports d' and f'. The valve B′ can thus travel between the ports b' and d' and close both ports, or have the port a' closed and the port d' open, or have the port d' open and the port a' closed, as required for the operation of applying the brakes, holding them applied, and releasing the brakes.

The spring H is of a length to abut against the piston F, when the piston has been lowered to close the passage e' and port d' and passage f', and not lowered sufficient to open communication between the ports a' and b'. The stem n abuts against the cover K when the valve B′ is in its normal position, and the coiled spring o is of a resistance sufficient to force the piston F down to strike the spring H, as the pressure below the piston F is lowered, and the air-pump stops, and the spring i is of a resistance to hold the valve g seated until pressure is admitted below the piston, and have the initial pressure overcome the resistance of the spring o, and by reason of the larger area of piston F unseat valve m, and raises the valve B′ to open communication between the port d' and passages e' and f' to vent the brake-cylinder to the atmosphere before valve g rises to refill the car-reservoir. The passage f' is one side of the port d', as shown by the dotted lines in Fig. 1, and the location of the port a' and passage e' in the valve B′ is shown in Fig. 3.

The location of the passages s and t of the valve M is shown in Fig. 3, and as the passage u is one side of the passage p the passage t is of a sufficient width to overlie both passages p and u, and of a length to connect these two passages when the valve M is lowered, and the form of the passage u and its location are shown by dotted lines in Fig. 1.

The passages from the chambers on both sides of the piston and the passage to the atmosphere and the passages in the valve M can be varied in position without departing from the spirit of my invention so long as such passages furnish a communication for train-pipe pressure, by which the piston will be actuated to move the valve S.

Having described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a brake mechanism, the combination of a valve controlling the direct passage of pressure from a train-pipe to a brake-cylinder, a piston connected to said valve and actuated wholly by train-pipe pressure, and a valve controlling the train-pipe pressure on the piston for opening and closing the communication between a train-pipe and a brake-cylinder through the direct action of train-pipe pressure, substantially as specified.

2. In a brake mechanism, the combination of a train-pipe, a brake-cylinder, an interposed chamber communicating with the train-pipe and brake-cylinder, a piston in said chamber, a piston-stem, a valve on the piston-stem controlling the passage from the interposed chamber to the brake-cylinder, and a controlling-valve and passages for the admission of pressure from the train-pipe to move the

piston and open the valve, substantially as and for the purposes specified.

3. In a brake mechanism, the combination of a train-pipe, a brake-cylinder, an interposed chamber communicating with the train-pipe and brake-cylinder, a piston connected to said valve and in said chamber, a piston-stem, a valve on the piston-stem controlling the passage from the interposed chamber to the brake-cylinder, passages leading from the interposed chamber on both sides of the piston, and a valve connecting the passages from the chamber for opening and closing the passage from the interposed chamber to the brake-cylinder by train-pipe pressure, substantially as specified.

4. In a brake mechanism, the combination of a train-pipe, a brake-cylinder, an interposed chamber communicating with the train-pipe and brake-cylinder, a piston in the interposed chamber, a piston-stem, a valve on the piston-stem controlling the passage from the interposed chamber to the brake-cylinder, passages leading from the interposed chamber on both sides of the piston, and a slide-valve connecting the passages from the chamber and operated from the train-pipe pressure for controlling the direct communication between the train-pipe and brake-cylinder by train-pipe pressure, substantially as specified.

5. In a brake mechanism, the combination of a train-pipe, a brake-cylinder, an interposed chamber, a piston in said chamber, a piston-stem, a valve on the piston-stem controlling the passage from the interposed chamber to the brake-cylinder, passages leading from the chamber on both sides of the piston, a passage leading to the atmosphere, and a slide-valve having a passage connecting the passages on both sides of the piston and a passage connecting the chamber with the passage to the atmosphere, substantially as and for the purposes specified.

6. In a brake mechanism, the combination of a train-pipe, a brake-cylinder, an interposed chamber, a piston in said chamber, a piston-stem, a valve on the piston-stem controlling the passage from the interposed chamber to the brake-cylinder, passages leading from the chamber on both sides of the piston, a passage leading to the atmosphere, and a slide-valve operated by a piston from train-pipe pressure and having passages connecting the passages in the chamber on both sides of the piston and the passages to the atmosphere, substantially as and for the purposes specified.

7. In a brake mechanism, the combination of a train-pipe, a brake-cylinder, an interposed chamber, a piston in said chamber, a piston-stem, a valve on the piston-stem controlling the passage from the interposed chamber to the brake-cylinder, passages leading from the chamber on both sides of the piston, a passage leading to the atmosphere, a slide-valve, a passage in the slide-valve connecting the passages from the chamber on both sides of the piston, a passage in the slide-valve connecting the chamber and the atmosphere passage, a piston-stem carrying the slide-valve, a piston, and a chamber for the slide-valve and piston communicating with the train-pipe, substantially as and for the purposes specified.

8. In a brake mechanism, a chamber having a passage for communication with a train-pipe, and a passage for communication with a brake-cylinder, a piston in said chamber, a piston-stem, a valve on the piston-stem controlling the brake-cylinder passage from the chamber, and passages leading from the chamber on both sides of the piston, and a valve controlling such passages for opening and closing the valve for the brake-cylinder passage by direct action of train-pipe pressure, substantially as specified.

9. In a brake mechanism, a chamber having a passage for communication with a train-pipe, and a passage for communication with a brake-cylinder, a piston in said chamber, a piston-stem, a valve for the piston-stem, controlling the brake-cylinder passage, passages leading from the chamber on both sides of the piston, and a slide-valve having a passage connecting the passages from the chamber on both sides of the piston, substantially as and for the purposes specified.

10. The chamber P, having the inlet *w*, outlet *v*, and passages *p* and *u*, in combination with the piston Q, stem R, and valve S, for controlling the pressure direct from a train-pipe to a brake-cylinder, substantially as specified.

11. The chamber P, inlet *w*, outlet *v*, passages *u* and *p*, piston Q, and stem R, in combination with the valve S, valve M, and passage *t*, for neutralizing the piston Q, to open the valve S by train-pipe pressure, substantially as and for the purposes specified.

12. The chamber P, inlet *w*, outlet *v*, passages *p* and *u*, piston Q, stem R, and valve S, in combination with the valve M, passage *t*, passage *s*, and passage *r*, for controlling the pressure to the brake-cylinder direct by train-pipe pressure, substantially as specified.

13. The train-pipe A, connecting-pipe Z, and chamber P, having the inlet *w* and outlet *v*, in combination with the piston Q, stem R, valve S, and passages leading from the chamber above and below the piston and controlled by a valve, substantially as and for the purposes specified.

14. The train-pipe A, brake-cylinder W, pipe Z, and chamber P, having the inlet *w* and outlet *v*, in combination with the piston Q, stem R, valve S, passages *p*, *r*, and *u*, and valve M, having passages *s* and *t*, substantially as and for the purposes specified.

15. In a brake mechanism, the combination of a train-pipe, a brake-cylinder, a car-reservoir, an interposed chamber, a connection between the train-pipe and chamber, a piston in said chamber, a piston-stem, a valve on the piston-stem controlling a passage from the

interposed chamber to the brake-cylinder, passages leading from the chamber on both sides of the piston, a passage to the atmosphere, a valve controlling the chamber and atmosphere-passages, and a valve controlling ports and passages between the car-reservoir and the brake-cylinder, substantially as and for the purposes specified.

16. In a brake mechanism, the combination of a train-pipe, a brake-cylinder, a car-reservoir, a chamber between the train-pipe and reservoir, a piston in said chamber, a piston-stem, a slide-valve carried by the piston-stem and controlling ports and passages between the car-reservoir and brake-cylinder, a slide-valve carried by the same piston-stem and controlling passages from an interposed chamber, an interposed chamber, a piston in said chamber, passages leading from the chamber on both sides of the piston and controlled by the slide-valve, a piston-stem, a valve on the piston-stem controlling the passage from the chamber to the brake-cylinder, and a pipe leading from the train-pipe to the interposed chamber, substantially as and for the purposes specified.

17. In a brake mechanism, the cylinder E, provided with the ports b' and d', passages C′ and c', and port f', transversely in line with the port d', in combination with the valve B′, having the port a', for grading purposes, and the transverse passage e', connecting the ports d' and f' when the valve B′ is at its normal position, substantially as and for the purpose specified.

18. The chamber D, and cylinder E, provided with ports b', d', and g', passages C′ and c', communicating with the ports b', d', and g', and a port, f', in line transversely with the port d', in combination with the valve B′, provided with the port a', and a transverse passage, e', connecting the ports d' and f' when the valve B′ is at its normal position, substantially as and for the purposes specified.

19. The chamber D, cylinder E, piston F, stem I, arm L, and valve M, having the passage t, in combination with the chamber P, piston Q, stem R, valve S, passages v and w, and passages p and u, for admitting pressure on both sides of the piston to open the valve S, substantially as and for the purposes specified.

20. The chamber D, and cylinder E, provided with the ports b', d', and g', passages C′ and c', and port f', transversely in line with the port d', in combination with the valve B′, having the port a', and transverse passage e', connecting the ports d' and f' when the valve B′ is at its normal position, piston F, stem G, spring H, stem I, and arm A′, substantially as and for the purposes specified.

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Witnesses:
O. W. BOND,
H. B. HALLOCK.