No. 610,948. Patented Sept. 20, 1898.

H. S. PARK.

AIR BRAKE.

(Application filed Mar. 7, 1890.)

(No Model.) 3 Sheets—Sheet 1.

Fig. 1.

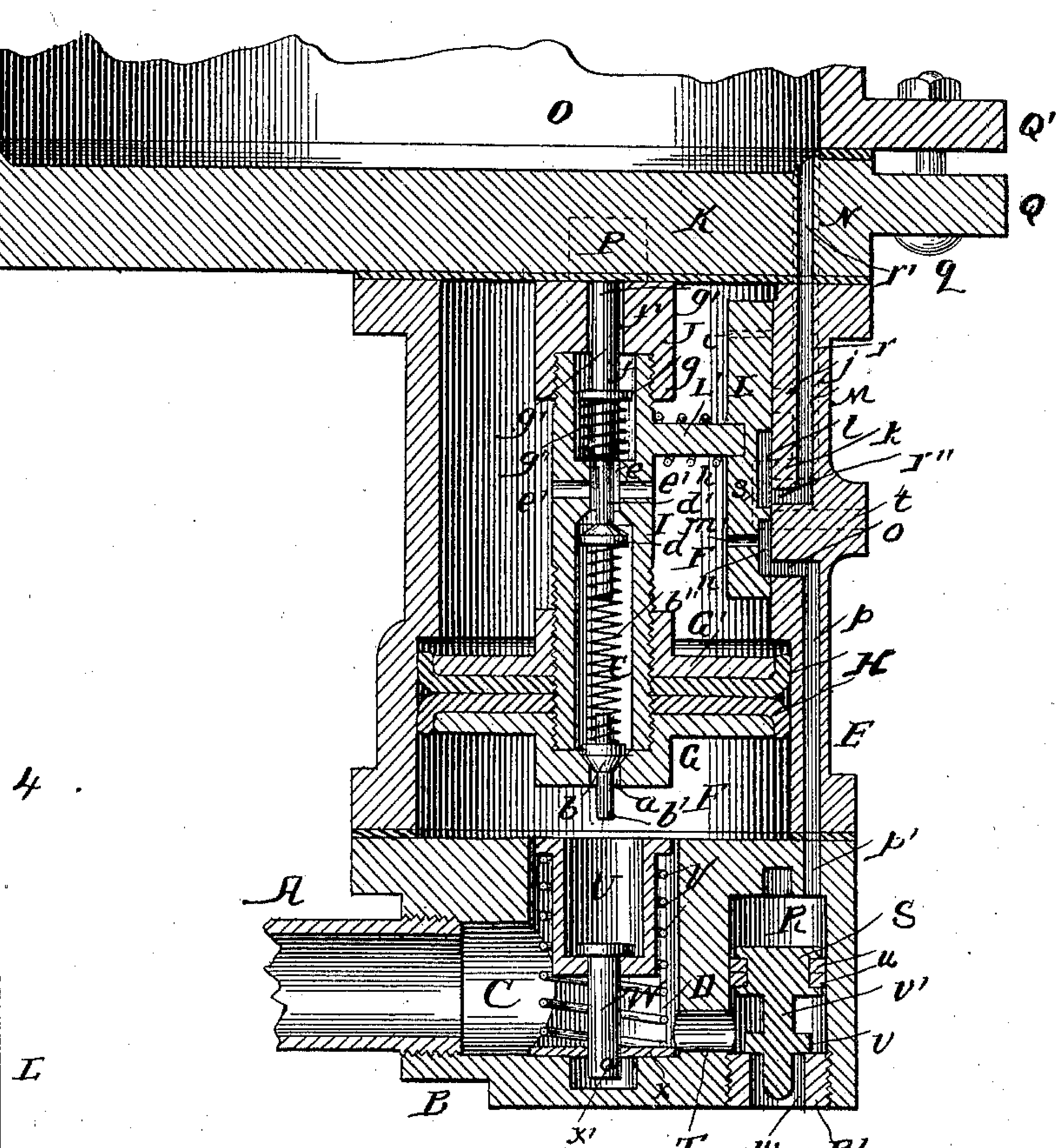


Fig. 4.

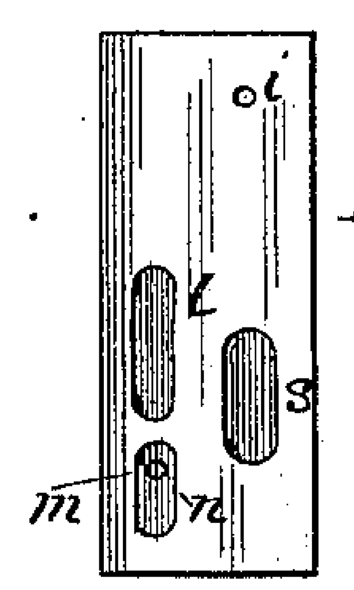
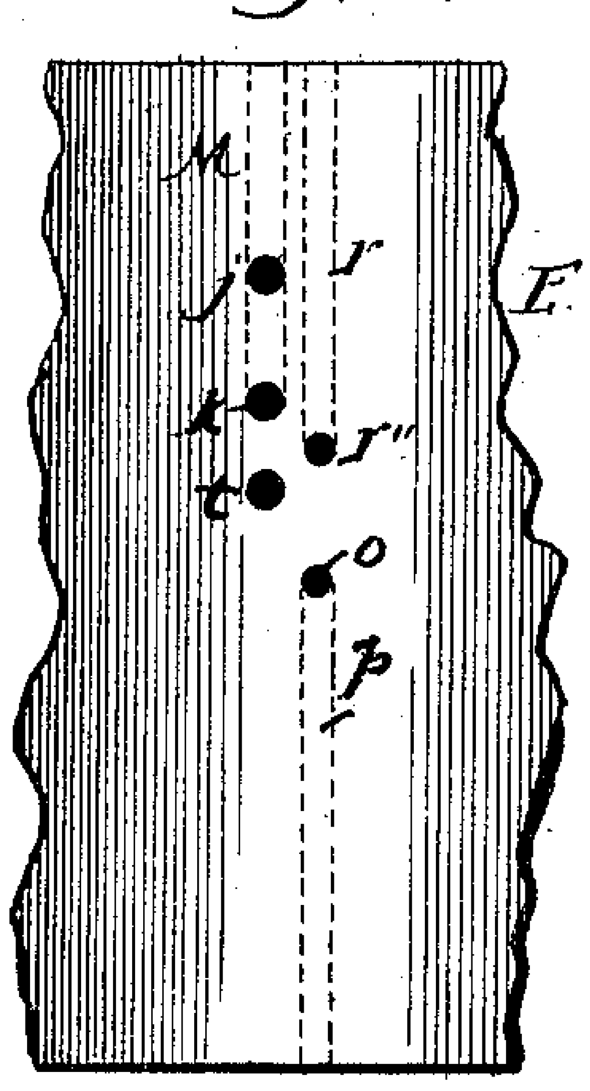


Fig. 5.



Witnesses:
J. R. Andrews.
O. W. Bond.

Inventor:
Harry S. Park

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

No. 610,948. Patented Sept. 20, 1898.

H. S. PARK.

AIR BRAKE.

(Application filed Mar. 7, 1890.)

(No Model.) 3 Sheets—Sheet 2.

Fig. 2.

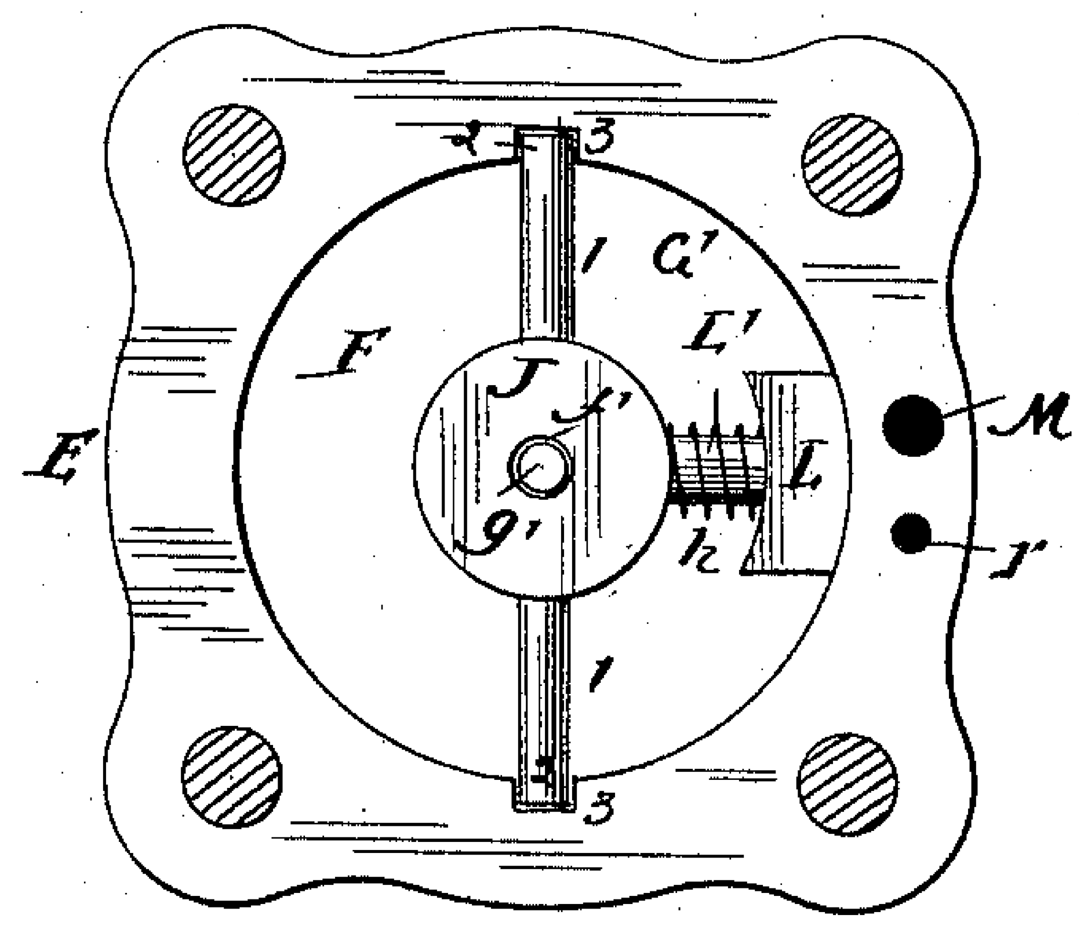
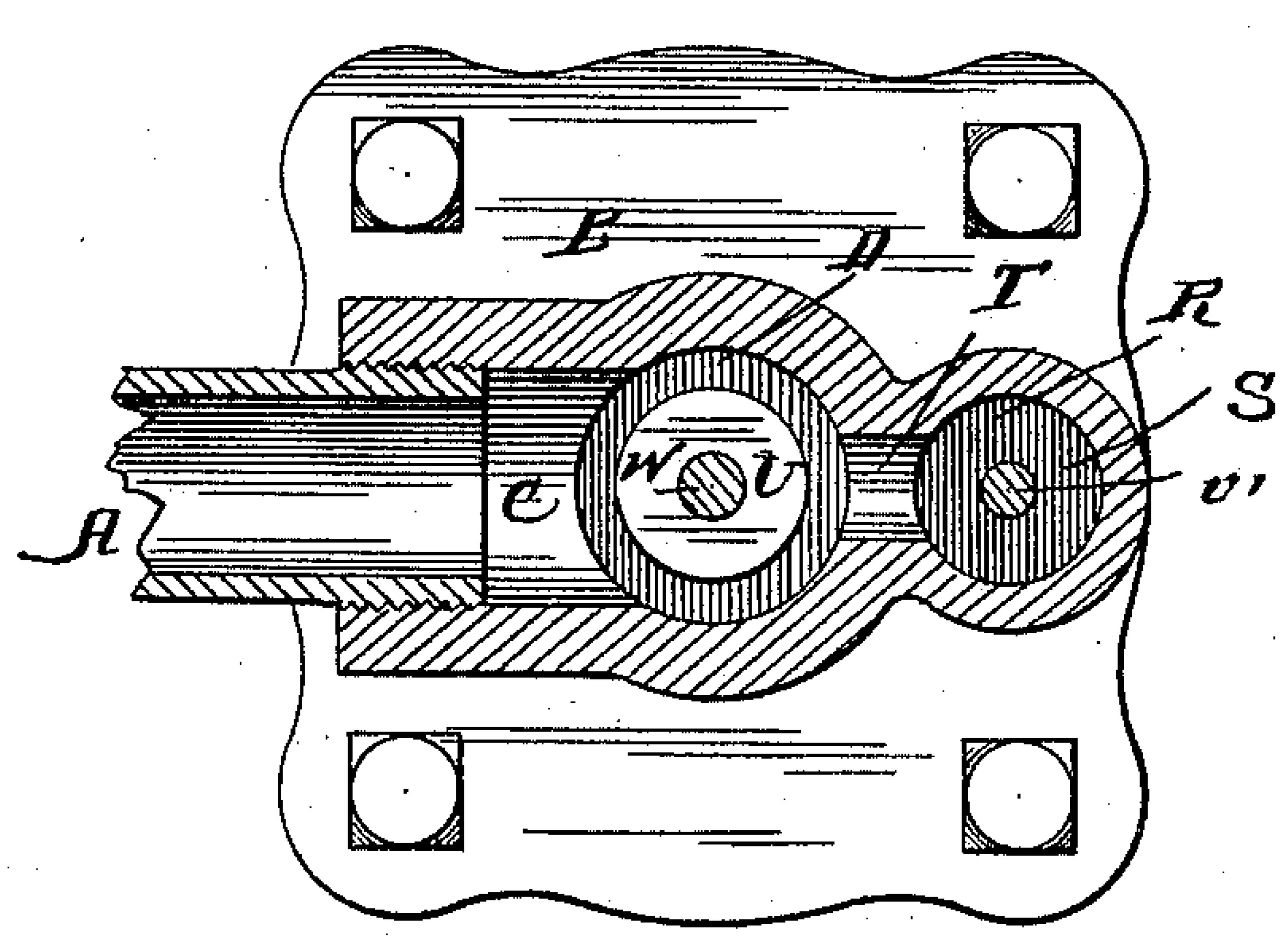


Fig. 3.



Witnesses:
O. W. Bond.
J. R. Andrews

Inventor:
Harvey S. Park

No. 610,948. Patented Sept. 20, 1898.

H. S. PARK.

AIR BRAKE.

(Application filed Mar. 7, 1890.)

(No Model.) 3 Sheets—Sheet 3.

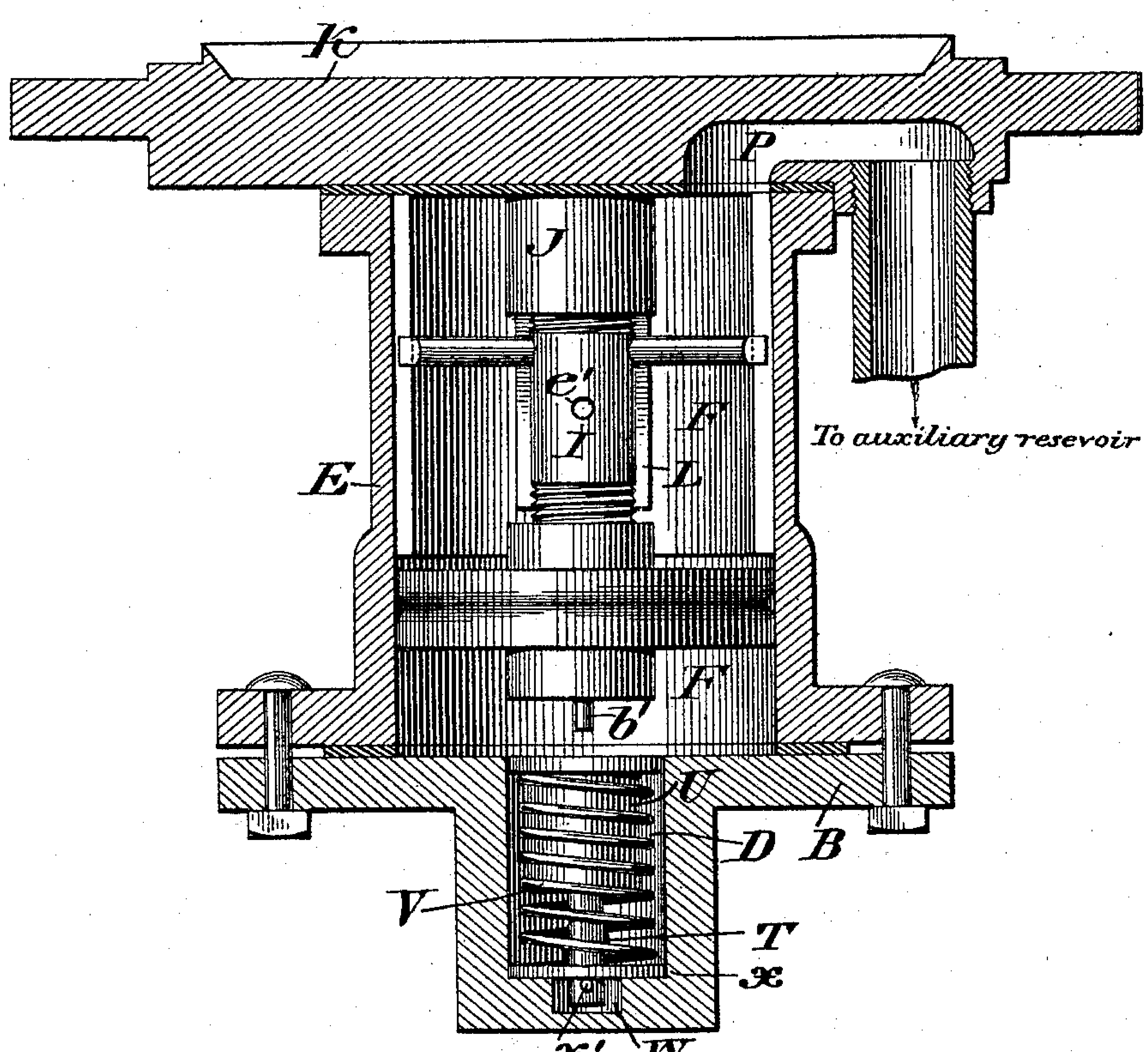


Fig. 6.

Witnesses

James C. Herron.

T. J. Hogan.

Inventor:

Harry S. Park

by J. Snowden Bell.

atty.

UNITED STATES PATENT OFFICE.

HARVEY S. PARK, OF CHICAGO, ILLINOIS, ASSIGNOR TO THE WESTINGHOUSE AIR BRAKE COMPANY, OF PITTSBURG, PENNSYLVANIA.

AIR-BRAKE.

SPECIFICATION forming part of Letters Patent No. 610,948, dated September 20, 1898.

Application filed March 7, 1890. Serial No. 343,047. (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, 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 pertains to make and use the same, reference being had to the accompanying drawings, forming a part thereof, in which—

Figure 1 is a sectional elevation showing the main valve, a portion of the train-pipe, and a portion of a brake-cylinder. Fig. 2 is a top or plan view of the main valve. Fig. 3 is a section through the train-pipe, cap of the main valve, and the vent-chamber. Fig. 4 is a face view of the main slide-valve. Fig. 5 is a face view of a portion of the main-valve chamber, showing the seat of the main valve and the ports and passages therein. Fig. 6 is a vertical section through the main-valve casing, showing the connection of the main-valve chamber with the auxiliary reservoir.

It has been found in practice that with air-brakes in which the venting of the entire train-pipe is had at the engineer's valve the reduction of the train-pipe pressure throughout the entire train-line is not simultaneous, as the pressure in the rear cars is not reduced until the air can flow from the train-pipe of the rear cars to pass out at the engineer's valve, the result being an uneven setting of the brakes, in which the brakes for the forward cars are set, while those of the rear cars are not acted on, permitting the rear cars to bump or come in contact, causing more or less jar and in some cases where the stoppage is sudden creating considerable damage; and the object of this invention is to overcome the objection of non-setting of the brakes of the rear cars at substantially the same time with those of the forward cars and to have the brakes on all the cars set simultaneously, or approximately so; 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 for the train-pipe end of the main-valve chamber.

C is a passage in the cap or cover B and into which the end of the train-pipe A is screw-threaded or otherwise connected.

D is a chamber or passage into which the passage C opens, and this passage D is closed at one end, and its other end opens into the main-valve chamber.

E is the cylinder or casing of the main valve, to which the cap or cover B is attached by suitable bolts, and the joint between the cap or cover B and the cylinder E is made air-tight by a suitable packing.

F is the main-valve chamber, formed of two sections, one of which is of a larger diameter than the other.

G is a plate or disk having at its center a screw-threaded hole in the form of construction shown, and G′ is a companion plate or disk also having a screw-threaded hole at its center.

H are cup-leather packings, one for each disk G and G′, which packings are placed between the disks and secured by screwing the disk G′ down, and the ends of the packings H extend around the circumference or edge of the respective plates, as shown in Fig. 1.

I is a stem having a screw-threaded portion for the attachment of the plates G and G′. The hub or center of the plate G has therein a port *a*, in which is seated a valve *b*, having a stem *b′* projecting on both sides of the valve, and the port *a* opens into a chamber *c* in the stem I, at the opposite end of which chamber is a port *e*, closed by a valve *d*, which valve has a stem *d′* projecting on both sides thereof, and in the chamber *c*, between the valves *b* and *d* and around the stems *b′* and *d′*, is a coiled spring *b″*, by which the valves *b* and *d* are held to their seats. The port *e* has side passages *e′* crosswise of the stem I, and this port opens into a chamber *f*, and from the chamber *f* a hole *f′* leads through a head on the end of the stem I, and in the chamber *f* is located a disk *g*, having a stem *g′* projecting on both sides thereof, one end of the stem entering the hole *f′*, and the other end of the stem *g′* has a coiled spring *g″* around it for one end of the spring to abut against the disk g and the other to rest upon the bottom of the chamber f. The plate or disk g, with its stem g' extending through the hole f', and the coiled spring g'' furnish a means for holding the piston G, G', and H from a full return until sufficient pressure is had back of the piston in the chamber F to overcome the resistance of the spring g''.

J is a head on the end of the stem I, in which head is the hole f'.

K is a cover or head for the brake-cylinder O, to which is attached the cylinder or casing E by suitable bolts, and the joint between the cylinder E and the head K is made tight by a suitable packing, as shown in Fig. 1.

L is a slide-valve attached to the stem I by an arm L' and held to its seat on the inner face of the cylinder E by a coiled spring h around the arm L'. This valve has a port i through it, and its acting face has a passage or cavity l, and in the acting face of this valve L is a second passage or cavity n, with a port m, through which the cavity n communicates with the chamber F.

M is a passage in the wall of the cylinder or casing E, which passage has a port j, communicating with the chamber F through the port i in the valve L, and also a port k, communicating with the passage s when the valve L is in its normal position. The inner face of the wall of the casing or cylinder E has a port o to communicate with the passage n with the valve L in its normal position, and this port o communicates with a passage p in the wall of the casing or cylinder E, which passage p is in line with a passage p' in the cap or cover B. The wall of the cylinder or casing E has a passage r, (shown by the full lines in Fig. 1,) which passage is in line with a passage r' through the cap or head K, and the passage r at one end has a port r'', which communicates with a passage l in the face of the valve L, and the passage k also communicates with a port t through the cylinder or casing E when the valve L is in its normal position, as shown in Fig. 1.

N is a passage through the head K.

The passages M and N form in effect a single passage by which pressure is admitted from the chamber F to the brake-cylinder, and these passages M and N and the port j, the port k, and the passage s and the port t are shown by dotted lines in Fig. 1, and also by dotted lines as to the passage M in Fig. 5.

O is the brake-cylinder, having a piston and stem, as usual, and this cylinder O is attached to the head K in any suitable manner.

P is a passage in the head K for admitting air from the chamber F to the auxiliary reservoir.

Q are ears on the head K, and Q' are ears on the brake-cylinder, through which ears Q and Q' bolts q are passed for attaching the head, and the joint between the head and the brake-cylinder is made air-tight by a suitable packing.

R is a chamber in the cap or cover B, into which the passage p' leads.

S is a piston in the chamber R, which piston has a suitable packing u and carries a valve v, attached to the piston by a stem v', which valve closes a port or opening w in a ring R', screw-threaded into the end of the chamber R, which ring permits the insertion of the piston S into the chamber R and closes the end of the chamber R.

T is a passage connecting the chambers D and R.

U is a cup located in the chamber D.

V is a coiled spring encircling the cup U and supporting such cup by a ledge or flange, which rests upon the spring V.

W is a sliding pin in the cup U, carrying a plate x by a pin x', which plate x supports one end of the spring V. The other end of the spring V holds the cup U in position to form a stop for limiting the motion of the triple-valve piston in service applications of the brakes.

The auxiliary reservoir is not shown, but is to be attached to the bottom of the car in any usual and well-known manner, and this reservoir is charged by air passing from the main reservoir on the locomotive through the pipe A into the chamber D, through the passage C, and thence into the chamber F, with the piston in such chamber and the sliding valve L in the position shown in Fig. 1, which is the normal position for these parts, and this pressure will raise the valve b, allowing air to enter from the chamber F back of the piston into the chamber c in the stem I, and as the valve d is opened by the abutting ends of the stems d' and g', as shown in Fig. 1, the air from the chamber c will flow into the port e and pass out through the side openings e' into the chamber F in front of the piston and into the passage P, which communicates with the chamber F, and from the passage P such air will flow through a connecting-pipe into the auxiliary reservoir, and such admission of air into the auxiliary reservoir will continue until the pressure in the auxiliary reservoir and train-pipe are equal, in which condition the pressure in the chamber F back and in front of its piston and in the chamber c will all be equal and the same as the train-pipe and auxiliary-reservoir pressure, and with the pressure thus equalized the spring b'' acts and seats the valve b, closing the port a against further admission of air to the chamber c, and consequently to the chamber F in front of the piston. The fluid under pressure in the chamber F in front of its piston will pass through the port m into the passage or cavity n and through the port o, passage p, and passage p' will enter the chamber R back of the piston S and hold the valve v to its seat, closing the port or opening w against outflow of air from the chamber R in front of the piston S, and as the chamber R in front of the piston S is connected with the chamber D by the passage T the chamber D is closed against any outflow of air at the port or opening w when the valve v is on its seat.

A reduction in the train-pipe pressure produces a corresponding reduction in the chamber F back of the piston in such chamber, as the fluid under pressure will pass out through the chamber D and passage C into the train-pipe. A slight reduction of a few pounds of train-pipe pressure and a corresponding reduction in the chamber F back of the piston in such chamber causes the pressure in the chamber F in front of the piston to move such piston, and by such movement of the piston the valve L is drawn back sufficiently for the port i to communicate with the port j, when air from the chamber F in front of the piston can enter the passage M and through the passage N pass into the brake-cylinder O to set the brakes at a grading pressure, and with this movement air from the auxiliary reservoir to supply the necessary pressure enters the chamber F in front of the piston through the passage P.

The chamber R is connected with the chamber F in front of the piston in the latter chamber by the passage p', passage p, port o, passage n, and port m, and the admission of fluid under pressure into the chamber F in front of the piston admits air to and gives a corresponding pressure in the chamber R back of the piston S, so that with the valve L in its normal position the pressure in the chamber R in front and back of the piston S is equal and the piston S will be held in its normal position, closing the vent w; but with an excess of pressure in the chamber R in front of the piston over the pressure at the back of the piston the piston S will be carried back, withdrawing the valve v and opening the port or passage w, and such excess is had by a decrease of the pressure in the chamber R back of the piston S when the valve L is caused to recede by a reduction of train-pipe pressure, and an excess of air-pressure in the train-pipe back of the first triple valve as such train-pipe air flows forward to pass through the train-pipe will at once open the valve v by moving the piston S back, and such opening of the valve v opens the port or passage w, so that a part of the air in the train-pipe between the next triple valve and the first one will enter the chamber D and pass out through the opening T and the port w, producing a vent of the train-pipe at the triple valve instead of the air flowing forward to pass out at the engineer's valve. The valve of the second car will be actuated by venting at the valve of the first car by the opening of the port or passage w of such first valve, and the valve of the third car will be actuated by venting at the valve of the second car by the opening of the port or passage w of the second valve by the train-pipe pressure from the third car, which enters the chamber D of the second valve and moves the piston S to open the valve v for the air to pass out through the opening T and port w, and this reduction will occur with each succeeding car at the valve of the preceding car.

The moving of the valve L to apply the brakes carries the passage l back until the passage l communicates with the ports r'' and o, and with such communication air from the vent-chamber R will pass through the passage p' into the passage p, thence through the port o, passage l, and port r'' into the passage r, and thence through the passage r' into the brake-cylinder, reducing the pressure in the chamber R back of the piston S below that of the pressure in the chamber R in front of the piston, and such pressure in front of the piston acts on the piston S to unseat the valve v and open the port or opening w, thereby opening an outlet for air through the passage T from the chamber D and bringing the parts into position for air to enter the passage C from the train-pipe A and pass through the chamber D to the chamber R in front of the piston in such chamber R and vent to the atmosphere, and this opening of the valve v will occur at each valve of the train simultaneously. The valve v, which will be closed by the increase of pressure in the brake-cylinder acting through the passages r' r l p p' on piston R, when closed enables the pressure in the chamber F to be restored, and with such restoration of the pressure the piston in the chamber will be advanced, bringing the parts to the normal position shown in Fig. 1.

The opening of the vent port or passage w will occur at each movement of the valve L to set the brakes, and the closing of the valve v will occur as the train-pipe air is restored to its normal pressure. When the parts are in position for setting the brakes, the port i will be in communication with the port j and the passage l will be in communication with the port r'' and the port o, venting the chamber R to the brake-cylinder through the passages p, p', r, and r', and the passage n will have passed the port o, shutting off the admission of air from the chamber F through the passage p and the port o into the chamber R. A return of the piston and the valve L to its normal position carries the passage n for communication between the port m and the port o for air to pass into the chamber R from the chamber F and carries the passage s for communication between the port k and the port t, and when this communication is established air from the brake-cylinder will flow out through the passages N M, port k, passage s, and port t, venting the brake-cylinder to the atmosphere and releasing the brakes, and air from the chamber F will enter the chamber R back of the piston S to advance the piston and seat the valve v to close the vent-port w.

It will be seen that the vent opening or port w is controlled wholly by the air-pressure and that by means of this opening or port w the train-pipe can be vented at the valve itself without the necessity of the air traveling through the entire train-pipe to the engineer's valve, and each valve thus becomes a vent for the succeeding valve, by which all the valves throughout the train will be vented nearly simultaneously, applying the brakes to all the cars in unison, or nearly so, and thereby preventing any jar or concussion from the bumping or coming in contact of one car with another. The piston S, by which the valve *v*, which controls the port or passage *w*, is operated, is actuated by the difference of pressure in the chamber R at the front and back of this piston, as with the reduction of the pressure in the chamber R back of the piston S, which occurs with the receding of the valve L to apply the brakes, the piston S is moved back, opening the valve *v*, and on an increase of the pressure in the chamber R back of the piston S, which occurs when the air from the train-pipe enters the chamber F to return its piston to normal position in releasing the brakes, the piston S is advanced, closing the port or opening *w* by the increase of pressure in the brake-cylinder, and this action of the piston S must occur with the setting and release, respectively, of the brakes, the result being the positive action or movement of the valve *v*.

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

1. The combination in an air-brake mechanism of a vent-chamber communicating with the train-pipe, a piston therein, a passage leading to the vent-chamber from the main-valve chamber, and a passage leading from the brake-cylinder to the main-valve chamber, a main valve, a passage in the main valve connecting the vent-chamber passage and a vent-valve opened by the piston in the vent-chamber and the brake-cylinder passage, substantially as and for the purpose specified.

2. The combination in an air-brake mechanism of a vent-chamber communicating with the train-pipe, a piston in the vent-chamber having a valve carried by the piston, a vent-opening closed by the valve, a passage between the vent-chamber and the main-valve chamber, a passage between the brake-cylinder and the main-valve chamber, a slide-valve, and a passage in the slide-valve connecting the vent-chamber passage and the brake-cylinder passage, substantially as and for the purpose specified.

3. In an automatic fluid-pressure brake system, the combination with a train-pipe, a brake-cylinder, a triple-valve piston and a supplemental movable abutment, of a passage for releasing fluid from the train-pipe, a release-valve controlling such passage, and operative by variations of fluid-pressure on opposite sides of the movable abutment, and a valve device operative on a reduction of train-pipe pressure to release pressure from one side of the movable abutment, substantially as set forth.

4. In an automatic fluid-pressure brake system, the combination, with a train-pipe, a brake-cylinder, and a triple valve, of a passage for releasing fluid from the train-pipe, a release-valve controlling the passage, a movable abutment for operating the release-valve and which is normally exposed to fluid-pressure on its opposite sides, and a valve device operated by a reduction of train-pipe pressure for releasing pressure from one side of the abutment and thereby opening the release-valve, substantially as set forth.

5. In an automatic fluid-pressure brake system, the combination, with a triple valve, of a release-passage through which fluid under pressure may be released from the train-pipe, a release-valve controlling the passage and operative by variations of pressure on opposite sides of a movable abutment, and a valve device for releasing fluid-pressure from one side of the movable abutment to the brake-cylinder, substantially as set forth.

6. In an automatic fluid-pressure brake system, the combination, with a triple valve, of a release-passage through which fluid may be released from the train-pipe, a release-valve normally closing the release-passage, a movable abutment for operating the release-valve, a passage controlled by the slide-valve of the triple valve and through which fluid under pressure may be released from one side of the movable abutment, and thereby effect opening movement of the release-valve, substantially as set forth.

7. In an automatic fluid-pressure brake system, the combination, with a triple valve, of a release-passage through which fluid may be released from the train-pipe, a release-valve normally closing the release-passage, a movable abutment for operating the release-valve, a passage controlled by the slide-valve of the triple valve and through which fluid under pressure may be admitted to one side of the movable abutment when the triple valve is in normal position, and released from that side when the triple valve is moved by a reduction of train-pipe pressure, substantially as set forth.

HARVEY S. PARK.

Witnesses:
O. W. BOND,
J. R. ANDREWS.