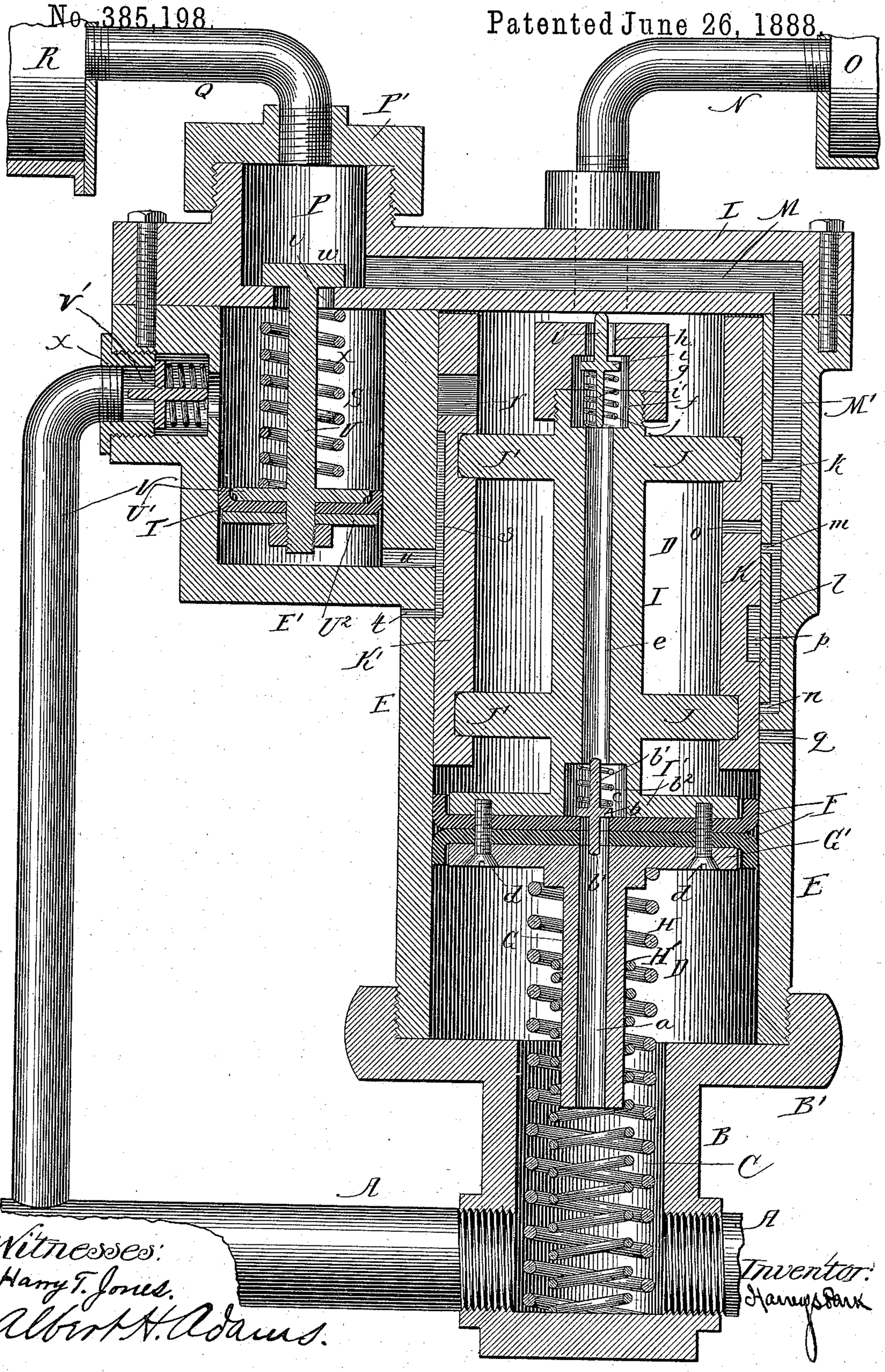
(No Model.)

# H. S. PARK.

## AIR BRAKE.

No. 385,198. Patented June 26, 1888.



# UNITED STATES PATENT OFFICE.

HARVEY S. PARK, OF CHICAGO, ILLINOIS.

## AIR-BRAKE.

SPECIFICATION forming part of Letters Patent No. 385,198, dated June 26, 1888.

Application filed January 3, 1888. Serial No. 259,565. (No model.)

*To all whom it may concern:*

Be it known that I, HARVEY S. PARK, residing at Chicago, in the county of Cook and State of Illinois, and a citizen of the United States, have invented certain new and useful Improvements in Air-Brakes, of which the following is a specification, reference being had to the accompanying drawing, which is a sectional elevation.

The object of this invention is to quicken the action of pneumatic controlling devices of air-brakes for railroad-cars and have the apparatus embody the advantages of a perfect grading system in applying the brakes, and the ability of filling the car-reservoir while the brake is set; and to this end the gist of the improvement consists in providing a valve normally held seated by train-pipe pressure on a piston or movable wall located in a chamber, which piston can be counterbalanced to allow it to rise and permit the train-pipe air to pass direct to the brake-cylinder, and by venting the car-reservoir of air to close the valve, permitting the train-pipe air to pass to the car-reservoir and restore the pressure, after which to escape the air from the brake-cylinder to the atmosphere and release the brake without disturbing the valve and its controlling-piston or movable wall, as hereinafter more particularly described, and pointed out in the claims.

The drawing illustrates the construction and operation of the specific form of apparatus in which the invention is embodied; but it is to be understood that the construction and arrangement can be varied from that shown, without departing from the principle of the invention.

In the drawing, A represents the train-pipe.

B is a cap or cover, into which the train-pipe is screw-threaded or otherwise attached, and on this cap, at one end, is a flange, B′, having a rim with an internal screw-thread.

C is a passage or chamber in the cap B, having communication with the train-pipe.

D is the main valve-chamber, with which the passage or chamber C communicates.

E is the wall or casing of the chamber D.

F is the packing portion of a piston, formed of cup-leather or other suitable material.

G is a stem having a central longitudinal hole, *a*, and provided at one end with a disk or plate, G′.

H H′ is a pressure-spring, formed of two coiled springs, one within the other, as shown, one end of the spring resting on the bottom of the passage C and the other end abutting against the disk G′ around a shoulder on the stem G.

I is a stem having a central longitudinal hole, *e*, and provided at one end with a disk or plate, I′, between which and the disk or plate G′ the packing F is clamped by screws *d*, so that the parts F, G′, and I′ form a piston or movable wall. The passage *e* communicates with a chamber, *c*, in the end of the stem I, and through the packing F in line with the passage *e* is a passage forming a communication between the chamber *c* and the passage *a*, and this communication is controlled by a valve, *b*, seating on the packing around the hole therein and having the stem *b′* on both sides in the form shown, and, as shown, the valve is held down to its seat by a coiled spring, $b^2$, located around the stem *b′* in the chamber *c*. The passage *e* enters a chamber, *f*, formed partly in the end of the stem I and partly in a head or cap, *g*, screwed onto the end of the stem, and leading from the chamber *f* through the cap *g* is a passage, *h*, controlled by a valve, *i*, on a stem, *i′*, which valve seats onto the end wall of the chamber *f* around the passage *h*, and is held seated by a coiled spring, *j*, and, as shown, the valve *i* is forced open by the end of the stem *i′* striking the end plate of the chamber D.

J J′ are arms or lugs extending out from the stem I.

K K′ are slide-valves located in the chamber D, and connected to the stem I by the arms or lugs J J′, respectively.

L is the end cap or plate for the wall or cylinder E, and bolted or otherwise secured to the wall and packed in any suitable manner at the joint so as to be air-tight.

M is a passage in the end plate, L, communicating with a passage, M′, in the wall E, which passage communicates with the chamber D by a port, *k*, and has a continuation forming a smaller passage, *l*, in the wall E, which passage *l* communicates with the cham-

ber D by ports *m* and *n*, and the chamber D has an exit or exhaust port, *q*, through the wall E. The slide-valve K has a by passage or port, *o*, which can be brought into communication with the port *m*, and a by passage or port, *p*, which can be brought into communication with the ports *n* and *q*, the ports coming into communication with the descent of the valve K.

N is a pipe leading from a passage in the cap L to the car-reservoir.

O is the car-reservoir.

P is a chamber, into which the passage M leads.

Q is a pipe, screw-threaded into the cap P′ of the chamber P and forming a communication between the chamber P and the brake-cylinder.

R is the brake-cylinder.

S is a chamber formed in an extension, E′, of the case or cylinder E in the construction shown. This chamber S has communication with the outer air by a port, *u*, and a passage, *s*, in the slide-valve, K′, and a further communication is had with the port *u* as the slide-valve descends by a passage, *r*, and the chamber S is exhausted through the port *u*, passage *s*, and port *t* in the wall or shell E.

T is the packing of a piston.

U is a stem having a plate or disk, U′, between which and a plate or disk, U², the packing T is secured, so that the parts T, U′, and U² form a piston, located in the chamber S. The chamber S communicates with the chamber P by a passage, *v*, which passage is controlled by a valve, *w*, which valve is held seated by a spring, *x*, and the air-pressure above the piston.

V is a pipe leading from the train-pipe A to a passage, V′, leading into the chamber S, and having a valve, *x*, to prevent the escape of air when the train parts.

The car-reservoir O is charged or filled with air when the slide-valves K K′ are as shown, in which position the air from the train-pipe enters the chamber C and passes to the chamber D, and this air, if the slide-valves and piston are down, will raise these parts, allowing the air from the train-pipe to pass into the passage *a*, raising the valve *b*, entering the chamber *c*, to pass through the passage *e*, chamber *f*, and passage *h*, to enter the pipe N and pass to the car-reservoir O, the valve *i* being open at this time.

A slight lowering of the train-pipe pressure closes the valve *b* and reduces the pressure below the piston, so that the excess of pressure of the other side of the piston or movable wall in the chamber D forces the piston back, carrying with it, through the stem *i* and arms J J′, the two slide-valves K K′. This lowering of the slide-valve K brings the port *o* thereof into communication with the port *m*, permitting the air from the car-reservoir to enter the chamber D and pass through the ports *o* and *m* into the passage *l*, and thence to the passages M and M′ and the chamber P, from which chamber the pressure passes to the brake-cylinder R through pipe Q to set the brakes in the usual manner; and when the brakes have been set to the required pressure the train-pipe pressure is restored, returning the piston or movable wall and the slide-valve K, opening the valves *b* and *i* for again charging the car-reservoir, and such return will close the port *m*, as the slide-valve K is then in its normal position.

The brakes are released by further reducing the train-pipe pressure, closing the slide-valve K, with its port *o*, to pass and close the port *m*, and bringing the passage or recess *p* to a point connecting the ports *n* and *q*, allowing the air to pass from the brake-cylinder through the pipe Q into the chamber P, and thence through the passages M, M′, and *l* to exhaust through the port Q, and with the parts in this position the spring H is brought into play to hold the slide-valve against further descent by the striking of the shoulder on the stem G against the second spring-coil, H′.

The bringing of the ports *n* and *q* into communication through the passage or recess *p* allows the air in the brake-cylinder to vent to the atmosphere and release the brake, and in case it is not desired to release the brakes entirely the restoration of the train-pipe pressure will send the slide-valve home or to its normal position in the manner already described, holding the brake pressure to any extent desired.

The brakes are set to a full pressure by still further reducing the train-pipe pressure until the passage or recess *p* passes the ports *n* and *q* for the valve K to close such ports and have its end pass the port *k*, which is done by reason of the port *r* of the valve K′ connecting with the port *u*, allowing the car-reservoir air under pressure to pass into the chamber S below the piston or movable wall thereof, producing a counterbalancing-pressure on the under side of the piston U′ sufficient to overcome the pressure on top of the piston, so that the train-pipe pressure on the under side of the valve *w* will raise such valve, allowing air to pass direct from the train-pipe through the pipe V into the chamber S, and thence into the chamber P, and through the pipe Q to the brake-cylinder R, and on this occurring the excess of the car-reservoir pressure over the train-pipe pressure quickly lowers the piston or movable wall of the chamber D and opens the port *k* by the slide-valve K passing such port, so that the car-reservoir air passes through the port *k* and passages M M′ into the chamber P, and thence to the brake-cylinder through the pipe Q, and with this open communication it will be seen that the train-pipe, car-reservoir, and brake-cylinder are in communication, producing an equal pressure in the train-pipe, chamber S, chamber P, brake-cylinder R, car-reservoir O, and the connecting-passages. The air passing from the pipe V into the brake-cylinder R reduces the pressure in the chamber D, lowering the piston I

and valve K, which opens the port *k*. The air from the reservoir O will flow through the passage M, chamber P, and pipe Q into the brake-cylinder R, and the air in the train-pipe having been greatly reduced by flowing into the brake-cylinder R, the pressure in the chamber S is below the reservoir-pressure, so that on opening the port *k* the reservoir-pressure, being greater than that in the chamber S, will close the valve *w;* but if it should not, the valve X acts to prevent the flow of air to the train on opening the port *k*, and if the valve *w* is not closed the flow of air from the passage M to the chamber S will not be objectionable to the perfect working of the parts. The parts when in this condition will have the valves *b* and *i* seated by their respective springs, and the pressure below the piston or movable wall of the chamber D will then act and seat or return the valves K and K′, closing the ports for the valve K and bringing the passage S into communication with the port *u*, so that the air in the chamber S below the piston or movable wall of such chamber will vent to the atmosphere through the port *u*, passage *s*, and port *t*, causing the excess of the train-pipe pressure on such piston or movable wall to return the same and close the valve *w*, allowing the car-reservoir to be restored through the passages *a* and *e*, as before described, and when the car-reservoir pressure has been restored the brake can be released by passing the valve K to that point communicating the ports *n* and *q* with the passage *p*, which action of the valve K is had by lowering the train-pipe pressure, as already described, and if additional pressure is required in the brake cylinder it can be had by moving the slide-valve K to bring the ports *m* and *o* into communication, as already described.

The valve *b* seats downward, and there is no by-port for air-passage, thus insuring the lowering of the piston or movable wall and the slide-valve K and K′, producing a reliable and certain action of the brake, and the valve *i*, seating upward, insures the return of the piston or movable wall and its slide-valves K and K′ to their normal position, as the air cannot pass to the car-reservoir until the valve *i* is unseated by its stem *i′* striking the cap or end plate, L.

In setting the brake, the grading-port *o* in the valve K being small, the quick lowering of the valve closes the port *m* almost instantly, enabling the opening of the valve *w* to vent the train-pipe air into an empty brake cylinder from the pipe V and chamber S.

The valve *w* is held normally seated by the train-pipe pressure on its piston or movable wall in the chamber S; but when this valve is allowed to rise by the excess of pressure on the opposite side of its piston or movable wall the train-pipe air and pressure will pass direct into the empty brake-cylinder, and this is effected by the counterbalancing of the train-pipe pressure on the piston by the admission of air and pressure from the car-reservoir, and it will also be seen that by exhausting or removing the car-reservoir pressure from the piston the train-pipe pressure will at once act on the piston and close the valve *w* with the closing or return of the main valve, thus allowing the car-reservoir pressure to be restored with the brakes applied, and at the same time no interference is had with the release of the brakes by the moving of the main valve to vent the air from the brake-cylinder to the atmosphere, and such release will not disturb in any manner the controlling-valve *w* and its movable piston. This arrangement gives a quick action for setting the brake and venting the train-pipe air into a brake-cylinder and using such air to set the brake rather than venting the air to the atmosphere. The apparatus enables the pressure in a car-reservoir to be restored while the brake is set, which is a great advantage, and in case of release of the brakes the car reservoir is fully charged for again setting them, and, furthermore, by the employment of the main slide-valve and the piston-controlled valve *w* the combined action of the train-pipe pressure and the car-reservoir pressure can be had simultaneously by applying the brakes.

The valve X is provided to prevent the exhausting of the air from the car-reservoir through the pipe V in case of an accidental parting of the train, which would prevent the setting of the brakes from the car-reservoir pressure.

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

1. In a brake mechanism, the combination of a train-pipe, a car-reservoir, a brake-cylinder, a chamber having communication with the train-pipe, the car-reservoir, and the brake cylinder, two slide-valves located and operating in said chamber, a secondary chamber having communication with the train-pipe, brake-cylinder, and car-reservoir, a piston or movable wall located and operating in said chamber, and a valve connected with said piston or movable wall and held seated by air-pressure from the train-pipe on the piston and opened by the admission of air-pressure from the car-reservoir to overcome the train-pipe pressure on the piston for the air-pressure from the train-pipe to act on the valve, substantially as described.

2. In a brake mechanism, the combination of a train-pipe, a car-reservoir, a brake-cylinder, a chamber communicating with the car-reservoir, brake-cylinder, and train-pipe, a second chamber communicating with the train-pipe, brake cylinder, and car-reservoir through the first chamber, a movable piston or wall in the second chamber controlling a valve between the train-pipe and brake cylinder, and two slide-valves located in the first chamber and operated by a piston in said chamber, one of said valves at the initial travel of the piston opening a port between the car-reservoir and the brake-cylinder, and the further travel of

the same valve opening a communication between the brake-cylinder and atmosphere, and a still further travel of the same valve closing such communication and opening a communication through the other valve between the car-reservoir and the second chamber containing the movable piston or wall to overcome the train-pipe pressure on the piston and open direct communication between the train-pipe and brake-cylinder, substantially as set forth.

3. In a brake mechanism, the combination of a slide-valve, a piston connected with the said valve, a chamber communicating with a car-reservoir and a brake-cylinder, a second chamber connected with the car-reservoir through the first chamber and communicating with the train-pipe and brake-cylinder, a movable wall or piston in the said second chamber, a valve connected with said movable wall or piston and controlling communication between the train-pipe and brake-cylinder, and a second slide-valve operated by the piston of the first slide-valve, whereby the first slide-valve controls the communication between the car-reservoir and brake-cylinder and the brake-cylinder and atmosphere, and the second slide-valve controls the communication between the train-pipe and the brake-cylinder direct by overcoming the train-pipe pressure on the piston in the second chamber, substantially as specified.

4. In a brake mechanism, the combination of a train-pipe, a car-reservoir, a brake-cylinder, two slide-valves, a secondary valve controlled by a piston moving in a chamber, and a piston carried by a hollow stem having at one end a valve seated downward and at the other end a valve seated upward, each held seated by a spring and operating, when said piston is at its normal position, to have the upper valve unseated and the lower valve lifted to permit air to pass from the train-pipe through the piston and hollow stem to the car-reservoir, and with the preliminary travel of the piston to have the upper valve seat and prevent the passage of air from the train-pipe to the car-reservoir and the lower valve seat and prevent the passage of air from the car-reservoir to the train-pipe, substantially as specified.

5. In a brake mechanism, the combination of a train-pipe, a car-reservoir, a chamber communicating with the train-pipe and car-reservoir, a brake-cylinder communicating with said chamber, a slide-valve in said chamber provided with ports controlling ports and passages in the chamber connecting the car-reservoir, brake-cylinder, and atmosphere, a second chamber connected with the car-reservoir through the first chamber, a slide-valve in the first chamber controlling communication between the two chambers, a piston or movable wall in the second chamber, a valve connected with said piston and controlling the communication direct between the train-pipe and brake-cylinder, a hollow stem connecting the slide-valves with the piston, valves for the said stem seated upward and downward, and springs to return the piston for the slide-valves to its normal position, substantially as set forth, and for the purposes specified.

6. In a brake mechanism, the combination of a train-pipe, a car-reservoir, a chamber provided with ports and passages connecting the car-reservoir and brake-cylinder and the brake-cylinder and atmosphere, a piston in said chamber, a slide-valve attached to said piston and provided with a port and recess to coact with the ports and passages of the chamber, and springs for returning the piston, whereby the first movement of the slide-valve opens a port for the car-reservoir and brake-cylinder by lowering the pressure in the train-pipe, the equalization of the pressure through the spring restores the piston and slide-valve to normal position, holding the pressure on the brake-cylinder and refilling the car-reservoir through the stem of the piston from the train-pipe, a further reduction of the train-pipe pressure moving the valve to open the ports for discharging the brake-cylinder to the atmosphere, a further reduction of the train-pipe pressure closing such port, and a further reduction of the train-pipe pressure moving the valve to open a port for increased pressure between the car-reservoir and brake-cylinder, and a quick restoration of the train-pipe pressure returning the piston and valve instantly to normal position, holding the pressure on the brake-cylinder, substantially as set forth, and for the purposes specified.

7. In a brake mechanism, the combination of a train-pipe, a car-reservoir, a brake-cylinder, a chamber connected with the train-pipe, car-reservoir, and brake-cylinder, a piston, and two slide-valves located in said chamber, one of said slide-valves controlling the connection between the car-reservoir and brake-cylinder, and the other of said slide-valves controlling a port from its chamber to a second chamber, a piston in said second chamber, and a valve attached to said piston and controlling the supply from the train-pipe to the brake-cylinder, said valve being closed by train-pipe pressure on the piston and raised by train-pipe pressure on the valve when said pressure on the piston is overcome by air admitted from the car-reservoir, substantially as set forth, and for the purposes specified.

8. In a brake mechanism, the combination of the cap L, passage M, passage M′, and ports *k m n q*, with slide-valve K, port *o*, and recess *p*, substantially as and for the purposes specified.

9. In a brake mechanism, the combination of a piston or movable wall, a stem, G, having a passage, *a*, and stem I, having a passage, *e*, with the valve *b*, valve *i*, and cap L, substantially as and for the purpose specified.

10. In a brake mechanism, the combination of the slide-valve K′, having port *r* and recess

*s*, with the chamber S, ports *t* and *u*, a piston or movable wall, valve *w*, and pipe V, substantially as and for the purpose specified.

11. In a brake mechanism, the combination of the slide-valve K′, having the port *i* and recess *s*, with the chamber S, ports *t* and *u*, a piston or movable wall, a valve, *w*, a connecting-pipe, V, and a valve, *x*, substantially as and for the purpose specified.

12. The chamber D, connecting-pipe N, car-reservoir O, slide-valve K′, having a port, *r*, and a piston or movable wall in the chamber D, in combination with the chamber S, port *u*, a movable wall or piston in the chamber S controlling a valve, *w*, and a valve, *x*, for operating the brake in case of parting of the train-pipe, substantially as specified.

13. In a brake mechanism, the combination of a chamber or casing, S, having connection with a brake-cylinder, a valve, *w*, which opens toward the brake-cylinder and controls communication between the chamber S and the brake-cylinder, a piston or diaphragm, U′, a piston-rod, U, and a pipe, V, communicating at one end with the chamber S and at the other end with a train-pipe, a car-reservoir, a chamber, D, and a port, *u*, in the wall of the chamber S, through which air can be admitted to the under side of the piston, substantially as and for the purpose specified.

14. In a brake mechanism, the combination of a train-pipe, a car-reservoir, a brake-cylinder, a valve-chamber, D, a slide-valve in said chamber D, a chamber, S, a piston, U′, and a valve, *w*, held seated by air on the piston U′ and actuated by air-pressure from the train-pipe when by the admission of air from the car-reservoir to the under side of the piston the effect of the air from the train-pipe upon the upper side of the piston has been neutralized, substantially as specified.

15. In a brake mechanism, the combination of a train-pipe, a car-reservoir, a brake-cylinder, a valve-chamber, D, a slide-valve in said chamber operated by the piston I′, a port, *m*, opened and closed by the preliminary travel of the piston, ports *n*, recess *p*, and port *q*, for opening communication between the brake-cylinder and atmosphere, ports *r* and *u* to open communication between the chamber D and the chamber S, passage *s* and port *t* to open communication between the chamber S and the atmosphere, and port *k* to open communication between the car-reservoir and the brake-cylinder, substantially as and for the purpose specified.

16. In a brake mechanism, a valve-chamber, D, provided with ports *k*, *m*, *n*, *q*, *r*, and *t*, a slide-valve having passages *p* and *s*, a piston, I′, a hollow stem, I, and valves *b* and *i*, in combination with a chamber, S, provided with a port, *u*, valve *w*, piston U′, and pipe V, substantially as and for the purpose specified.

HARVEY S. PARK.

Witnesses:
HARRY T. JONES,
O. W. BOND.