

UNITED STATES PATENT OFFICE.

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AIR-BRAKE.

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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 drawing, which is a sectional elevation showing the main valve, a portion of the auxiliary reservoir, and a portion of a brake-cylinder, with the main valve provided with a vent-passage leading from the train-pipe to the atmosphere. This invention relates to air-brakes of that class in which the engineer, through the medium of a train-pipe, an auxiliary or car reservoir, and a brake-cylinder on each car, and a main valve connected with the train-pipe, auxiliary or car reservoir, and brake-cylinder, controls the setting and releasing of the brakes on the cars of the entire train. Air-brakes of this class as formerly used had the vent for the train-pipe at the engineer's valve, necessitating the travel of the air through the entire length of the train-pipe to the engineer's valve to either set or release the brakes, and in consequence of such travel of the air it follows that the brakes on the cars will be actuated in succession and not simultaneously, as should be the case, for the reason that each additional car must cause the air to travel farther in order to vent the train-pipe sufficient to operate the main-valve piston and set the brakes. The result of this slow action is often attended with ill results, for if the brakes of the first car are set instantly each succeeding car being set as the air is vented and after the setting of the brake on the preceding car must produce a shock between the cars by reason of each succeeding car bumping into the preceding one, and in some cases the shock to the last cars of the train will be severe, especially if the train is made up of a number of cars. Attempts have been made to remedy this defect, one of which is a passage leading from the train-pipe to the brake-cylinder and controlled by a valve operated through the medium of the main-valve piston, forcing

such valve open when the piston reaches the limit of its descent; but this construction is open to the objection that the back pressure is liable to counteract the train-pipe pressure and produce a retardation instead of an acceleration in the venting of the train-pipe, and consequent setting of the brakes in succession instead of simultaneously, as desired, and it is to overcome this slow setting of the brakes and to produce an instantaneous venting of the train-pipe at each main valve and a simultaneous setting of the brakes on all of the cars which constitutes the main object of this invention; and to this end the nature of the invention consists in providing a vent-passage for the train-pipe adjacent to each main valve and devices for controlling such vent-passage through the medium of the piston of the main valve; and its nature further consists in the several parts and combinations of parts hereinafter described, and pointed out in the claims as new.

In the drawing, A represents the train-pipe. B is the cap or cover for the main-valve chamber at the train-pipe end thereof, which cap or cover has a side extension B'.

C is a chamber in the extension B' of the cap or cover B, which chamber C is in communication with the train-pipe by a connection or pipe *a* from a coupling *a'*, and from this chamber C a port or passage *c''* leads to the main-valve chamber.

D is a supplemental piston or head fitting snugly in the chamber C and traveling back and forth in such chamber and having attached thereto a valve *d* by a stem *d'*, which valve *d* controls a port *c*, leading to the atmosphere from the end of the chamber C.

E is the shell or casing of the main-valve chamber, to the end of which the cap or head B is suitably bolted.

F is the main-valve chamber, inclosed by the wall or casing E. The chamber F is in communication with the chamber C, back of the piston D, by the port or passage G'.

G is the resisting-spring for the piston of the main valve, one end of which abuts against the piston end and the other enters a chamber or opening G' in the cap or cover B.

H is the main piston, of a diameter to fill the chamber F and slide back and forth in

such chamber and suitably packed, so as to be air-tight between the piston and the walls of the chamber. This piston, as shown, is formed with a chamber H' and a chamber H'', and has through it a passage *g*, with a port *g'* leading into the chamber H', through which passage *g* and port *g'* air can pass from back of the piston H to the chamber F, in front of such piston H, to fill or charge the auxiliary reservoir, which is in open communication with the chamber F through the pipe P.

I is a second piston located in the chamber H' of the piston H and supported at the open end of the chamber H' on a cross-bar or other support and held in its normal position on the cross-bar or support by a spring *h*.

J is the cross-bar or support for the piston I, which bar is attached to the piston H, at the open end of the chamber H', by suitable screws, and, as shown, the piston I has a chamber or opening I', and the piston I carries a valve *g''*, by which the port *g'* is closed when the piston I is in its normal position, and when the piston is advanced its open end passes the port *g'* for air to pass through such port *g'*.

K is a piston located in the chamber H'' of the piston H, and this piston K is held in its normal position and returned to such position by a spring *k*², one end of which is against the face of the piston K and the other rests upon a support *J'*, which closes one end of the chamber H''.

L is a stem formed with or connected to the piston K and extending through beyond the end of the piston H and carrying a valve *l*, which valve opens and closes a passage *k* in the side wall of the casing E, and a catch or stop *l'* on the piston H is adapted to strike against the piston K and carry back the stem L to withdraw the valve *l* from the port or opening *k*, leaving a free outlet from the chamber F.

M is a cap or cover closing the opposite end of the chamber F to the cap or cover B, and this cap or cover M has therein a passage *m*, communicating by a port or opening *k'* with the port or passage *k*, so that when the valve *l* is withdrawn air from the chamber F can enter the passage *m* through the passage or port *k* and port *k'*.

N is the brake-cylinder, having therein a piston N', with a stem N'', as usual, and this cylinder N is connected with the cap or cover M by suitable flanges on the cap or cover bolted to the end of the cylinder N, and the cap or cover has a passage *m'*, which, when the parts are together, is in line with a port *m''* through the head of the brake-cylinder. The passage *m* and the passage *m'* are in communication by a port *n*, leading from the passage *m*, and a port *n'*, leading from the passage *m'*, and these ports *n* and *n'* are in communication by a passage *n''* in a cap or cover *n*³, bolted to M, over the ports *n* and *n'*.

O is the car-reservoir.

P is a pipe leading from the chamber F to the car-reservoir O.

The construction of the piston and the arrangement of the ports and passages coacting with the piston to supply air to the car-reservoir and to set and release the brakes can be varied without departing from the spirit of the invention herein, which is the vent port or passage *c* and its independent controlling devices, by which each valve is vented to the atmosphere without requiring the air to travel from each valve to the engineer's valve before the vent is had, and it is to be understood that the construction and arrangement of this vent-passage in its relation to the valve and the train-pipe can be varied.

The chamber C communicates with the opening G' for the spring G by a passage *c''*, leading to the chamber C, back of the piston, and an adjustable plug *d''*, packed around the stem *d'*, is provided for regulating the force of the spring *d*³. The chamber C communicates with the train-pipe by a passage C' and a port *c'*, and this chamber C communicates with the chamber F in front of the piston D by a passage *f'* and a port *f''* in the piston H, which port *f''*, when the piston H is moved, communicates with a port *f*³, leading into a passage *g*³ in the wall E, which passage *g*³ communicates with a passage *h'*, from which a port *h''* leads to the chamber C, and the passage *g*³ also communicates by a port *h*³ with a port *i*³, leading into a passage *i''* in the piston H. The passage *i''* opens into the front end of chamber F on one or both sides of the valve *l* and is always in communication with the auxiliary reservoir.

The operation of the mechanism shown, so far as relates to the venting of the train-pipe pressure to the atmosphere at each valve, is as follows: A reduction of the train-pipe pressure produces a corresponding reduction in the chamber C back of the piston D by the pressure passing out from the chamber C through the passage *c''* into the train-pipe, and with such reduction a corresponding reduction is had in the chamber F back of the piston H, while the pressure in the front of the piston H is that of the car-reservoir, and car-reservoir pressure is likewise in the chamber C in front of the piston D by reason of the passage *i''*, which communicates with the chamber F in front of the piston H, ports *h*³ *i*³, passage *g*³, passage *h'*, and port *h''*, and as this car-reservoir pressure is in excess of the pressure in the chamber C back of the piston D such pressure acts and moves back the piston D, opening the port *c* by withdrawing the valve *d* for the train-pipe to vent to the atmosphere through the passage C', port *c'*, and port *c*, and when the port *f''* is brought into communication with the port *f*³ by the backward movement of the piston H the air in the chamber C in front of the piston D will flow out through the port *h''*, passage *h'*, passage *g*³, ports *f''* *f*³, and passage *f'* into the

chamber F back of the piston H for such pressure to escape into the train-pipe, equalizing the pressure on both sides of the piston D for the spring d^3 to act and force the piston D forward, closing the valve d and shutting off the escape of the train-pipe pressure through the passage C' and port c' to the atmosphere through the vent port or passage c , and on the return of the piston H to its normal position the valve d is closed, and with the piston H in its normal position the passage g^3 is in communication, through the ports h^3 and i^3 , with the passage i'' for the pressure in the chamber F in front of the piston H to enter the chamber in front of the piston D by flowing through the passage i^3 , ports h^3 i^3 , passage g^3 , passage h' , and port h'' , charging the chamber C to move the piston back with the next reduction of train-pipe pressure to vent the train-pipe to the atmosphere at the port c .

Each valve has a direct train-pipe vent through the passage or port c , and this vent is controlled by the pressure in the train-pipe, the result being that as the train-pipe pressure at the first valve is reduced the valve d will be opened for the train-pipe pressure to vent to the atmosphere, and this will occur simultaneously with each valve on the entire train, producing a simultaneous venting of all the valves on the train, and consequently an application of the brake on all the cars of the train simultaneously, or nearly so, thereby preventing the shock heretofore found in the use of automatic air-brakes, and each valve will have an open air vent or passage, which is automatic and quick in its action, by which a reduction of the train-pipe pressure through the entire train is had simultaneously with each succeeding main valve, and this reduction extends through the entire train, setting the brakes approximately throughout the train at the same time and in such a manner as to produce an easy stoppage without any jar or shock consequent upon the brakes of one car being set while those of the succeeding car are not applied.

The joints of the valve are to be made airtight by suitable packing, as indicated by the black lines, and packing is likewise to be used for the connections, as indicated in the same manner.

It will be seen that with my improvement a release of fluid from the train-pipe to the atmosphere will be effected on a sufficient reduction of pressure in the train-pipe to permit the reservoir-pressure acting on the piston D to overcome the resistance of the spring d' , and a further reduction of train-pipe pressure—such, for instance, as may be caused by the local exhaust of fluid from the train-pipe—does not cause the release-valve to remain

open, but by permitting a reduction of pressure on the right of the piston D insures the closing of the release-valve by the spring d' . The cut off of the exhaust of fluid from the train-pipe is effected by the action of the release-valve independent of any check-valve or other separate valve or device for controlling the release-port, and the release-valve is closed by the spring d' at such a time as to permit only a portion of the fluid to escape from the train-pipe. As the release of fluid is to the atmosphere, this is an important feature of my improvement, by which the total loss of pressure in the train-pipe is prevented.

I claim as my invention and desire to secure by Letters Patent—

1. The combination, with a triple-valve device, of a train-pipe release-valve for releasing fluid under pressure to the atmosphere, a supplemental piston for opening the release-valve, which is normally exposed on its opposite sides to fluid under pressure, and means whereby the release-valve may be closed automatically when a limited quantity of fluid has been released from the train-pipe, substantially as set forth.

2. The combination, with a triple-valve device, of a train-pipe release-valve for releasing fluid under pressure to the atmosphere, a supplemental piston for opening the release-valve, and means for closing the release-valve automatically when the pressure of the train-pipe has been reduced sufficiently to effect a full application of the brakes and before the fluid is completely exhausted from the train-pipe, substantially as set forth.

3. The combination, with a triple-valve device, of a train-pipe release-valve for releasing fluid under pressure to the atmosphere, a supplemental piston for opening the release-valve, and means for closing the release-valve automatically when a portion of the fluid is released from the train-pipe and a reduction of pressure is effected on one side of the supplemental piston, substantially as set forth.

4. The combination, with a triple-valve device, of a train-pipe release-valve for releasing fluid under pressure to the atmosphere, a supplemental piston for opening the release-valve which is normally exposed on its opposite sides to fluid under pressure, a spring tending to close the valve, and means whereby the pressures on opposite sides of the supplemental piston may be equalized so as to permit the spring to close the valve after a limited quantity of fluid has been released from the train-pipe, substantially as set forth.

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Witnesses:

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