

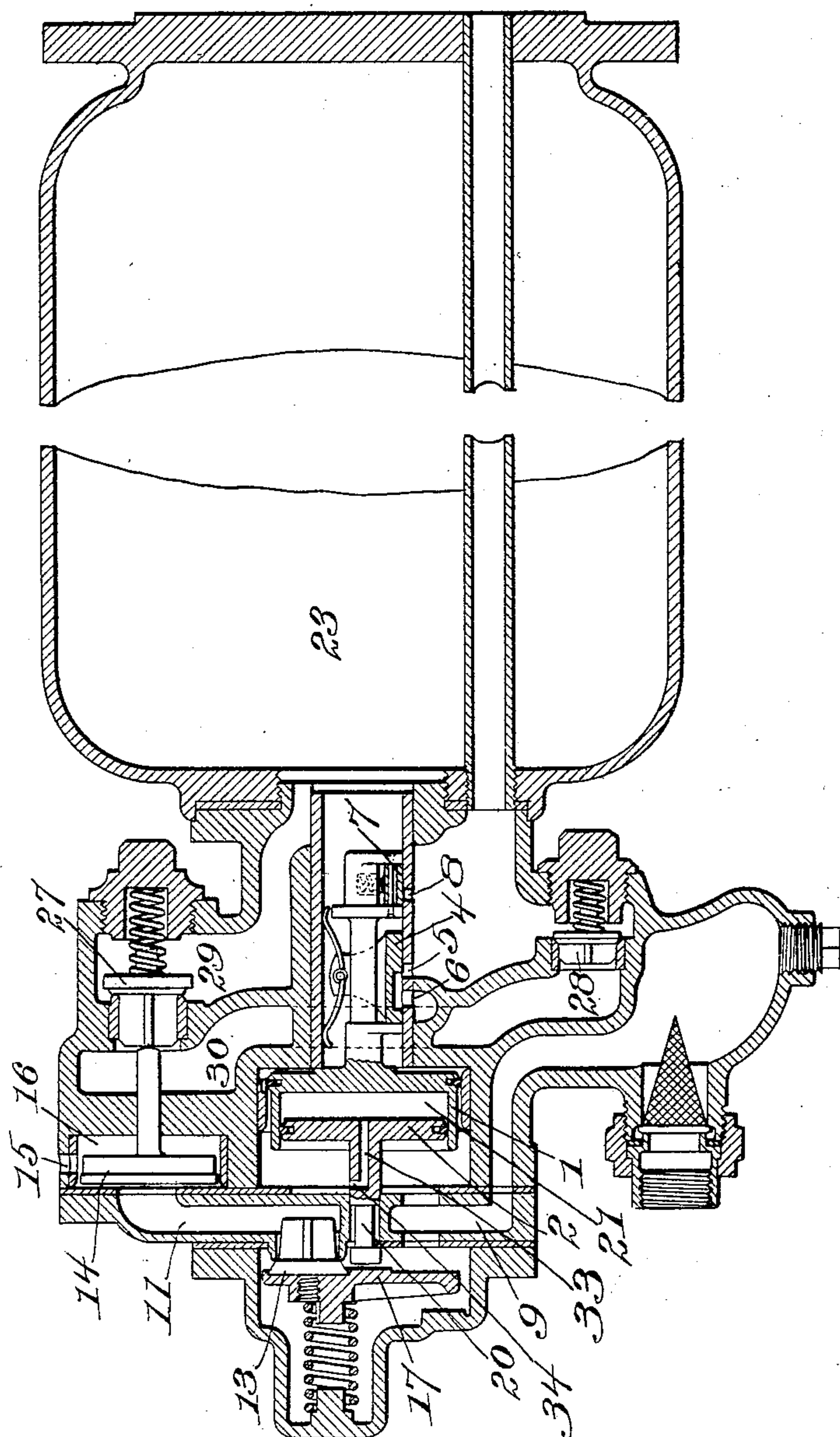
No. 745,735.

PATENTED DEC. 1, 1903.

M. H. NEFF.  
AIR BRAKE.

APPLICATION FILED MAY 21, 1903.

NO MODEL.



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# UNITED STATES PATENT OFFICE.

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## AIR-BRAKE.

SPECIFICATION forming part of Letters Patent No. 745,735, dated December 1, 1903.

Application filed May 21, 1903. Serial No. 158,136. (No model.)

*To all whom it may concern:*

Be it known that I, MILTON H. NEFF, of Watertown, county of Jefferson, and State of New York, have invented an Improvement in Air-Brakes, of which the following description, in connection with the accompanying drawing, is a specification, like figures on the drawing representing like parts.

This invention relates to an air-brake apparatus, and has for its object the attainment of very prompt individual application of the brakes on the several cars of the train.

The invention is embodied in an air-brake apparatus having provision for locally venting the train-pipe for the purpose of hastening the serial application of the brakes on the several cars of a train, and is shown as applied to a triple-valve structure of the kind shown in patent to A. P. Massey, No. 537,057, dated April 9, 1895. As shown in said Massey patent, the escaping train-pipe air when vented to produce quick serial operation actuates a valve controlling a duct from the auxiliary reservoir to the brake-cylinder, so that the air is permitted to flow from the auxiliary reservoir to the brake-cylinder through said passage more copiously than through the passage employed in ordinary service or graduated applications of the brakes.

The present invention relates mainly to the means for controlling the operation of the train-pipe vent-valve, which, as shown in said Massey patent, is operated by a piston exposed to train-pipe pressure on one side and to the pressure of air contained in a small chamber at the other side, there being a small duct or passage through or past the piston connecting the train-pipe and said small chamber, which duct remains constantly open, so that the air may flow therethrough at all times in either direction, according as the pressure at one or the other side of the piston preponderates.

The present invention consists mainly in means for controlling the duct through the vent-valve motor-piston, whereby said duct is closed in response to a very rapid or sudden fall in train-pipe pressure, and thus confines the air in the small chamber at the other side of the piston, so as to continue the effect of the said confined air beyond the time that

it would be effective if said passage were left constantly open, as in prior constructions of this general nature.

The drawing shows in longitudinal vertical section a triple valve of an air-brake apparatus embodying this invention, the parts being shown with the emergency-valve mechanism in the same vertical plane with the triple-valve mechanism, although in the practical construction of the apparatus this arrangement or relative location of the parts may be and commonly is different from that shown in the drawing.

The triple valve proper actuated by the piston 1 and comprising the exhaust-valve 4 for connecting the passage 5 from the brake-cylinder with the passage 6 to the atmosphere and the valve 7 for controlling the flow of air from the auxiliary reservoir 23 through the passage 8 into the brake-cylinder are shown as of the same construction as in the Massey patent, No. 537,057, the specific construction of these parts of the apparatus constituting no part of the present invention and it being unnecessary to describe their mode of operation, as it is well known to those acquainted with this art and is set forth in the said Massey patent.

The train-pipe vent-valve 13, controlling communication between the train-pipe air chamber or space 9 and the train-pipe escape port or duct 11, is actuated by the motor-piston 2, which is constantly exposed to train-pipe air-pressure on one side and at the other side to the pressure of the air confined in the small chamber 21, which in the normal position of the piston 2 occupied when the vent-valve 13 is closed communicates with the train-pipe by a small duct or passage 33, formed in the stem 20 of said piston 2.

The small chamber 21 containing air at one side of the vent-valve motor-piston 2 is shown as formed within the triple-valve piston 1, which, together with the vent-valve motor-piston 2, constitutes a compound piston, the same as in the structure shown in the Massey patent; but this construction is not essential to the present invention, which resides mainly in the arrangement and control of the duct 33. Said duct 33, as before stated, is formed in the piston-stem 20 and



has a lateral opening 34 near the guide-passage in the casing of the valve in which the said stem 20 works. The result of this arrangement is that when the piston 2 has moved only a slight distance from its normal position in the direction to open the train-pipe vent-valve 13 and has dislodged the said valve 13 from its seat the opening 34 of the connecting-duct 33 has passed within the guide-passage for the piston-stem and is covered and closed thereby, and thus further communication between the train-pipe and the interior of the chamber 21 is cut off, so that the air in said chamber 21, that caused the valve-opening movement of the piston 2, remains confined in said chamber, and thus retains the piston 2 in the position in which it holds the vent-valve 13 open. But for such closure of the connecting-duct 33 34 the air would very quickly escape from the chamber 21, and thus permit the vent-valve 13 to be closed very shortly after it was opened, so that only a sudden puff of air would be permitted to escape from the train-pipe.

The escape of train-pipe air when the vent-valve is open hastens the application of the brakes on the next car of the train, producing the quick serial action that is exhibited in an emergency application of the brakes, and the escaping train-pipe air also serves in the apparatus herein shown to actuate an emergency brake-cylinder supply-valve 27, controlling the duct 29 30, which leads from the auxiliary reservoir to the brake-cylinder through the check-valve 28. Said brake-cylinder supply-valve 27 is actuated by a piston 14, working in a chamber 16, communicating with the train-pipe escape-passage 11 and having an outlet 15 to the atmosphere so located that the air in escaping through the vent-passage 11 will actuate the piston 14, and thereby unseat the valve 27, which is thus retained open while the train-pipe air is escaping through the passages 11 and 15. These means for operating the brake-cylinder supply-valve when the train-pipe air is vented in an emergency application are embodied in the structure shown in the Massey patent and serve to hasten the individual application of the brakes when having the quick serial action operation; but the appliances employed in the structure of the Massey patent for opening the train-pipe vent-valve open the same only for an instant, and the escaping train-pipe air consequently opens the brake-cylinder supply-valve 27 only for an instant.

By the construction forming the subject of the present invention, however, the closing of the duct 34, connecting the air-spaces at the two sides of the vent-valve motor-piston, causes the train-pipe vent-valve to remain open for a short interval of time, and the continued escape of train-pipe air acting upon the piston 14 will retain the brake-cylinder supply-valve 27 open long enough to permit the air to flow from the auxiliary reservoir

to the brake-cylinder until the pressures therein are very nearly equalized, so that the maximum braking force is attained. Although it requires more than a mere instantaneous opening of the valve 27 to accomplish the full charging of the brake-cylinder, it requires that the valve should be retained open only a small fraction of a second, so that by the construction forming the subject of the present invention, in which the valve 27 is retained opened longer than it would be by the mere impact or blow of the piston 14, the brakes are individually applied with maximum force in an extremely short interval of time, as is especially desirable in connection with trains running at very high speed when an emergency arises demanding the stopping of the train in the shortest possible distance.

Except for the prolonging of the time that the vent-valve 13 is opened and the corresponding prolonging of the period in which the brake-cylinder supply-valve 27 is opened the operation of the apparatus shown is substantially the same as that of the apparatus shown in the Massey patent, which is well known.

Briefly described, the operation is as follows: In making service applications of the brakes the train-pipe air is permitted by the engineer to escape slowly, and the reduction in train-pipe pressure causes the triple valve proper to be operated by the auxiliary-reservoir pressure to close the exhaust from the brake-cylinder and admit air to the brake-cylinder through the passage 8 from the auxiliary reservoir. With such slow reduction of train-pipe pressure the air will escape from the chamber 21 through the passage 33, so as to reduce the pressure in the chamber 21 substantially as fast as the train-pipe pressure is reduced, so that no appreciable pressure is brought to bear on the motor-piston 2 for opening the train-pipe vent-valve 13, which consequently remains unaffected in the service applications of the brakes. In making an emergency application the train-pipe air is permitted to escape as rapidly as possible, and the fall of train-pipe pressure takes place very rapidly, and the pressure in the chamber 21 does not fall so rapidly, owing to the smallness of the duct 33. There thus arises a preponderance of pressure upon the motor-piston 2, tending to force its stem against the lever 17 of the vent-valve 13, which is thus opened and permits the train-pipe air to escape locally through the passage 11. The movement of the motor-piston 2, which thus opens the vent-valve 13, also closes the opening 34 of the duct 33 by carrying it into the guideway of the stem 2, and thus prevents, or rather greatly diminishes, the flow of air from the chamber 21, so that the air remains entrapped in said chamber 21 and retains the vent-valve 13 open for a short period of time. The volume of air in the chamber 21 is very small, and the air will escape from said cham-



ber in a short time by reason of the inevitable leakage around the piston or around its stem 20, even though the passage 33 34 is closed, and consequently the vent-valve 13 will be  
 5 closed shortly after it has been opened by the motor-piston, although its closing movement will not instantly follow the opening movement, as is the case in the construction in which the passage through the motor-piston  
 10 is constantly open. The guideway for the stem 20 of the vent-valve motor-piston 2, in connection with the passage 33 34, thus constitutes means for closing the duct from the small chamber 21, containing the air for ac-  
 15 tuating the motor-piston, said means for closing said duct being called into operation by a relatively sudden reduction in train-pipe pressure, and the duct remaining open when the reduction of train-pipe pressure is rela-  
 20 tively slow; but the invention is not limited to this specific construction of the means for thus controlling the said duct.

The invention, which resides mainly in the novel means for controlling the train-pipe  
 25 vent-valve motor-piston, is not limited to the specific construction of triple-valve structure, and it is not essential that the train-pipe vent-valve and its motor and the brake-cylinder supply-valve and passage controlled  
 30 by the escaping train-pipe air should be structurally associated with or constitute a part of the triple-valve structure.

I claim—

1. The combination with the train-pipe,  
 35 auxiliary reservoir, and brake-cylinder of an air-brake apparatus; of a train-pipe vent-valve for permitting air to escape from the train-pipe; a brake-cylinder supply-duct from the auxiliary reservoir to the brake-cylinder,

and valve controlling said duct; and means 40 actuated by the air escaping from train-pipe when vented for actuating said valve in the brake-cylinder supply-duct; and a motor-piston for the train-pipe vent-valve exposed to  
 45 train-pipe pressure on one side and to pressure of air confined in a small chamber at the other side; a duct connecting the said small chamber with the space containing train-pipe air; and means for closing said duct in re-  
 50 sponse to a sudden reduction in train-pipe pressure.

2. The combination with the train-pipe, auxiliary reservoir, and brake-cylinder, of an air-brake apparatus; of a train-pipe vent-  
 55 valve for permitting air to escape from the train-pipe; a brake-cylinder supply-duct from the auxiliary reservoir to the brake-cylinder, and valve controlling said duct; means actu-  
 60 ated by the air escaping from train-pipe when vented for actuating said valve in the brake-cylinder supply-duct; a motor-piston for the train-pipe vent-valve exposed to train-pipe  
 65 pressure on one side and to pressure of air confined in a small chamber at the other side; a stem for said piston working in a guideway; and a duct from one to the other side of said  
 70 piston opening in the portion of the stem that enters the guideway whereby said duct is closed when the piston is moved by preponderance of pressure in the small chamber.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

MILTON H. NEFF.

Witnesses:

JNO. F. MALONEY,  
 R. HOLDEN.