W. V. TURNER & J. S. CUSTER.

TRIPLE VALVE.

APPLICATION FILED MAR. 10, 1904. RENEWED JUNE 28, 1907.

912,512. Patented Feb. 16, 1909.

2 SHEETS—SHEET 1.

Fig. 1.

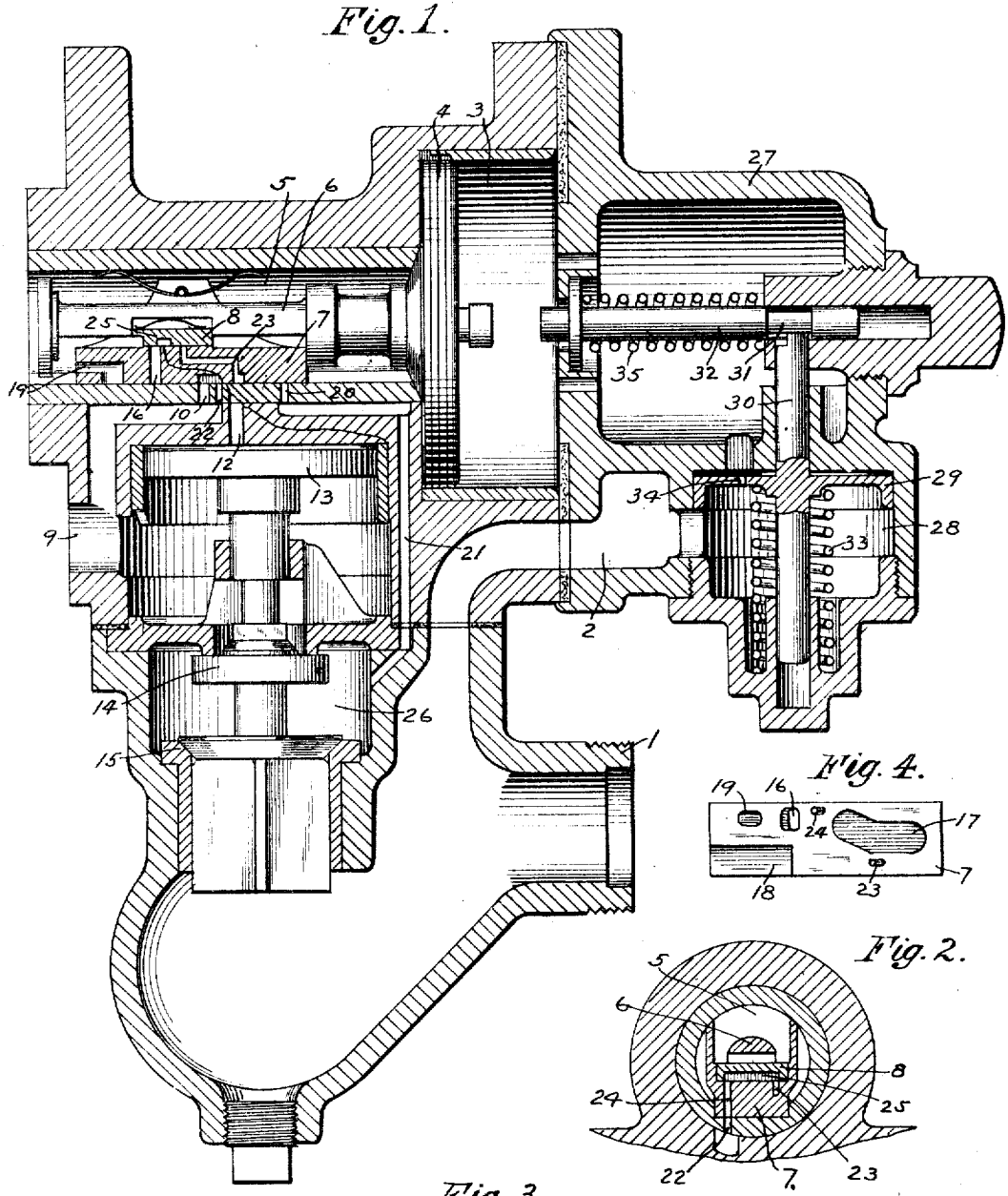
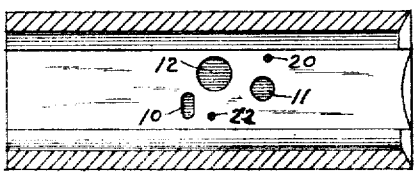


Fig. 4.

Fig. 2.

Fig. 3.



WITNESSES

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2 SHEETS—SHEET 2.

Fig. 5

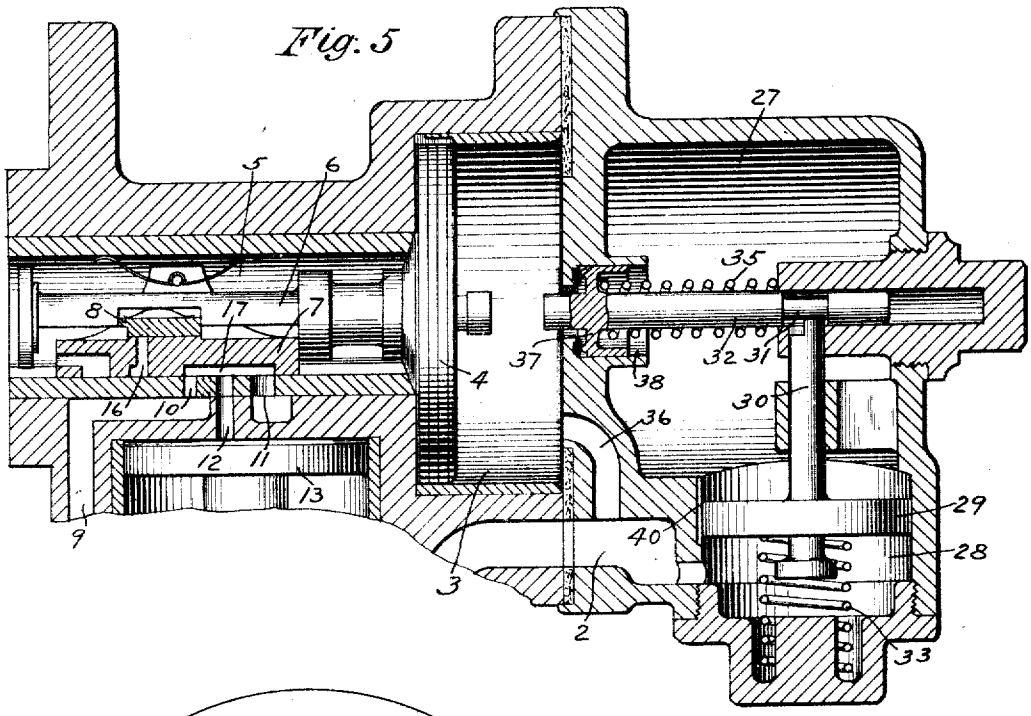
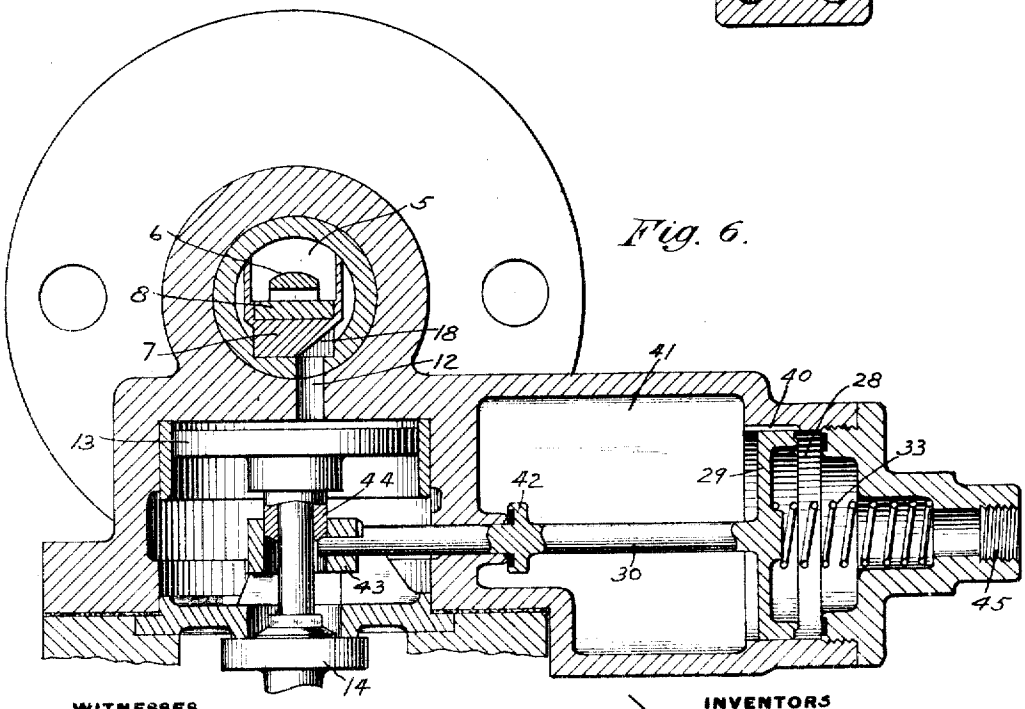


Fig. 6.



WITNESSES

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UNITED STATES PATENT OFFICE.

WALTER V. TURNER, OF WILKINSBURG, AND JOHN S. CUSTER, OF PITTSBURG, PENNSYLVANIA, ASSIGNORS TO THE WESTINGHOUSE AIR BRAKE COMPANY, OF PITTSBURG, PENNSYLVANIA, A CORPORATION OF PENNSYLVANIA.

TRIPLE VALVE.

No. 912,512. Specification of Letters Patent. Patented Feb. 16, 1909.

Application filed March 10, 1904, Serial No. 197,459. Renewed June 28, 1907. Serial No. 381,353.

To all whom it may concern:

Be it known that we, WALTER V. TURNER and JOHN S. CUSTER, citizens of the United States, residing, respectively, at Wilkinsburg and Pittsburg, both in the county of Allegheny and State of Pennsylvania, have invented a certain new and useful Improvement in Triple Valves, of which the following is a specification.

This invention relates to fluid pressure brakes for railway cars, and more particularly to what is known as the quick action triple valve device as used in such brake systems.

With the standard form of quick action triple valve as at present in use it sometimes happens that, owing to a sticky triple piston or other cause, the piston and valve will make a full traverse to emergency position when a service reduction of train pipe pressure is made and only a service application of the brakes is desired. This movement of one triple valve to emergency position also causes all the other triple valves in the train to go to emergency position by the well known serial quick action feature, and such undesirable action of the brakes has been the cause of many accidents and vexatious delays in handling trains.

The principal object of this invention is to provide means for preventing undesirable quick action or emergency applications of the brakes when a service reduction in train pipe pressure is made. This feature is well adapted for use in that form of triple valve device having means for locally venting the train pipe in service applications and thereby positively prevent any undesirable quick action or emergency application of the brakes resulting from a service reduction, even if the valve should have a tendency to go to emergency position.

Another feature of this invention comprises a triple valve device having ports for locally venting the train pipe in service applications and means for preventing back flow from the brake cylinder through the local vent passage to the train pipe, whereby after a full service application, the equalized brake cylinder and auxiliary reservoir pressure cannot be reduced by flowing back to the train pipe in which the pressure may then be diminishing on account of leakage to the atmosphere. This result may be readily accomplished in the standard form of quick action triple valve device by merely connecting the local train pipe vent passage with the chamber between the usual emergency valve and check valve of the quick action parts whereby the regular check valve in addition to its usual functions will also act to prevent back flow through the local train pipe vent passage to the train pipe, and this comprises another feature of our invention.

In the accompanying drawings, Figure 1 is a sectional view of a triple valve device having ports for locally venting the train pipe pressure in service applications, and also provided with one form of means for preventing undesirable quick action resulting from service reductions in train pipe pressure; Fig. 2 a transverse section of the slide valve chamber and valve, the parts being indicated in service application position; Fig. 3 a plan view of the main slide valve seat; Fig. 4 a face view of the main slide valve; Fig. 5 a sectional view of a portion of a standard triple valve structure showing a modified form of means for preventing undesirable quick-action; and Fig. 6 a transverse section of a portion of a standard quick action triple valve device showing another modification of means for preventing undesirable quick action.

According to the construction shown on Sheet one of the drawings, the device comprises the usual casing having nozzle 1 for connecting with the train pipe and communicating with train pipe passage 2, piston chamber 3 containing piston 4, valve chamber 5 containing piston stem 6, main slide valve 7, graduating valve 8, and communicating with the auxiliary reservoir, and brake cylinder passage 9 for connecting with the brake cylinder.

The main valve seat contains the usual brake cylinder port 10, exhaust port 11, and quick action or emergency port 12 leading to emergency piston 13 for actuating the usual emergency valve 14 and check valve 15. In the main slide valve 7 are located the usual graduating or service port 16, exhaust cavity 17, quick action port 18 and

emergency tail port 19, all of which corresponds with the standard and well known triple valve construction.

In order to secure a local venting of the train pipe in service applications we provide in addition to the above a port 20 connecting by passage 21 with the train pipe, a local vent port 22 leading to the brake cylinder, corresponding ports 23 and 24 in the main slide valve, and a cavity 25 in the graduating slide valve for controlling said local train pipe discharge ports, all of which corresponds substantially with the valve device as covered in prior pending application Ser. No. 189,115, filed Jan. 15, 1904. According to the present invention, this passage for locally venting train pipe pressure in service applications is provided with means, such as a check valve, for preventing a return flow from the brake cylinder to the train pipe. As a convenient means for securing this result, the passage 21 may be connected to the usual emergency valve chamber 26 above the check valve 15 thereby avoiding the necessity of adding another check valve to the structure.

The form of means for preventing undesirable quick action, as shown in Fig. 1, is located in the triple valve cap section 27 and comprises a piston chamber 28 communicating on one side with train pipe passage 2 and on the other side with the cap chamber, and containing piston 29 having a locking stem 30 normally engaging a groove 31 in the ordinary graduating stem 32. A spring 33 may be used for normally holding the piston and stem in locking position and the piston 29 is provided with a port 34 of the proper size or capacity to permit the flow of air from the triple piston chamber and cap chamber in all service reductions without causing any movement of piston 29. But when a sudden reduction in train pipe pressure is made for an emergency application the port 34 is not sufficiently large to provide for such rapid equalization of pressures and the piston is moved down against the spring, thus withdrawing the locking stem from the groove in the graduating stem and opening a wide passage around the piston 29 into the train pipe passage 2. The pressure in the piston chamber 3 is then rapidly reduced and the triple piston 4 moves back the full length of its traverse, thereby pushing back the graduating stem and compressing the spring 35.

The operation of the device as shown in Fig. 1 is as follows: The parts being in full release position, as shown, and the system charged to normal pressure; when a gradual reduction is made in train pipe pressure in the usual way for a service application of the brakes, the pressure in the piston chamber 3 and cap chamber reduces at the same rate as usual through the port 34 in piston 29 and the triple piston 4 moves out to the service position, in which the service port 16 of the main slide valve is opened by the graduating valve and registers with the brake cylinder port 10, while the exhaust is closed and the local train pipe vent passage 21 is put in communication with the brake cylinder through ports 20, 23, 25, 24 and 22. The locking stem 30 remains in engagement with the groove 31 of the graduating stem but this groove may be made slightly longer than the width of the locking stem if desired, so that the graduating stem and spring 35 may be slightly compressed by the stem of the triple piston in service position. Air under pressure from the auxiliary reservoir then flows to the brake cylinder in the usual way, and air from the train pipe also passes through check valve 15, chamber 26, local vent passage 21 and the connecting ports above mentioned to the brake cylinder, thereby quickening the action of the triple valves throughout the train in service applications by the amount of train pipe air locally vented on each car to the brake cylinder. When the auxiliary reservoir pressure has been reduced to or slightly below that of the train pipe, the triple piston moves the graduating slide valve to lap position, thereby closing the service port and the local train pipe discharge ports. Further reductions in train pipe pressure may be made in a similar manner for increasing the brake cylinder pressure. If the train pipe pressure is thus gradually reduced to the point of equalization between the auxiliary reservoir and brake cylinder, there may be a time when the valve will be left standing in service position with no balance of pressure to lap the valve. Under such circumstances, if the train pipe was leaky and there was no means for preventing back flow through the local train pipe vent passage, the air from the brake cylinder and auxiliary reservoir might all leak off through the train pipe, but by connecting the port 21 with the emergency valve chamber 26 the check valve 15 prevents any such back flow to the train pipe. The brakes are released in the usual way by increasing the train pipe pressure.

In all service reductions of train pipe pressure the locking piston 29 and stem 30 remain in normal position, so that in case of a sticky triple valve which fails to move promptly from release position in response to a gradual reduction of train pipe pressure, but moves with considerable force after it is once started, due to the greater difference between the auxiliary reservoir and train pipe pressures, the graduating stem is locked and prevents the triple piston from moving all the way over to emergency position and causing an undesirable quick action application of the brakes. It will also be observed that if for any other reason, such

as excessive local venting of the train pipe in service applications, the triple piston should tend to move to emergency position such movement will be positively prevented by the locked graduating stem. When a sudden reduction is made in train pipe pressure for the purpose of securing an emergency application, the first effect is to cause the piston 29 to move out against the spring 33 and withdraw the locking stem 30 from the groove in the graduating stem and open a large passage by the piston 29 to the train-passage 2. The triple piston then moves all the way over to emergency position carrying with it the graduating stem, which is now free to move and compressing the graduating spring 35. Air from the auxiliary reservoir then flows through the large ports 18 and 12 to the emergency piston 13, depressing the same and opening the emergency valve 14 for venting the train pipe to the brake cylinder, the check valve closing upon equalization of these pressures in the usual way.

In Fig. 5 is shown a modified form of the device for preventing undesirable quick action, arranged in the triple valve cap and applied to a standard triple valve device. According to this modification, the cap chamber 27 is normally closed and has no direct communication with the piston chamber 3, a separate passage 36 leading from the train pipe passage 2 to the triple piston chamber. A groove 40 is located around the locking piston 29 and is of sufficiently large capacity to permit the expansion of air from the cap chamber to the train pipe in all service reductions without moving the piston 29, but small enough to insure the movement of the piston in response to a sudden and rapid reduction in train pipe pressure for emergency applications. The collar of the graduating stem 32 is made in the form of a piston 37 and operates in a cylindrical recess 38 in the wall of the cap chamber. By this means the cap chamber is maintained substantially tight, even when the graduating stem is pushed back in emergency applications. The spring 33 is very light, so that when a sudden reduction is made for an emergency application the piston 29 moves in advance of the triple piston 4, that is, the locking stem 30 is withdrawn from the groove before the triple piston stem strikes the graduating stem and thereby permits the full movement of the triple piston and valve to emergency position.

According to the modification shown in Fig. 6, the locking stem is applied to the stem of the emergency piston 13 and prevents the opening of the emergency valve 14 in service applications, even if the triple piston and slide valve should go to emergency position. In this form of the device the piston 29 may be mounted in a chamber 41 secured to the body of the triple valve casing opposite the emergency piston chamber and the locking stem 30 extends through the wall of said casing and through a guide 43 beneath a collar 44 on the stem of the emergency piston 13, the stem 30 being provided with shoulder 42 for seating against the casing and maintaining a tight joint at this point. The cylinder 28 on the opposite side of the piston 29 is adapted to be connected at 45 with the train pipe and the device operates in substantially the same manner as above described, the air in chamber 41 expanding through groove 40 in all service reductions without moving the piston 29, but acting to move back said piston and withdraw the locking stem when a sudden reduction in train pipe pressure is made for an emergency application.

Other forms of means for preventing undesirable quick action when only a gradual reduction in train pipe pressure is made for a service application, may readily be devised, and it is understood that this feature of our invention is not limited to any particular form of device for this purpose but covers broadly any and all means as applied to a quick action triple valve device for preventing the opening of the emergency or quick action valve for venting the train pipe when only a service reduction is made in train pipe pressure, but permitting the opening of such quick action valve when a sudden reduction is made in train pipe pressure for an emergency application of the brakes.

Having now described our invention, what we claim as new and desire to secure by Letters Patent is:—

1. In a fluid pressure brake, the combination with a quick action triple valve device of means operated by variations in train pipe pressure for preventing quick action upon a service reduction in train pipe pressure.

2. A triple valve device having an emergency valve for venting the train pipe and adapted to be opened upon a sudden reduction in train pipe pressure, and means subject to variations in train pipe pressure for preventing the operation of the emergency valve during a gradual reduction of train pipe pressure for a service application.

3. A triple valve device, comprising a valve and piston operated by a gradual reduction of train pipe pressure to make a partial traverse in service applications, and by a sudden reduction of train pipe pressure to make a further or full traverse in emergency applications, and means for preventing a full traverse of the piston during service reductions.

4. In a fluid pressure brake, the combination with a quick action triple valve device of a locking device subject to variations in train pipe pressure for normally preventing

the emergency action of the triple valve device during service reductions in train pipe pressure, and means operated by a sudden reduction in train pipe pressure for withdrawing said locking device.

5. In a fluid pressure brake, the combination with a quick action triple valve device of a locking stem for preventing the emergency action of said device during service reductions in train pipe pressure, and a movable abutment or piston subject to the opposing pressures of the train pipe and a chamber for operating said locking stem.

6. A triple valve device, comprising a valve and piston having a "release" position, an intermediate "service" position, and a further "emergency" position, and a locking device for normally preventing the movement of the piston to "emergency" position during service reductions in train pipe pressure.

7. A triple valve device, comprising a valve and piston having a "release" position, an intermediate "service" position, and a further "emergency" position, and a locking device for normally preventing the movement of the piston to "emergency" position during service reductions in train pipe pressure, and means operated by a sudden reduction in train pipe pressure for withdrawing said locking device.

8. A triple valve device, comprising a valve and piston subject to variations in train pipe pressure, a graduating stem and spring for opposing the movement of the piston to emergency position, and means for locking the graduating stem during service reductions in train pipe pressure.

9. A triple valve device, comprising a valve and piston subject to variations in train pipe pressure, a graduating stem and spring for opposing the movement of the piston to emergency position, a locking stem normally engaging said graduating stem during service reductions in train pipe pressure, and a piston subject to the opposing pressures of the train pipe and a chamber for operating said locking stem.

10. A triple valve device, comprising a body portion containing a valve and piston operated by variations in train pipe pressure, a cap section containing a chamber and a graduating stem and spring, and a locking device for the graduating stem operated by the opposing pressures of the train pipe and the cap chamber.

11. A triple valve device, comprising a piston subject to train pipe pressure, a main valve operated by said piston and having ports for opening communication from the train pipe to the brake cylinder when in service position, a graduating valve operated by the piston and having a movement independent of the main valve for controlling said ports, and means for preventing back flow from the brake cylinder to the train pipe.

12. A triple valve device, comprising a piston, a valve operated thereby in response to variations in train pipe pressure and having ports for opening communication from the auxiliary reservoir to the brake cylinder and from the train pipe to the brake cylinder when in service position, a graduating valve, and a check valve for preventing back flow from the brake cylinder to the train pipe through the local vent passage.

13. A triple valve device, comprising an emergency valve and check valve for opening a large passage from the train pipe to the brake cylinder in emergency applications, a piston for operating said emergency valve, a small local train pipe vent passage leading from the chamber between the emergency valve and the check valve, and a piston and valve operated by a gradual reduction in train pipe pressure in service applications for opening communication through the local vent passage to the brake cylinder.

14. A triple valve device comprising an emergency valve for venting air from the train pipe to the brake cylinder in emergency applications, a piston for operating said valve, valve mechanism operated by variations in train pipe pressure for controlling the pressure on said emergency piston and for venting air from the train pipe to the brake cylinder in service applications, and a check valve for preventing back flow from the brake cylinder to the train pipe through the service vent passage.

15. A triple valve device comprising an emergency valve for venting air from the train pipe to the brake cylinder in emergency applications, a piston for operating said valve, a valve mechanism operated by the opposing pressures of the auxiliary reservoir and train pipe for opening communication from the auxiliary reservoir to the brake cylinder and from the train pipe to the brake cylinder in service applications, and for controlling the pressure upon said emergency piston, and a check valve for preventing back flow from the brake cylinder to the train pipe in either service or emergency applications.

16. A triple valve device comprising an emergency valve and check valve for venting air from the train pipe to the brake cylinder in emergency applications, a piston for operating said emergency valve, a local train pipe vent passage leading from the chamber between the emergency valve and check valve, and a piston and valve operated by variations in train pipe pressure for controlling the pressure on said emergency piston and for opening communication from the local train pipe vent port to the brake cylinder in service applications.

17. A triple valve device comprising a

piston, subject to variations in train pipe pressure, and a main valve operated thereby having ports for opening communication from the auxiliary reservoir to the brake cylinder and from the train pipe to the brake cylinder when in service position, a graduating valve having a movement relative to the main valve for controlling said ports and a check valve for preventing back flow from the brake cylinder to the train pipe through the service vent passage.

18. A quick action triple valve device comprising a valve mechanism operated by a gradual reduction in train pipe pressure for opening a local train pipe vent port, and means governed by train pipe pressure, for preventing quick action upon a gradual reduction in train pipe pressure.

In testimony whereof we have hereunto set our hands.

WALTER V. TURNER.
JOHN S. CUSTER.

Witnesses:
R. F. EMERY,
JAS. B. MACDONALD.