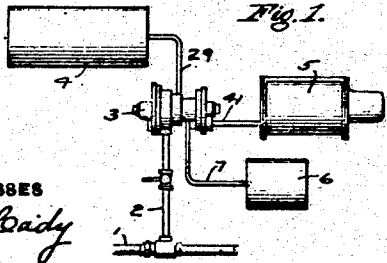
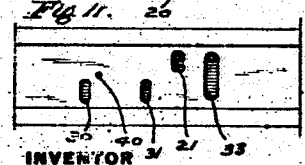
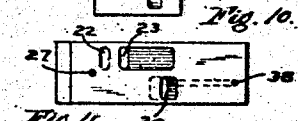
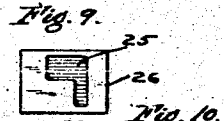
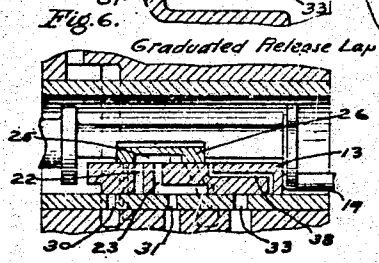
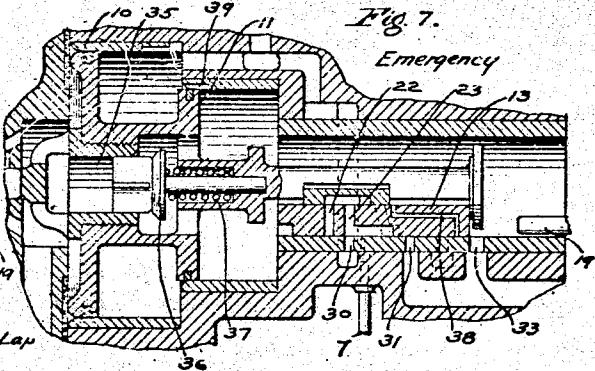
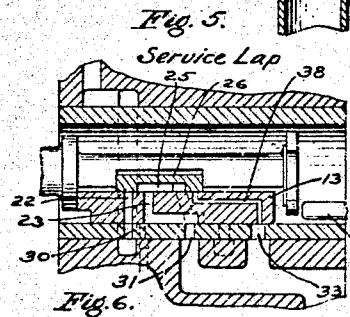
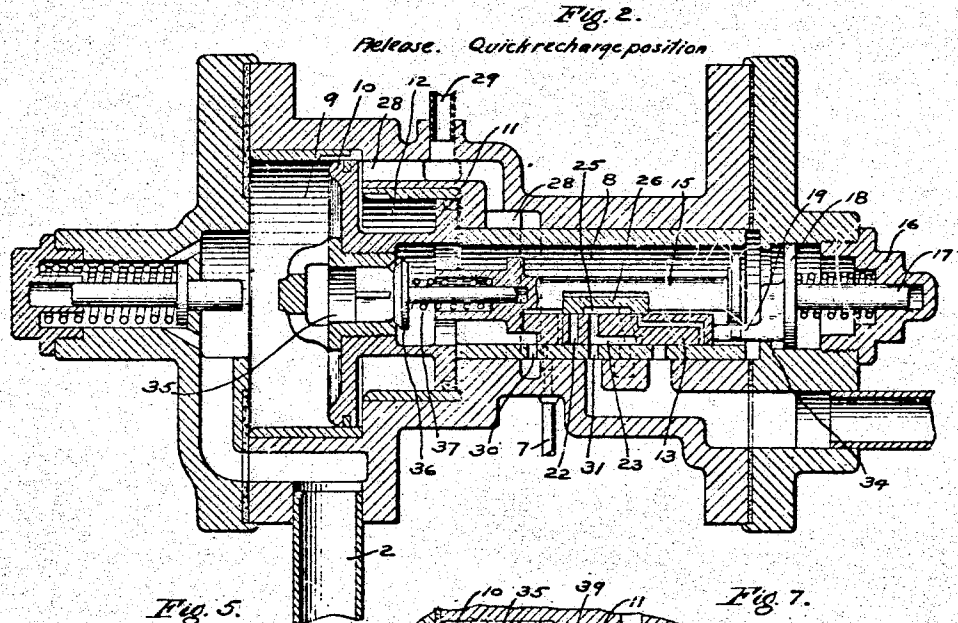


W. V. TURNER.  
 TRIPLE VALVE DEVICE.  
 APPLICATION FILED MAR. 21, 1907.

971,327.

Patented Sept. 27, 1910.  
 2 SHEETS—SHEET 1.



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 2 SHEETS-SHEET 2.

Fig. 3.

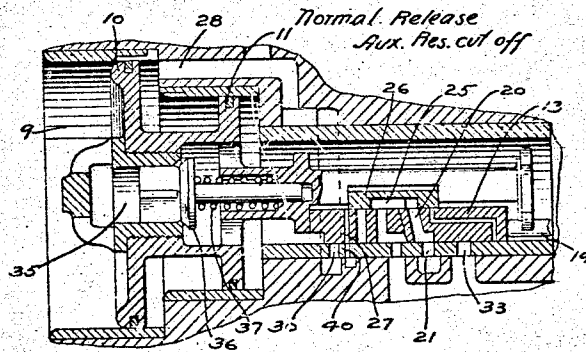


Fig. 4.

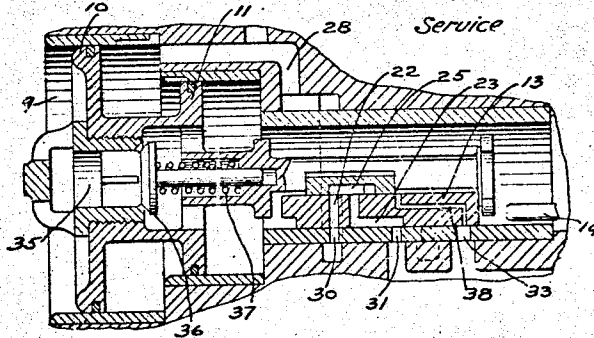
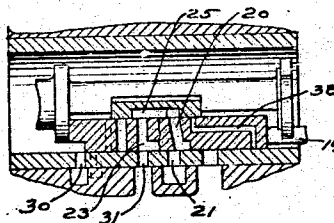


Fig. 8

Release  
 Quick recharge position



WITNESSES

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Att'y.

# UNITED STATES PATENT OFFICE.

WALTER V. TURNER, OF EDGEWOOD, PENNSYLVANIA, ASSIGNOR TO THE WESTINGHOUSE AIR BRAKE COMPANY, OF PITTSBURG, PENNSYLVANIA, A CORPORATION OF PENNSYLVANIA.

## TRIPLE-VALVE DEVICE.

971,327.

Specification of Letters Patent. Patented Sept. 27, 1910.

Application filed March 21, 1907. Serial No. 363,710.

To all whom it may concern:

Be it known that I, WALTER V. TURNER, a citizen of the United States, residing at Edgewood, in the county of Allegheny and State of Pennsylvania, have invented new and useful Improvements in Triple-Valve Devices, of which the following is a specification.

This invention relates to automatic fluid pressure brakes, and has for one of its objects to provide a simple and compact form of triple valve structure.

Another object is to provide improved means in a triple valve device for grading down brake cylinder pressure after an application of the brakes; and another object is to provide improved means adapted to secure accelerated action of the triple valves in service applications of the brakes; and a still further object is to provide improved means whereby the auxiliary reservoir may be quickly recharged.

Heretofore, in order to grade down the brake cylinder pressure after an application of the brakes, it has been proposed to vent air under pressure from an additional source of fluid pressure supply, such as a supplemental reservoir, to the auxiliary reservoir and valve chamber of the triple valve device, in a position of the valve parts in which a brake cylinder exhaust port is open, whereby the rise in pressure in the auxiliary reservoir will move said valve parts and close the exhaust port, but in all these devices it is necessary to raise the pressure of the entire auxiliary reservoir and the connected valve chamber.

According to my present invention a separate chamber, of small capacity, is employed, into which air from a supplemental reservoir, or other additional source of fluid pressure, may be supplied, and in which the pressure may be varied independently of that of the auxiliary reservoir, the chamber being so arranged that the movable abutment, or a portion thereof, which operates the triple valve, is subject to the pressure contained in said chamber. In order to secure accelerated action in making service applications of the brakes, a passage between the train pipe and said separate chamber is provided, which contains a check valve adapted to permit air from the train pipe to flow to said chamber, together with means adapted to vent air from the chamber when the valve moves to

service application position, so that a local reduction in train pipe pressure at each triple valve is secured. In order to obtain a quick recharge of the auxiliary reservoirs, the hereinbefore mentioned communication between the train pipe and the separate chamber may be utilized to admit train pipe air to said chamber in an additional release position of the valve parts, in which a communication is opened between said separate chamber and the auxiliary reservoir.

This invention also has other objects and advantages, all of which will now be more fully described and set forth.

In the accompanying drawings, Figure 1 is a diagrammatic plan view of a car brake equipment embodying the invention; Fig. 2 a central sectional view of the triple valve device, the parts being shown in what is known as the quick recharge position, which may also be a retarded release position; Fig. 3 a similar view of the main portion of the triple valve with the parts in normal full release position; Fig. 4 a similar view with the parts in service application position; Fig. 5 a similar view showing the position of the parts in service lap position; Fig. 6 a similar view showing the position of the parts in the graduated release lap position; Fig. 7 a similar view with the parts in emergency application position; Fig. 8 a similar view showing the position of the parts in quick recharge position, corresponding to Fig. 2, but in a different plane; Fig. 9 a face view of the auxiliary or graduating valve; Fig. 10 a face view of the main slide valve; and Fig. 11 a plan view of the main valve seat showing the arrangement of the ports.

The car air brake equipment comprises the train pipe 1, branch pipe 2, triple valve device 3, connected by pipe 29 to the auxiliary reservoir 4 and by pipe 41 to brake cylinder 5, and also by pipe 7 to a supplemental reservoir 6, or other source of pressure. According to this construction, the triple valve device comprises the usual piston chamber 9, containing the piston head 10, and communicating with the train pipe through passage 2. In a preferred form of the invention the usual valve chamber 8 constitutes the separate chamber, and for this purpose the usual auxiliary reservoir opening is closed by a cap 16. The piston for controlling the movement of the usual main slide valve 13, and auxiliary or graduating valve 12, com-

prises the piston heads 10 and 11. The piston head 11 is contained in a piston chamber 12 intermediate the valve chamber 8 and the piston chamber 9. A passage 28, communicating with the auxiliary reservoir pipe 29, opens into the space between the piston heads 10 and 11, so that the piston head 10 is subject to auxiliary reservoir pressure on one face, which is effective to oppose train pipe pressure on its area in excess of the area of piston head 11. The triple valve piston, or abutment, is therefore subject to train pipe pressure on one side and to auxiliary reservoir pressure and the pressure contained in a separate chamber, in this instance, the valve chamber 8, on the other. The seat for the main valve is provided with brake cylinder ports 31 and 33, auxiliary reservoir port 30, supplemental reservoir port 40, and the exhaust port 21. The main slide valve has through ports 22 and 23, adapted to register with auxiliary reservoir port 30 and brake cylinder port 31 in service position, and a through exhaust port 20. In addition the main valve has a through port 27, adapted to register with supplemental reservoir port 40 in normal release position, and an extended through port 38 for connecting the valve chamber in service position to a vent port, shown in this instance as the brake cylinder port 33. The auxiliary valve 26 is mounted on the main slide valve in the usual way, and has a cavity 25 adapted to control the various ports in the main slide valve.

The operation of the invention is as follows:—The triple valve being in normal release position, as shown in Fig. 3, the auxiliary reservoir is charged to the standard pressure through the feed groove, around the piston head 10, in the usual way, and air from the train pipe flows through check valve 36 into the separate chamber 8, and as the supplemental reservoir port 27 in the main slide valve communicates with the port 40 in this position, it also becomes charged to standard pressure. In order to make a service application of the brakes, a reduction is made in the train pipe pressure in the usual way: the auxiliary reservoir pressure on piston head 10 and the pressure in the valve chamber 8, on the piston head 11, cause the valve parts to assume the service position, as shown in Fig. 4, in which auxiliary reservoir port 30 is connected to brake cylinder port 31 by port 22, cavity 25 in the graduating valve, and port 23; at the same time port 38 is uncovered by the auxiliary valve 26 and communicates with port 33, whereby the pressure in chamber 8 is reduced, so that check valve 36 opens and air from the train pipe flows into the chamber 8, thence to the vent port 33, in this instance connected to the brake cylinder. In this manner, a local reduction in train pipe pres-

sure at each triple valve is produced, which hastens the successive serial operation of the triple valves throughout the train in the well-known way. On equalization of pressure on the triple piston, the valve parts are returned to service lap position, as shown in Fig. 5, in which the graduating valve 26 closes the auxiliary reservoir port 22 and the valve chamber vent port 38. Further reductions in train pipe pressure may be made, as desired, and the above operation will be repeated.

In order to grade down the brake cylinder pressure after an application of the brakes, the engineer's brake valve is turned to release position and then back to lap. The resulting increase in train pipe pressure moves the triple piston to normal release position, as shown in Fig. 3. In this position of the valve parts, the brake cylinder is open to the exhaust through the port 23, cavity 25 in the graduating valve, and exhaust port 20. At the same time, the auxiliary valve 26 uncovers port 27 in the main slide valve, which registers in this position with the port 40 communicating with the additional source of pressure supply, so that air from said additional source flows into the chamber 8. The resulting increase in the chamber pressure moves the triple piston over sufficiently to cause the graduating or auxiliary valve 26 to close the exhaust port 20 in the main valve and also the pressure supply port 27, as shown in Fig. 6. In order to further reduce the brake cylinder pressure the train pipe pressure may be again increased and the above described operation will be repeated.

In grading down the brake cylinder pressure, as hereinbefore described, the triple piston moves to release position, in which the chamber 8 is cut off from the auxiliary reservoir, as shown in Fig. 3, so that in order to provide for a quick recharge of the auxiliary reservoir, an additional release position is provided to which the triple piston may be moved, and in which a port from the auxiliary reservoir is opened to the separate chamber, or valve chamber 8, whereby air from the train pipe flowing by the check valve 36 into the chamber 8 will recharge the auxiliary reservoir. In order to normally maintain the triple piston in the normal release position, a yielding resistance device 18 is provided, which opposes the inward movement of the valve parts to said additional or extreme position, as shown in Fig. 2.

In operation, an increase is made in train pipe pressure and the triple piston is shifted, and the spring of the yielding resistant device 18 is compressed, so that the piston assumes the position as shown in Fig. 2, in which the auxiliary reservoir port 30 is uncovered by the main slide valve, and air

from the train pipe entering the chamber 8 through the check valve passage 35 flows into the auxiliary reservoir. As the pressure on the triple piston equalizes, the yielding spring device 18 returns the valve parts to normal release position, in which the auxiliary reservoir port 30 is closed.

If it is desired to secure a retarded release the exhaust port to the brake cylinder may be restricted in the extreme release position, so that on the forward cars, where the increase in train pipe pressure is considerable, the triple valves assume the extreme position in which the exhaust from the brake cylinder is retarded, and on the rear cars the rate of increase in train pipe pressure being much less, the triple pistons move over and assume the normal release position, in which the exhaust from the brake cylinder is wide open.

In order to make an emergency application of the brakes, the usual heavy reduction in train pipe pressure is made, and the triple piston moves to its outer extreme position, and seats on the leather gasket, as shown in Fig. 7. In this position, a large port 33, to the brake cylinder, is uncovered, and air from the train pipe flows by the check valve 36 to chamber 8, thence by way of port 33 to the brake cylinder. A feed groove around the piston head 11 is also opened in this position, so that air from the auxiliary reservoir flows from the passage 28 through said feed groove into the chamber 8, thence to the brake cylinder through the port 33.

It will thus be seen that I have provided a compact triple valve device of few parts, which is adapted to grade the brake pressure up or down, and having quick recharge and quick action in emergency features; these features heretofore requiring a much more complicated structure.

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

1. A triple valve device for supplying air from the auxiliary reservoir to the brake cylinder, comprising a piston adapted to be controlled in its movement by the opposing pressures of the train pipe in one direction and the auxiliary reservoir and a separate source of fluid pressure supply in the opposite direction.

2. A triple valve device adapted to supply air from the auxiliary reservoir to the brake cylinder in service applications, comprising a piston operated in one direction by train pipe pressure and in the other by auxiliary reservoir pressure and pressure in a separate chamber.

3. A triple valve device, comprising a piston having two abutments, one of which is subject to the opposing pressures of the train pipe and auxiliary reservoir, and the other abutment of which is subject to the

pressure in a separate chamber a main valve and an auxiliary valve having a movement relative to the main valve and operated by said piston for controlling the admission of fluid to the brake cylinder.

4. A triple valve device, comprising a piston and means operated by said piston for controlling the supply of air from the auxiliary reservoir to the brake cylinder in service applications of the brakes, said piston being subject on one side to train pipe pressure and on the other to auxiliary reservoir pressure and to pressure from a separate source.

5. A triple valve device, comprising a movable abutment subject to the opposing pressures of the train pipe and the auxiliary reservoir and a separate chamber, means for establishing communication from the train pipe to said chamber, and means operated by said movable abutment for controlling a vent port from said chamber.

6. A triple valve device, comprising a movable abutment subject to the opposing pressures of the train pipe and the auxiliary reservoir and a separate chamber, means for establishing communication from the train pipe to said chamber, and a valve mechanism operated by said movable abutment for controlling a vent port from said chamber.

7. A triple valve device, comprising a movable abutment having two piston heads, one subject to the opposing pressures of the train pipe and auxiliary reservoir, and the other subject to pressure in a separate chamber, means for establishing communication from the train pipe to said chamber, and means operated by said movable abutment for opening a vent from said chamber.

8. A triple valve device, comprising a movable abutment subject to the opposing pressures of the train pipe and the auxiliary reservoir and a separate chamber, means for establishing communication from the train pipe to said chamber, means operated by said movable abutment for admitting air to the brake cylinder and for opening a vent from said separate chamber.

9. A triple valve device, comprising a movable abutment subject to the opposing pressures of the train pipe and the auxiliary reservoir and a separate chamber, a passage containing a check valve for admitting air from the train pipe to said separate chamber, a valve mechanism operated by said movable abutment upon a reduction in train pipe pressure to admit fluid pressure to the brake cylinder and to open a vent to said separate chamber.

10. A triple valve device, comprising a movable abutment subject to the opposing pressures of the train pipe and the auxiliary reservoir and a separate valve chamber, means for admitting fluid pressure from the

train pipe to the valve chamber, and a valve mechanism operated by said movable abutment for controlling the fluid pressure supply to the brake cylinder and for controlling a vent from said valve chamber.

11. A triple valve device, comprising a movable abutment subject to the opposing pressures of the train pipe and the auxiliary reservoir and a separate valve chamber, means for establishing communication from the train pipe to said valve chamber, and a valve mechanism operated by said movable abutment upon a reduction in train pipe pressure to supply air to the brake cylinder and to open a vent from said valve chamber.

12. In an automatic fluid pressure brake system, the combination, with a train pipe, auxiliary reservoir, and brake cylinder, of a triple valve device comprising a movable abutment subject to the opposing pressures of the train pipe and the auxiliary reservoir and a separate valve chamber, said abutment having a passage containing a check valve for supplying air from the train pipe to said valve chamber, and a valve mechanism operated by said abutment upon a reduction in train pipe pressure to admit air to the brake cylinder and to open a vent from said valve chamber.

13. A triple valve device, comprising a movable abutment having differential heads subject to the opposing pressures of the train pipe in one direction and the auxiliary reservoir and the separate valve chamber in the opposite direction, means for establishing communication from the train pipe to said separate valve chamber, and a valve mechanism operated by said abutment upon a gradual reduction in train pipe pressure for supplying air from the auxiliary reservoir to the brake cylinder and for venting air from the separate valve chamber.

14. A triple valve device, comprising a movable abutment having differential heads subject to the opposing pressures of the train pipe in one direction and the auxiliary reservoir and the separate valve chamber in the opposite direction, means for establishing communication from the train pipe to said separate valve chamber, and a valve mechanism operated by said abutment for controlling the supply of air from the auxiliary reservoir to the brake cylinder and from the separate valve chamber to the brake cylinder in service applications of the brakes.

15. A triple valve device, comprising a movable abutment having differential heads subject to the opposing pressures of the train pipe in one direction and to the auxiliary reservoir and the separate valve chamber in the other, means for establishing communication from the train pipe to said separate valve chamber, and a valve mechanism operated by said abutment and having a main

valve and an auxiliary valve with separate ports for controlling the supply of air from the auxiliary reservoir to the brake cylinder and from the valve chamber to the brake cylinder in service applications.

16. In an automatic fluid pressure brake system, the combination, with a train pipe, auxiliary reservoir, brake cylinder and an additional source of fluid pressure supply, of a triple valve device comprising a movable abutment subject to the opposing pressures of the train pipe and the auxiliary reservoir and a separate chamber, means operated by said movable abutment, when the train pipe pressure is increased, for releasing air from the brake cylinder, and for supplying air from said additional source of fluid pressure supply to said separate chamber.

17. In an automatic fluid pressure brake system, the combination, with a train pipe, auxiliary reservoir, brake cylinder and an additional source of fluid pressure supply, of a triple valve device comprising a movable abutment subject to the opposing pressures of the train pipe and the auxiliary reservoir and a separate chamber, a valve mechanism operated by said movable abutment, when the train pipe pressure is increased, for releasing air from the brake cylinder, and for supplying air from said additional source of fluid pressure supply to said separate chamber.

18. In an automatic fluid pressure brake system, the combination, with a train pipe, auxiliary reservoir, brake cylinder and an additional source of fluid pressure supply, of a triple valve device comprising a movable abutment subject to the opposing pressures of the train pipe and the auxiliary reservoir and a separate valve chamber, valve mechanism operated by said movable abutment, when the train pipe pressure is increased, for releasing air from the brake cylinder, and for supplying air from said additional source of fluid pressure supply to said separate chamber.

19. In an automatic fluid pressure brake system, the combination, with a train pipe, auxiliary reservoir, brake cylinder and an additional source of fluid pressure supply, of a triple valve device comprising a movable abutment having two differential heads subject to the opposing pressures of the train pipe and the auxiliary reservoir and a separate chamber, means operated by said movable abutment, when the train pipe pressure is increased, for releasing air from the brake cylinder, and for supplying air from said additional source of fluid pressure supply to said separate chamber.

20. A triple valve device, comprising a movable abutment subject to the opposing pressures of the train pipe in one direction and the auxiliary reservoir and a separate

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chamber in the other, and means operated by said abutment upon an increase in train pipe pressure to release air from the brake cylinder and to supply air to said separate chamber.

21. A triple valve device, comprising a valve and piston for opening communication from the brake cylinder to the exhaust and from the train pipe to the auxiliary reservoir when in normal release position, and having a further inward movement for opening an additional feed port to the auxiliary reservoir, and yielding resistance means for opposing the further inward movement of the valve beyond normal release position.

22. A triple valve device, comprising a valve and piston for opening communication from the brake cylinder to the exhaust, and from the train pipe to the auxiliary reservoir when in normal full release position, and having a further inward movement for restricting said exhaust communication and for opening an additional feed port to the auxiliary reservoir, and yielding resistance means for opposing the further inward movement of the valve beyond normal full release position.

23. A triple valve device, comprising a movable abutment subject to the opposing pressures of the train pipe in one direction and the auxiliary reservoir and a separate chamber in the other, a valve operated by said abutment for controlling a brake cylinder exhaust port and having a normal release position in which said valve opens a communication to said separate chamber from an additional source of fluid pressure supply, and an additional release position in which a communication is established between said separate chamber and the auxiliary reservoir, and yielding resistance means for returning said valve to normal release position.

24. A triple valve device, comprising a movable abutment subject to the opposing pressures of the train pipe in one direction and the auxiliary reservoir and a separate chamber in the other, a valve operated by said abutment by an increase in train pipe pressure for opening a brake cylinder exhaust port and having a normal release position in which said valve opens a communication to said separate chamber from an additional source of fluid pressure supply, and an additional release position in which a communication is established between said separate chamber and the auxiliary reservoir, and yielding resistance means for returning said valve to normal release position.

25. A triple valve device, comprising a movable abutment subject to the opposing pressures of the train pipe in one direction and the auxiliary reservoir and a separate

chamber in the other direction, and means operated by said abutment, upon variations in train pipe pressure, for controlling the admission and release of fluid pressure to and from the brake cylinder.

26. A triple valve device, comprising a movable abutment having differential piston heads subject to the opposing pressures of the train pipe in one direction and the auxiliary reservoir and a separate chamber in the other direction, and means operated by said abutment, upon variations in train pipe pressure, for controlling the admission and the release of fluid pressure to and from the brake cylinder.

27. A triple valve device, comprising a movable abutment having differential piston heads subject to the opposing pressures of the train pipe in one direction and the auxiliary reservoir and a separate valve chamber in the opposite direction, and means operated by said abutment, on variations in train pipe pressure, for controlling the admission to and the release of fluid pressure from the brake cylinder.

28. A triple valve device, comprising a movable abutment subject to the opposing pressures of the train pipe in one direction and the auxiliary reservoir and a separate valve chamber in the other, and a valve mechanism operated by said abutment, on variations in train pipe pressure, for controlling the pressure in the brake cylinder.

29. A triple valve device, comprising a movable abutment subject to the opposing pressures of the train pipe and the auxiliary reservoir and a separate valve chamber, and a valve mechanism comprising a main valve and an auxiliary valve mounted thereon, operated by said abutment by variations in train pipe pressure, for controlling the brake cylinder supply and release ports.

30. A triple valve device, comprising a movable abutment subject to the opposing pressures of the train pipe and the auxiliary reservoir and a separate valve chamber, and a valve mechanism comprising a main valve, said main valve having a brake cylinder service port and an exhaust port controlled by the auxiliary valve and operated by said abutment by variations in train pipe pressure.

31. A triple valve device, comprising a piston subject to the opposing pressures of the train pipe in one direction and the auxiliary reservoir and a separate chamber in the other, a valve operated by said piston upon an increase in train pipe pressure for opening communication from the brake cylinder to the exhaust and from the train pipe to the auxiliary reservoir when in normal release position, and having a further inward movement for opening an additional feed port to the auxiliary reservoir, and yielding resistance means for opposing the further inward

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movement of the valve beyond normal release position.

32. A triple valve device, comprising a movable abutment having differential piston heads subject to the opposing pressures of the train pipe in one direction and the auxiliary reservoir and a separate valve chamber in the other, and means, operating upon a sudden reduction in train pipe pressure, for establishing communication from the train pipe and auxiliary reservoir to said chamber and from said chamber to the brake cylinder.

33. A triple valve device, comprising a movable abutment subject to the opposing pressures of the train pipe in one direction and the auxiliary reservoir and a separate chamber, means for establishing a communication between the train pipe and said separate chamber, and means operated by said abutment upon an emergency reduction in train pipe pressure, for establishing com-

munication between said chamber and the brake cylinder and between the auxiliary reservoir and said chamber.

34. A triple valve device, comprising a movable abutment subject to the opposing pressures of the train pipe in one direction, and the auxiliary reservoir and a separate valve chamber in the other, said triple valve device having a passage containing a check valve for controlling the admission of air from the train pipe to said chamber, and a valve mechanism operated by said abutment, upon an emergency reduction in train pipe pressure, for establishing communication between said chamber and the brake cylinder.

In testimony whereof I have hereunto set my hand.

WALTER V. TURNER.

Witnesses:

R. F. EMERY,

J. B. MACDONALD.