W. V. TURNER.

TRIPLE VALVE.

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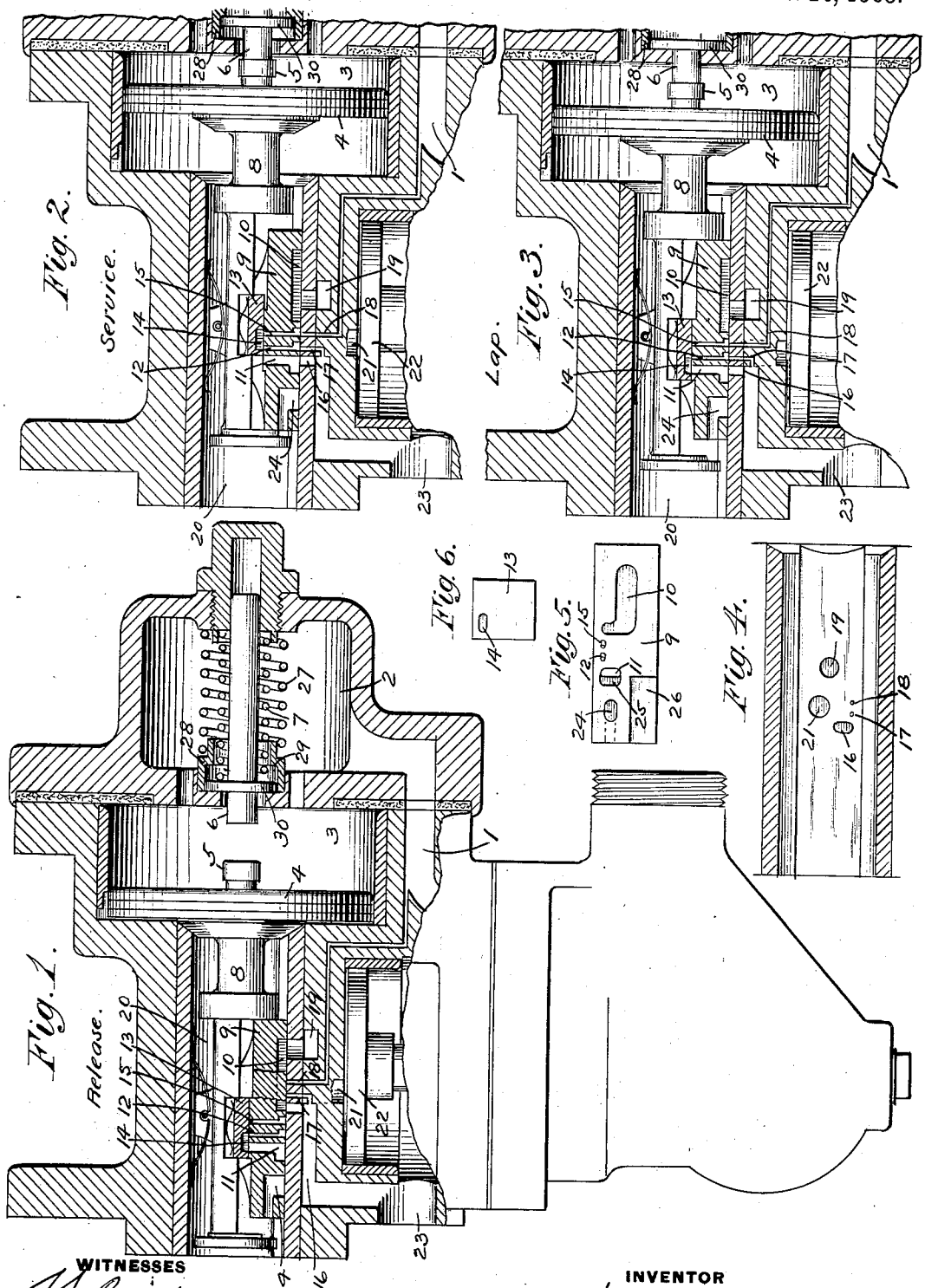
Patented Feb. 16, 1909.



WITNESSES

J. Custer

Jas. B. MacDonald.

INVENTOR

Walter V. Turner

By E. H. Wright

Att'y.

UNITED STATES PATENT OFFICE.

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

TRIPLE VALVE.

No. 912,511. Specification of Letters Patent. Patented Feb. 16, 1909.

Application filed January 15, 1904. Serial No. 189,115.

To all whom it may concern:

Be it known that I, WALTER V. TURNER, a citizen of the United States, residing at Wilkinsburg, in the county of Allegheny and State of Pennsylvania, have invented a certain new and useful Improvement in Triple Valves, of which improvement the following is a specification.

This invention relates to triple valve devices for automatic fluid pressure brakes, and has for its object to provide an improved means embodied in said valve device for securing a local discharge of train pipe air at each triple valve in service applications of the brakes and thereby accelerate the action of said valves throughout the train.

In the standard air brake apparatus, as at present in use, a service application of the brakes is produced by making a gradual reduction in train pipe pressure at the train pipe discharge valve on the locomotive, consequently all of the compressed air which is vented from the train pipe to produce the desired reduction in service application must be discharged at the front end of the train pipe, thereby causing a very slow reduction in pressure at the rear end of the train, due to the expansion of the air toward the forward end, and a correspondingly slow action of the rear triple valves in service applications, especially on long trains. This is an objectionable feature of the apparatus in practice, and my improvement is designed to overcome this defect by providing a triple valve device having means for automatically venting fluid under pressure from the train pipe locally upon each car in service applications, and thereby hasten, by the well known serial action, the movement of each succeeding triple valve, and the complete service application of the brakes.

I will now describe more in detail a preferred form of triple valve device embodying my improvement, reference being had to the accompanying drawing, in which:—

Figure 1 is a longitudinal section of a quick-action triple valve device embodying my invention, the lower part of the check valve case being shown in elevation and the parts being indicated in full release position; Fig. 2 a broken longitudinal section of the triple valve device with the parts in the position for service application; Fig. 3 a similar view showing the parts in lap position; Fig. 4 a plan view of the valve seat; Fig. 5 a face view of the main slide valve; and Fig. 6 a face view of the graduating slide valve.

According to the construction as shown in the drawings, the device comprises the usual casing having train pipe passage 1, cap chamber 2, piston chamber 3, valve chamber 20 in open communication with the auxiliary reservoir, piston 4, stem 8, main slide valve 9, graduating stem 6, and spring 7. An additional spring 27 to be compressed in emergency applications only, may also be used and bears against a cup 28 surrounding the collar 30 of the graduating stem 6, and provided with a shoulder 29, which is engaged by and forms a stop for the said collar 30 in service applications of the brakes.

The graduating stem 6 is preferably made slightly longer than in the present standard triple valve, for the purpose of engaging the stem 5 of the piston, so that the graduating spring 7 will be slightly compressed until the collar 30 engages the shoulder 29 when the valve is in service position, as shown in Fig. 2, and will expand and move the piston and valve to lap position as shown in Fig. 3 when the pressures equalize on opposite sides of the piston in a service application.

The main slide valve is provided with emergency port 24, service port 11, local train pipe discharge ports 12 and 15, and exhaust cavity 10. In the valve seat the service port 16 leads to the brake cylinder passage 23, and the port 19 communicates with the exhaust in the usual way. I also provide the local train pipe vent ports 18 and 17 of small capacity relative to the service port, the port 18 leading from the train pipe passage 1 and the port 17 being shown as venting to the brake cylinder, although it will be evident that it might lead

to the atmosphere or elsewhere if desired. The main slide valve 9 is provided with the usual emergency port 24, exhaust cavity 10, and quick action port 26 for supplying pressure to port 21 leading to the emergency piston 22, when the valve is in emergency position. In the main slide valve are also located the service port 11 and the local train pipe discharge ports 12 and 15 adapted to register with the respective ports 16, 17 and 18 of the valve seat when the valve is in service position, as shown in Fig. 2.

On the main slide valve 9 is mounted the auxiliary or graduating slide valve 13 moving with the stem 8 of the main piston and having the usual lost motion with respect to the main slide valve. In the graduating valve is formed the cavity 14 for connecting the local train pipe discharge ports 13 and 15 of the main slide valve when in service position.

The operation of my improved valve device is as follows: The parts being in full release position, as indicated in Fig. 1, air under pressure from the train pipe flows through the feed groove around the triple piston and charges the auxiliary reservoir in the usual way; when a gradual reduction of train pipe pressure is made at the service discharge port of the engineer's brake valve on the locomotive, the first triple valve piston is then actuated by the preponderance of auxiliary reservoir pressure to move rearwardly toward service position, the first part of the movement drawing the graduating slide valve to the position for connecting ports 12 and 15 of the main slide valve through cavity 14, and opening the service application port 11 of the main valve. The head of the triple piston stem then engages the main slide valve 9 and the further movement of the piston carries the main slide valve and graduating valve with it to the service position, as indicated in Fig. 2, in which the graduating stem 6 is actuated by the stem 5 to compress the graduating spring 7 an amount slightly greater than the width of the service port through the main slide valve, at which time the collar 30 of the graduating stem 6 engages the shoulder 29, forming a yielding stop for determining the service position of the main valve. The local train pipe discharge ports are of necessity of much smaller capacity than the service port from the auxiliary reservoir to the brake cylinder, but these ports 12 and 15 in the main slide valve are provided with so-called feet or extensions in the face of the valve, whereby these ports begin to open at the same time or preferably slightly in advance of the opening of the service port, and remain open to their full capacity until the service port is fully open as shown. As soon as the ports 12 and 15 of the main valve register with ports 17 and 18 in the valve seat air from the train pipe begins to discharge to the brake cylinder, thus creating a local reduction of train pipe pressure to the extent of the capacity of these ports at the same time that air under pressure from the auxiliary reservoir is being charged into the brake cylinder through the service ports 11 and 16. The result of this is to hasten the action of each succeeding triple valve to the extent of the local venting of the train pipe at each valve, and to secure a positive and prompt movement of each valve to fully open its service port from the auxiliary reservoir to the brake cylinder and slightly compress the graduating spring 6. The relative capacities of the local train pipe discharge ports and the service application port are so calculated as to insure a more rapid rate of reduction of the auxiliary reservoir pressure to the brake cylinder than of the train pipe through the local vent ports after the service train pipe discharge port at the engineer's brake valve has closed and the result of this is that, following immediately after the automatic closing of the train pipe discharge at the engineer's brake valve, the pressure of the auxiliary reservoir is reduced to substantially equal that of the train pipe, and the piston then being balanced as to fluid pressure the graduating spring 7 moves the piston and graduating valve 13 to lap position, see Fig. 3, thereby first cutting off communication between the local train pipe discharge ports 12 and 15, and then closing the service port 11 through the main slide valve. If the additional spring 27 is omitted and the graduating stem 6 is made shorter, so that the spring 7 is not compressed when the main slide valve moves to service position, it will be apparent that the auxiliary reservoir pressure will diminish by discharge to the brake cylinder until slightly below that of the train pipe, when the train pipe pressure will operate to move the piston and graduating valve to lap position in a manner similar to that of the present standard triple valve device, and if desired such a construction may be used with my improvement. Further service reductions may be made in the same way for increasing the brake cylinder pressure. The release of the brakes is brought about in the usual manner by increasing the train pipe pressure and moving the piston and main slide valve to the full release position shown in Fig. 1, in which the brake cylinder port 16 communicates with the exhaust port 19 through the cavity 10 of the main slide valve.

The emergency action of the device caused by a sudden reduction in train pipe pressure is substantially the same as with the present standard apparatus, both springs 7 and 27 being compressed as the piston moves to emergency position.

In order to prevent any tendency of the piston and valve to go to emergency position in service applications on short trains, due to the local train pipe discharge, the graduating port 11 in the main slide valve is provided with a foot or extension 25 in the face of the valve, so that the first movement of the main valve from its service position toward emergency position operates to cut off the local train pipe discharge, while at the same time maintaining the service port from the auxiliary reservoir to the brake cylinder open to its full capacity. The train pipe discharge being closed the auxiliary reservoir pressure will then reduce to the brake cylinder with sufficient rapidity to prevent further movement of the valve toward emergency position, as will be readily understood. Any suitable form of main valve and auxiliary valve means, having the desired functions, may be employed for producing these results.

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

1. A triple valve device comprising a movable abutment subject to train pipe pressure, a main valve operated by said abutment for controlling the exhaust from the brake cylinder, and an auxiliary valve having a movement relative to the main valve and operated by the abutment in service applications of the brakes for controlling a train pipe discharge port to the brake cylinder and a port from the auxiliary reservoir direct to the brake cylinder.

2. A triple valve device comprising a movable abutment subject to train pipe pressure, a main valve operated by said abutment for controlling the exhaust from the brake cylinder, and an auxiliary valve operated by the abutment and having a movement relative to the main valve, with means for opening a train pipe discharge port and a direct communication from the auxiliary reservoir to the brake cylinder when in service position.

3. A triple valve device comprising a main valve for controlling the brake cylinder exhaust, an auxiliary valve subject to the auxiliary reservoir pressure and having a movement relative to the main valve, a brake cylinder service port and a local train pipe discharge port adapted to be opened by said auxiliary valve in service position, and a movable abutment subject to the opposing pressures of the train pipe and auxiliary reservoir for operating said valves.

4. A triple valve device comprising a main valve, separate ports for establishing communication from the auxiliary reservoir and from the train pipe to the brake cylinder, an auxiliary valve having a movement relative to the main valve and adapted to open said ports when in service application position, and a movable abutment subject to train pipe pressure for operating said auxiliary valve.

5. A triple valve device comprising a movable abutment subject to the opposing pressures of the auxiliary reservoir and the train pipe, a main slide valve operated by said abutment and having ports for opening direct communication from the auxiliary reservoir to the brake cylinder and for locally venting the train pipe when in service position, and a graduating valve having a movement relative to the main valve and operated by the said abutment for controlling the ports in the main slide valve.

6. A triple valve device comprising a movable abutment subject to the opposing pressures of the auxiliary reservoir and train pipe, a main slide valve operated thereby but having a lost motion relative thereto, said valve having ports for opening direct communication from the auxiliary reservoir to the brake cylinder and for locally venting the train pipe when in its service position, and a graduating valve moving with said abutment for controlling said ports in the main slide valve.

7. A triple valve device comprising a movable abutment subject to the opposing pressures of the auxiliary reservoir and the train pipe, a main slide valve operated by said abutment and having ports for simultaneously opening direct communication from the auxiliary reservoir to the brake cylinder and for locally venting the train pipe when in service position, and a graduating slide valve mounted on said main valve and controlling the ports therein.

8. A triple valve device comprising a movable abutment subject to the opposing pressures of the auxiliary reservoir and train pipe, a main slide valve operated thereby but having a lost motion relative thereto, said valve having ports for opening direct communication from the auxiliary reservoir to the brake cylinder and from the train pipe to the brake cylinder when in service position, and a graduating valve moving in unison with said abutment for controlling the ports in the main slide valve.

9. A triple valve device comprising a piston subject to the opposing pressures of the auxiliary reservoir and the train pipe, a main slide valve operated by said piston and having ports for opening communication from the auxiliary reservoir to the brake cylinder and for locally venting the train pipe when in service position, a graduating valve operated by said piston and having a movement relative to the main valve for controlling the ports therein, and a spring tending to move said piston and graduating valve from service to lap position and to close said ports in the main valve.

10. A triple valve device comprising a

piston subject to the opposing pressures of the auxiliary reservoir and the train pipe, a main slide valve operated by said piston and having ports for opening communication from the auxiliary reservoir to the brake cylinder and for locally venting the train pipe when in service position, a graduating valve operated by said piston and having a movement relative to the main valve for controlling the ports therein, and a spring tending to move said piston and graduating valve from service to lap position, and another spring for opposing the movement of said piston beyond its service position.

11. A triple valve device comprising a piston subject to the opposing pressures of the auxiliary reservoir and the train pipe, a main slide valve operated by said piston and having a service port for opening communication from the auxiliary reservoir to the brake cylinder when in service position and other ports of relative small capacity for locally venting the train pipe at the same time, and a graduating valve operated by said piston and having a movement relative to the main valve for controlling the ports therein.

12. A triple valve device comprising a piston subject to the opposing pressures of the auxiliary reservoir and the train pipe, a main slide valve operated by said piston and having a service port for opening communication from the auxiliary reservoir to the brake cylinder when in service position and other ports of relative small capacity for locally venting the train pipe at the same time, said train pipe ports being provided with extensions at the face of the valve, and a graduating valve operated by said piston and having a movement relative to the main valve for controlling the ports therein.

13. A triple valve device comprising a piston subject to the opposing pressures of the auxiliary reservoir and the train pipe, a main slide valve operated by said piston and having a service port for opening communication from the auxiliary reservoir to the brake cylinder when in service position and other ports of relative small capacity for locally venting the train pipe at the same time, said service port being provided with an extension at the face of the valve, and a graduated valve operated by said piston and having a movement relative to the main valve for controlling the ports therein.

14. A triple valve device comprising a movable abutment subject to the opposing pressures of the train pipe and auxiliary reservoir, a main slide valve subject to the auxiliary reservoir pressure, and an auxiliary valve also subject to the auxiliary reservoir pressure and operated by said abutment to control the brake cylinder service port and a local train pipe discharge port in service applications, both said ports being open in one position of the valves.

15. A triple valve device comprising a movable abutment operating in response to variations in train pipe pressure, a main slide valve subject to the auxiliary reservoir pressure and controlling the exhaust from the brake cylinder, a graduating slide valve also subject to the auxiliary reservoir pressure and operated by said abutment to have movement relative to the main valve and to control the brake cylinder service port and a local train pipe discharge port in service applications, both said ports being open in one position of the valves.

16. A triple valve device, comprising a movable abutment subject to train pipe pressure, a main valve operated by said abutment, and an auxiliary valve means having a movement relative to the main valve, said valves being operated by said abutment under a reduction in train pipe pressure to open a train pipe vent port slightly in advance of opening the brake cylinder service port, both ports being normally open in service position.

17. A triple valve device, comprising a casing having a brake cylinder service port and a train pipe vent port, a main valve, an auxiliary valve means having a movement relative to the main valve, and a movable abutment operated by a reduction in train pipe pressure to move said valves to open both ports, the vent port being opened slightly in advance of the service port.

18. A triple valve device, comprising a main valve, an auxiliary valve means having a movement relative to the main valve, and a movable abutment operating under a reduction in train pipe pressure to move said valves first to open a train pipe vent port and then a brake cylinder service port, and upon a further movement in the same direction to close said vent port while the service port is still open.

19. A triple valve device, comprising a casing having a brake cylinder service port and a train pipe vent port, a main valve having corresponding ports, an auxiliary valve having a movement relative to the main valve for controlling said ports, a piston operated by a reduction in train pipe pressure to move said valves to a position for opening both ports.

20. A triple valve device, comprising a casing having a brake cylinder service port and a train pipe vent port, a main valve having corresponding ports, an auxiliary valve having a movement relative to the main valve for controlling said ports, a piston operated by a reduction in train pipe pressure to move said valves to a position for opening both ports, the main valve upon its outward movement being adapted to open

the vent port slightly in advance of the service port.

21. A triple valve device, comprising a casing having a brake cylinder service port and a train pipe vent port, a main valve having corresponding ports, an auxiliary valve having a movement relative to the main valve for controlling said ports, a piston operated by a reduction in train pipe pressure to move said valve to a position for opening both ports, the auxiliary valve upon its return or lap movement being adapted to close the vent port slightly in advance of the service port in the main valve.

In testimony whereof I have hereunto set my hand.

WALTER V. TURNER.

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