W. V. TURNER.

TRIPLE VALVE DEVICE.

APPLICATION FILED FEB. 8, 1911.

1,108,948.

Patented Sept. 1, 1914.

2 SHEETS—SHEET 1.

Fig. 1

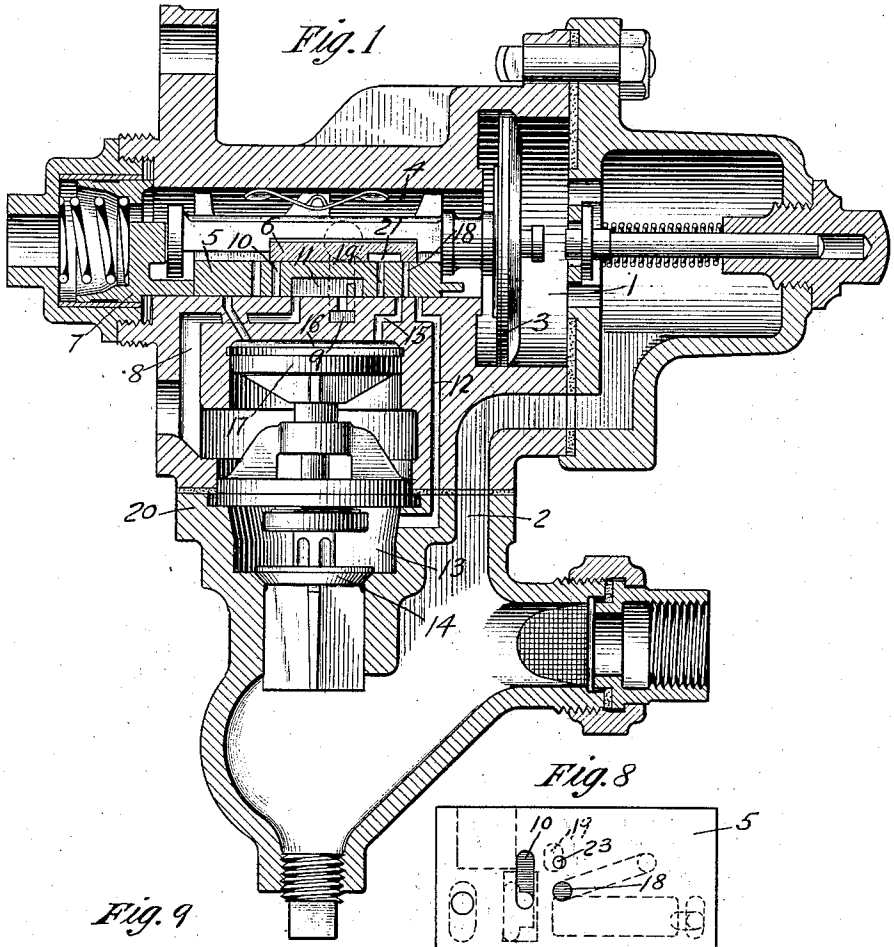


Fig. 8

Fig. 9

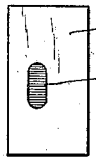


Fig. 7

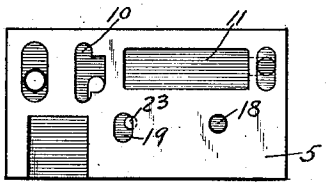
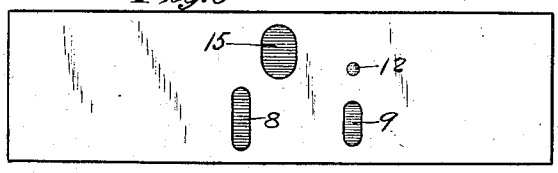


Fig. 6



WITNESSES

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2 SHEETS—SHEET 2.

Fig. 2

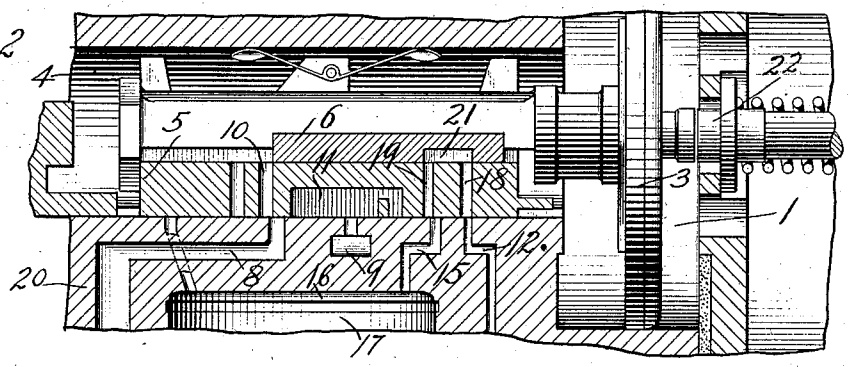


Fig. 3

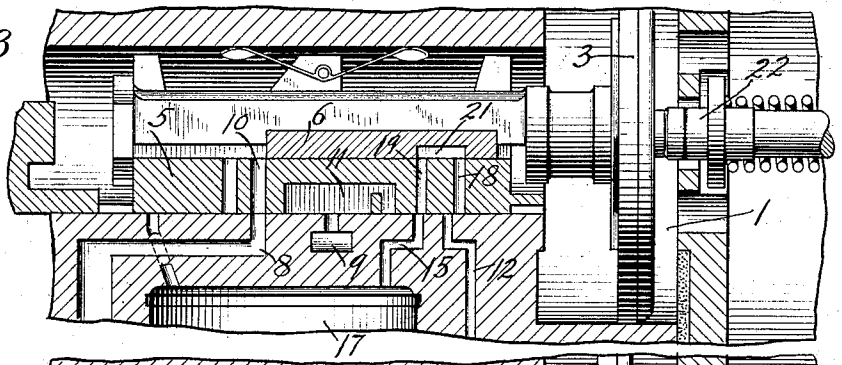


Fig. 4

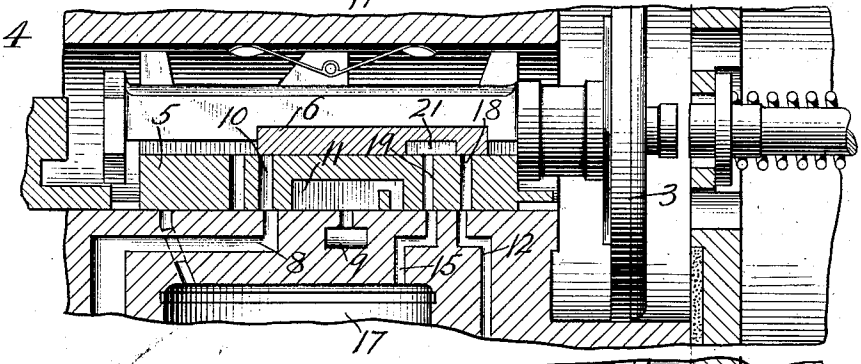
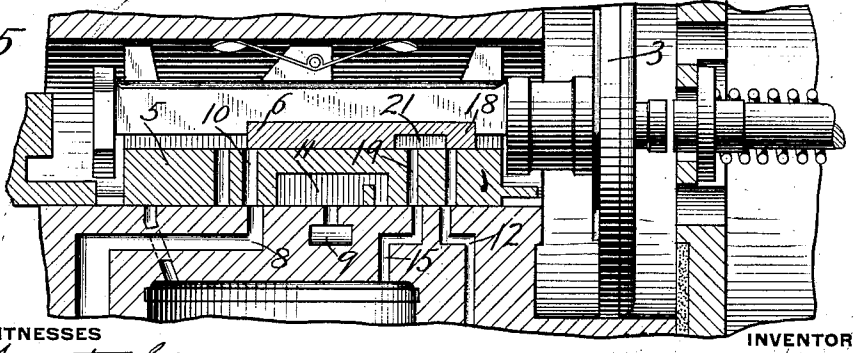


Fig. 5



WITNESSES

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UNITED STATES PATENT OFFICE.

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

TRIPLE-VALVE DEVICE.

1,108,948. Specification of Letters Patent. Patented Sept. 1, 1914.

Application filed February 8, 1911. Serial No. 607,245.

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 triple valve devices, and the principal object of the invention is to provide improved means for securing a local discharge of air from the train pipe at each triple valve in service applications of the brakes to thereby accelerate the action of said valves throughout the train.

With devices of the above character, the relative capacities of the local train pipe discharge ports and the service application port should be so calculated as to provide at all times a more rapid rate of reduction in auxiliary reservoir pressure than of the train pipe pressure through the local train pipe discharge ports after the service train pipe discharge port at the engineer's brake valve has been closed, so as to insure the reduction in auxiliary reservoir pressure to substantially that in the train pipe and the consequent movement of the triple valve parts to lap position to cut off the further flow of air from the auxiliary reservoir to the brake cylinder.

According to the present invention, the local train pipe discharge passage has an inlet and an outlet port controlled by the main slide valve of the triple valve and upon movement of the valve by the triple piston upon a reduction in train pipe pressure, said valve is adapted to first open the inlet port of the train pipe discharge passage, then simultaneously open the outlet port of said passage and the brake cylinder service port. The effective opening of the train pipe discharge passage is thus controlled at the outlet port which has the advantage that the ports which regulate the size of the opening may be as large as desired, rendering it possible to provide the same character of port opening as is provided at the brake cylinder service port. The inlet port may then be made of comparatively small area so as to obviate any possibility of the train pipe pressure in said inlet port lifting the slide valve from its seat.

Other objects and advantages of my invention will appear in the following more detailed description of the invention.

In the accompanying drawings Figure 1 is a central sectional view of a triple valve device embodying my improvement, showing the parts in normal full release position, the main slide valve having its ports arranged in one plane rather than as actually positioned, so as to more clearly show the relative location of the ports in the various positions of the valve; Fig. 2 a similar view of a portion of the triple valve, showing the parts in position for effecting a service application of the brakes; Fig. 3 is a similar view, showing the parts in full service application position; Fig. 4 a similar view, showing the parts in service application lap position; Fig. 5 a similar view, showing the parts after the triple valve piston has moved the graduating valve outwardly from the service lap position; Fig. 6 a plan view of the seat for the main slide valve of the triple valve, showing the relative location of the ports therein; Fig. 7 a face view of the main slide valve, showing the relative location of its ports and cavities; Fig. 8 a plan view of the main slide valve; and Fig. 9 a face view of the graduating slide valve.

As shown in Fig. 1 of the drawings, the triple valve device may comprise a casing 20 having a piston chamber 1 connected to train pipe passage 2 and containing triple valve piston 3, and a valve chamber 4 open to the auxiliary reservoir and containing main slide valve 5 and graduating slide valve 6, mounted on the main slide valve and having a movement relative thereto.

While the triple valve shown is of the retarded release type having a spring stop device 7 for resisting the movement of the triple valve parts from full release position to an inner retarded release position, my improvement may be applied to various other types of triple valves.

The main slide valve seat is provided with the usual brake cylinder port 8 and exhaust port 9 and the main slide valve is provided with the usual service application port 10, adapted to be controlled by the

graduating valve 6 and exhaust cavity 11 for connecting the brake cylinder port 8 with exhaust port 9 in release position.

According to my improvements, a train pipe inlet port 12 leads from the check valve chamber 13 above the usual emergency check valve 14 to the seat of the main slide valve and a local train pipe discharge outlet port 15 leads from the seat of the main slide valve to the chamber 16 above the usual emergency piston 17. The main slide valve is also provided with ports 18 and 19 adapted to register with ports 12 and 15 respectively, in making a service application of the brakes, and the graduating valve 6 is provided with a cavity 21 adapted to connect the ports 18 and 19 in the main slide valve.

Figs. 1 to 5 show the ports somewhat distorted in order to more clearly illustrate the relation of the ports in the various positions, but Figs. 6, 7, 8, and 9 show the ports as actually arranged. As shown in Fig. 6 the brake cylinder port 8 and the local train pipe discharge outlet port 15 are substantially rectangular in cross section and service application port 10 and port 19 are also substantially rectangular in cross section.

In operation, if it is desired to make a service application of the brakes, a gradual reduction in train pipe pressure is made and thereupon, the triple valve piston 3 moves outwardly causing the graduating valve 6 to first move relatively to the main slide valve 5 and uncover service port 10 and also connect ports 18 and 19 through cavity 21. The main slide valve 5 is then moved to cut off the exhaust port 9 from the brake cylinder port 8 and upon a further movement the port 18 fully registers with train pipe port 12. A further movement of the main slide valve now causes the service port 10 and the port 19 to simultaneously crack open the respective ports 8 and 15, as shown in Fig. 2, so that fluid is then admitted from the auxiliary reservoir to the brake cylinder through the port 10 and fluid is also vented from the train pipe through the port 15 to chamber 16 whence it flows around the loose fitting emergency piston 17 to the brake cylinder.

It will be noted that while the openings for the admission of air from the auxiliary reservoir to the brake cylinder and from the train pipe to the brake cylinder are both substantially rectangular, the train pipe discharge opening is of less extent transversely than the service supply opening, so that the flow of air from the train pipe is relatively less than the flow of air from the auxiliary reservoir and by reason of the rectangular arrangement of the ports, this ratio is accurately maintained during the movement of the main valve to further open said ports.

It will also be noted that as the inlet port 12 is fully open to the port 18 at the time the service and the train pipe discharge outlet ports commence to open, the capacity of the train pipe discharge is regulated solely at the outlet. Port 18 is of larger size than port 12 so that the full area of port 12 may be maintained through a certain desired movement of the main valve.

The graduating spring stop 22 is preferably so positioned that in making a service application of the brakes, the service application port may be cracked open to admit air to the brake cylinder before the triple valve piston 3 engages the stop, said piston then engaging the stop, further movement of the parts to increase the opening of the service application is yieldingly resisted by the spring stop. Should the triple valve piston continue its outward movement a position is reached in which the further increase in capacity at the point of registration of the ports 15 and 19 is not effective to increase the flow of air from the train pipe to the brake cylinder for the reason that at some point in the passageway for the flow of air from the train pipe the area is restricted so as to limit the ultimate maximum capacity and consequent maximum flow of air from the train pipe to a predetermined rate. This restricted area is preferably at 23 where the port 19 registers with cavity 21 in the graduating valve 6, but if desired may be provided for by making the inlet port 12 of the desired restricted area. The ultimate rate of reduction in train pipe pressure can thus not exceed a certain maximum beyond which it is neither desirable nor necessary to go. The outward movement of the triple valve piston finally causes the gradual closing of communication through ports 12 and 18 until in the ordinary full service position, as shown in Fig. 3, the train pipe discharge inlet port is entirely closed. The triple valve piston is not apt to go beyond this position ordinarily, as there is now a very large port opening for supplying air from the auxiliary reservoir to the brake cylinder and the port for venting air from the train pipe is closed so that a rapid reduction in auxiliary reservoir pressure takes place. In case, however, that the part should move outwardly beyond the full service position, the capacity of the service port is rapidly increased owing to the laterally extending rear portion of the port 10. By the above described means the triple valve parts are thus prevented from going to emergency application position during a service application of the brakes.

After the auxiliary reservoir pressure has become reduced by flow to the brake cylinder in a service application of the brakes to substantially equal the pressure in the train pipe, the piston 3 shifts the graduating

valve to lap position, as shown in Fig. 4, closing the service application port and the local train pipe discharge ports. Should the piston 3 move outwardly from lap position due to a slow reduction in train pipe pressure such as might be caused by train pipe leakage, the service port 10 will be cracked open before the local train pipe discharge port is connected up by the cavity 21, as shown in Fig. 5, so as to insure the return of the parts to lap position by the venting of air from the auxiliary reservoir to the brake cylinder.

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 and a valve operated by said abutment for controlling an inlet and an outlet port of a local train pipe discharge passage, the effective capacity of said passage being regulated at the outlet port.

2. A triple valve device comprising a movable abutment subject to the opposing pressures of the train pipe and auxiliary reservoir and a main valve operated thereby for controlling an inlet and an outlet port of a local train pipe discharge passage in a service application of the brakes, said valve being adapted to regulate the capacity of said passage at the outlet port.

3. A triple valve device comprising a movable abutment subject to the opposing pressures of the train pipe and auxiliary reservoir and a main slide valve operated by said abutment upon a reduction in train pipe pressure for first opening an inlet port of a local train pipe discharge passage and then an outlet port of said discharge passage.

4. A triple valve device comprising a movable abutment subject to the opposing pressures of the train pipe and auxiliary reservoir and a main slide valve operated by said abutment upon a gradual reduction in train pipe pressure for first opening an inlet port of a local train pipe discharge passage and then an outlet port of said discharge passage to thereby effect a local venting of air from the train pipe.

5. A triple valve device comprising a movable abutment subject to the opposing pressures of the train pipe and auxiliary reservoir and a slide valve operated by said abutment upon a gradual reduction in train pipe pressure for first opening an inlet port of a local train pipe discharge passage and then an outlet port of said passage and a brake cylinder service port.

6. A triple valve device comprising a movable abutment subject to the opposing pressures of the train pipe and auxiliary reservoir and a slide valve operated by said abutment upon a gradual reduction in train pipe pressure for first opening an inlet port of a local train pipe discharge passage and then simultaneously opening an outlet port of said passage and a brake cylinder service port.

7. A triple valve device having a local train pipe discharge passage and comprising a movable abutment subject to train pipe pressure and a valve operated thereby for controlling an inlet port and an outlet port of said discharge passage, the effective area of said passage being regulated at said outlet port.

8. A triple valve device comprising a movable abutment subject to the opposing pressures of the train pipe and auxiliary reservoir and a slide valve operated by said abutment upon a gradual reduction in train pipe pressure for first opening an inlet port of a local train pipe discharge passage and then simultaneously opening an outlet port of said passage and a brake cylinder service port, the ports being so constructed that the effective openings at the brake cylinder service port and the outlet port are substantially rectangular.

9. A triple valve device having a local train pipe discharge passage and comprising a movable abutment subject to the opposing pressures of the train pipe and auxiliary reservoir and a valve adapted to be moved by said abutment upon a reduction in train pipe pressure to first open an inlet port of said discharge passage, then simultaneously open an outlet port of said passage and a brake cylinder service port, and finally close said discharge passage at the inlet port.

10. A triple valve device having a local train pipe discharge passage and comprising a movable abutment subject to the opposing pressures of the train pipe and auxiliary reservoir and a valve adapted to be moved by said abutment upon a reduction in train pipe pressure to first open an inlet port of said discharge passage, then while maintaining said inlet port open to simultaneously open an outlet port of said discharge passage and a brake cylinder service port.

11. A triple valve device having a local train pipe discharge passage and comprising a movable abutment subject to the opposing pressures of the train pipe and auxiliary reservoir, a main valve having ports for controlling an inlet and an outlet port of said discharge passage and a brake cylinder service port and adapted to be moved by said abutment upon a reduction in train pipe pressure, to finally close said discharge passage at the inlet port while maintaining the brake cylinder service port open, and a graduating valve having a cavity for controlling the ports in the main valve.

12. A triple valve device comprising a main slide valve having ports adapted to register respectively with an inlet and an outlet port of a local train pipe discharge passage, a graduating valve having a movement relative to the main valve for controlling said ports, and a movable abutment operated by a reduction in train pipe pressure for moving said valves to open communication through said discharge passage at the outlet port.

In testimony whereof I have hereunto set my hand.

WALTER V. TURNER.

Witnesses:
S. W. KEEFER,
A M. CLEMENTS.