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TRIPLE VALVE.

APPLICATION FILED FEB. 21, 1911.

1,040,070. Patented Oct. 1, 1912.

2 SHEETS—SHEET 1.

Fig. 1.

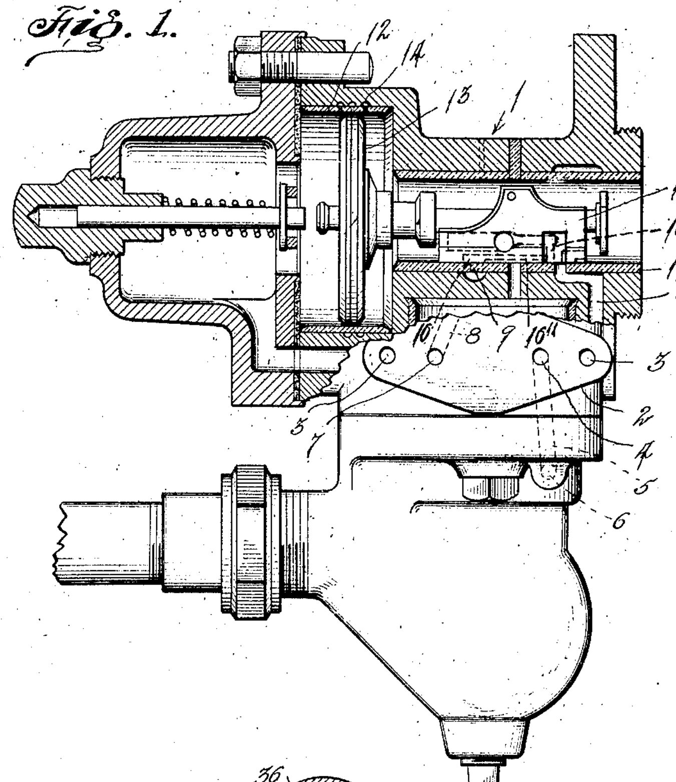
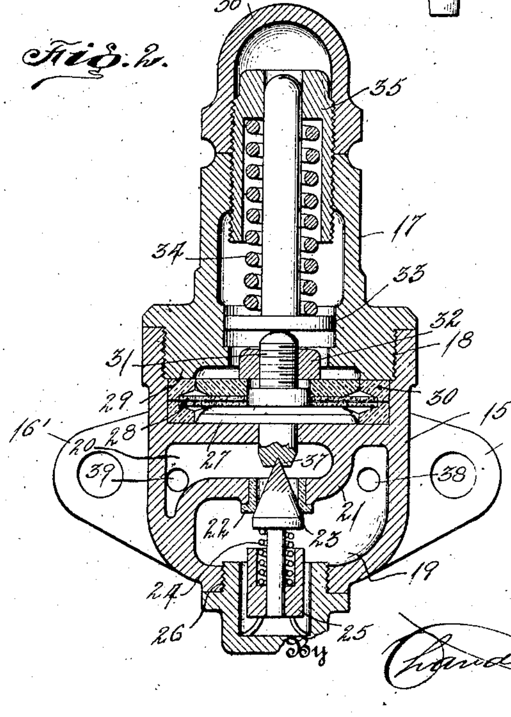


Fig. 2.



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2 SHEETS—SHEET 2.

Fig. 5.

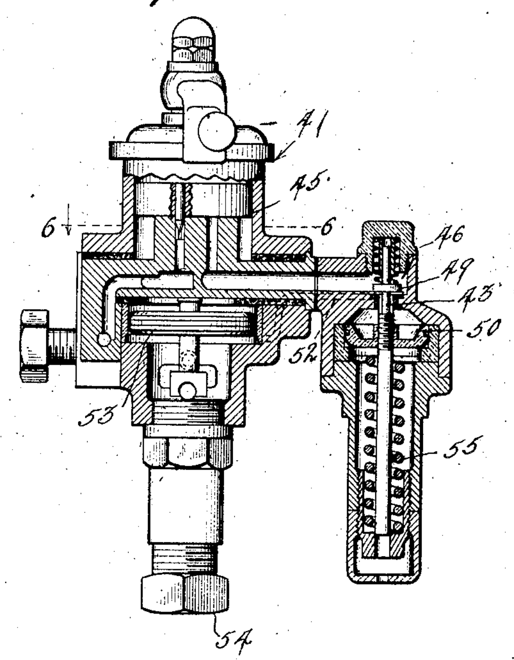


Fig. 6.

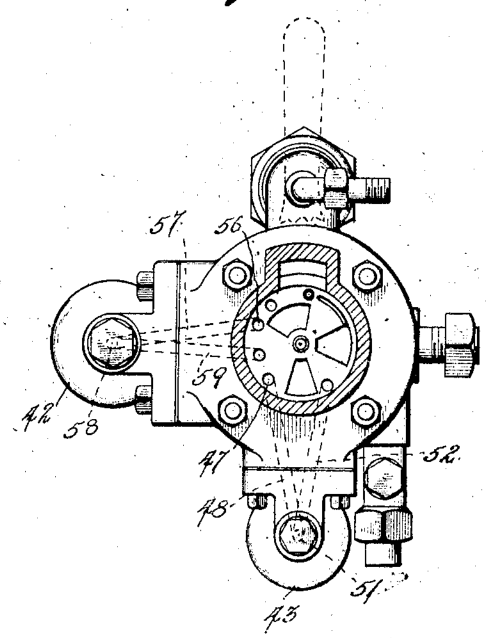


Fig. 3.

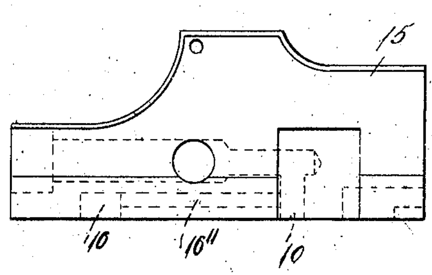
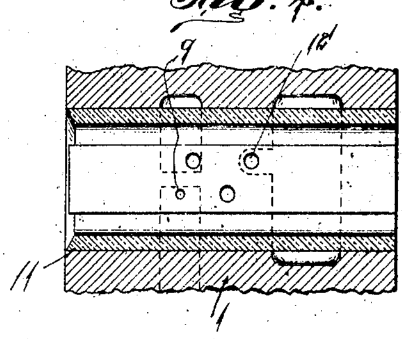


Fig. 4.



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TRIPLE VALVE.

1,040,070. Specification of Letters Patent. Patented Oct. 1, 1912.

Application filed February 21, 1911. Serial No. 610,053.

To all whom it may concern:

Be it known that we, WILLIS C. WEBSTER and JAMES I. LACY, residing at Dubois, in the county of Clearfield and State of Pennsylvania, and EDWARD A. LACY, residing at Galeton, in the county of Potter and State of Pennsylvania, all citizens of the United States, have invented certain new and useful Improvements in Triple Valves; and we do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to fluid pressure train brakes, and more specially to triple valves, and the primary object is to provide a construction by which a portion of the fluid required for service application of the brakes will be drawn from the train pipe instead of from the auxiliary reservoir, thus saving fluid which was previously vented to the atmosphere.

A further object is to provide a construction which will equalize pressure between the auxiliary reservoir and the train pipe in the service position.

A further object is to provide a system by which the brake cylinder pressures in service application will be the same throughout the train, regardless of piston travel or leakage, and a still further object is to automatically maintain constant brake cylinder pressure in long continued service application with the engineer's brake valve in running position.

With the above and other objects in view the invention consists primarily in an auxiliary valve, which we call a brake cylinder supply valve, adapted for attachment to a quick-action triple valve of the standard type.

The invention further consists in certain minor changes in the structure of the triple valve proper to enable it to co-act with the auxiliary valve for the purposes above stated.

The invention still further consists in means for supplying the train pipe with main reservoir air during service application.

The invention further consists in a certain construction, combination, and arrangement of parts and details which will be hereinafter more fully described, specifically pointed out in the appended claims and illustrated in the accompanying drawings, which are attached to and form a part of this application.

In these drawings, which are illustrative of a preferred embodiment of the invention, Figure 1 is a side elevation in part section of a triple valve constructed in accordance with the invention. Fig. 2 is a sectional elevation of the auxiliary valve. Fig. 3 is a detail side elevation of the slide valve. Fig. 4 is a longitudinal sectional view of the slide valve bushing. Fig. 5 is a longitudinal section of the modified engineer's valve. Fig. 6 shows a transverse section of the same through the line 6—6 of Fig. 5.

Referring more specifically to these drawings, in which similar reference numerals designate corresponding parts throughout the several views, 1 indicates the body of the triple valve which as shown is of the standard quick-action type. As is apparent from the drawings, the valve is largely made up of standard parts, and where parts or details are not specifically described it is to be understood that they are of the common type and not concerned with the invention except as necessary elements to form an operative entirety.

On one side of the valve body a face 2 is finished in which are found the tapped holes 3. A port 4 in the face 2 is connected by a passage 5, preferably cored in the wall of the valve body, with the port 6 which opens into the chamber between the check-valve and the rubber-seated valve, these latter parts being of standard construction. A second port 7 in the face 2 is connected by a passage 8 with a port 9 in the slide valve bushing 11. In the bushing or liner 12 of the main piston 13 is formed a spiral groove 14 of two turns, the pitch being such that the axial length of the spiral slightly exceeds the thickness of the piston 13. This groove is approximately midway the length of the liner 12 so that in the service position of the piston 13 the groove will open communication around the piston. In the slide valve 15 is formed a downwardly opening cavity 16, which in the service position of the slide valve, registers with the port 9 of the bushing. Connecting this cavity 16 with the graduating valve port 10 is a passage 16″ by means of which communication is established with the brake cylinder through the passage 12′

Referring to Fig. 2, the auxiliary valve, which we call the brake cylinder supply valve, is seen to consist of a lower body portion 15′, and an upper body portion 17 threaded into the lower portion as at 18. The back face of the portion 15′ is finished to seat upon the face 2 and provided with laterally extending drilled lugs 16′, the openings of which are adapted to register with the tapped holes 3 so that the auxiliary valve may be secured by bolts or studs to the body of the triple valve. The lower half 15′ of the body is divided into two chambers 19 and 20 by a partition wall 21, said wall having an opening in its center in which is secured the valve bushing and seat 22. A cone shaped valve 23 is adapted to seat at 22, the seating of the valve being effected by the pressure of the coil spring 24 which surrounds the stem of the valve and is compressed by a cap member 25 threaded into a tapped opening 26 in the bottom of the body. Adjacent the upper portion of the body member 15′ the walls are extended inwardly to form an annular shoulder 27 against which is clamped a diaphragm 28, the clamping being effected by the lower edge 29 of the part 17. The diaphragm 28 is as shown of annular form, the central opening being closed by the disk 30 formed on the stem 31, which is threaded on its upper extremity and clamped in a gas-tight fit to the diaphragm by the nut 32. Downward pressure is directed on this diaphragm by the plunger 33 which is pressed by the coil spring 34, the force of which may be adjusted by the threaded sleeve 35. This sleeve is locked in position and the upper valve body at the same time closed by the cap 36 which is provided with internal threads engaging the external threads of the sleeve 35. As is clearly shown in the drawings, the lower end of the stem 31 is formed with a small cavity 37 in which engages the conical point of the valve 23. A port 38 is formed in the back wall of the chamber 19 and a second port 39 in the back wall of the chamber 20, these ports being so positioned as to register respectively with the ports 4 and 7 in the face 2 when the auxiliary valve is secured in its proper position on that face.

The operation of the valve is as follows. By means of the sleeve 35, the coil spring is adjusted so that the diaphragm 28 will be forced upward to permit the closing of the valve 23 when the pressure in the chamber 20 is equal to the desired service pressure of the brake cylinder. The engineer's valve being turned to the service position, the release of pressure in the train pipe will permit the main piston 13 to travel to the left under the excess pressure of the auxiliary reservoir. The movement of this piston will first open the graduating valve, then pick up the slide valve, as in standard practice. As this latter valve moves to the left the port 10 registers with the port 12′ and communication is opened between the auxiliary reservoir and the brake cylinder. At the same time the cavity 16 registers with the port 9 of the slide valve bushing, forming communication between the slide valve regulating passage and the chamber 20. The escape of air from the auxiliary reservoir into the brake cylinder will in general reduce the pressure in the former below that of the reduced train line pressure. The piston 13 will hence be moved back into the position in Fig. 1, which is called the service lap position, and in this position the graduating valve is on its seat thus closing communication between the auxiliary reservoir and the brake cylinder. The passage 16′ however which connects the cavity 16 with the port 10 enters the slide valve passage on the brake cylinder side of the graduating valve, and communication is thus maintained between the chamber 20 and the brake cylinder. Should the brake cylinder pressure be lower than that for which the diaphragm adjusting spring is set the valve 23 will be forced from its seat and train pipe air entering through the check valve will build up and maintain the brake cylinder pressure at the desired point, regardless of leakage losses, excessive piston travel, or other imperfections of the brake mechanism proper. It is intended that the larger volume of air for the application of the brakes should be drawn from the train pipe, the reduction of pressure in the auxiliary reservoir being just sufficient to operate the main piston. In the service lap position of the main piston it will be seen that communication is opened between the auxiliary reservoir and the train pipe through the spiral leakage groove, and the auxiliary reservoir pressure thus builds up that of the train pipe while the service application continues. It will be seen that it is only necessary to vent enough air from the train pipe to the atmosphere to operate the main piston of the triple valve on the first car. When this valve is opened sufficient air will vent into the brake cylinder of that car to operate the second valve, and so on throughout the length of the train. When the engineer's valve is set in the emergency position, the over-travel of the main piston will operate to open direct communication between the train pipe and the brake cylinder, the portions of the triple valve concerned with emergency operation being unaltered by the modification described. In order to maintain train line pressure during service application we provide a slightly modified form of engineer's valve, having two train line control valves, one adapted to feed the train line from the main reservoir when the engineer's valve is in the full release position and adapted to cut off automatically at 80 pounds or any desired pressure, the other one adapted to feed the train line when the engineer's valve is in the running position and adapted to cut off at 70 pounds or any desired pressure. As 80 pounds is the standard pressure to release the brakes the train line will be fed with the brakes applied by placing the engineer's valve in running position which feeds the train line at 70 pounds' pressure.

Figs. 5 and 6 show our modified form of engineer's valve together with their control valves. Where parts and details are not specifically described it is to be understood that they are of the common type and not concerned with the invention except as necessary elements to form an operative entirety.

Referring more specifically to Figs. 5 and 6, 41 designates the engineer's valve proper and 42 and 43 the control valves adapted to act therewith. The train line control valve 42 is adapted to act when the engineer's valve is in full release position, and feeds at 80 pounds or any desired pressure, while the valve 43 feeds at 70 pounds or any desired pressure with the engineer's valve in running position. As the operation of the valves 42 and 43 is identical we have shown the engineer's valve 41 in running position only. The stem of the controlling valve 43 is pressed against the top of the piston by a light spring at the top. Air enters the chamber 45 of the valve 41 and passes to the top 46 of the control valve 43 by the port 47 and passage 48 and flows down beneath the valve 49 and into the cavity above the piston 50. It then turns and flows out to the engineer's valve 41 below the piston 53 through the port 51 and passage 52 and from them to the train line by the port 54. As the pressure above the piston 50 increases the latter is forced down compressing the spring 55 until, when a pressure of 70 pounds or any desired pressure has been reached, the spring is pressed to such an extent that the valve 49 is permitted to close and thus shut off further supply of air. When the engineer's valve is in full release position the control valve 42 will be operated in the same manner, the air passing into it by the port 56 and passage 57, and passing back to the engineer's valve under pressure of 80 pounds or any desired pressure by the port 58 and passage 59 and down to the train line by port 54. It will therefore be seen that we have so modified the engineer's valve that it will furnish air to the train line at 70 pounds or any desired pressure when in running position and at 80 pounds or any desired pressure when in full release position.

What we claim is:

1. In a fluid pressure brake, including a triple valve adapted to co-act with a train pipe, an auxiliary reservoir, and a brake cylinder, said valve, including a main piston and a slide valve operated thereby, a reducing valve connected with said train pipe, and means whereby the movement of said slide valve to the service position will open communication between the brake cylinder and the train pipe through said reducing valve.

2. A fluid pressure brake, comprising a triple valve adapted to co-act with a train pipe, an auxiliary reservoir, and a brake cylinder, said valve, including a slide valve having a passage therethrough forming ports, a reducing valve in communication with said train pipe and with a port in the bushing of said slide valve, whereby the movement of said slide valve to the service position will cause one of said ports of the slide valve passage to register with said bushing port and the other of said ports to register with the opening of a passage communicating with said brake cylinder.

3. A fluid pressure brake, comprising a triple valve adapted to co-act with a train pipe, an auxiliary reservoir and a brake cylinder, said valve including a slide valve having a passage therethrough, one end of said passage opening into the slide valve chamber, the other end opening on the bearing face of said valve, a graduating valve adapated to close said passage, and a second passage having one opening on the bearing face of the valve and the other in the wall of said first named passage and beyond said graduating valve, and means whereby said last mentioned passage will be put into communication with said train pipe when the slide valve moves to the service position.

4. A fluid pressure brake, comprising a triple valve adapted to co-act with a train pipe, an auxiliary reservoir and a brake cylinder, said valve, including a slide valve having a passage therethrough, one end of said passage opening into the slide valve chamber, the other end opening on the bearing face of the valve, a graduating valve adapted to close said passage, a second passage in the slide valve, said second passage having one opening on the bearing face of said valve and the other in the wall of said first named passage and beyond said graduating valve, a reducing valve, and means whereby said last mentioned passage will be put into communication with said train pipe, through said reducing valve, when the slide valve moves to the service position.

5. A fluid pressure brake, comprising a triple valve adapted to co-act with a train

pipe, an auxiliary reservoir and a brake cylinder, said valve, including a body portion and a slide valve, a reducing valve adapted to be secured to the wall of said body portion, said wall having passages therethrough, one of said passages connecting the train pipe, through a check valve, with said reducing valve, another of said passages connecting said reducing valve with a port in the bearing face of the slide valve bushing, and a graduating pin carried in said slide valve and adapted to close the service application passage in said valve, said valve having a second passage leading from the brake cylinder side of said graduating pin to the bearing face of said valve, and adapted to register with said bushing port when the slide valve moves to the operative position.

6. In a fluid pressure train brake system, the combination of a triple valve including a slide valve and a check valve, of a reducing valve attached to and co-acting with said triple valve, said reducing valve consisting of a casing, a partition wall in said casing forming an upper and a lower casing, said wall being provided with a valve seat, a valve for said seat, a port communicating between the upper chamber and the slide valve of the triple valve, and a port communicating between the lower chamber and the check valve of the triple valve.

In testimony whereof, we affix our signatures, in the presence of two witnesses.

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JAMES I. LACY.
EDWARD A. LACY.

Witnesses:
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R. VERNE BLOOM.