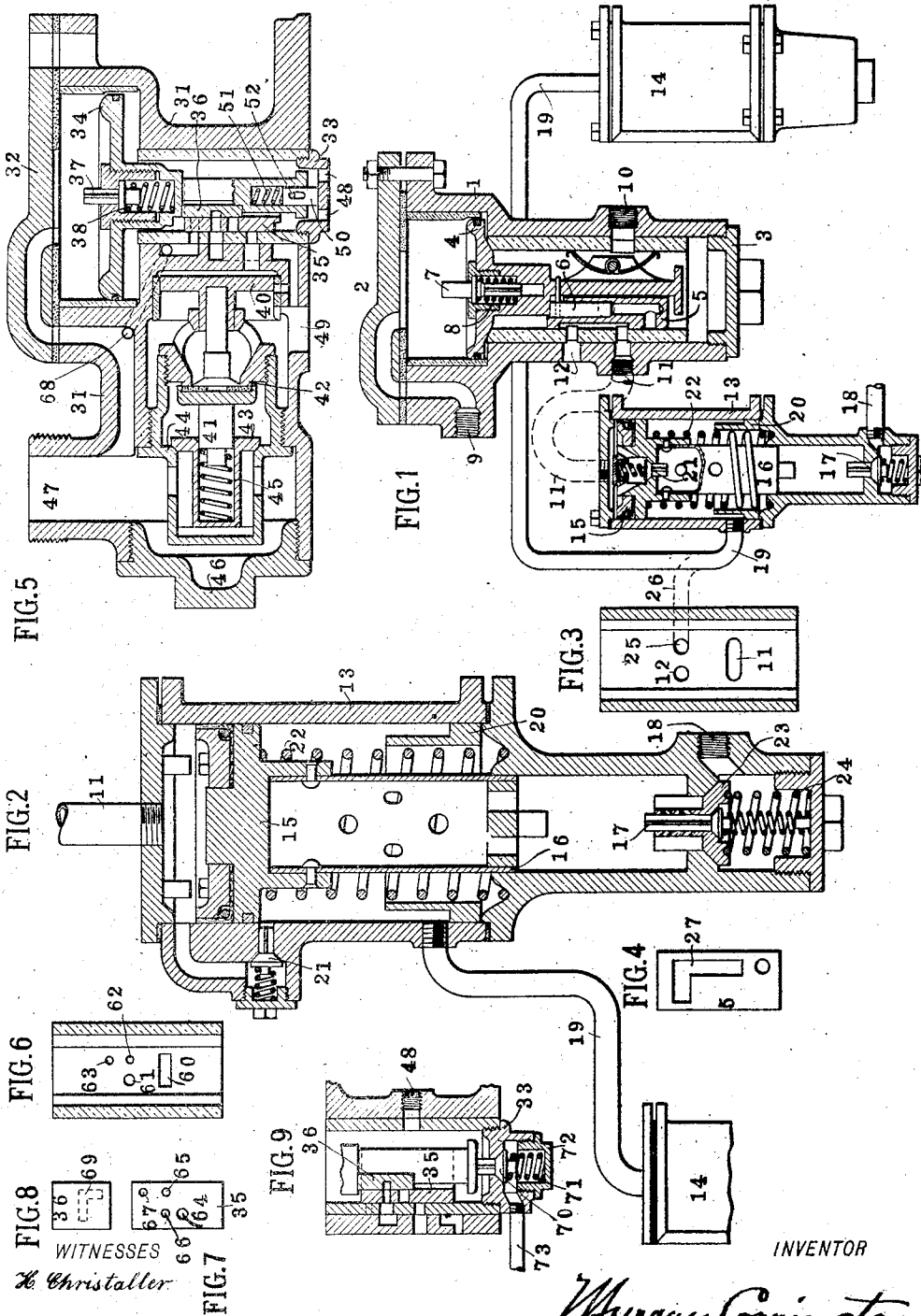


M. CORRINGTON.
 FLUID PRESSURE BRAKE APPARATUS.
 APPLICATION FILED JUNE 26, 1906.

941,914.

Patented Nov. 30, 1909.



WITNESSES
 H. Christaller
 Harry L. Callanan

INVENTOR
 Murray Corrington

UNITED STATES PATENT OFFICE.

MURRAY CORRINGTON, OF NEW YORK, N. Y.

FLUID-PRESSURE-BRAKE APPARATUS.

941,914.

Specification of Letters Patent. Patented Nov. 30, 1909.

Application filed June 28, 1906. Serial No. 323,432.

To all whom it may concern:

Be it known that I, MURRAY CORRINGTON, a citizen of the United States, residing at New York city, in the county and State of New York, have invented certain new and useful Improvements in Fluid-Pressure-Brake Apparatus, of which the following is a specification.

My invention relates to improvements in fluid pressure brake apparatus, particularly in relation to the triple valve and apparatus operating in conjunction therewith, as pointed out in the specification and claims.

Figure 1 is a section through a triple valve and its casing and a view of two cylinders one in sectional and the other in outside view; Fig. 2 is a sectional and outside view of two cylinders showing a modification; Fig. 3 is a plan of a modified slide valve seat of the triple valve in Fig. 1; Fig. 4 is a view of the face of a slide valve to operate on Fig. 3; Fig. 5 is a view in section of a quick acting triple valve showing further improvements; Fig. 6 is a plan of the main valve seat of Fig. 5; Fig. 7 is a top view or plan of the main valve; and Fig. 8 a top view or plan of the graduating valve of Fig. 5. Fig. 9 illustrates a modification.

Fig. 1 shows a section of a triple-valve casing 1, piston cap 2, slide valve cap 3, triple piston 4, main valve 5, graduating valve 6, graduating stop 7, and spring 8, all operating in the usual manner. The casing has the usual ports or passages 9 to the train pipe, 10 to the auxiliary reservoir, 11 to the brake cylinder and 12 to exhaust. In connection with the triple valve are arranged two cylinders 13 and 14, which may be constructed like two ordinary brake cylinders. When the triple valve operates in the application of the brakes to admit pressure through the passage 11, it enters the cylinder 13, and moves the piston 15 against spring 22. Instead of allowing the rod 16 to extend through the casing and apply the brakes directly, I arrange a valve 17 in position in the non-pressure head of the cylinder to be opened by the piston rod 16 and admit pressure from a supply passage 18 into cylinder 13, whence it flows through pipe or passage 19 to cylinder 14, which moves the piston in said cylinder out and forces the shoes against the wheels. Supply passage 18 may lead from the auxiliary reservoir or from any other reservoir or

source of supply from which it has heretofore been proposed to admit pressure into a cylinder to actuate a piston to apply brakes. In this connection I prefer for such source of power to operate the piston of cylinder 14 a reservoir chamber charged with pressure directly from a main reservoir or pump through a pressure reducing device which reduces the pressure to any required degree, such for instance, as reservoir 9 in Fig. 1 of patent to McCrea, No. 549,738, dated Nov. 12, 1895, which is charged with pressure from main reservoir 2 through pressure reducing device 5. A stop 20 may be placed in the cylinder 13 to limit the travel of piston 15 to the point where it opens valve 17, which is just about the position said piston would occupy if it were employed to move the shoes directly against the wheels. A check valve 21 is placed in the piston 15 which prevents air admitted against the piston through passage 11 from flowing through it during application of the brakes. The application of brakes can be graduated by several light reductions of train pipe pressure in the usual manner, the chamber formed above piston 15 when it moves to open valve 17, being of the required size to allow an initial pressure of 70 pounds in auxiliary reservoir to produce an equalized pressure of 50 pounds between reservoir and cylinder. When the triple valve moves to normal or release position shown in Fig. 1, the pressure admitted to cylinder 13 through passage 11 escapes through passage or pipe 11 and the triple valve to exhaust, and the pressure in cylinder 14, pipe or passage 19 and cylinder 13 on the opposite side of piston 15 flows past the check valve 21 and thence by passage 11 and the triple valve to exhaust. A spring 22 bears against piston 15 and is just strong enough to easily return the piston to its normal position when the pressures are equal on its opposite sides. The piston does not return, however, after each admission of pressure into cylinder 14. If the triple be operated to admit any given pressure to the top of piston 15 the piston moves down, creating the usual chamber above the piston and opening valve 17. Pressure then flows past said valve into cylinder 14, and against the under side of the piston until the pressure below the piston equals that above it, when the spring on valve 17 aided by the spring 22, if present,

returns the piston far enough to close valve 17. Any tendency of piston 15 to move upward decreases the size of the chamber and, therefore, increases the pressure above the piston, and it also increases the size of the chamber and, therefore, decreases the pressure below the piston. The piston, therefore, remains at or near the point where its stem bears against valve 17. There is little tendency of pressure to leak past piston 15, because the pressures are substantially equal on its opposite sides. But there is considerable tendency of pressure in cylinder 14 to leak away because one of the sides of its piston is exposed to pressure at each application of brakes while the other side is exposed to the atmosphere. As the pressure admitted through valve 17 and passage 19 to cylinder 14 and the under side of piston 15 leaks away, the pressure on the upper side of the piston moves it down and opens valve 17 admitting more pressure against the under side of the piston until the valve is again closed. It is apparent that piston 15 may as well stand normally in the position where its stem bears against valve 17 and, since the real purpose of employing spring 22 is to assist in moving piston 15 far enough to allow valve 17 to close, it is apparent that the spring on valve 17 may be made strong enough to effect the closing of said valve without the aid of spring 22.

Fig. 2 shows an enlarged view of cylinder 13 and parts connected therewith slightly modified. The operation is the same as that just described save that the check valve 21 is located in the wall of the cylinder instead of in the piston. A second valve 23 held to its seat by a stout spring 24 is also employed. When the triple is moved to the service position on a slight reduction of train pipe pressure, the piston 15 moves out and opens the valve 17 and admits pressure through passage 19 into cylinder 14 without striking the stop 20. When the triple is operated for emergency it moves through its full traverse, compressing spring 8 and uncovering large port or passage 11 (see Fig. 3) admitting pressure rapidly and in large volume against piston 15 which then moves quickly against the stop 20, unseating both valves 17 and 23 and admitting pressure quickly through passage 18, valve 23 and passage 19 into cylinder 14. A spring conveniently located, such as 24 holds valve 23 closed in the moderate or service operation, but opens, as explained, in emergency. Cylinders 13 and 14 may be of the same size as in Fig. 1, or of different size, as in Fig. 2, and either may be made of any desired size.

Figs. 3 and 4 show modifications in which check valve 21 is dispensed with. A port 25 in the slide valve seat may lead by a suitable pipe or passage 26, indicated in dotted lines, to passage 19, and the valve 5, Fig. 4,

may have an L-shaped cavity 27 on its face. In the normal or release position of the valve, said cavity connects all three ports 11, 12 and 25, thus venting the pressure from both cylinders 13 and 14 to exhaust, but so long as the valve stands in position for applying brakes, port 25 remains closed.

Figs. 5 to 8 inclusive illustrate a quick-acting triple valve embracing further improvements which may operate either in conjunction with, or independently of, those just described. Fig. 5 embraces a main casing 31, triple piston cap 32, slide valve chamber cap 33, triple piston 34, main valve 35, graduating valve 36, graduating stop 37, and graduating spring 38. There is also an emergency piston 40, emergency valve 41, emergency valve seat 42, check valve 43, check valve seat 44, spring 45 and emergency cap 46. The casing has the usual train pipe passage 47, auxiliary reservoir passage 48 and brake cylinder passage 49. The stem of the piston 34 has inserted in it a stop 50 held in its outward position by a spring 51 and the stop is held in position and at the same time allowed to retire within the stem by means of the pin 52 moving within a slot in the stop 50. The main valve seat, Fig. 6, has port 60, leading to the top of emergency piston 40, port 61 leading to brake cylinder passage 49, port 62 leading to exhaust and port 63 leading to the train pipe by passage 68. The main valve 35, Fig. 7 has ports 64, 65, 66 and 67 through it, and the graduating valve 36, Fig. 8, has an L shaped cavity 69 on its face seen in dotted lines.

When the system is charged for operation with a normal pressure which we assume to be seventy pounds per square inch, a slight reduction in train pipe pressure is made for a service application which causes the piston 34 to move outward and shift the valve 36 to such position that the port 64 is uncovered, while the L cavity in the valve 36 disconnects ports 65 and 66 and connects ports 65 and 67. This preliminary movement of the triple piston brings the collar on the end of the stem against the main valve 35 but does not move it. It should be noted that in the position shown in Fig. 5, or normal position of the parts, port 60 in the valve seat is closed by the valve 35, port 64 in valve 35 stands between ports 60 and 61 and is closed, ports 65, 66 and 67 in valve 35 stand respectively over and register wholly or partly with ports 62, 61 and 63 in the valve seat, and the L shaped cavity in valve 36 connects ports 65 and 66 in valve 35. When valve 36 makes its movement above described and connects ports 65 and 67, air from the train pipe at the triple so operated flows through passages and ports 68, 63, 67, 69, 65 and 62 to exhaust, which causes a further reduction in train pipe pressure at that triple and this causes the triple to move

more quickly than it otherwise would to its service position in which stop 37 rests against cap 32 and port 64 in valve 35 registers with port 61 leading to cylinder 13 (or other receptacle), and the ports 62, 63 and 67 are meanwhile closed. This venting of the train pipe also causes the quicker service operation of the next triple on the train and so on throughout the length of a train where any of these triples are in operation. It will be noted that the train pipe is opened only long enough to cause the triple to move to service position when the vent port is promptly closed. As soon as auxiliary reservoir pressure falls slightly below train pipe pressure, the piston moves the valve 36 to close port 64 and these operations may be repeated as desired. In emergency a quick reduction of train pipe pressure causes the triple valve to move through its full traverse, opening port 60, admitting pressure against piston 40 opening valve 41 and venting train pipe pressure through port 49, all of which is well understood by those skilled in the art. When air is charged into the train pipe to release brakes the piston 34 first moves valve 36 upon the valve 35 far enough to take up all of the independent motion of the piston, when the cavity 69 in valve 36 passes across ports 65 and 66 in valve 35 and stands nearly or quite over port 64. The piston continues its movement through the length of its chamber, compressing the spring 51 and retiring stop 50 within the stem. This movement lands valve 35 in the position shown in Fig. 5 when, as explained above, port 64 is closed and ports 65, 66 and 67 register respectively, with ports 62, 61 and 63 in the valve seat. Air does not escape from the cylinder because valve 36 closes ports 65 and 66. The charging of air from train pipe to auxiliary in the usual manner soon equalizes pressures sufficiently to allow the spring 51 to move the piston and valve 36 back to the position shown in Fig. 5, when cavity 69 connects ports 65 and 66 which already register with ports 62 and 61, respectively, so that pressure now escapes from the cylinder through 49, 61, 66, 69, 65 and 62 to exhaust. In the arrangement of ports described the train pipe air is vented in making a service application through port 62 to the atmosphere but shifting the positions of ports 61 and 62 would vent it to the cylinder. I do not deem it necessary to illustrate further the adaptation of Figs. 5 to 8 for employing two cylinders as in Figs. 1 to 4. It is evident that the cavity 69 in valve 36 may be a little wider or said cavity or ports 65 and 66 so changed in location with reference to each other, that when the piston is in position against the end of valve 35 and spring 51 is compressed, there shall be a slight or gradual venting of pressure from the cylinder,

greater or less as desired, instead of a total stopping of such exhaust.

I do not claim herein means for venting the train pipe at each triple in the service application, as such construction is covered in a prior application; neither do I claim the use of one cylinder to admit pressure into a second cylinder to move the shoes against the wheels, instead of doing the work with one cylinder, as I regard the use of two cylinders so employed the equivalent of one.

Fig. 9 illustrates a modification in which the end of the slide valve chamber is closed by the cap 33 inclosing a valve 70 held normally closed by a spring 71 all inclosed by a cap 72. Pressure from a supply passage 73, which may be had from any source as suggested above with reference to passage 18, enters the valve case or cap 33, and when the piston is moved to the limit of its traverse, it opens valve 70 and quickly recharges the auxiliary reservoir from passage 73 when spring 71 returns the pistons and valves 36 and 70 to the positions shown. The supply passage 73 in Fig. 9 may lead from a reservoir or source of supply such as above described in connection with passage 18 of Fig. 1, and said Patent No. 549,738, or it may lead from a reservoir which is charged with pressure through the triple valve chamber and thence through the valve 70 and passage 73.

I claim:

1. In a fluid pressure brake system, the combination of a triple valve having a piston, a main valve with lost motion and a secondary valve operated by said piston, and a passage for releasing brakes controlled by both said valves, which may be closed while the piston is moved to one limit of its traverse by increasing train pipe pressure and then opened when the secondary valve makes a partial movement in the opposite direction.

2. In a fluid pressure brake system, the combination of a triple valve having a piston, a main valve with lost motion and a secondary valve operated by said piston, a passage for releasing brakes so controlled by both valves that the passage may be closed while the piston is actuated by admitting train pipe pressure and opened when the piston and secondary valve make a partial movement in the opposite direction, and means for causing said partial movement.

3. In a fluid pressure brake system, the combination of a triple valve having a piston, a main valve with lost motion and a secondary valve operated by said piston, a passage for releasing brakes so controlled by both valves that it may be closed while the train pipe pressure exceeds the auxiliary reservoir pressure and opened as said pressures equalize and means operated by the

triple piston for admitting pressure into the auxiliary reservoir from a source independent of the train pipe.

4. In a fluid pressure brake system, the combination of a triple valve device having a piston and two valves operated thereby, two cylinders, one of which receives pressure admitted through the triple valve device, a valve operated by the piston of said cylinder for admitting pressure into the second cylinder and means controlled by the triple valve device for releasing pressure from both cylinders through both valves of the triple valve device.

5. In a fluid pressure brake system, the combination, with a triple valve having a piston capable of occupying three positions, one of which is intermediate the other two, a main and a secondary valve operated thereby, a passage controlled by both valves for releasing brakes, which is open while the piston occupies its intermediate position and a spring for moving the piston and secondary valve from one extreme to said intermediate position.

6. In a fluid pressure brake system, the combination, with a triple valve having a piston, a main valve, and a secondary valve operated thereby, of a passage through the main valve and controlled by the secondary valve for releasing brakes, which is opened while said piston occupies an intermediate position between two outer positions and means for moving said piston from one of its outer positions to said intermediate position.

7. In a triple valve, the combination of a main valve having a passage through it for releasing brakes, a secondary valve controlling said release passage, a piston for operating both said valves and for causing them to open said release passage while said piston is in the middle of three positions and means tending to move said piston and secondary valve from an outer position to said middle position.

MURRAY CORRINGTON.

Witnesses:

ISRAEL A. WASHBURN,
HARRY L. CALLANAN.