

J. E. NORMAND.
 VALVE MECHANISM FOR RAILWAY AIR BRAKE SYSTEMS.
 APPLICATION FILED NOV. 15, 1904.

902,163.

Patented Oct. 27, 1908.

3 SHEETS—SHEET 2.

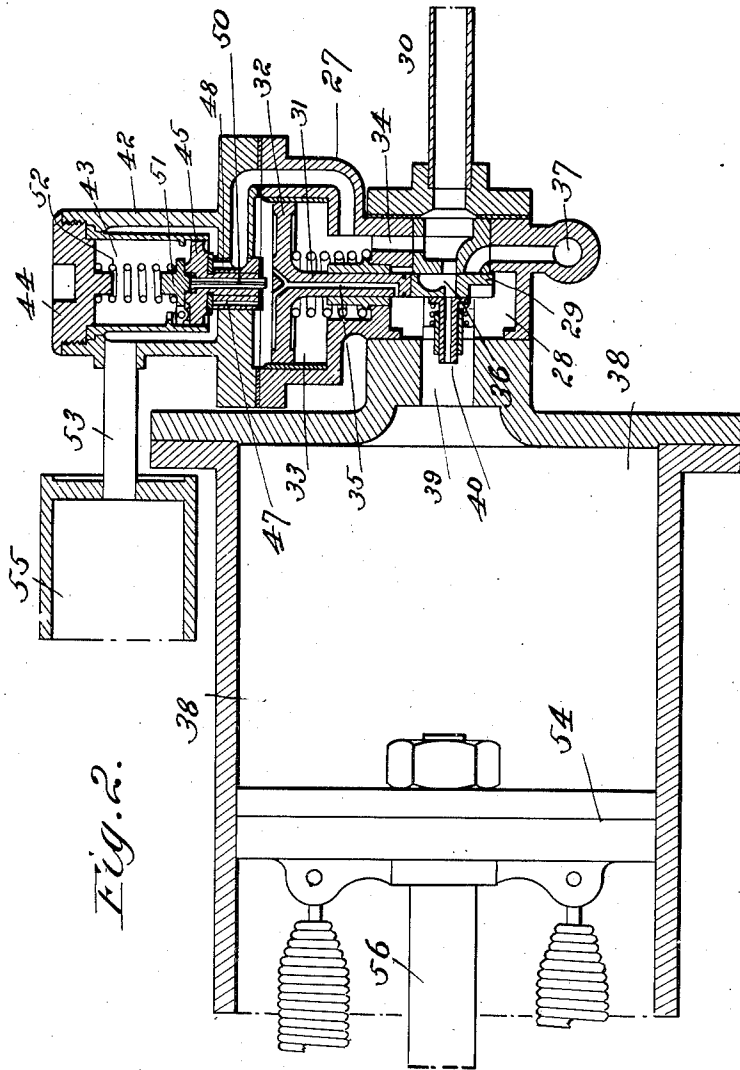


Fig. 2.

Witnesses
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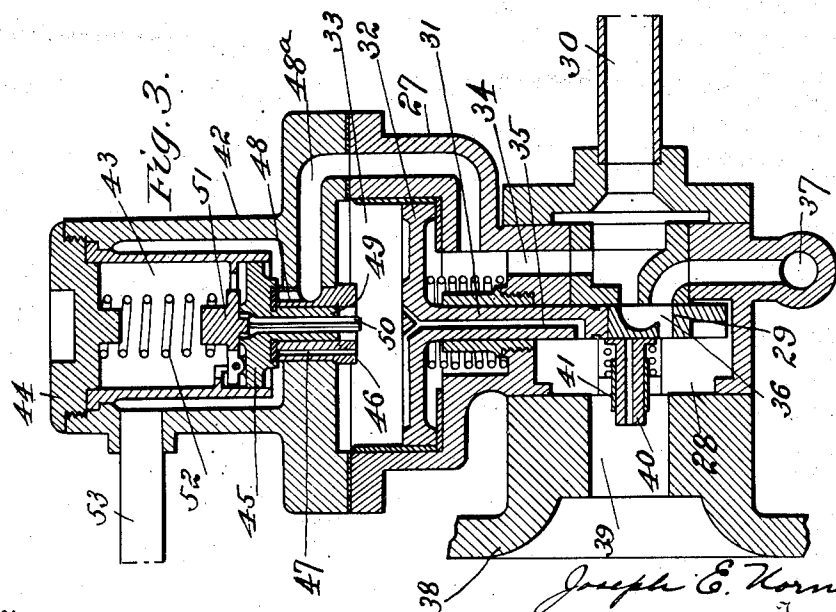
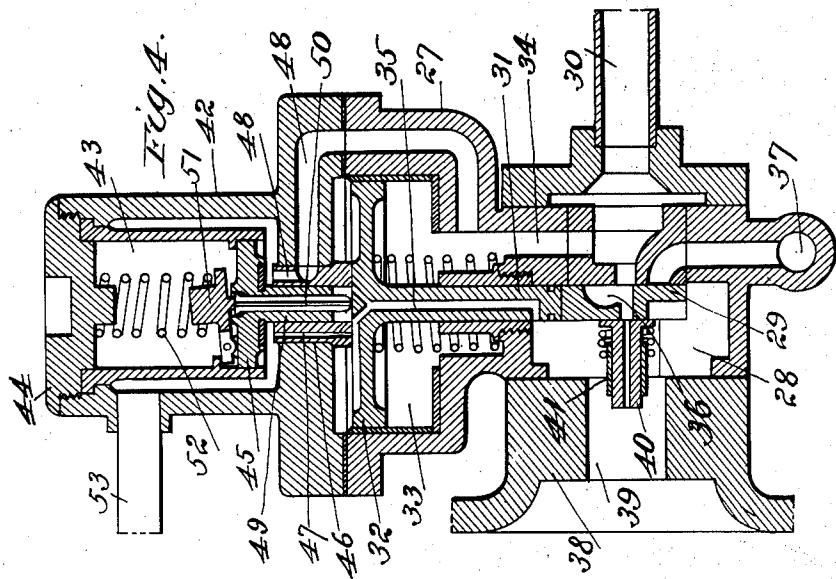
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UNITED STATES PATENT OFFICE.

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VALVE MECHANISM FOR RAILWAY AIR-BRAKE SYSTEMS.

No. 902,163.

Specification of Letters Patent.

Patented Oct. 27, 1908.

Application filed November 15, 1904. Serial No. 232,813.

To all whom it may concern:

Be it known that I, JOSEPH E. NORMAND, a citizen of the United States, residing at Hoboken, in the county of Hudson, State of New Jersey, have invented certain new and useful Improvements in Valve Mechanisms for Railway Air-Brake Systems, of which the following is a specification, reference being had therein to the accompanying drawings, in which—

Figure 1 is a longitudinal vertical sectional view of the triple valve and the release valve mechanism; Fig. 2 a similar view showing the invention applied to a slightly different form of brake apparatus; and Figs. 3 and 4 similar views of the release mechanism shown in Fig. 2, showing the release valve in different positions.

This invention relates to that class of quick release valve mechanisms for air brake systems covered by my applications filed April 29, 1903, Serial No. 154,706 and January 13, 1904, Serial No. 188,833, and wherein a supplemental reservoir is provided on each car of the train, together with means whereby when the triple valve is moved to its full release position the supplemental reservoir will be put in communication with the train pipe to thereby quickly restore the pressure in said pipe to release the brakes.

The invention has for one of its objects to provide a valve mechanism operated directly by the triple valve when it is moved to its full release position and permitting the air in the supplemental reservoir to open a valve and thereby put the supplemental reservoir in communication with the train pipe.

Other and equally important objects and advantages of the invention will appear hereinafter.

Referring to the various parts by numerals, 1 in Fig. 1, designates the train pipe; 2 the pipe to the brake cylinder; 3 the auxiliary reservoir; 4 the triple valve and 5 the supplemental or reinforcing reservoir. The triple valve piston 6 travels in the usual chamber 7, the slide valve of the triple valve moving in the usual chamber 8 in the triple valve casing. This chamber 8 is connected by means of a passage 9 with the auxiliary reservoir. The brake cylinder pipe 2 is connected to the chamber 8 of the triple valve casing and to the atmosphere through the usual ports in the triple valve casing; and

the train pipe 1 is connected to the chambers 7 and 8 by means of the passage 10 and the usual connecting ports.

It is, of course, to be understood, that in the form of the apparatus shown in Fig. 1 the air pressure in the train pipe is reduced when it is desired to apply the brakes. This reduction in train pipe pressure permits the piston 6 to be moved outward by auxiliary reservoir pressure so that the triple valve uncovers the port connecting the brake cylinder pipe 2 with the chamber 8. When it is desired to release the brakes the train pipe pressure is increased and the slide valve so moved as to cut off communication between the chamber 8 and the brake cylinder pipe and to put said pipe in communication with the atmosphere.

Connected to the rear end of the triple valve casing is a release valve casing 11 through which the passage 9 is formed connecting the triple valve chamber 8 to the auxiliary reservoir. To the rear end of this release valve casing is bolted the auxiliary reservoir. It is, of course, to be understood, however, that the auxiliary reservoir may be located at any desired point and connected to the triple valve chamber in any suitable manner. Formed in the release valve casing axially in line with the center of the triple valve piston 6 is a cylindrical chamber 12; and located in this chamber is a cylinder 13 which is smaller in diameter than the chamber 12 so that an air space is formed between said cylinder and the wall of the chamber. This cylinder is open at its forward end and terminates short of the front wall of the chamber 12; and its rear end is closed by means of a cap 14 which is secured to the casing 11. Mounted to reciprocate in the cylinder 13 is a piston-valve 15 which is provided with a forwardly projecting stem 16. This stem fits snugly in a bushing 17 inserted in the front wall of the release valve casing and serves to guide the piston in its movement. Formed in the bushing 17 are two ports 18 and 19, one of which places the interior of the chamber 12 in communication with a port 20 which is in turn connected to the train pipe by a pipe 21. Carried by the piston-valve 15 at its forward side is a washer 22 which in the normal position of the piston 15 seats against the end of the bushing 17 and closes the ports 18 and 19.

Pivoted on the rear face of the piston 15 is a valve 23 which normally closes a port through the piston and its stem 16, a spring 24 being interposed between said valve and the rear wall of the cylinder 13 to yieldingly hold said valve and piston 15 on their seats. Mounted in the passage through the piston and its stem is a rod 25 which is formed with ribs in order that air may move freely through said passage. The forward end of this rod extends into the triple valve chamber 8 and is adapted to be engaged by the rear end of the triple valve when said valve is moved to its full release position. The rear end of this rod engages valve 23. Connected to the chamber 12 is the reinforcing reservoir 5.

The operation of the apparatus is as follows:—

During the charging operation air from the train pipe passes through the usual charging port 7^a around the piston 6 into chamber 8 of the triple valve and from there into the auxiliary reservoir. Air will also pass through the passage 16^a through the piston 15 and its stem, into the cylinder 13 and around piston 15 into chamber 12 and thence into the supplemental or reinforcing reservoir. When the pressure in the various reservoirs and chambers has equalized at the maximum pressure the piston 15 will close ports 18 and 19 and the valve 23 will close the passage 16^a and the slide of the triple valve will return to its normal position. When it is desired to apply the brakes the train pipe air is exhausted to permit the auxiliary reservoir air to move the piston 6 forward and thereby place the chamber 8 in communication with the brake cylinder pipe. When it is desired to effect a quick release of the brakes the train pipe pressure is increased sufficiently to move the triple valve to its full release position causing it to move the rod 25 and force the valve 23 from its seat and thereby permit the air in the cylinder 13 to exhaust through the passage 16^a into chamber 8. This is possible because of the preceding reduction of pressure in chamber 8 and the auxiliary reservoir, consequent upon the application of the brakes, and the chamber 13 being charged with air under a maximum pressure. As soon as the pressure in the cylinder 13 is reduced the air in chamber 12 being at a maximum pressure, forces the piston 15 rearward in the cylinder 13 and uncovers ports 18 and 19 thereby permitting supplemental reservoir air to flow into the chamber 8 and the auxiliary reservoir, and through pipe 21 to the train pipe. The port into chamber 8 is very small compared with the port leading to the train pipe so that a much smaller quantity of air will pass into the auxiliary reservoir than into the train pipe. In the cylinder 13 is formed a lug 26 with

which one end of the valve 23 is adapted to contact when the piston 15 is moved in order that the valve 23 may be held from its seat until the piston 15 is returned to its normal position. It will therefore be seen that the operation of the quick release valve to put the supplemental or reinforcing reservoir in communication with the train pipe is dependent upon a reduction of air pressure in the triple valve chamber 8 consequent upon the application of the brakes.

In Figs. 2, 3 and 4 the release valve mechanism is shown as applied to what is known as the equilibrio systems of air brakes. In this system the brakes are held in their release position by maintaining an equal air pressure on two sides of the brake applying piston. When it is desired to apply the brakes the train pipe pressure, and, through the triple valve, the pressure on one side of the brake applying piston, is reduced. This permits the air on the other side of the piston to expand and move the piston and apply the brakes. When it is desired to release the brakes the train pipe pressure is increased until the pressures on both sides of the brake-piston have equalized. This form of air brake apparatus is well known and need not be fully shown or described here, as it broadly forms no part of the present invention.

Referring to Figs. 2, 3 and 4, 27 designates the triple valve casing in the chamber 28 of which slides the triple valve 29. Connected to said chamber through the slide valve is a train pipe 30. Connected to the triple valve by means of a stem 31 is a piston 32, this piston sliding in the usual chamber 33 and said chamber being connected with the train pipe by means of a passage 34. The triple valve chamber on the outer side of the piston is connected to the main chamber by means of a small passage 35 extending through the piston stem. In the triple valve is formed a port 36 which, when the valve is moved to full application position as shown in Fig. 3, puts the valve chamber and the train pipe in communication with the atmosphere through port 37, so that when the brakes are applied there is a reduction of air pressure in the triple valve chamber.

The triple valve casing is secured to one end of the brake cylinder or auxiliary reservoir 38 and the triple valve chamber is in communication with said cylinder or reservoir through port 39 so that there will be a reduction of air pressure in said cylinder, or reservoir, upon the application of the brakes. To yieldingly maintain the triple valve on its seat the spring pressed bearing block 40 is provided, said block being slidably mounted in a suitable supporting bar 41. This bearing block is formed with a small aperture therethrough which in the normal position of the triple valve is in register with the port 36,

thereby placing the train pipe in communication with the triple valve chamber and the brake cylinder, or the auxiliary reservoir.

To the outer end of the triple valve casing 27 is secured a release valve chamber 42 corresponding to the chamber 11 shown in Fig. 1. In this chamber is secured a cylinder 43 which is smaller in diameter than the chamber 42, so that an air space is formed between the cylinder and the inner wall of the chamber. The inner end of this cylinder is open and its outer end is closed by means of a closure cap 44. Mounted to slide in said cylinder at its inner open end is a piston 45 which forms a release valve, the inner side of said piston seating against a bushing 46 and normally closing ports 47 and 48 therein. The port 47 is connected to the triple valve chamber while the port 48 is connected to the train pipe through ports 48^a and 34, the port leading to the train pipe being very much larger than the port leading to the triple valve chamber for a purpose hereinafter set forth. The piston is formed with a stem 49 which slides in an axial passage through the bushing 46, and this stem is formed with an axial passage therethrough in which reciprocates a rod 50 the inner end of which is adapted to be moved by the triple valve when said valve is in its full release position, this rod being formed with ribs to permit air to pass through said passage. Pivoted on the outer side of the piston 45 is a valve 51 which closes the outer end of the passage through the piston and is yieldingly held to its seat by means of a spring 52. This spring also holds the piston valve 45 to its seat. Connected to the chamber 42 outside of the cylinder 43 by a pipe 53 is the reinforcing or supplemental reservoir 55 in which air is maintained at a maximum pressure.

The operation of this form of apparatus is as follows:—It is to be understood, of course, that air is maintained in the brake cylinder or auxiliary reservoir 38 at a uniform pressure upon both sides of the piston 54 therein, and that the brakes are applied through the piston rod 56 by destroying this equilibrium of pressure, and are released by restoring it. It will also be understood that the air pressure is equalized in the triple valve chamber and on both sides of the piston of the triple valve and in the cylinder 42, chamber 41, and in the reinforcing reservoir.

When it is desired to apply the brakes the train pipe pressure is reduced thereby permitting the air on the outer side of the piston of the triple valve to move said piston inward and thereby place the train pipe and the triple valve chamber and one end of the brake cylinder or reservoir in communication with the atmosphere through ports 36 and 37. When it is desired to release the brakes the train pipe pressure is increased thereby returning the triple valve to its nor-

mal position and increasing the air pressure in the brake cylinder until the pressures are equalized on both sides of the brake piston. When it is desired to effect a quick release of the brakes the train pipe pressure is increased sufficiently to cause the triple valve to engage and move the rod 50 and valve 51 to permit the air in the chamber 43 to exhaust into the triple valve casing, the pressure in said casing having been reduced consequent upon the application of the brakes. Exhausting the air from the cylinder 43 permits the supplemental air which is under maximum pressure in the chamber 42 to force the piston 45 into the cylinder 43, thereby uncovering the ports 47 and 48 and permitting the supplemental reservoir air to pass into the train pipe through the largest port and into the triple valve chamber through the smaller port. (See Fig. 4.) The object of connecting the larger port to the train pipe is to permit the air to pass to the train pipe in a larger quantity than to the triple valve chamber.

When the pressures in the various chambers and reservoirs and train pipe have equalized the valves return to their normal positions. In charging this form of the apparatus the train pipe pressure is increased and the air passes into the triple valve chamber and through ports 35 and 50 into the cylinder 43 and thence around the piston 45 into the reinforcing reservoir. It will thus be seen that in both forms of the apparatus the supplemental reservoir is put in communication with the train pipe by means of an increase in train pipe pressure to move the triple valve to its full release position. It will also be noted that the quick release valve is operated by supplemental reservoir air and is dependent upon the reduction of air pressure in the auxiliary reservoir or triple valve chamber consequent upon an application of the brakes.

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

1. In a fluid pressure brake, the combination with a brake cylinder and piston held in release position by fluid under pressure on opposite sides thereof, a valve device operating upon a reduction in train pipe pressure for releasing air from one side of said brake piston to apply the brakes, of a supplemental reservoir and means operating upon an increase in train pipe pressure, for opening communication from the supplemental reservoir to the train pipe.

2. In a fluid pressure brake, the combination with a brake cylinder and piston held in release position by fluid under pressure on opposite sides thereof, a valve device operating upon a reduction in train pipe pressure for releasing air from one side of said brake piston to apply the brakes, of a supplemental

reservoir and a release valve mechanism operated by said valve device for controlling communication from the supplemental reservoir to the train pipe.

5 3. In a fluid pressure brake, the combination with a brake cylinder, train pipe, auxiliary reservoir and supplemental reservoir, of a release valve mechanism operating upon an increase in train pipe pressure by means
10 of the reduced auxiliary reservoir pressure for opening communication from the supplemental reservoir to the train pipe, and a valve in the release valve mechanism for controlling communication from one side of the re-
15 lease valve mechanism to the auxiliary reservoir.

4: In a fluid pressure brake, the combination with a train pipe, brake cylinder, aux-

iliary reservoir, and supplemental reservoir, of a release valve mechanism normally sub- 20
ject on opposite sides to the pressure in the supplemental reservoir, and a valve in said
valve mechanism operated upon an increase
in train pipe pressure for releasing air from
one side of the release valve mechanism to 25
the auxiliary reservoir, thereby actuating
said release valve mechanism to supply air
from the supplemental reservoir to the train
pipe.

In testimony whereof I hereunto affix my 30
signature in the presence of two witnesses
this fourteenth day of November 1904.

JOSEPH E. NORMAND.

Witnesses:
ROYAL B. CUSHING,
WM. R. DAVIS.