(No Model.) 2 Sheets—Sheet 1.

T. J. HOGAN.

AIR BRAKE.

No. 546,449. Patented Sept. 17, 1895.

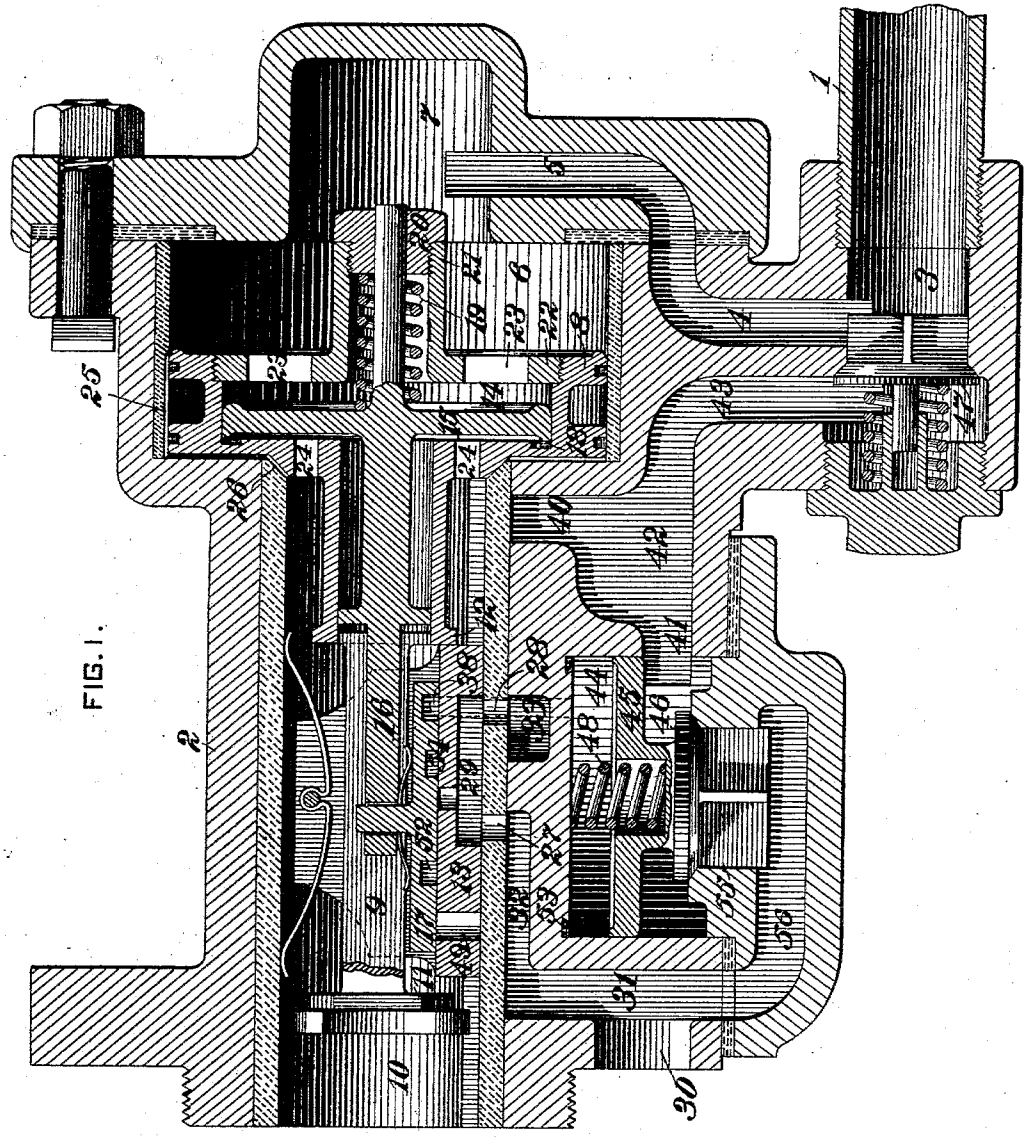

FIG. 1.

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(No Model.) 2 Sheets—Sheet 2.

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FIG. 2.

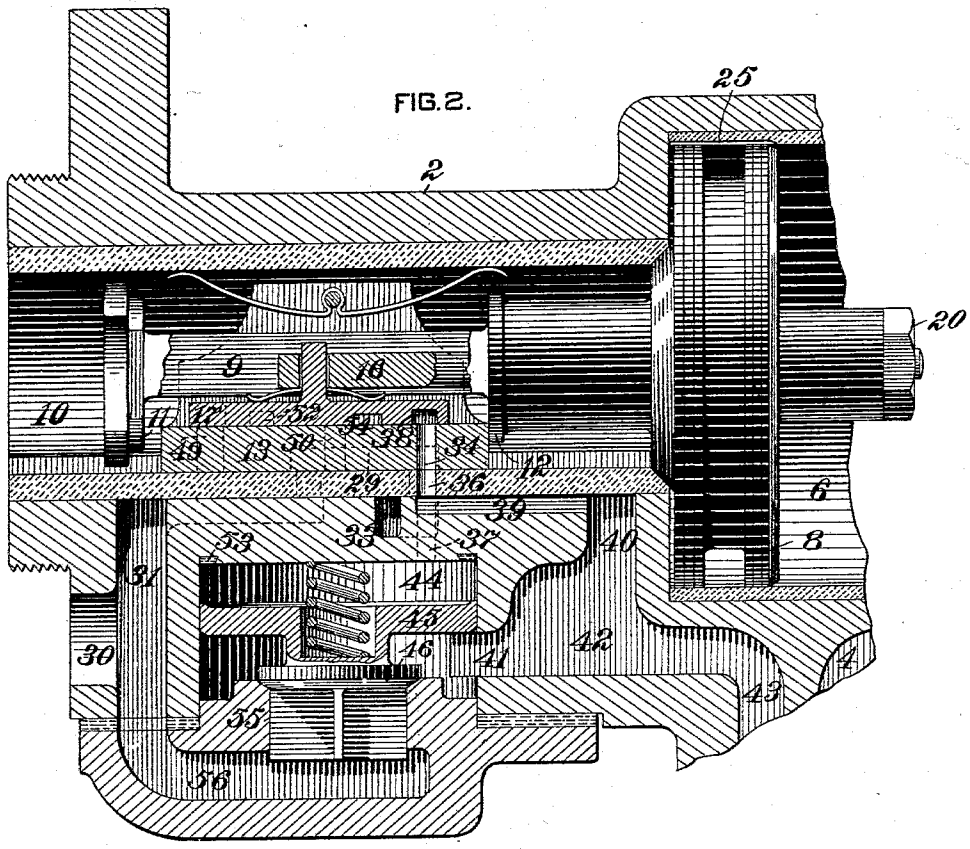


FIG. 3.

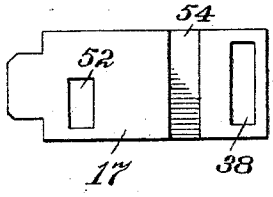


FIG. 4.

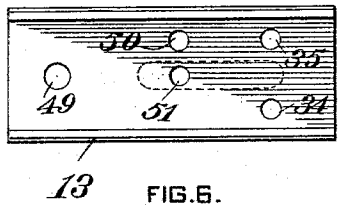


FIG. 5.

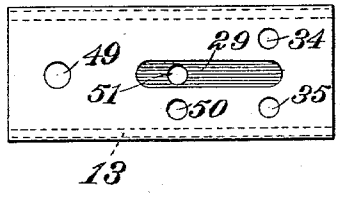
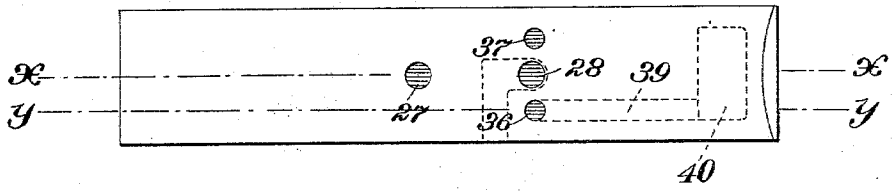


FIG. 6.



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UNITED STATES PATENT OFFICE.

THOMAS J. HOGAN, OF PITTSBURG, ASSIGNOR TO THE WESTINGHOUSE AIR BRAKE COMPANY, OF WILMERDING, PENNSYLVANIA.

AIR-BRAKE.

SPECIFICATION forming part of Letters Patent No. 546,449, dated September 17, 1895.

Application filed November 14, 1894. Serial No. 528,710. (No model.)

To all whom it may concern:

Be it known that I, THOMAS J. HOGAN, a citizen of the United States, residing at Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented or discovered a certain new and useful Improvement in Air-Brakes, of which improvement the following is a specification.

The object of my invention is to provide an improvement in quick-action devices for automatic fluid-pressure brake systems; and to this end it consists in new and improved means for controlling the local release of fluid under pressure from the train-pipe for the purpose of effecting emergency applications of the brakes.

In the accompanying drawings, which illustrate an application of my invention, Figure 1 is a vertical longitudinal section through a triple-valve device constructed in accordance with my invention, the plane of the section being indicated by the line *x x* in Fig. 6; Fig. 2, a similar section in a plane parallel to that of Fig. 1 and indicated by the line *y y* of Fig. 6; Fig. 3, a view of the face of the graduating-valve; Fig. 4, a plan view of the back of the main valve which forms the seat of the graduating-valve; Fig. 5, a view of the face of the main valve; Fig. 6, a plan view of the seat of the main valve.

The train-pipe 1 or a branch therefrom is connected to the casing 2 of the triple-valve device, so as to communicate with a passage 3, which is in open communication with the triple-valve piston-chamber 6 through the passages 4 5 and chamber 7. The main piston 8 of the triple-valve device is provided with a stem 9, which extends into the main-valve chamber 10 and is provided with shoulders 11 and 12, between which the main slide-valve 13 is located in position to be moved coincidently with the movement of the main piston when the lost motion between the shoulders 11 and 12 and the ends of the main valve has been taken up.

The main piston 8 has a chamber 14 formed within it, in which chamber a supplemental piston 15 is fitted. The supplemental piston 15 is provided with a stem 16, which is operatively connected to an auxiliary or graduating valve 17, fitted to slide on the back of the main slide-valve 13.

When the system is charged with fluid under pressure, air from the train-pipe passes through the passages 3, 4, 5, and 7 into the piston-chamber 6 and moves the main piston into the position shown in the drawings. The supplemental piston 15 normally bears against the gasket 18 and has no movement relative to the main piston in service applications of the brakes. It is held in its normal position by means of a spring 19, which bears at one end against the piston 15 and at its other end against a nut 20, screwed into an extension 21 of the plate 22. The plate 22 is secured to the main piston 8, so as to form a stop for limiting the movement of the piston 15, and is provided with openings through it, whereby the piston 15 is at all times exposed on one side to train-pipe pressure. The other side of the piston 15 is exposed to the pressure of the fluid in the auxiliary reservoir, which has access thereto through the openings 24 in the main piston.

When the main piston 8 is in its normal position, one end of the feed-groove 25 is uncovered, and fluid under pressure from the train-pipe flows through the feed-groove 25 around the piston 8 and through the groove 26 into the main valve-chamber 10 and to the auxiliary reservoir. The main slide-valve 13 is then in position to connect the ports 27 and 28 in its seat through the cavity 29 in the valve, so that the brake-cylinder is connected with the atmosphere through the passages 30 31 32, port 27, cavity 29, port 28, and passage 33. At the same time the ports or passages 34 and 35, which extend entirely through the main valve, register with the ports 36 and 37, respectively, in the seat of the main valve and communicate with one another at their upper ends through a cavity 38 in the auxiliary or graduating valve 17. The port 37 communicates with the upper end of a chamber 44, in which is fitted a piston 45, which is operatively connected to a valve 46, controlling a passage leading to the brake-cylinder. The port 36 is connected by means of passages 39 and 40, and the cavity 42 with the passage 43 leading from the train-pipe, and

with a port 41, opening into the chamber 44 below the piston 45.

When the system is charged with fluid under pressure, so as to move the parts into the positions shown in the drawings, the check-valve 47 is unseated and fluid under pressure flows from the train-pipe through the passage 43, cavity 42, and port 41 into the chamber 44 below the piston 45, and at the same time through the passages 40, 39, 36, 34, 38, 35, and 37 into the chamber 44 above the piston 45.

The effective area of the piston 45 is greater on its upper than on its lower side, and the excess of fluid-pressure due to this difference in area, assisted by the spring 48, tends to hold the valve 46 on its seat.

When it is desired to make a service application of the brakes, a comparatively slight and gradual reduction of train-pipe pressure will cause the main piston 8 to move to the limit of its stroke to the right, and the supplemental piston 15 will move with it, but will not change its position relative to the main piston. The graduating-valve 17 will be moved to the right a distance relative to the main valve equal to the distance between the shoulder 11 on the main-piston stem and the end of the main valve, and this movement will uncover the port 49 in the main valve 13. The shoulder 11 on the main-piston stem will abut against the end of the main valve 13 and will move it into position to cut off communication between the brake-cylinder and the atmosphere and to cause the port 49 in the main valve to register with the port 27 in the main-valve seat. Fluid under pressure will then flow from the auxiliary reservoir to the brake-cylinder through the ports and passages 49, 27, 32, 31, and 30.

When the auxiliary-reservoir pressure is reduced slightly below the train-pipe pressure by the flow from the auxiliary reservoir to the brake-cylinder, the train-pipe pressure will move the pistons 8 and 15 to the left until the shoulder 12 on the main-piston stem abuts against the main valve. This movement will cause the graduating-valve 17 to close the port 49 in the main valve, and thereby cut off the flow from the auxiliary reservoir to the brake-cylinder. The main valve will remain stationary and prevent further movement of the pistons and graduating-valve to the left. If it is desired to increase the pressure in the brake-cylinder, a further slight reduction of train-pipe pressure will cause the pistons and graduating-valve to be again moved to the right, so as to open the port 49 in the main valve and permit a further flow of fluid from the auxiliary-reservoir to the brake-cylinder. This may be repeated as often as desired, or until the auxiliary-reservoir and brake-cylinder pressures have equalized.

The brakes are released by increasing the train-pipe pressure sufficiently to return the pistons and valves to the positions in which they are shown in the drawings.

In order to effect an emergency application of the brakes, a greater and more rapid reduction of train-pipe pressure is necessary—that is, such a reduction as will be sufficient to permit the auxiliary-reservoir pressure acting on one side of the piston 15 to overcome the train-pipe pressure and the pressure of the spring 19 acting on the other side of the piston 15 so as to move the piston 15 to the right relatively to the main piston the full length of its stroke in the chamber 14.

The main piston 8 will be moved the full length of its stroke to the right, as in service applications of the brakes, and the main valve will also be moved to the same position that it occupies in service applications; but the auxiliary or graduating valve 17 will be moved farther to the right than it is in service applications, so that the port 49 will be uncovered and the cavity 52 in the auxiliary or graduating valve will register with the ports 50 and 51 in the main valve. The port 50 in the main valve registers with the port 37 in the seat of the main valve in both service and emergency applications of the brakes, but in service applications it is closed at its upper end by the graduating-valve.

When, in emergency applications, the cavity 52 in the graduating-valve is caused by the independent movement of the piston 15 to register with the ports 50 and 51 in the main valve, a communication is opened from the upper end of the chamber 44 above the piston 45 to the atmosphere through the port 37 in the main-valve seat, port 50 in the main valve, cavity 52 in the graduating-valve, port 51 and cavity 29 in the main valve, and port 28 in the main-valve seat, which opens into the exhaust-passage 33, leading to the atmosphere. The fluid under pressure in the upper end of the chamber 44 above the piston 45 escapes to the atmosphere, and the reduction of pressure thereby effected permits the fluid under pressure below the piston 45 to lift the piston and open the valve 46. The fluid under pressure in the cavity 42 and passage 43 is released to the brake-cylinder through the passages 55, 56, and 30. The check-valve 47 is unseated by train-pipe pressure, and fluid under pressure flows from the train-pipe to the brake-cylinder until the back-pressure in the brake-cylinder is great enough to close the check-valve. At the same time that the fluid under pressure is flowing from the train-pipe, and after the check-valve 47 is closed, fluid under pressure flows from the auxiliary reservoir to the brake-cylinder through the port 49 in the main valve, port 27 in the main-valve seat, and passages 32, 31, and 30 until the auxiliary-reservoir and brake-cylinder pressures are equalized.

When the piston 45 is moved upward, it seats on the gasket 53 and forms a tight joint to prevent the escape of fluid to the atmosphere from the under side of the piston.

The cavity 54 in the under side of the grad-

uating-valve is open at both ends, so as to permit auxiliary-reservoir fluid to partially balance the graduating-valve.

It will be seen that with my improvement emergency applications of the brakes are controlled by the auxiliary or graduating valve, and that the main valve and the main piston of the triple-valve device have the same traverse for both service and emergency applications of the brakes.

It will be obvious that under my invention the main valve may be provided with ports or passages controlled by the auxiliary or graduating valve for releasing fluid under pressure from the train-pipe directly to the brake-cylinder without the employment of a separate piston and valve, such as the piston 45 and valve 46, and my invention is not therefore limited to the particular construction shown.

I claim as my invention and desire to secure by Letters Patent—

1. The combination, in a triple valve device, of the main valve, and the graduating valve, and ports controlled by said graduating valve for effecting the release of fluid from the train pipe when the main valve is in position to make an application of the brakes, substantially as set forth.

2. The combination in a triple valve device of a main valve which has but a single traverse for service and emergency applications of the brakes, and a graduating valve whose movement controls the local exhaust of fluid from the train pipe when the main valve is in position to make an application of the brakes, substantially as set forth.

3. The construction, in a triple valve device, of the main valve, and the graduating valve, and ports controlled by said graduating valve for effecting the local exhaust of fluid from the train pipe in emergency applications of the brakes, substantially as set forth.

4. The combination, in a triple valve device, of the main valve, a release valve, for releasing fluid under pressure from the train pipe, a piston controlling the operation of the release valve, the graduating valve and ports controlled by said graduating valve for effecting variations of pressure on one side of the piston and thereby controlling the operation of the piston and the release valve, substantially as set forth.

5. The combination, in a triple valve device, of the main valve, a release valve for releasing fluid under pressure from the train pipe, a piston normally exposed to fluid under pressure and controlling the release valve, the graduating valve, and ports controlled by said graduating valve for effecting the release of fluid under pressure from one side of the piston, substantially as set forth.

6. The combination, in a triple valve device, of a main valve, a graduating valve having an initial traverse relative to the main valve whereby fluid under pressure is admitted from the auxiliary reservoir to the brake cylinder when the main valve is in service position, and having an additional traverse for effecting an emergency application of the brake without further movement of the main valve, substantially as set forth.

In testimony whereof I have hereunto set my hand.

THOMAS J. HOGAN.

Witnesses:
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F. E. GAITHER.