

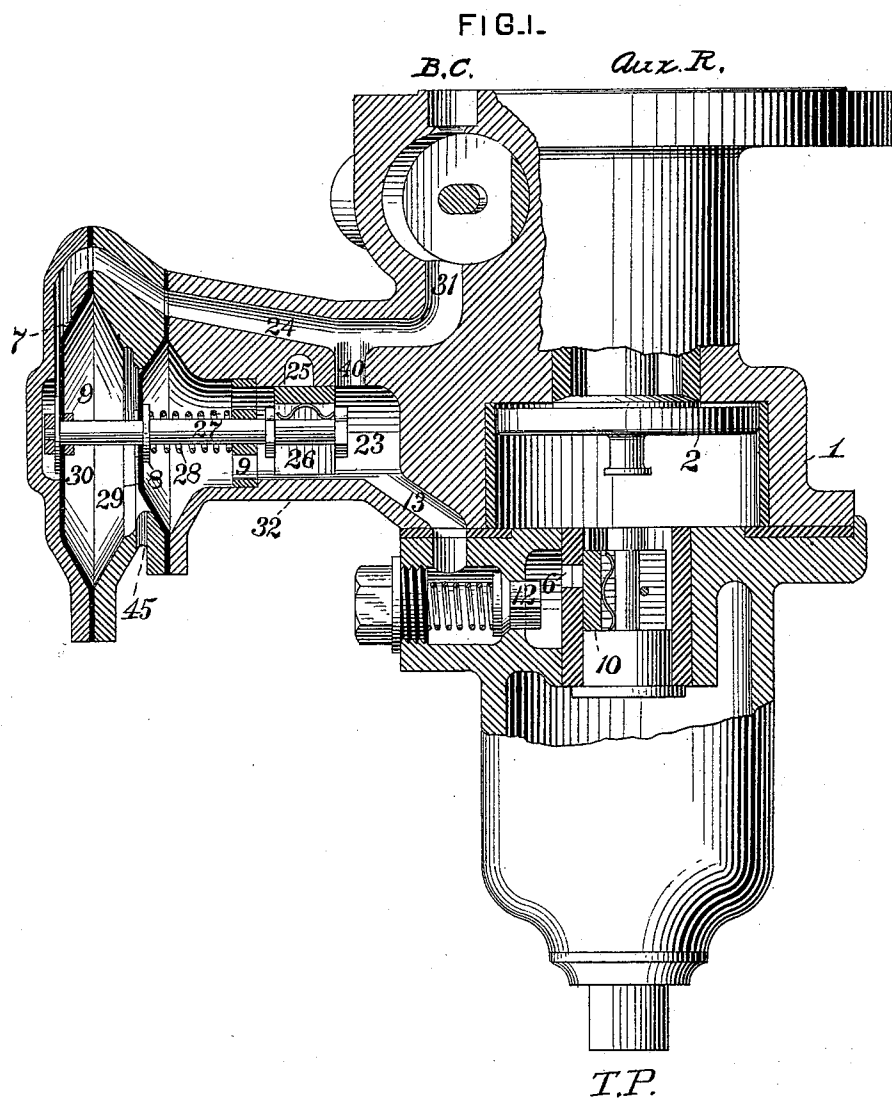
(No Model.)

2 Sheets—Sheet 1.

T. J. HOGAN.
AIR BRAKE.

No. 447,731.

Patented Mar. 3, 1891.



WITNESSES:

Sturden Bell
F. E. Gaither

INVENTOR,

Thomas J. Hogan.

(No Model.)

2 Sheets—Sheet 2.

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FIG. 2.

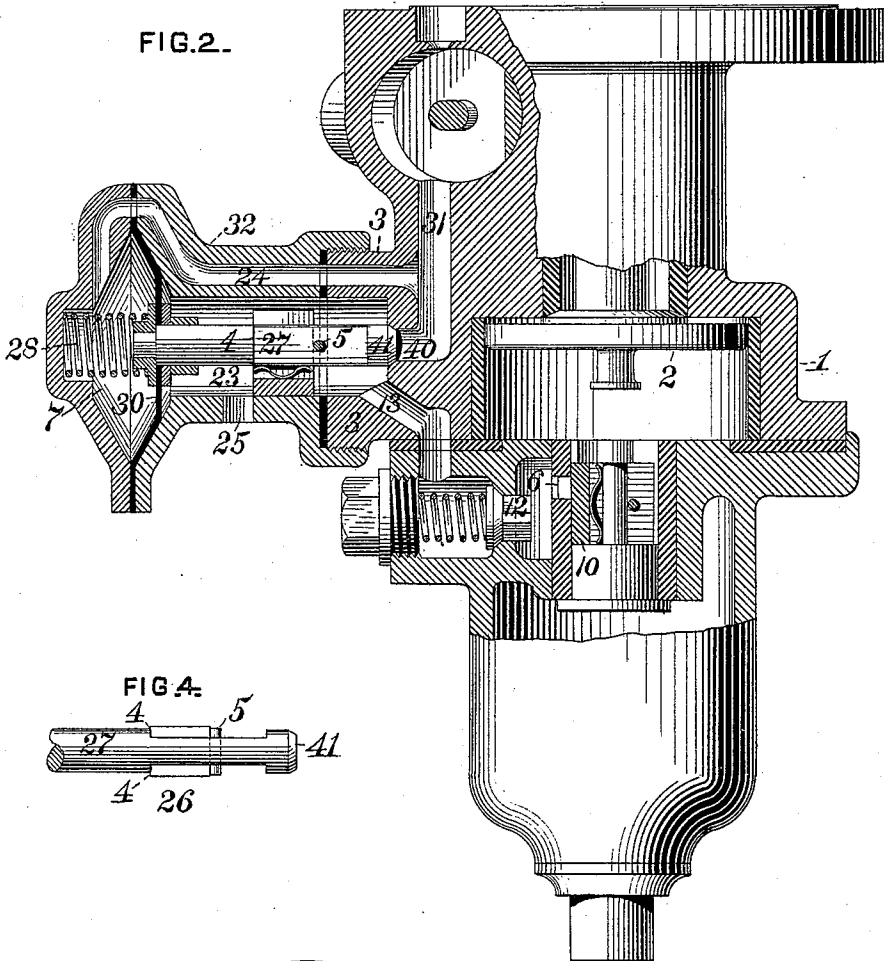


FIG. 4.

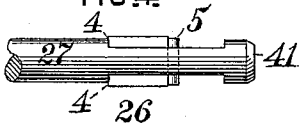
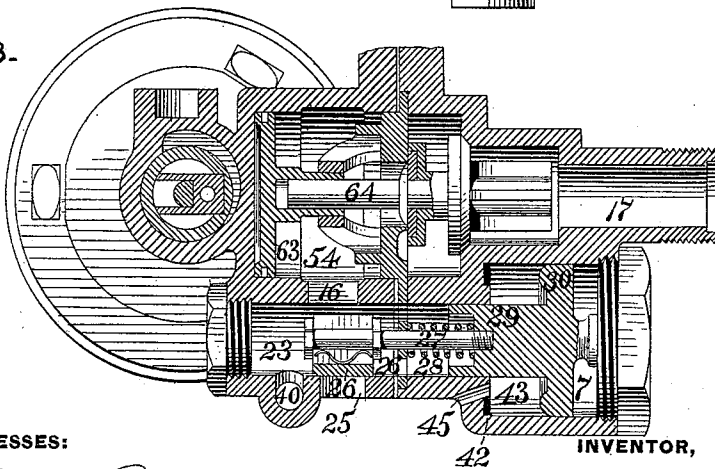


FIG. 3.



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UNITED STATES PATENT OFFICE.

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

AIR-BRAKE.

SPECIFICATION forming part of Letters Patent No. 447,731, dated March 3, 1891.

Original application filed May 29, 1890, Serial No. 353,609. Divided and this application filed August 12, 1890. Serial No. 361,838.
(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.

My present invention relates to improvements in devices of the class described and claimed by me in Letters Patent No. 433,594, of August 5, 1890, of which this application is a division.

The object of my invention is to provide means for releasing the air from the train-pipe under each car in applying the brakes and exhausting the air so released to the brake-cylinder and to the atmosphere, the release of air from the train-pipe being effected by the aid of auxiliary-reservoir pressure or the movement of the triple or governing valve which is actuated by auxiliary-reservoir pressure on a preliminary reduction of train-pipe pressure.

To this end my invention consists of means for controlling the exhaust of air to the brake cylinder and to the atmosphere after it has been released from the train-pipe by the expansion of the air in the auxiliary reservoir which actuates the triple valve or other piston or diaphragm.

In the devices which have been proposed heretofore for releasing the air from the train-pipe by the action of auxiliary-reservoir pressure on the piston of a triple valve, or on a special piston or diaphragm for that purpose, the air after being released escapes either to the atmosphere only or to the brake-cylinder only; but in my improvement a part of the air released from the train-pipe passes to the brake-cylinder and a part to the atmosphere.

While my improvement may be used in connection with any compressed-air automatic brake system it is specially adapted for use with the Westinghouse automatic brake, in which a release-valve is employed in connection with the triple valve. As employed in that system, the train-pipe release-valve is arranged so as to allow the air which escapes from the train-pipe to pass to the brake-cyl-

inder, where it acts on the brake-piston and helps to increase the braking-power when it is most needed—that is, in making emergency stops.

In all of the devices of which I am aware for releasing the air from the train-pipe to the brake-cylinder the flow from the train-pipe to the brake-cylinder is checked and counteracted by the pressure of the air which enters the brake-cylinder from the auxiliary reservoir, and to prevent a backward flow from the brake-cylinder to the train-pipe it is necessary to have a check or non-return valve in the passage leading from the release-valve to the brake-cylinder, and this check-valve is closed as soon as or a little before the pressure in the brake-cylinder equals the pressure of the air escaping from the train-pipe. The consequence of this is that the flow from the train-pipe is checked very soon after it begins and when only a slight reduction of train-pipe pressure has been obtained.

With my improvement the air released from the train-pipe is allowed to pass to the brake-cylinder so long as the pressure in the brake-cylinder is low enough to permit of a flow of air into it from the train-pipe, and so soon as the brake-cylinder pressure has risen to a certain predetermined amount (which would prevent the flow of air into it from the train-pipe or which would cause a backward flow from it toward the train-pipe) the passage from the train-pipe to the brake-cylinder is closed automatically and a passage opened by which the air from the train-pipe can escape to the atmosphere, so that the closing of the passage to the brake-cylinder does not in any way check the flow from the train-pipe, but causes a freer flow and a great and quick reduction of train-pipe pressure. In this way I obtain the full benefit of all the air that can be utilized in the brake-cylinder and have every advantage of a free exhaust to the atmosphere.

While the check or non-return valve referred to above is shown in my drawings, it will be readily understood that it is not necessary with my improvement, but is shown only as a part of an existing structure to which my improvement is applied.

In the accompanying drawings, illustrating my invention, Figure 1 is a partial section of a triple valve with my improvement attached. Fig. 2 is a similar section of a triple valve with a modification of my improvement. Fig. 3 shows a modification of my improvement adapted for use with the train-pipe release-valve shown in Figs. 2 and 3 of Patent No. 376,837 to G. Westinghouse, Jr., January 24, 1888. Fig. 4 is a plan of the connected slide and puppet valves shown in Fig. 2.

In Fig. 1 the triple-valve casing 1 is shown broken away so as to show the triple-valve piston 2, train-pipe release-valve 10, and check-valve 12, which are shown in Patent No. 360,970, to G. Westinghouse, Jr., March 29, 1887; but instead of leading the air from the check-valve 12 directly to the brake-cylinder, as is done in that patent, I form a passage 13, by which the air which passes the check-valve 12 enters a valve-chamber 23, in which a valve 26 is arranged to slide over two ports 25 and 40. This slide-valve is connected to a stem 27, which passes through a guide 9, and has connected to it near its outer end two diaphragms 29 and 30. The diaphragms are of different areas, the inner one being the smaller, and they are normally held in the position shown in the drawings by the action of the spring 28, which presses at one end against the guide 9 and at the other end against a collar 8 on the valve-stem 27. The space between the diaphragms is open to the atmosphere through ports 45, and the two diaphragms move together, with the stem 27 as a differential piston or diaphragm. The smaller one is exposed on one side to the pressure in the chamber 23, and the larger one is exposed on its outer side to the pressure which enters the space 7 through the passage 24.

When the train-pipe pressure is sufficiently reduced to cause the triple-valve piston to open the train-pipe release-valve 10, the air from the train-pipe passes through the port 6, lifts the valve 12, and passes through passage 13 into chamber 23, fills chamber 23, and passes through port 40 and passage 31 to the brake-cylinder. At the same time the air passes through the passage 24 to the outer side of the large diaphragm 30, where it acts to move the diaphragm and connected stem and valve 26 to the right against the pressure of the spring 28 and the air-pressure on the inner side of the smaller diaphragm 29. This movement causes the valve 26 to close the port 40 and prevent any further flow from the train-pipe to the brake-cylinder, and at the same time the valve 26 opens the port 25 and the air from the train-pipe passes out through port 25 to the atmosphere. After the port 40 is closed the brake-cylinder pressure acts on the outer side of diaphragm 30 to hold the valve 26 in position to keep the port 40 closed and the port 25 open. When the train-pipe is recharged to take off the brakes, the air escapes from the brake-cylinder

through the brake-cylinder exhaust-port of the triple valve and relieves the pressure on the outside of diaphragm 30, and the diaphragms 29 and 30 and the valve 26 are then moved to the left by the spring 28, thus opening the port 40 and closing the port 25.

In the modification of my improvement shown in Fig. 2 I employ a single diaphragm 30, which has a stem 27 connected to it, at the end of which stem is formed the conical valve 41, which in its normal position closes the port 40, which opens into the passage 31, leading to the brake-cylinder. Connected to the stem 27 is a slide-valve 26, which, when the diaphragm 30 is moved to the left, closes the port 25, which opens to the atmosphere. In the normal position of the parts the port 25 is open, the diaphragm 30 being pressed to the right by the spring 28.

When the train-pipe release-valve 10 is opened by the movement of the triple-valve piston, the train-pipe air passes through port 6, lifts valve 12, and through passage 13 enters chamber 23, where it acts on diaphragm 30 and moves it to the left, compressing the spring 28. This movement of the diaphragm causes valve 26 to close port 25 and valve 41 to open port 40, so that the train-pipe air then passes through passage 31 to the brake-cylinder and through passage 24 to the space 7 on the outer side of diaphragm 30, which it moves to the right, closing port 40, and again opening port 25 to permit the train-pipe air to pass out through port 25 to the atmosphere.

When the train-pipe release-valve 10 is first opened and the air from the train-pipe first enters chamber 23, a portion of the air will escape through port 25 to the atmosphere and cause a quick reduction of train-pipe pressure; but the escape through port 25 will not be rapid enough to prevent the pressure from acting on diaphragm 30 and moving it to the left to open port 40.

Fig. 4 shows one way in which the slide-valve 26 may be connected to the stem 27. A portion of the stem 27 is cut away on each side, leaving a flat part, which fits between the wings of the slide-valve 26. The slide-valve is fitted to this part with one end resting against the shoulders 4, and a pin 5 is then passed through the flat part of the stem at the other end of the valve to hold it from longitudinal movement on the stem. The object of this construction is to permit the removal or replacing of the valve 26 by merely unscrewing the casing 32 from the part 3 and without removing the stem 27 and diaphragm 30 from the casing 32.

In Fig. 3 I show another modification of my improvement applied to the train-pipe release-valve shown in Patent No. 376,837, to G. Westinghouse, Jr., January 24, 1888, Figs. 2 and 3. I change the position of the port 16, (shown in Fig. 2 of that patent,) so that instead of opening from above the chamber 54 it opens from the side, as shown in Fig. 3 of my drawings, which is the same as Fig. 3 of

the patent referred to with my improvement added.

In my improvement the port 16, instead of opening directly to the brake-cylinder passage, opens into a chamber 23, so that when the air is escaping from the train-pipe through port 16 into chamber 23, where it acts on piston 29, it fills the chamber 23, and passes through the port 40 to the brake-cylinder, and by a branch passage from port 40, similar to the passage 24, (shown in Figs. 1 and 2, but not shown in Fig. 3,) the air also passes to the space 7 at the outer side of piston 30, where it acts on the greater area of piston 30 to overcome the pressure of the spring 28 and of the air acting on the smaller area of piston 29 in chamber 23 and moves the valve 26 to the left, closing port 40 and opening port 25.

When the brakes are released in the usual way by recharging the train-pipe, the pressure in the space 7, which acts on the outer side of piston 30, is relieved and the spring 28 moves the pistons and valve 26 to the right, opening port 40 and closing port 25. The space 43 to the left of piston 30 is open to the atmosphere through ports 45, and the piston 30, when at the end of its stroke to the left, rests on the packing-ring 42 and forms an air-tight joint, which prevents the escape of air from the space 7 to the right of piston 30.

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

1. In an automatic fluid-pressure brake mechanism, the combination of a train-pipe release-valve for releasing the air from the train-pipe under each car by a preliminary reduction of train-pipe pressure, said valve being operated by the pressure of the air in the auxiliary reservoir, and a passage from the release-valve to the brake-cylinder and to the atmosphere, and a valve device which closes the passage to the brake-cylinder when a given pressure has been reached therein, and thereby prevents the escape of air from the brake-cylinder to the atmosphere.

2. In an automatic fluid-pressure brake mechanism, the combination of a triple valve, a train-pipe release-valve operated thereby, and a passage from the train-pipe release-valve to the brake-cylinder and to the atmosphere, and a valve device controlling the flow of air to the brake-cylinder and to the atmosphere.

3. In an automatic fluid-pressure brake mechanism, the combination of a train-pipe release-valve operated by auxiliary-reservoir pressure, a passage from the release-valve to the brake-cylinder and to the atmosphere, and a valve which closes said passage to the brake-cylinder and opens the passage to the atmosphere.

4. In an automatic fluid-pressure brake mechanism, the combination of a triple valve, a train-pipe release-valve operated thereby, a passage from the release-valve to the brake-cylinder and to the atmosphere, and a valve which closes said passage to the brake-cylinder and opens the passage to the atmosphere.

5. In an automatic fluid-pressure brake mechanism, the combination of a train-pipe release-valve operated by auxiliary-reservoir pressure, a passage from the release-valve to the brake-cylinder, and a valve which closes the passage to the brake-cylinder and holds it closed by means of the pressure of the air in the brake-cylinder.

6. In an automatic fluid-pressure brake mechanism, the combination of a train-pipe release-valve operated by the pressure in the auxiliary reservoir, passages from the release-valve to the brake-cylinder and to the atmosphere, and a valve device which operates to permit a portion of the air to pass to the atmosphere, then closes the passage to the atmosphere and opens the passage to the brake-cylinder, and finally closes the passage to the brake-cylinder and opens the passage to the atmosphere.

7. In an automatic fluid-pressure brake mechanism, the combination of a train-pipe release-valve operated by the movement of the triple valve, passages from the release-valve to the brake-cylinder and to the atmosphere, a differential piston or diaphragm, and a valve operated by the pressures on the differential piston or diaphragm to control the passages leading to the brake-cylinder and to the atmosphere.

8. In an automatic fluid-pressure brake mechanism, a device for releasing the air from the train-pipe to the brake-cylinder under each car, which consists of a valve operated by auxiliary-reservoir pressure, a passage controlled by said valve and leading from the train-pipe to a chamber, a diaphragm or piston in said chamber, which is always exposed on one side to brake-cylinder pressure, and a second valve operated by the diaphragm or piston and opened by the pressure of air from the train-pipe acting on one side of the diaphragm or piston, and a passage controlled by the second valve and through which air from the train-pipe is admitted to the brake-cylinder.

In testimony whereof I hereunto set my hand.

THOMAS J. HOGAN.

Witnesses:

R. H. WHITTLESEY,
F. E. GAITHER.