(No Model.)

T. J. HOGAN.

AIR BRAKE.

No. 433,595. Patented Aug. 5, 1890.

FIG. 2.

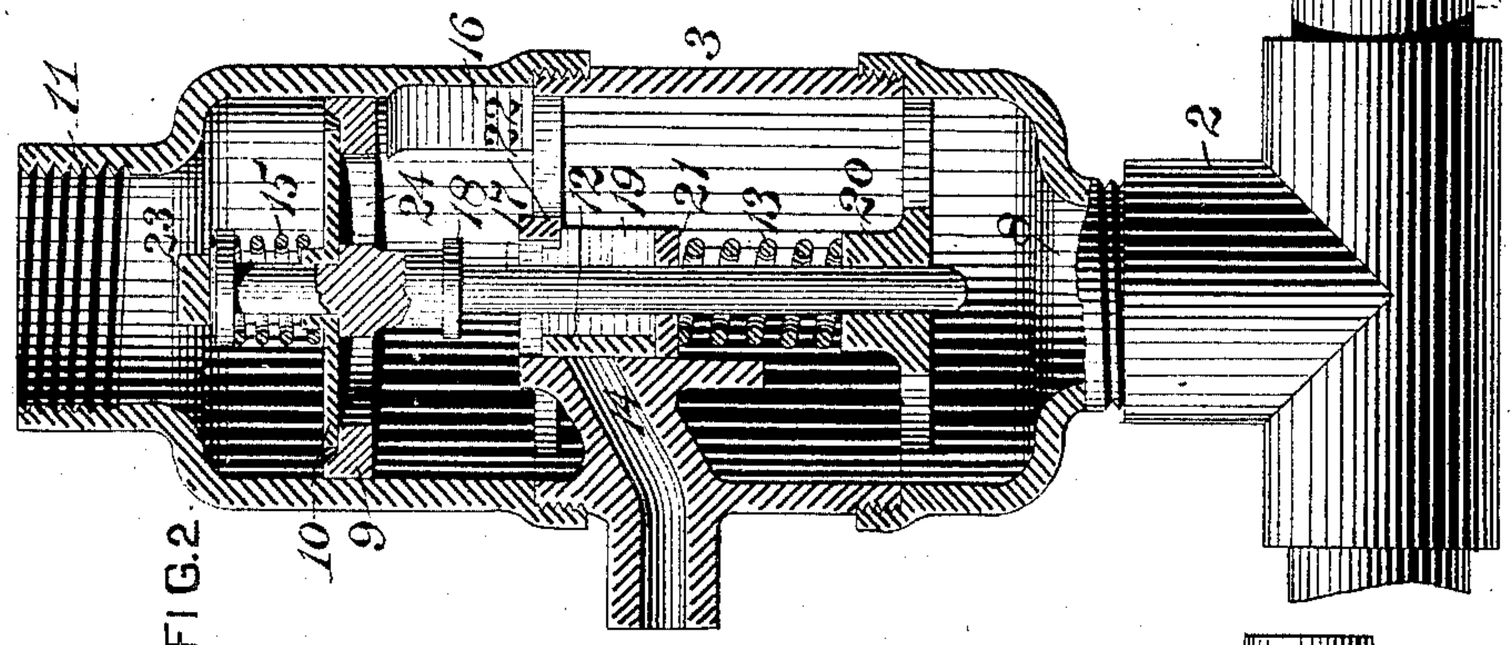


FIG. 1.

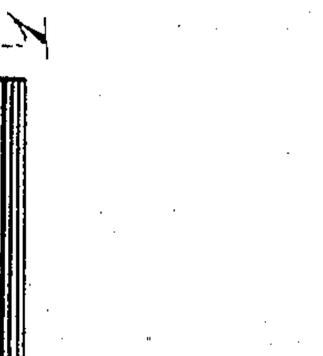


FIG. 3.

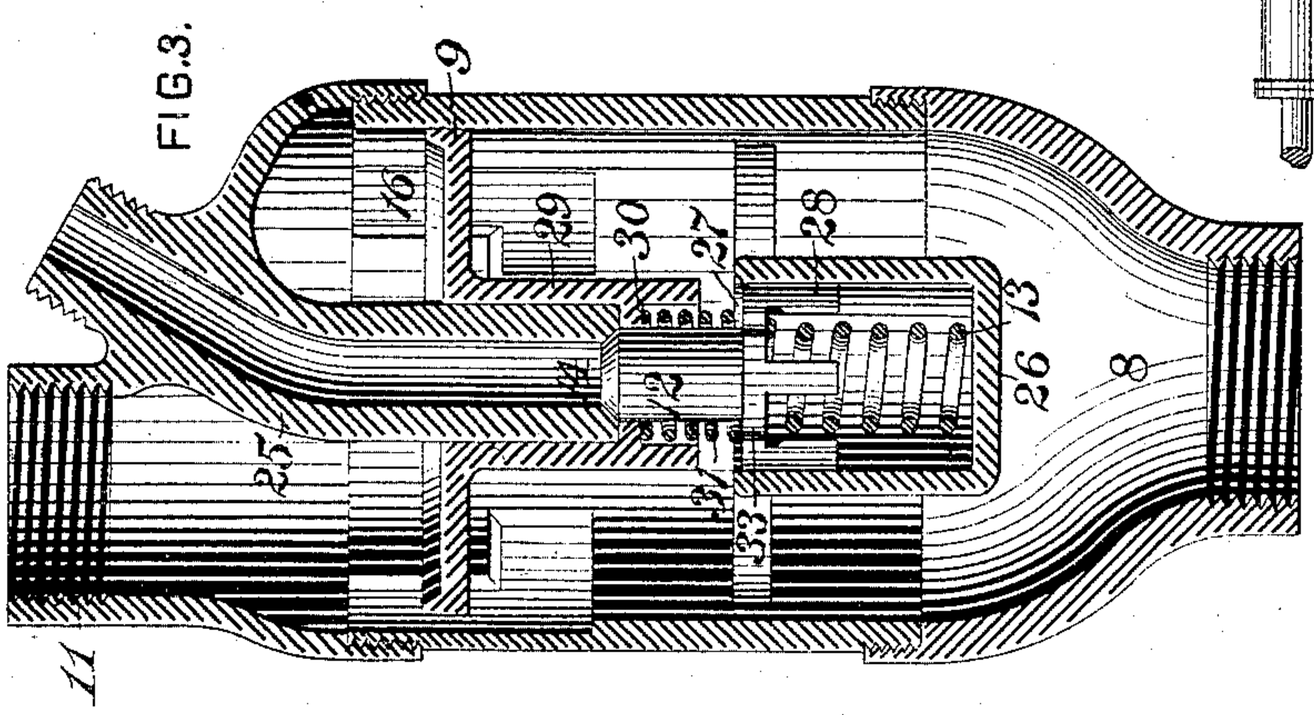


FIG. 4.

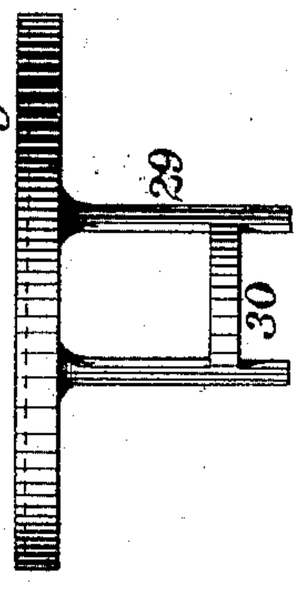
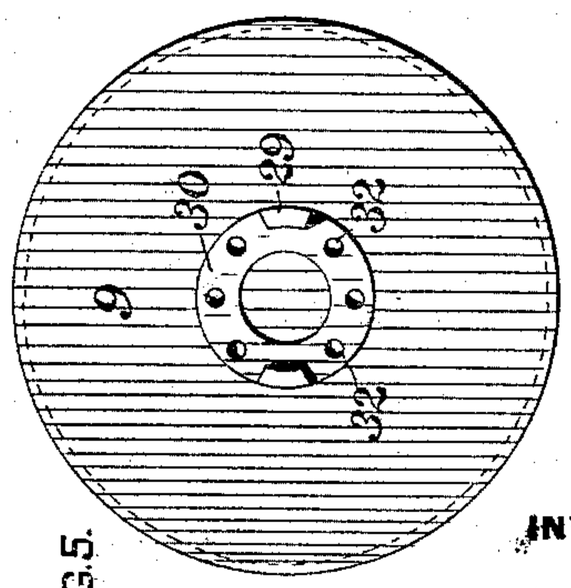


FIG. 5.



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UNITED STATES PATENT OFFICE.

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AIR-BRAKE.

SPECIFICATION forming part of Letters Patent No. 433,595, dated August 5, 1890.

Application filed June 13, 1890. Serial No. 355,324. (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 means for locally venting the train-pipe under each car in automatic fluid-pressure railway-brakes; and to this end it consists of a train-pipe release-valve which is independent of the pressure in any auxiliary reservoir and of the movement of the triple or main governing-valve, and which is operated by the variation of pressure in the pipe in which it is located. It is an improvement in that class of devices which act to release the air from the train-pipe under each car when the proper preliminary reduction of train-pipe pressure is made either through the engineer's valve on the locomotive or by the breaking apart of the train.

The train-pipe release-valves that have heretofore been proposed for releasing the air from the train-pipe under the cars by first reducing the train-pipe pressure by means of the engineer's valve have been of two kinds: first, those which were operated by the air in the pipe in which they were placed, and, second, those which were operated by the pressure in an auxiliary reservoir acting on one side of the valve-actuating piston or diaphragm. Those depending for their action on a stored reservoir of air are either connected by separate additional connections to the usual auxiliary reservoir under each car or are operated by the air in the said auxiliary reservoir by the movement of the triple or governing valve piston, or an additional auxiliary reservoir or chamber is provided in which air is stored for the purpose of actuating the release-valve when the train-pipe pressure is reduced. In all these cases the action of the release-valve is dependent on the pressure which exists in the reservoir, and if such pressure is deficient the release-valve will not operate. The consequence of this is that the release-valve is not capable of operation immediately after the train-pipe has been charged, but only after the reservoirs have been fully charged. Besides, those train-pipe release-valves which are operated by the movement of the triple or governing valves are only operated when the triple valves have reached positions which it is the object of the release-valves to cause them to take—that is, the triple valve must first move to the position in which it is desired to have it, and then it acts to open the release-valve, when it is the real object of the release-valve to cause it to take that position. The failure of the triple valve also insures the failure of the release-valve, and the advantageous effect of its opening is not only lost on the triple valve, by which it is operated, but on those in rear of it on the other cars. Besides, where the release-valves are operated by the triple-valve pistons coming in contact with them, an additional resistance is offered to the movement of the triple valve.

The advantages of my improvement over such devices are that it is independent of any stored reservoir of pressure and requires no other connections or branches than those which already exist, as it is connected directly in the line of the sections of pipe already in use. No new connections to the auxiliary reservoir are required, no separate reservoir is required, and no change in any form of triple or governing valve is necessary. It is independent of the triple or governing valve in its action, and its action is not affected by the failure of the triple valve to act; but, on the contrary, its action insures the action of the triple valves, which are inclined to move slowly or to stick. It is more certain in its action, because the movable abutment (which may be either a diaphragm or piston) by which it is operated can always move freely and without friction, as no packing is required, such as is used on triple-valve pistons.

The other class of train-pipe release-valves—that is, those which are operated by train-pipe air only independent of any auxiliary reservoir of pressure—have been defective in not being practically operative and in releasing the train-pipe air from the section of pipe on one side only of the valve device,

(usually from the rear section,) and where they were permanently connected to the train-pipe, in requiring that two such valves be placed under each car, as but one valve could operate properly when the car was placed in a train with one end toward the front of the train, and when the car was placed with its other end toward the front of the train the valve which was operative before had to be cut out and made inoperative by means of a hand-valve and the other valve connected by similar means for operation. This was due to the fact that the release-valves were placed directly in the line of the main train-pipe, and consequently they were affected by the direction of the flow of air in the pipe, which of course was reversed when the car was turned around in such a manner that the movement of air which opened or closed the release-valve when the car was in one position produced the opposite effect on the same valve when the car was turned with its other end forward. Those devices which used but a single valve exhausted only from the rear section and were formed in detachable sections of hose placed between the couplings, which had to be detached by hand and reversed when the after section of the train became the forward section.

My improvement overcomes the defects of all such release-valves by its location in the branch pipe between the main train-pipe and the triple or governing valve, and this I consider an important feature of my invention. By being so located it is independent of the direction of flow of the air in the main train-pipe, and therefore operates equally well, no matter which end of the car is forward. But one valve is required under each car, and no hand-valve or other device is necessary to put it in operative position. It is always permanently in position and in condition to be operated from either end of the train, and it releases the air from the section of pipe on each side of it when open.

Another feature of my invention is in the construction and arrangement of the valve mechanism by which when the valve is opened to release the air from the train-pipe, the flow of air which takes place around the movable abutment or piston which operates the valve tends to hold the valve open, while in all other similar devices the current of air which passes from one side of the piston to the other side in order to reach the release-port has tended to close the release-port.

In the accompanying drawings, in which my improvement is illustrated, Figure 1 is a plan view showing the arrangement of my release-valve in relation to the other parts of the brake mechanism; Fig. 2, a longitudinal section of the release-valve, showing its connection with the train-pipe; Fig. 3, a modification of the release-valve; Fig. 4, a side elevation of the movable abutment shown in Fig. 3; Fig. 5, a bottom plan view of said abutment.

In Fig. 1 the main train-pipe 1 is shown with the usual T-coupling 2 for connecting the branch pipe to the triple-valve. To this coupling is connected the train-pipe release-valve 3, which is connected at its other end to the branch pipe 4, leading to the triple-valve 5, which is connected in the usual way to the auxiliary reservoir 6 and the brake-cylinder 7.

In the device shown in Fig. 2, when the brakes are off and the reservoirs are being charged, the air from the train-pipe 1 enters the release-valve casing 3 through the opening 8 and passes to the piston or movable abutment 9, lifts the light disk-valve 10, passes through the opening 24 in the piston and through the opening 11, and by the branch pipe 4 to the triple valve 5, and thence to the auxiliary reservoir 6, charging the auxiliary reservoirs in the usual manner. During this operation the release-valve 12 is held in position by the spring 13 to close the release-port 14, so that no air can escape through it from the train-pipe. The disk-valve 10 is held in position by a light spring 15, which offers but little resistance to the passage of air from the train-pipe, but is sufficient to seat the valve when the pressures on the two sides of the valve are equal, or nearly so. The piston 9 is fitted to move easily in the casing and is without packing. The stem 17, which is connected to the piston 9, extends down between two lugs 19 on the valve 12 and through the guide 20, formed in the lower part of the casing. The spring 13 bears against this guide at one end and against a plate 21 at the other end, which plate supports the valve 12 and has an opening through which the stem 17 passes freely. In its closed position the other end of the valve presses against the stop 22. A stop 23 is formed in the upper part of the casing to limit the movement of the piston in that direction.

When slight reductions of pressure are made in the train-pipe, the piston is moved toward the train-pipe by the pressure on its other side until the shoulder 18 comes in contact with the valve 12, when its further movement is cheeked by the resistance of the spring and the friction due to the pressure of the valve 12 on its seat, so that the release-valve is not opened. The piston is then in such a position that the air in the branch pipe 4 can pass around it through the groove or recess 16 in the wall of the casing to the train-pipe, and thus cause a reduction of pressure below the triple-valve piston. If a sufficiently great reduction of pressure occurs in the train-pipe—as, for instance, in making emergency stops—the piston 9 moves sufficiently far and with sufficient force to compress the spring 13 and open the valve 12, thus releasing the air from the train-pipe and causing a quick reduction of the pressure therein and a quick and simultaneous action of the triple valves. The air so released may be allowed to escape to the atmosphere or to

the brake-cylinder or any other receptacle; but in this application for Letters Patent I do not wish to limit my improvement to any particular connection, since it is obvious that the opening of the release-port 14 may permit the release of air from the train-pipe to cause a reduction of the pressure therein, whether the port opens to the atmosphere or into any inclosed space whatever in which the pressure is below that in the train-pipe when the valve is opened; but in my application, Serial No. 353,609, filed May 29, 1890, I describe and claim in connection with the improvement set forth in this application a further improvement by which I release the air from the train-pipe to the brake-cylinder under each car.

In the modification of my improvement shown in Fig. 3 the connections to the train-pipe by means of the opening 8 and to the branch pipe 4 by means of the opening 11 are the same as in Fig. 2; but the piston 9 is an annular disk, around which the air passes from one side to the other through the recesses 16, no matter what the position of the piston. The piston is fitted around a central projection 25, on which it slides and through which the release-passage 14 is formed. The port or passage 14 is controlled by a puppet-valve 12, which is held to its seat by the spring 13, which at one end presses against the closed end of a cup-shaped projection 26. The other end of the spring 13 presses against a flange 27, formed on the end of the valve 12, and this flange has wings 28 formed on it which serve as guides. Projecting from the piston are guides 29, which are connected near their ends by a ring 30, which is preferably formed integral with the guides 29, and which forms a shoulder which rests against the end of the central projection 25 when the piston is in its normal position and the release-valve closed. This ring 30 also forms an abutment for one end of a light spring 31, which presses with its other end against the flange 27 on the valve 12 and acts to hold the piston in its normal position.

When a slight reduction of pressure is made in the train-pipe, the piston 9 is moved down far enough to compress the light spring 31 and cause the ends of the guide-pieces 29 to come in contact with the flange 27 on the valve 12, when its further movement is resisted by the spring 13; but when a much greater reduction of train-pipe pressure occurs the piston is moved for a greater distance with greater force and compresses the spring 31, and the ends of the guide-pieces 29 strike against the flange 27 of the valve with force enough to compress the spring 13 and open the valve 12, thereby releasing the air from the train-pipe, as in the instance first described.

In order to prevent air at different pressures being confined in the space occupied by the spring 13 and forming a cushion for the valve 12, openings 33 are formed in the flange 27 of the valve, whereby the air may pass freely out of the cup-shaped projection 26. For the same reason I make openings 32 in the ring 30, (see Fig. 5,) as this ring would otherwise tend to prevent the escape of air from the chamber formed in the projection 26 when the piston was moved down to open the valve.

The size and number, and also the form of the recesses 16, by which air passes from one side of the piston to the other, may be varied; but I prefer to make them of such a form that when the piston is moved to the position in which it opens the valve a larger opening for the passage of air around the piston is made. In Fig. 3 this is done by widening the lower end of recess 16.

In Fig. 3, as in Fig. 2, it will be seen that the flow of air which takes place around the piston when the release-valve is open tends by its movement to hold the valve open.

The flange on the end of the valve 12 is fitted to slide in the cup-shaped projection 26, and this cup-shaped projection is closed, except at one end, so that the current of air from the train-pipe will not act by impact on the end of the valve to force it to its seat.

In using the terms "triple valve" or "governing-valve" I wish to be understood as including any of the usual forms of triple or governing valves which are used in automatic brakes for supplying air to and releasing it from the brake-cylinders, and do not wish to limit myself to any particular form; and in using the term "auxiliary reservoir," in regard to its being a source of pressure for operating the release-valves, I mean to include any separate reservoir or any ordinary auxiliary reservoir or any brake-cylinder used as a reservoir of air, such as are used in what are sometimes called "equilibrium-brakes."

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

1. In an automatic fluid-pressure-brake system, a train-pipe release-valve located in the branch pipe between the main train-pipe and the triple or main governing valve, whereby air may be released from the train-pipe by a preliminary reduction of train-pipe pressure, said release-valve being operated by the air in the branch pipe.

2. In an automatic fluid-pressure-brake system, a single release-valve under each car operated by variations of pressure in the train-pipe independent of any reservoir of air under pressure to release the air from the train-pipe, said valve being operative with either end of the car toward the forward end of the train.

3. In an automatic fluid-pressure-brake system, a train-pipe release-valve located in the branch pipe under a car between the main train-pipe and the triple or main governing valve and which is independent of the triple or main governing valve.

4. In an automatic fluid-pressure-brake system, a train-pipe release-valve located in

the branch pipe under a car between the main train-pipe and the triple or main governing valve and which is independent of any stored reservoir of pressure.

5. In an automatic fluid-pressure-brake system, a train-pipe release-valve operated by variations of pressure on the opposite sides of a movable abutment to allow the escape of air from both sides of the abutment and thereby cause a reduction of train-pipe pressure.

6. In an automatic fluid-pressure-brake system, a train-pipe release-valve which is operated by variations of pressure on the opposite sides of a movable abutment, said valve and abutment being so arranged that the air which passes from one side of the abutment to the other side, in order to reach the release-port, tends to hold the release-valve open.

7. The combination, in an automatic fluid-pressure-brake system, of a train-pipe release-valve which is operated by variations of pressure in the train-pipe independent of any reservoir of pressure, a movable abutment for actuating the release-valve, and passages by which the fluid under pressure may at all times pass from one side of the abutment to the other.

8. In an automatic fluid-pressure-brake system, a train-pipe release-valve under a car which is independent of any storage-reservoir of pressure and which is operative by a reduction of pressure at either end of the car.

In testimony whereof I have hereunto set my hand.

THOMAS J. HOGAN.

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