(No Model.)

F. L. CLARK.

AIR BRAKE.

No. 522,825. Patented July 10, 1894.

FIG. 1.

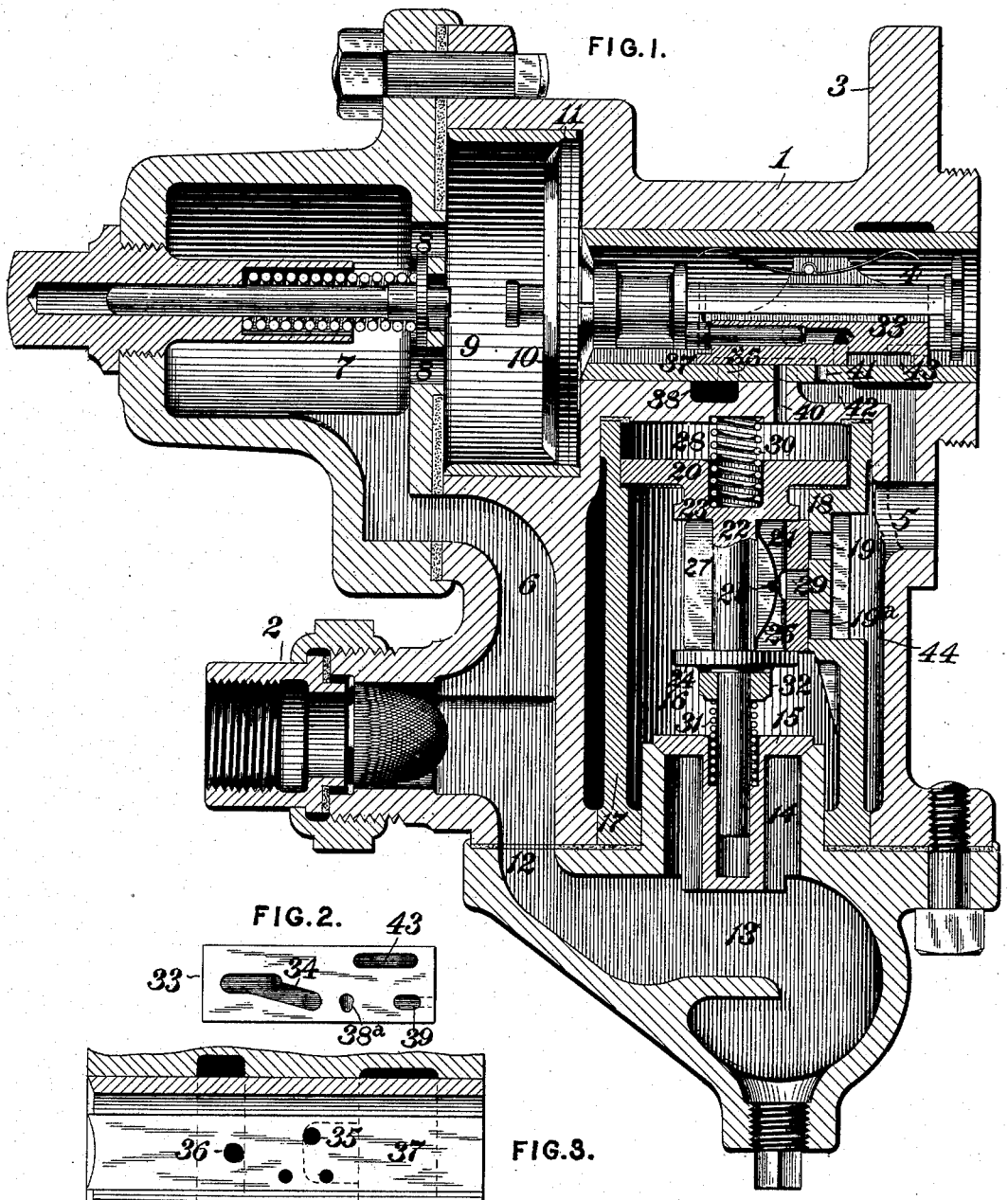

FIG. 2.

FIG. 3.

WITNESSES:

T. J. Hogan.

F. E. Gaither.

INVENTOR.

Francis L. Clark,

by Howson & Howson Pell

Att'y.

UNITED STATES PATENT OFFICE.

FRANCIS L. CLARK, OF WILKINSBURG, ASSIGNOR TO THE WESTINGHOUSE AIR BRAKE COMPANY, OF PITTSBURG, PENNSYLVANIA.

AIR-BRAKE.

SPECIFICATION forming part of Letters Patent No. 522,825, dated July 10, 1894.

Application filed November 24, 1893. Serial No. 491,859. (No model.)

To all whom it may concern:

Be it known that I, FRANCIS L. CLARK, a citizen of the United States, residing at Wilkinsburg, 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 improved quick action valve mechanism for automatic fluid pressure brake systems; and to this end it consists of a novel valve mechanism for releasing fluid under pressure from the train pipe, and in the combination of such valve mechanism with other members of a fluid pressure brake system.

In the accompanying drawings, Figure 1 is a central section through a valve casing illustrating an application of my invention in connection with a Westinghouse triple valve device; Fig. 2, a view showing the face of the slide valve of the triple valve proper, as modified under my invention, and, Fig. 3, a plan view of the seat of the valve shown in Fig. 2.

As shown in the drawings my improvement consists of a quick action valve mechanism, for releasing fluid under pressure from the train pipe in which the port or passage through which the fluid is released from the train pipe is normally closed and is subject to the pressure of a fluid which is independent of the auxiliary reservoir fluid, and is opened by the release of fluid to the brake cylinder by the movement of the triple valve piston. The release of fluid to the brake cylinder which effects the opening of the quick action valve and the release of fluid from the train pipe is, as shown in the drawings, controlled by the slide valve of the triple valve, but a separate valve operated by the movement of the triple valve piston may be employed. My invention is not, therefore, limited to the specific construction shown.

When the quick action mechanism is controlled by the slide valve of the triple valve I prefer to locate it in the same casing as the triple valve mechanism, as shown in the drawings.

The casing 1, of the triple valve may be connected as usual to the main train pipe by means of the union, 2, and any preferred form of triple valve may be employed. The triple valve may be secured to the auxiliary reservoir, or to the brake cylinder head, by means of the flange 3, in such manner as to connect the chamber 4 with the auxiliary reservoir space and the passage 5 with the interior of the brake cylinder. The fluid from the train pipe, after passing through the nozzle 2, flows through the passage 6, chamber 7, and passages 8, into the piston chamber 9, where it moves the piston 10 to the right and uncovers the feed groove 11 through which the auxiliary reservoir is charged, in the usual manner. Fluid from the train pipe also flows through the passage 12 into the chamber 13 and passage 14, lifting the check valve 15, and enters the chamber 16, within the bushing 17. The bushing 17 is provided with a valve seat 18, formed on one side of its interior, in which seat are formed ports, 19, 19^a, communicating with the brake cylinder passage 5.

A movable abutment 20, which may be either a piston or a diaphragm, is fitted to work in the chamber 16, of the bushing 17, and is connected to a valve 21, which controls the ports 19, 19^a. This valve may be of any preferred form and may be formed integral with, or be connected to the piston 20, in any preferred manner. As shown in the drawings, it is a slide valve, which is connected to the piston by being fitted between two shoulders, 23 and 24, formed on the stem 22.

A spring 25, the ends of which bear against the piston stem 22, and the middle portion of which is fitted around a pin 26, serves to hold the valve to its seat, in the absence of fluid pressure sufficient for that purpose. The pin 26 is secured to the two lugs or flanges 27, which are formed on the valve 21, and is fitted between the shoulders 23 and 24 on opposite sides of the stem 22. The piston 20, and the slide valve 21, normally occupy the positions shown in Fig. 1 of the drawings, in which the slide valve closes the ports 19 and 19^a, and prevents the release of fluid from the chamber 16.

When fluid under pressure enters the chamber 16, a portion of the fluid leaks by the piston 20, into the space 28, until the pressures on

the two sides of the piston 20 are equalized. For this purpose the piston may be fitted loosely in the bushing, so as to permit the fluid to pass around its edges, or if preferred, one or more small passages may be formed through the piston, or in the wall of the piston chamber so as to open above and below the piston, or one or more grooves may be formed in the edge of the piston, or in the surface of the chambers over which the piston moves.

When there is no fluid under pressure in the chamber 16, or in the space 28, the piston is held in its normal position by the pressure of the spring 30, one end of which bears against the wall of the casing and the other against the piston 20. When the fluid is being admitted to the chamber 16, it lifts the check valve 15, against the pressure of the spring 31, and is thereby prevented from being admitted with sufficient quickness and under sufficient initial pressure to move the piston 20 against the pressure of the spring 30; and the equalization of pressures on the opposite sides of the piston 20 takes place with sufficient rapidity to prevent any material accumulation of pressure in the valve chamber 16, in excess of that in chamber or space 28, such as would be sufficient to overcome the resistance of the spring 30 and move the piston 20. The spring 31 bears at one end against the check valve 15, and, at its other end, against the fixed stop 32, which is secured to, or formed integral with, the bushing 17. The opening movement of the check valve 15 and the compression of the spring 31 are, therefore, entirely independent of the movement or position of the piston 20. The collar or shoulder 24, on the piston stem 22, abuts against the stop 32, when the piston 20 is at one end of its stroke and the valve 21 is closed.

When the train pipe is charged with fluid under pressure, and the brakes are off, the piston 10 and the slide valve 33 of the triple valve occupy the positions shown in Fig. 1 of the drawings. The exhaust cavity, 34, in the slide valve, is then in position to connect the brake cylinder port 35 in the seat 37 with the exhaust port 36, which communicates, by means of the passage 38, with the atmosphere. Two other ports 38^a and 39, formed in the slide valve 33, are caused, by the movement of the piston 10, to register with the port 35 in the valve seat, in making service and emergency applications of the brake respectively, as shown in Patent No. 360,070, to George Westinghouse, Jr., dated March 29, 1887.

When my improved quick action valve mechanism is controlled by the movement of the slide valve of the triple valve, I employ a port or passage, 40, which extends through the seat 37, of the slide valve 33, and communicates with the chamber or space 28 on one side of the piston 20, and, in addition thereto, I employ another port or passage, 41, which is formed in the seat 37, and communicates with a passage 42, leading to the brake cylinder passage 5.

Both of the passages 40 and 41 are normally closed by the slide valve 33, and remain closed when the slide valve is in position to effect a service application of the brakes. But when a sufficiently great and rapid reduction of train pipe pressure is made to cause the piston 10 to move to the limit of its stroke to the left, the cavity 43 in the slide valve, 33, connects the port or passage 40 with the port or passage 41, and permits a quick exhaust of fluid pressure from the chamber or space 28 to the brake cylinder. At the same time, the pressure of the fluid in the chamber 16, on the other side of the piston 20, overcomes the resistance of the spring 30 and moves the piston 20 and with it the slide valve 21, so as to open the ports 19 and 19^a in the valve seat 18. With the construction shown in the drawings the slide valve is moved so as to cause the port 29 in the valve to register with the port 19 in the valve seat, and the lower edge of the slide valve uncovers the port 19^a. When the ports 19 and 19^a are opened, the fluid under pressure in the chamber 16 escapes through the ports 19, 19^a, and the passage 5, to the brake cylinder. The release of fluid from the chamber 16, by releasing the pressure from one side of the check valve 15, permits the train pipe pressure to lift the check valve 15, and the fluid under pressure in the train pipe flows through the passage 14, chamber 16, ports 19, 19^a, and passage 5, to the brake cylinder. At the same time that the cavity 43 in the slide valve 33 connects the ports 40 and 41, the port 39, in the slide valve 33 registers with the port 35, in the valve seat 37, and permits the passage of fluid under pressure from the auxiliary reservoir to the brake cylinder.

The ports 19 and 19^a, and the other passages through which the fluid passes from the train pipe to the brake cylinder, are of such dimensions as to permit a quick release of the fluid from the train pipe, and, since open communication is established from both sides of the piston 20 to the brake cylinder, by connecting the ports 40 and 41 through the cavity 43, and by opening the ports 19, 19^a, the pressures on opposite sides of the piston 20 will be quickly equalized and the spring 30 will move the piston 20 and valve 21 into position to close the ports 19 and 19^a.

Fluid will continue to flow from the auxiliary reservoir to the brake cylinder, through the port 39 in the valve 33, and through the port 35 in the seat 37, until the brake cylinder and auxiliary reservoir pressures are equalized.

If preferred, the space 44, surrounding the bushing 17, may be open to the atmosphere and be shut off from the passage 5, which leads to the brake cylinder, as shown by dotted lines in Fig. 1. The fluid which is exhausted from the train pipe and chamber 16

through the ports 19, 19ª will then flow through the space 44 to the atmosphere instead of to the brake cylinder.

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

1. In an automatic fluid pressure brake system, the combination, with a train pipe, a brake cylinder, and a triple valve, of a passage for releasing fluid from the train pipe, a valve device controlling said passage, and normally exposed to fluid under pressure, a passage through which the fluid under pressure may be released to the brake cylinder, and a valve operated by the movement of the triple valve piston and controlling said passage, substantially as set forth.

2. In an automatic fluid pressure brake system, the combination, with a train pipe, a brake cylinder, and a triple valve, of a valve controlling the release of fluid from the train pipe, a movable abutment for operating the valve which is normally exposed to fluid under pressure, and a valve operated by the triple valve piston for releasing fluid under pressure from one side of the movable abutment to the brake cylinder, substantially as set forth.

3. In an automatic fluid pressure brake system, the combination, with a train pipe, a brake cylinder, and a triple valve, of a valve controlling a passage through which fluid is released from the train pipe, a movable abutment operatively connected to the valve and normally exposed to fluid under pressure on its opposite sides, and a passage from one side of the abutment through which fluid under pressure is released to the brake cylinder by the movement of the triple valve piston, substantially as set forth.

In testimony whereof I have hereunto set my hand.

FRANCIS L. CLARK.

Witnesses:
T. J. HOGAN,
J. S. CUSTER.