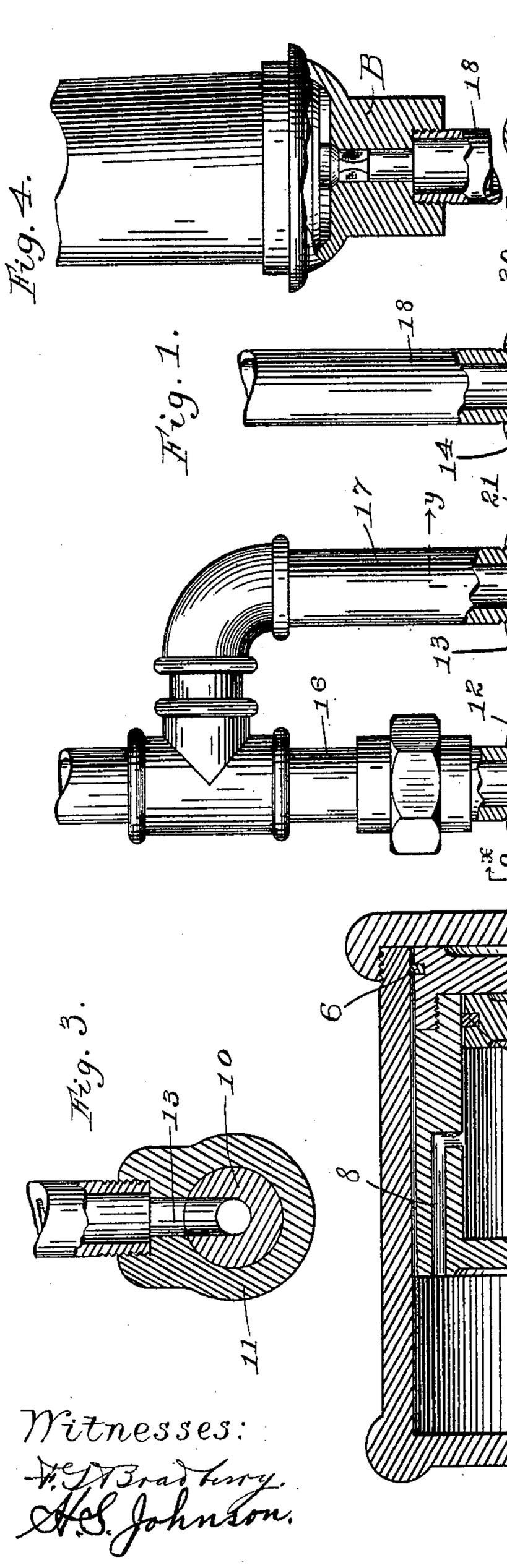
(No Model.) 2 Sheets—Sheet 1.

J. W. WINTERS, Dec'd.

C. B. BRUNSON, Administrator.

AIR BRAKE.

No. 594,228. Patented Nov. 23, 1897.



Witnesses:
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H. S. Johnson.

Inventor:
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Charles B. Brunson:
Administrator.
per: T. W. Mercer Attorney.

(No Model.) 2 Sheets—Sheet 2.

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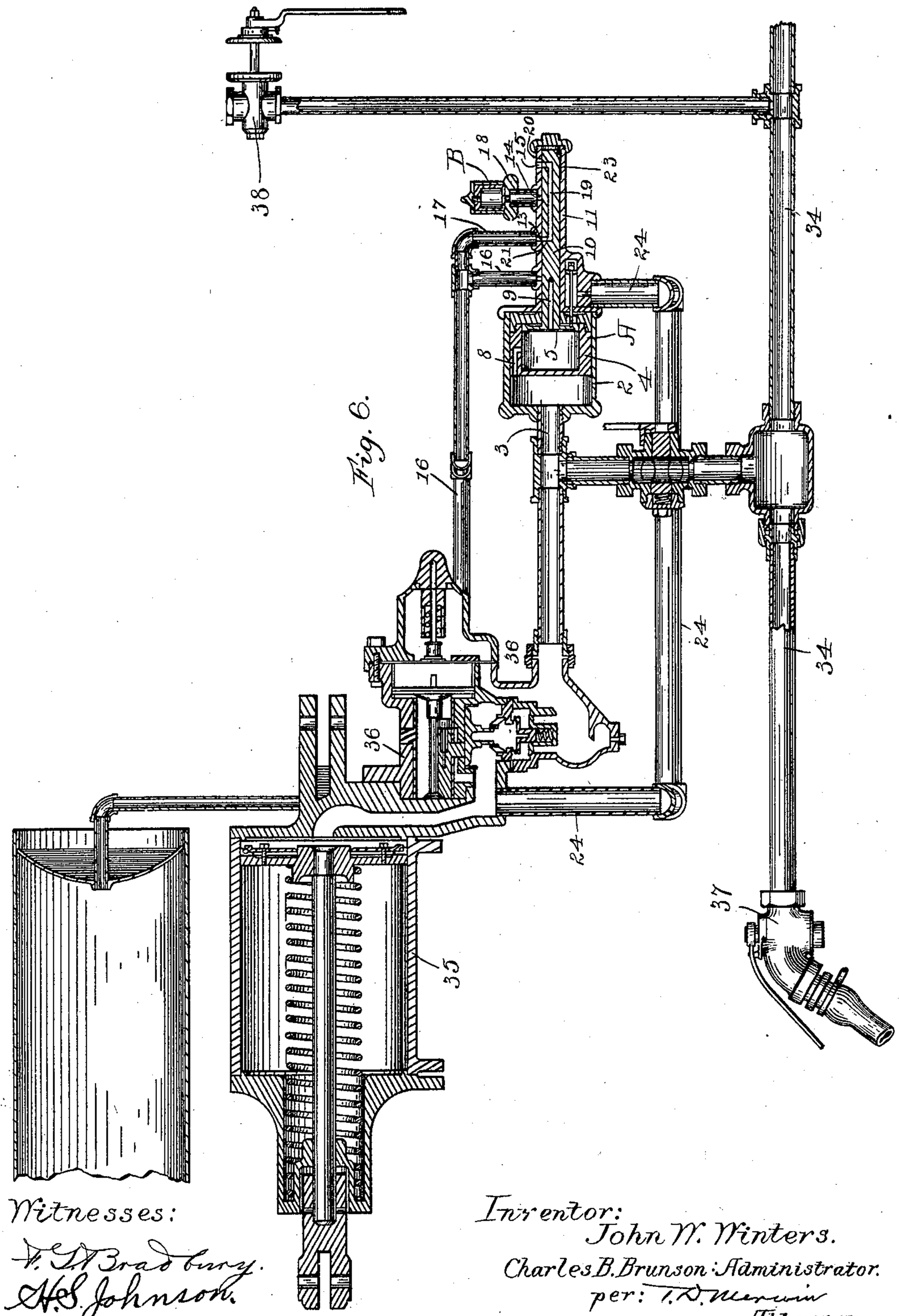

Fig. 6.

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UNITED STATES PATENT OFFICE.

CHARLES B. BRUNSON, OF ST. PAUL, MINNESOTA, ADMINISTRATOR OF JOHN W. WINTERS, DECEASED, ASSIGNOR OF FIVE-EIGHTHS TO DE-VILLE H. KENT AND JEREMIAH WEBBER, OF SAME PLACE, AND ALBERT J. KOS, OF ROCHESTER, MINNESOTA.

AIR-BRAKE.

SPECIFICATION forming part of Letters Patent No. 594,228, dated November 23, 1897.

Application filed October 6, 1896. Serial No. 607,995. (No model.)

To all whom it may concern:

Be it known that JOHN W. WINTERS, deceased, late a citizen of the United States, residing at St. Paul, Ramsey county, Minnesota, did invent certain Improvements in Air-Brakes, of which the following is a specification.

This invention relates to improvements in automatic fluid-pressure air-brakes and methods of operating the same, its object being to provide improved means under the control of the engineer for connecting and disconnecting the pressure-retaining valve and the triple-valve exhaust-ports, so as to control the exhaust from the brake-cylinder and dispense with the necessity of doing the work by hand.

To this end the invention consists in reducing the train-pipe pressure below that for service application to connect a pressure-retaining valve with the brake-cylinder exhaust-port and again reducing the train-pipe pressure below that for service application to disconnect the retaining-valve and the brake-cylinder exhaust-port and then restoring the normal pressure in the train-pipe to release the brakes.

It further consists, as means for carrying out said method, in connecting to the brake-cylinder, or the air-passage leading thereto from the triple valve, a cylinder in which works a compound piston, which by its movement connects or disconnects the triple-valve exhaust-port and the pressure-retaining valve. The cylinder is also connected at its other end directly with the train-pipe. The piston is operated to connect the pressure-retaining valve and the triple-valve exhaust-port by excess of pressure of the air in the brake-cylinder over that in the train-pipe and is operated oppositely to disconnect the pressure-retaining valve and the triple-valve exhaust-port by the excess of pressure in the train-pipe over that in the brake-cylinder.

The invention further consists in the methods and construction and combination hereinafter particularly described and claimed.

In the accompanying drawings, forming part of this specification, Figure 1 represents a sectional elevation of the device, showing the operating parts and the means for connecting it to the various pipes of the air-brake system. Fig. 2 is a cross-section of the same on line $x\ x$ of Fig. 1. Fig. 3 is a cross-section on line $y\ y$ of Fig. 1. Fig. 4 is a sectional detail of the retaining-valve. Fig. 5 is a detail of the air-vent in the inclosing case of the piston-stem; and Fig. 6 is a cross-section showing the triple valve, brake-cylinder, and train-pipe connected to the device.

In the drawings, 2 represents an air-cylinder supported in any suitable position on the car and connected by means of the pipe 3 with the train-pipe 34, leading to angle-cock 37 and train-valve 38, by means of the pipe 24 with the brake-cylinder 35 or air-passage thereto, by means of the pipe 16 with the exhaust-port of the triple valve 36, and by means of the pipe 18 with the retaining-valve B. In the cylinder works the compound piston A, made up of the outer hollow piston 4, serving as a cylinder for the included piston 5. The piston 4 has a packing-ring 6 and the piston 5 a packing-ring 7. Through the wall of the piston 4 is the air-passage 8, which connects the interior of the cylinder 2 beyond the piston with the interior of the piston at about its middle line. The interior of the piston 4 is also in communication with the outer air by means of the axial passage 9, extending downward in the stem 10 of the piston 5 and having lateral openings 31, communicating with the groove 32 in the wall of the inclosing case 11, leading to the vent 33, opening to the outer air. Arranged in the wall of the case 11 are the ports 12, 13, 14, and 15. Communicating with the port 12 is the pipe 16, leading directly to the triple-valve exhaust-port. The port 13 is also connected by means of the branch pipe 17 with the pipe 16. Communicating with the port 14 is the pipe 18, which leads to the retaining-valve B. The port 15 opens to the outer air. The piston-stem 10 is provided with an axial passage 19, having lateral openings 20 and 21 at its ends, so disposed that when the opening 20 registers with the port 15 the opening 21 will register with the port 13 and when the opening 20 regis-

ters with the port 14 the opening 21 will register with the port 12. Consequently when the piston 5 is moved toward the left to its limit, which is determined by the feather 22, working in the groove 23 in the wall of the case 11, striking the end of the groove, the triple-valve exhaust-port is connected to the retaining-valve by means of the described connection, and when the piston 5 is at its limit on the right, as shown in the drawings, the triple-valve exhaust-port is in connection with the outer air. The pistons are moved or operated against the pressure of air in the train-pipe by means of the excess of air-pressure in the brake-cylinder, which is connected with the improved attachment by means of the pipe 24, tapped into the case 11, in communication with the port 25. This port communicates with the cylindrical passage 26, opening into the cylinder 2 and also into the interior of the piston 4 through the registering port 27. In the passage 26 works the lift-valve 28, the stem 29 of which is secured to the piston 5 and is of such length that when the piston 5 has been carried to its limit toward the left the valve closes the opening 27 by resting upon the valve-seat 30. The parts being in that position an excess of pressure communicated through the pipe 24 will move the outer piston 4, the air entering the chambered space between the piston and the end of the cylinder.

Operation: The device being applied to a car in any suitable position and connected, as described, by means of the pipe 3 with the train-pipe, by means of the pipe 16 with the triple-valve exhaust-port, by means of the pipe 18 with the pressure-retaining valve, and by means of the pipe 24 with the air-passage connecting the triple-valve and the brake-cylinder or directly to the brake-cylinder, is ready for operation. The parts of the device are then in the position shown in Figs. 1 and 6 of the drawings, the pressure-retaining valve being disconnected from the system. When on reaching the top of a grade the engineer wishes to apply the pressure-retaining valves, he reduces the pressure in the train-pipe in the ordinary manner to apply brakes until the pressure in the brake-cylinder is one or two pounds in excess of that in the train-pipe. This acting through the pipe 14 moves the piston 5 toward the left to the opposite end of the cylinder-piston 4, the position limited by the stop 22, when the opening 21 of the passage 19 will register with the port 12 and the opening 20 with the port 14, thus putting the triple-valve exhaust-port in connection with the pressure-retaining valve through the medium of the passage 19 and the pipes 16 and 18. The moment the piston 5 passes the passage 8 and until the piston has reached the limit of its movement toward the left the passage 9 is in communication with the outer air through the groove 32 in the interior of the case 11, which in turn has a vent or port 33 to the outer air, thus exhausting the air contained between the left side of piston 5 after it has passed to the left of the passage 8 and the right side of the left end of cylinder-piston 4. As the piston passes the outlet of the passage 8 connection is made between the pipe 24 and the passage 8, which serves to increase the pressure in the train-pipe sufficiently to move the train-pipe indicator in the cab. The engineer when notified by his indicator of the above-described action of the apparatus can recharge his train-pipe and auxiliary reservoirs and handle his brakes as he would in ordinary use unless he reduces his train-pipe pressure below the equalized pressure of the auxiliary reservoirs and brake-cylinders; but in this use whenever the pressure is increased and the brake-valve put into release position the pressure in the brake-cylinders will immediately drop to that held by the pressure-retaining valves. When he wishes to disconnect the retaining-valve and thus release the brakes of all pressure, the parts being in the position last described, he again reduces the pressure in the train-pipe below the equalized pressure of the brake-cylinder and auxiliary reservoir, when the air entering from the pipe 24 into the chambered space on the right of the piston 4 will instantly move the piston in its cylinder. The moment that this takes place, the valve 28 remaining stationary, the port 27 is again opened, and during the short interval elapsing until the opening to the passage 8 shall have passed the piston 5 the excess of pressure in the pipe 24 is shown by the engineer's indicator, as before. He is thus informed that both pistons are at their limits to the left. Then operating his lever so as to release the brakes the normal pressure is again obtained in the train-pipe and acts instantly through the connecting-pipe 3 upon the piston 4 and through the connecting-passage 8 upon the piston 5, forcing them both into their original and normal positions and bringing the openings 20 and 21, respectively, into registering position with the ports 15 and 13, so as to exhaust the retained pressure in the brake-cylinder and entirely release the brakes.

While the ordinary form of pressure-retaining valve may be employed for the purpose described, yet the three-way cock as ordinarily used is dispensed with, being entirely unnecessary, since the exhaust is made through the port 15. The pressure-retaining valve, as shown in the drawings, Figs. 4 and 6, is therefore shown without the cock.

It is apparent that the piston-stem with its axial passage and the various port and pipe connections perform the function of a three-way cock and takes the place of a hand-cock in the ordinary construction.

It is also obvious that various modifications of form of the device for connecting and disconnecting the pressure-retaining valve with the triple-valve exhaust-port may be made and so connected to the pistons of the device

as to constitute equivalents of the construction shown, the main object of the invention being to provide automatic means for operating a device having the same function as the usual three-way cock interposed between the brake-cylinder and the retaining-valve.

The device will operate, as above described, as long as there is a pressure in the train-pipe of at least five pounds excess over the pressure retained by the pressure-retaining valve, which could not be done if springs were used instead.

What is claimed is—

1. The combination in a fluid-pressure brake system, of a pressure-retaining valve and a piston-valve for connecting and disconnecting the pressure-retaining valve and the brake-cylinder exhaust-port through the medium of the pressure in the brake-cylinder, and operated by reducing the train-pipe pressure below that for service application.

2. In an automatic fluid-pressure brake system, the combination of the train-pipe, the auxiliary reservoir, the brake-cylinder, the pressure-retaining valve, and the piston-valve adapted to connect and disconnect such pressure-retaining valve and brake-cylinder exhaust-port and operated by reducing the train-pipe pressure below that for service application.

3. In an automatic fluid-pressure brake system, the combination with the train-pipe, the brake-cylinder and the pressure-retaining valve, of means interposed in said system between said retaining-valve and said train-pipe and brake-cylinder, whereby the reduction of pressure in the train-pipe below that for service application serves to connect said valve with the brake-cylinder exhaust-port, and when thus connected by the train-pipe pressure being again in like manner reduced said valve is disconnected from said exhaust-port.

4. In an automatic fluid-pressure brake system, the combination with the brake-cylinder, the train-pipe, and the pressure-retaining valve, of the interposed means operative by the variations in pressure of the air in the train-pipe and that in the brake-cylinder, whereby the reduction of the pressure in the train-pipe below that for service application causes said means to connect said retaining-valve with the exhaust-port of said brake-cylinder, and when thus connected, and after the normal pressure has been restored and the train-pipe pressure being again reduced below that for service application said means serves to disconnect said valve from said brake-cylinder and to open said cylinder's exhaust-port.

5. In an automatic fluid-pressure brake system, the combination with the brake-cylinder, its auxiliary reservoir, the train-pipe and pressure-retaining valve, of the means connected with said cylinder, pipe and valve, automatically operative by the variations in pressure of the air in said pipe, and serving when the pressure in said pipe is reduced below that for service application to connect said valve with said brake-cylinder exhaust-port, and to maintain such connection to permit the normal pressure in said pipe to be restored so as to refill said reservoir, and serving when the train-pipe pressure is again reduced in like manner, to disconnect said valve from said cylinder and to open said cylinder's exhaust-port and permit the normal train-pipe pressure to be again restored.

6. In an air-brake system, the combination with the train-pipe, the brake-cylinder, the triple valve, the retaining-valve and the piston-stem valve, of the air-cylinder connected at one end with the train-pipe and at the other end with the brake-cylinder, the piston-cylinder working in said air-cylinder, and having a lateral opening communicating with the air-cylinder forward of the piston-cylinder, the piston working in said piston-cylinder and having an air-vent connecting the interior of the piston-cylinder with the outer air when the piston passes to the left of the lateral opening which connects the piston-cylinder with the outer cylinder, and operative connection between said piston and said piston-stem valve, substantially as described.

In testimony whereof I affix my signature in the presence of two witnesses.

CHARLES B. BRUNSON,
Administrator of the estate of John W. Winters, deceased.

Witnesses:
A. F. NORRISH,
H. S. JOHNSON.