No. 688,299. Patented Dec. 10, 1901.

L. D. GILLETT, J. S. PEARCE, G. HOLMES & C. STALEY.

DOUBLE HEADING FEED VALVE FOR FLUID PRESSURE BRAKES.

(Application filed Aug. 9, 1901.)

(No Model.) 2 Sheets—Sheet 1.

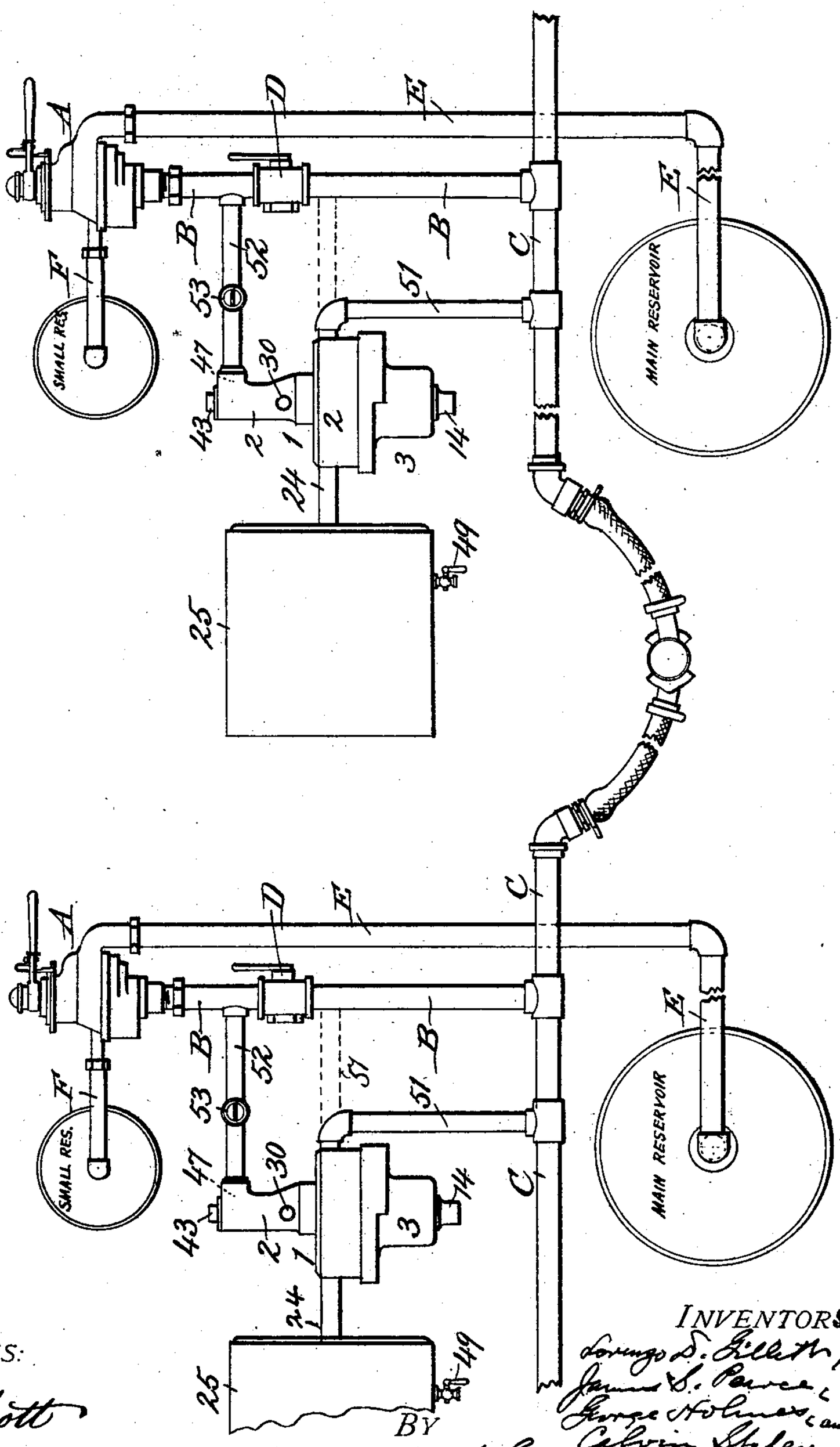

Fig. 1.

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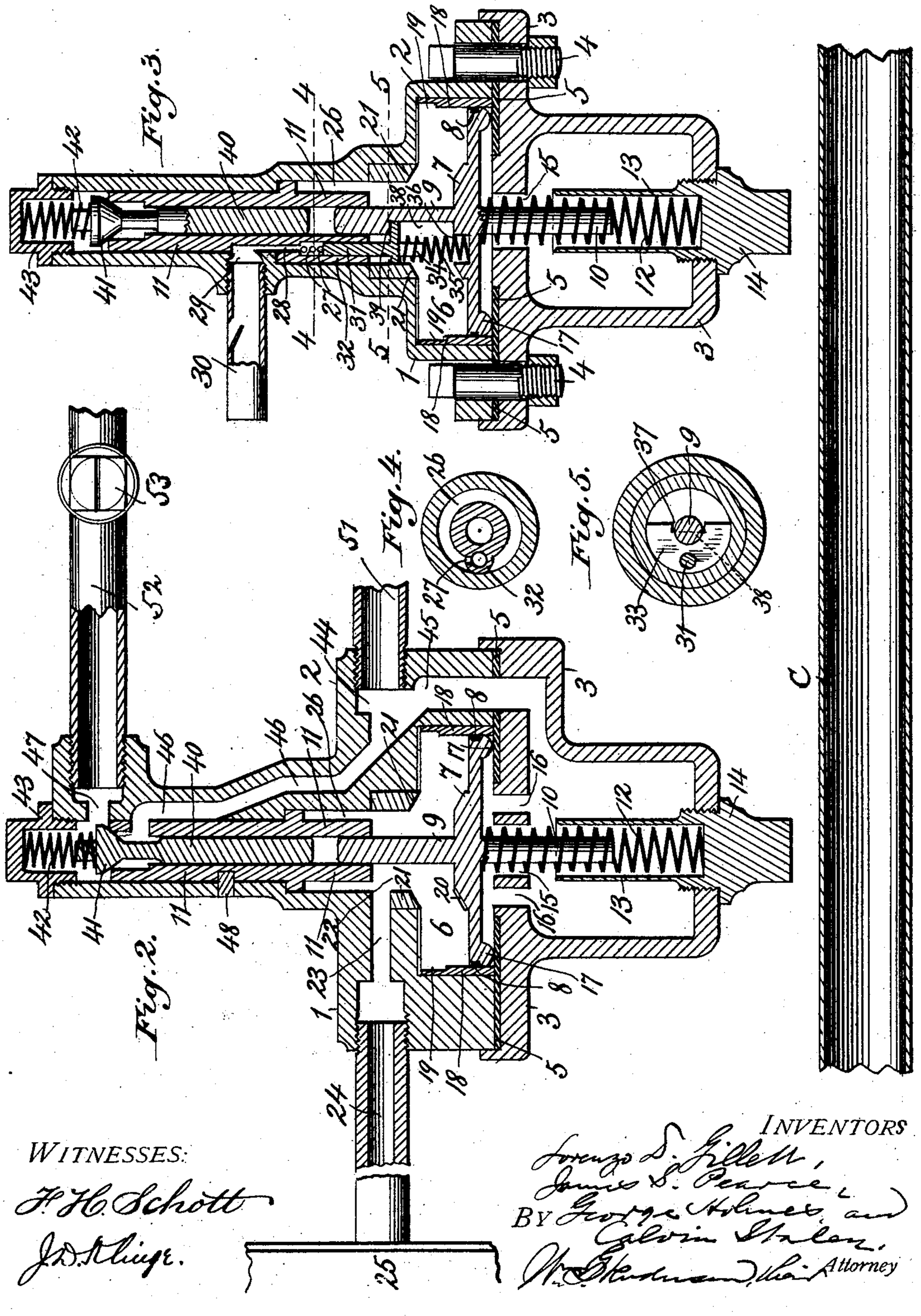

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DOUBLE-HEADING FEED-VALVE FOR FLUID-PRESSURE BRAKES.

SPECIFICATION forming part of Letters Patent No. 688,299, dated December 10, 1901.

Application filed August 9, 1901. Serial No. 71,508. (No model.)

To all whom it may concern:

Be it known that we, LORENZO D. GILLETT, JAMES S. PEARCE, GEORGE HOLMES, and CALVIN STALEY, citizens of the United States, residing at Roanoke, in the county of Roanoke and State of Virginia, have invented certain new and useful Improvements in Double-Heading Feed-Valves for Fluid-Pressure Brakes; and we do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters and figures of reference marked thereon, which form a part of this specification.

Our invention relates to railway fluid-pressure brakes; and it has for its object to provide a device simple and efficient in construction and operation for the purpose of enabling the leading engineman of a train made up with two or more engines to open or close at will communication between the train-line and the supply of fluid or compressed air furnished by the second engine by a proper manipulation of the brake-valve handle on one engine when the brake-valve handle on the other engine is placed in running position and the cock under the same, between it and the train-line, is cut out.

To the accomplishment of the foregoing and such other objects as may hereinafter appear the invention consists in an automatically-operating feed-valve having features of construction and a mode of operation as will be hereinafter particularly pointed out, and sought to be clearly defined by the claims, reference being had to the accompanying drawings, forming a part hereof, and in which—

Figure 1 is a view in elevation, showing in outline an engineer's brake-valve of two engines with our invention connected to both and illustrating the relation of the same to the brake-valve and to the train-line. Fig. 2 is a vertical section through the feed-valve and showing a portion of an auxiliary reservoir used in connection with the same. Fig. 3 is a vertical section through the feed-valve, taken at right angles to Fig. 2. Figs. 4 and 5 are cross-sectional views on the lines 4 4 and 5 5, respectively, of Fig. 3.

The feed-valve consists of a casing or body portion 1, which is preferably made of two parts 2 and 3, secured together by bolts 4 and having a suitable packing 5 at their meeting faces to make a close joint. The part 1 is formed with a chamber 6, in which works a piston 7, provided at its periphery with a packing-ring 8 and provided on one face with a stem 9 and on its opposite face with a stem 10, the stem 9 fitting into a bushing 11 and the stem 10 being encircled by a spring 12, which bears at one end against one face of the piston 7 and fits within a shell 13, which extends from a nut 14, screwed into the bottom of the cap or part 3 of the body portion, and against which nut one end of the spring bears. The cap or part 3 of the body portion is chambered and communicates with the piston-chamber 6 through the opening 15 in the face of the cap, through which the stem 10 extends, and also through the ports 16. The face of the piston 7 next to the face of the cap 3 is preferably formed with an annular bead 17, which when the piston is in its lowest position will rest upon the packing 5 and leave a space between the piston and the face of the cap 3, as illustrated, and the wall of the chamber 6 is provided with a bushing 18, against which the piston-packing ring will bear, the upper portion of said bushing being reduced or cut away, so as to form a port 19 for the passage of the fluid-pressure agent from below to above the piston when the piston is raised to the port 19, the fluid-pressure agent thus brought above the piston finding its escape from the chamber 6 through a port 20, formed in the face of the piston 7, when said piston is seated in its upstroke against the bushing 21, provided therefor in the part 2 of the body portion above the chamber 6, the pressure agent entering a chamber 22 and passing from thence through a port 23 into a nipple 24, which communicates with an auxiliary reservoir 25. The chamber 22 also communicates with a space 26, extending partially around the lower portion of the bushing 11, which space communicates through a port or ports

27 with a port 28, which opens into a port 29, formed in the side of the upper part of the body portion 1, so that the pressure agent exhausting through port 28 may pass into a whistle 30, that may be screwed into the port 29. The port or ports 27 are controlled by a graduating-valve, which preferably consists of a stem 31, which slides in a side extension 32 of the bushing 11 and which has at its lower portion a shoulder or offset 33, below which is a projection or stud 34, which serves to hold in place the upper end of the coiled spring 35, the lower end of which fits in a depression 36, formed in the top of the piston 7, said spring serving to lift the graduating-valve to close the port or ports 27 at the proper time. The shoulder or offset 33 is provided with a recess 37 in one edge, and the side of the piston-stem 9 next thereto is cut away for a portion of its length, so as to form a slot or recess 38 in its side, and thus forming a shoulder 39 on the piston-stem, which will extend over the top of the offset 33 of the graduating-valve, so that at the proper time in the downward movement of the piston the graduating-valve will be drawn down, so as to open the ports 23, the elongated slot or recess 38 in the piston-stem 9, however, permitting movement of the piston for a portion of its stroke without moving the graduating-valve. This construction will also prevent the piston from turning, as will be obvious. The stem 40 of a check-valve 41 slides in the bushing 11, the top of said bushing constituting the seat for said check-valve, and this valve is normally pressed to its seat by a spring 42, which bears against the top of the check-valve and which fits in a screw-cap nut 43.

In the valve body or casing there is formed a port 44, which will be in communication with the train-line and from which port a branch port 45 will lead to the chambered portion of the cap 3, which is in communication with the piston-chamber 6, and from the port 44 another port 46 will lead to a point just below the check-valve 12, which port when the check-valve is raised from its seat will be in communication with a port 47, which will have communication with the pressure-supply reservoir, as will hereinafter appear.

The numeral 48 designates a dowel-pin, which may be used for securing the bushing 11 to the valve-body, and the numeral 49 a drain-cock for the auxiliary reservoir 25.

The letter A designates an engineer's brake-valve having the pipe B, which leads to the train-line C, and which pipe is provided with the cut-out cock D, the brake-valve A being connected with the main reservoir by a pipe E and also provided with the pipe F, which leads to the small reservoir, said parts all being constructed and arranged as usual, and therefore needing no further description, the main and small reservoirs referred to being shown in end elevation.

Our automatic double-heading feed-valve constructed as hereinbefore described is connected with the train-pipe B by a pipe 51 at a point below the cut-out cock D and also with the same pipe B above the cut-out cock by a pipe 52, which pipe is provided with a cut-in cock 53, said pipe 52 thus establishing communication between port 47 of our feed-valve and the source of pressure-supply through the engineer's brake-valve A and the pipe 51 establishing communication between the port 44 of our feed-valve and the train-line either through the train-pipe B at a point below the cut-out cock D, as shown by dotted lines, or directly, as shown by full lines.

The parts being constructed and connected as described and both air-pumps being started and all the air-cocks properly set and the connections made, with the cut-out cock D of the first or leading engine open and the corresponding cock in the train-pipe B of the second or following engine closed and with the cut-in cock 53 open in the pipe 52 in communication with the pressure-supply of the second engine and the corresponding cock in the corresponding pipe of the leading engine closed, the operation is as follows: The compressed air from the first engine passes into the train-line and from the train-pipe through pipe 51 into the valve through port 44, thence through port 45 into the chambered portion of cap 3, and thence through ports 15 and 16, so as to press against the lower face of piston 7, thereby lifting the piston and bringing the end of its spindle 9 against the stem 40 of check-valve 41 and lifting the latter, so as to admit the pressure agent through port 47 from the source of supply of the second engine, this pressure agent then flowing into and through port 46 and thence by reason of its higher pressure through port 44 and into the train-line through pipe 51, thus supplementing the pressure in the train-line from the first engine with the higher pressure from the pressure-supply of the second engine. As the piston 7 was lifted in the first instance by the train-line pressure, said piston opened the port 19 as it reached that point and allowed the train-line pressure to pass above the piston and through port 20 into chamber 22, (the portion of the piston toward the stem 9 at this time being seated against the bushing 21,) the pressure agent flowing from chamber 22 through port 23 and nipple 24 into the feed-valve auxiliary reservoir 25, which continued until the pressure in that auxiliary reservoir was equal to the pressure in the train-line proper, thus balancing the pressure on both sides of the piston 7. The parts stand in the position thus imparted to them during the time that the brakes are released. During this time the graduating-piston 31 is held closed, so that there can be no exhaust from the chamber 22 through the ports 27 into and through the exhaust-port 28, and the check-valve 41 is held from off its seat by the stem 9 of the piston 7

exerting an upward pressure on the stem of the check-valve. The pressure of the spring 42 against the top of the check-valve, as well as the weight of the check-valve, the piston 7, the graduating-valve 31, and its spring 35, is neutralized or counterbalanced by the spring 12, which exerts its pressure against the under side of the piston 7, and thus the piston is held in counterbalance while the fluid-pressure is the same against its opposite faces. When a reduction in pressure is first made for the purpose of setting the brakes, the pressure on the under side of piston 7 will fall and allow the pressure in the feed-valve auxiliary reservoir to move the piston down, first closing feed-port 19, and thus cutting off the auxiliary-reservoir pressure from passing beneath the valve. This downward movement of the piston relieves the pressure of its stem against the stem of the check-valve and allows the check-valve to seat, thus closing the port 47, which communicates with the pressure-supply of the engine. In this downward movement of the piston 7 the shoulder 39 of its stem 9 bears down on the offset 33 of the graduating-valve 31 and draws down or unseats that valve against the pressure of its spring 35, thus opening the port or ports 27 and allowing pressure in the feed-valve auxiliary reservoir to exhaust from chamber 22 and space 26 through ports 27 into and through the exhaust-port 28 and out through the whistle 30. When under this exhaust the pressure above the piston 7 is reduced slightly below that in the train-line, the pressure beneath the piston will lift the piston until its stem 9 rests against the end of the stem of check-valve 41; but at this time the stem of the piston will not press against the stem of the check-valve, so as to lift the latter. During this movement of the piston the graduating-valve 31 will be seated by the pressure of its spring 35, thus cutting off the exhaust from the auxiliary reservoir through the exhaust-port 28. A further reduction in the train-line pressure will cause piston 7 to again fall or retire and unseat the graduating-valve, so that there will be a further exhaust of the auxiliary-reservoir pressure in chamber 22 until the pressure above the piston is again slightly less than the train-line pressure, when the piston will be again lifted by the train-line pressure and the graduating-valve again seated and the exhaust from above the piston again cut off, as before, this operation being repeated at each reduction of the train-line pressure without lifting the check-valve 41 from its seat, and which consequently will prevent the pressure from the second-engine supply from passing into the train-line proper. The fit of the stem of the check-valve in the bushing 11 is such as to prevent the train-line pressure from leaking into the chamber 22. When the first engine raises the train-line pressure sufficient to begin to release brakes, the pressure from the train-line again enters the feed-valve, as before, and raises the piston 7, so as to lift the check-valve and supply the pressure from the second-engine supply to the feed-valve auxiliary reservoir and to the train-line, as before.

It will be observed that piston 7 is under the influence of the pressure agent on both sides thereof and imparts or permits movement of the other parts according as the pressure is increased or decreased on one side or the other of the piston and that it prevents an intermingling of the pressures on opposite sides of the piston until the piston is moved by pressure through port 45 far enough to uncover the feed-port 19. It is to be noted also that the stem 9 of the piston and the stem 40 of the check-valve are so proportioned in length that the check-valve will not be lifted until the piston is at the upper end of its chamber 6; also, that the piston-stem 9 does not pull on the graduating-valve 31 until the pressure in the chamber 6 is greater than the pressure against the under side of the piston, so as to drive the piston to the lower end of its chamber 6. The port 20 in the piston restricts the rush of pressure received through port 45 and entering the chamber 22 above the piston, and it is so proportioned that the chamber 22 and the feed-valve auxiliary reservoir 25 will not charge up as rapidly as the auxiliary reservoirs on the cars. By providing the feed-valve auxiliary reservoir 25 a larger body of pressure for the chamber 22 is possible than could well be maintained in a chamber formed in the body of the valve, and this increased volume permits more accurate results than would be otherwise obtained. If it should happen that the second or following engine is for the time without air-supply, the cut-in cock 53 is closed, so as to cut off the port 47 from the second-engine source of supply.

This automatic feed-valve can be applied to a system of fluid-pressure brakes without altering the construction and without omission of any of the parts constituting the ordinary make-up of such systems, and to connect the feed-valve it is simply necessary to make provision for connecting its pipes 51 and 52 with the train-line pipe above and below the cut-out cock D, ordinarily provided in the train-pipe leading from the engineer's brake-valve.

We have illustrated and described with particularity the preferred details of construction and arrangement of the several parts; but the invention is not restricted thereto when alterations can be made therein and certain features of the invention still be retained.

Having described our invention and set forth its merits, what we claim is—

1. In a fluid-pressure brake system, a feed-valve for establishing communication between the train-line and the second-engine pressure-supply, said feed-valve comprising a valve-casing having ports in communication with the train-line and with the second-engine pressure-supply respectively, a piston

working in a suitable chamber in the valve-casing, said chamber being in communication with the port which communicates with the train-line, an auxiliary reservoir for the feed-valve independent of the engineer's brake-valve equalizing-reservoir and in communication with the piston-chamber on one side of the piston, and a valve actuated from said piston and controlling communication between the train-line and the engine pressure-supply, substantially as described.

2. In a fluid-pressure brake system, a feed-valve for establishing communication between the train-line and the second-engine pressure-supply, said feed-valve comprising a valve-casing having ports in communication with the train-line and the engine pressure-supply respectively, a piston working in a suitable chamber in the valve-casing, said chamber being in communication with the port which communicates with the train-line, a fluid-pressure chamber on the opposite side of the piston, a valve for controlling the exhaust of pressure fluid from said chamber, and a valve actuated from the piston for controlling communication between the train-line and the engine pressure-supply, substantially as described.

3. In a fluid-pressure brake system, a feed-valve for establishing communication between the train-line and the second-engine pressure-supply, said feed-valve comprising a valve-casing having ports in communication with the train-line and the engine pressure-supply respectively, a piston working in a suitable chamber in the valve-casing, said chamber being in communication with the port which communicates with the train-line, an auxiliary reservoir in communication with the piston-chamber on one side of the piston, a valve for controlling the exhaust of pressure fluid from said chamber, and a valve actuated from the piston for controlling communication between the train-line and the engine pressure-supply, substantially as described.

4. In a fluid-pressure brake system, a feed-valve for establishing communication between the train-line and the second-engine pressure-supply, said feed-valve comprising a valve-casing having ports in communication with the train-line and with the second-engine pressure-supply respectively, a piston working in a suitable chamber in the valve-casing, said chamber being in communication with the port which communicates with the train-line, a fluid-pressure chamber on the opposite side of the piston, an auxiliary reservoir in communication with said last-mentioned chamber, a valve for controlling the exhaust of pressure from said chamber and auxiliary reservoir, and a valve actuated from the piston for controlling communication between the train-line and the engine pressure-supply, substantially as described.

5. In a fluid-pressure brake system, a feed-valve for establishing communication between the train-line and the second-engine pressure-supply, said feed-valve comprising a valve-casing having ports in communication with the train-line and the engine-pressure-supply respectively, a piston working in a suitable chamber in the valve-casing and a port for establishing communication between portions of the piston-chamber on opposite faces of the piston, said port being controlled by the piston in its movements, and the piston-chamber being in communication with the port which communicates with the train-line, a fluid-pressure chamber to one side of the piston, an auxiliary reservoir in communication with said chamber, a valve for controlling exhaust of the pressure fluid from said chamber, and a valve actuated from the piston for controlling communication between the train-line and the engine pressure-supply, substantially as described.

6. In a fluid-pressure brake system, a feed-valve for establishing communication between the train-line and the second-engine pressure-supply, said feed-valve comprising a valve-casing having ports in communication with the train-line and with the second-engine pressure-supply respectively, a piston working in a suitable chamber in the valve-casing, said chamber being in communication with the port which communicates with the train-line, a fluid-pressure chamber on the opposite side of the piston, a valve for controlling exhaust of the pressure fluid from said chamber, a valve actuated from the piston for controlling communication between the train-line and the engine pressure-supply, and a connection between the piston and the exhaust-valve whereby when the pressure on the train-line side of the piston is reduced said piston will unseat the exhaust-valve to permit exhaust from the pressure-fluid chamber on the opposite side of the piston, substantially as described.

7. In a fluid-pressure brake system, a feed-valve for establishing communication between the train-line and the second-engine pressure-supply, said feed-valve comprising a valve-casing having ports in communication with the train-line and with the second-engine pressure-supply respectively, a piston working in a suitable chamber in the valve-casing, said chamber being in communication with the port which communicates with the train-line, a port for establishing communication between portions of the piston-chamber on opposite sides of said piston, said port being controlled by the piston in its movements, a fluid-pressure chamber on one side of the piston, a port establishing a restricted communication between said pressure-chamber and the piston-chamber, an auxiliary reservoir in communication with said fluid-pressure chamber and a valve for controlling the exhaust of pressure fluid from said chamber, means connecting said valve with the piston whereby when the train-line pressure is reduced and the piston is moved

to close communciation between the portions of the piston-chamber on opposite sides of the piston, said exhaust-valve will be unseated to permit exhaust from the pressure-fluid chamber, and a valve actuated from the piston for controlling communication between the train-line and the engine pressure-supply, substantially as described.

8. In a fluid-pressure brake system, a feed-valve for establishing communication between the train-line and the second-engine pressure-supply, said feed-valve comprising a valve-casing having ports in communication with the train-line and with the second-engine pressure-supply respectively, a piston working in a suitable chamber in the valve-casing, said chamber being in communication with the port which communicates with the train-line, a valve for controlling communication between the train-line and the engine pressure-supply, and a member carried by the piston and normally separated from the valve which controls communication between the train-line and engine pressure-supply, said member being moved by the piston when pressure is thrown on the train-line and brought into engagement with a part of the valve which controls communication between the train-line and the engine pressure-supply so as to move said valve and admit the pressure from the engine-supply to the train-line, substantially as described.

9. In a fluid-pressure brake system, a feed-valve for establishing communication between the train-line and second-engine pressure-supply, said feed-valve comprising a valve having ports in communication with the train-line and the second-engine pressure-supply respectively, a piston working in a suitable chamber in the valve-casing, said chamber being in communication with the port which communicates with the train-line, a port for establishing communication between portions of the piston-chamber on opposite sides of the piston, said port being controlled by the piston in its movements, a fluid-pressure chamber on one side of the piston, a port for establishing a restricted communication between said chamber and the piston-chamber, an auxiliary reservoir in communication with said chamber, a valve for permitting an exhaust from said chamber, a check-valve having a stem for controlling communication between the train-line and the engine pressure-supply, and a stem connected to the piston and adapted to be brought into actuating engagement with the stem of the valve which controls communication with the engine pressure-supply as the train-line pressure is exerted against the piston when the brakes are released, said piston-stem adapted to recede from the stem of the check-valve and to move in the reciprocation of the piston under varying pressures against opposite faces of the piston without moving the check-valve in setting the brakes, substantially as described.

10. The combination with the train-line and engineer's brake-valve, of an automatic double-heading feed-valve comprising a valve-casing in communication with the brake-valve and train-line, a check-valve having a stem for controlling the communication between the brake-valve and train-line, said valve being adapted to seat when pressure in the train-line is below normal, a spring to exert a seating-pressure on said valve, and a piston having a stem arranged to be brought into engagement with the stem of the check-valve to unseat the latter and permit pressure from the engine pressure-supply and brake-valve through the double-heading feed-valve and to the train-line when pressure in the train-line is raised to release brakes, substantially as described.

11. The combination with the train-pipe and engineer's brake-valve, of an automatic double-heading feed-valve comprising a valve-casing in communication with the brake-valve and train-line, a check-valve having a stem for controlling communication between the brake-valve and the train-line, said valve being adapted to seat when pressure in the train-line is below normal, means to exert a seating-pressure on said valve, a piston having a stem arranged to be brought into engagement with the stem of the check-valve to unseat the latter and permit pressure from the engine pressure-supply and brake-valve through the double-heading feed-valve and to the train-line when pressure in the train-line is raised to release brakes, and a spring to exert a counterbalancing pressure against said piston, substantially as described.

12. In an automatic double-heading feed-valve for second and following engines, the combination of the check-valve and its stem for controlling communication between the engine pressure-supply and the train-line, of the piston having on its upper face a stem adjusted to be brought into engagement with the check-valve stem and on its under side a depending stem, a spring for holding the check-valve to its seat, the exhaust-valve, the spring for holding the exhaust-valve to its seat, the offset on the exhaust-valve and the shoulder on the piston-stem adapted to be brought into engagement with each other, and the spring exerting pressure against the under face of the piston, substantially as described.

13. In an automatic double-heading feed-valve for second and following engines, the combination with the valve-casing having the piston-chamber and the fluid-pressure chamber above it in communication with an exhaust-port, of the piston having an upwardly-extending stem with a recess and shoulder on one side, the exhaust-controlling valve provided with an offset adapted to engage with the shoulder of the piston-stem whereby said stem in the movement of the piston will unseat the exhaust-valve, and a spring for seating the exhaust-valve, substantially as described.

14. An automatic double-heading feed-

valve for second and following engines consisting of the valve-casing formed with a piston-chamber and having ports for attachment of pipes connecting with the train-pipe one below the cut-out cock in the train-pipe and the other between said cut-out cock and the engineer's brake-valve and provided with passages one leading from the train-line connection to the piston-chamber and the other leading to the port for connection of the pipe between the cut-out cock and the engineer's brake-valve, the valve-casing also being formed with a fluid-pressure chamber above the piston-chamber which is in communication with an exhaust-port and with a port leading to an auxiliary reservoir, the piston having a port formed in it for establishing communication between the pressure-fluid chamber and the piston-chamber when the piston is raised and provided with an upwardly-extending stem, a spring to bear against the under side of the piston, a port to establish communication between portions of the piston-chamber on opposite sides of the piston when the piston is raised, the exhaust-valve and the spring to seat the valve, the check-valve having the stem within range of movement of the stem to the piston when the piston is raised, the spring for seating the check-valve, and the auxiliary reservoir in communication with the pressure-chamber above the piston, substantially as described.

In testimony whereof we affix our signatures in presence of two witnesses.

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JAMES S. PEARCE.
GEORGE HOLMES.
CALVIN STALEY.

Witnesses:
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GEO. L. HART.