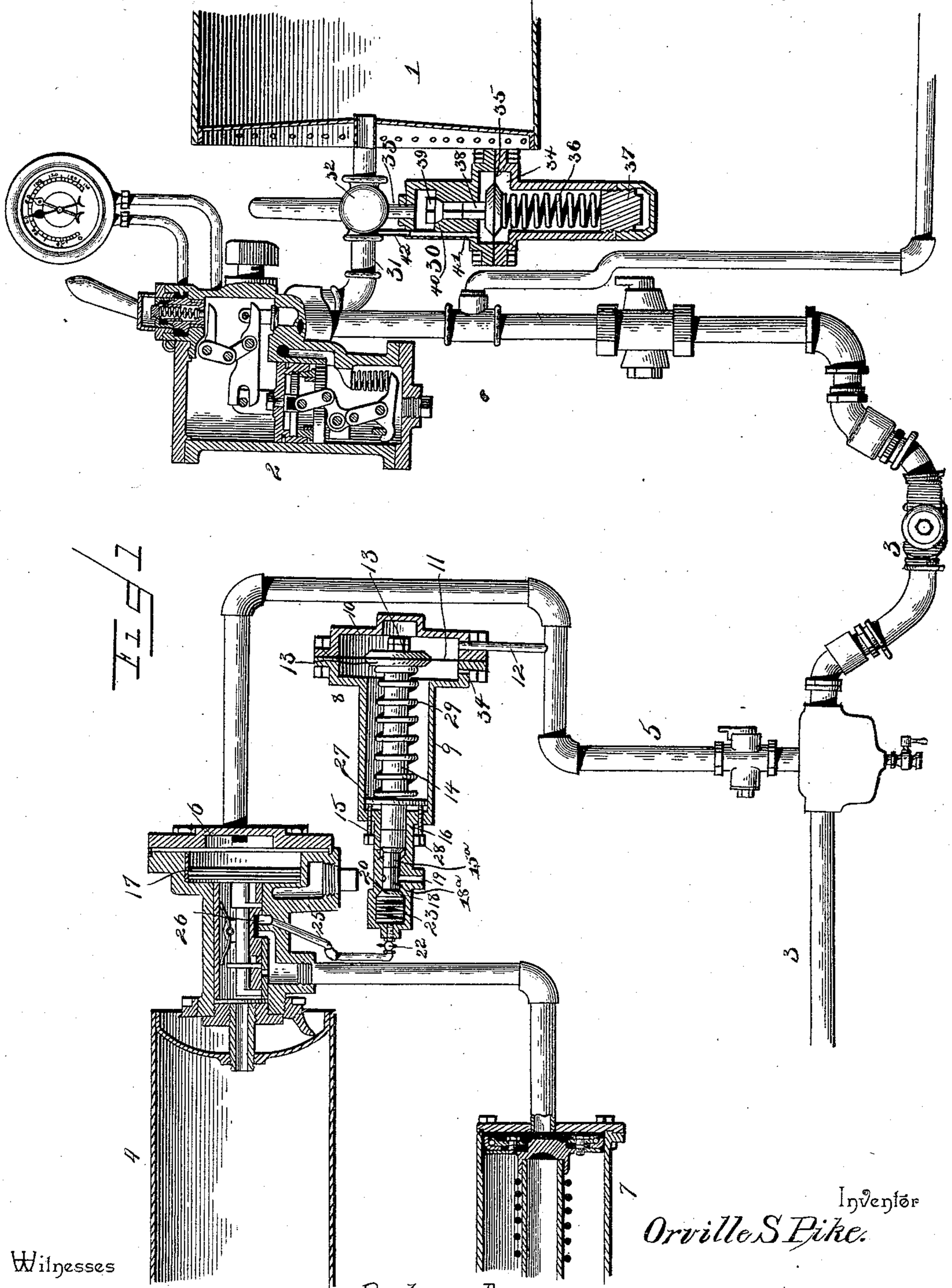
(No Model.) 2 Sheets—Sheet 1.

O. S. PIKE.

AUTOMATIC PRESSURE RETAINING VALVE FOR AIR BRAKES.

No. 529,137. Patented Nov. 13, 1894.



Witnesses

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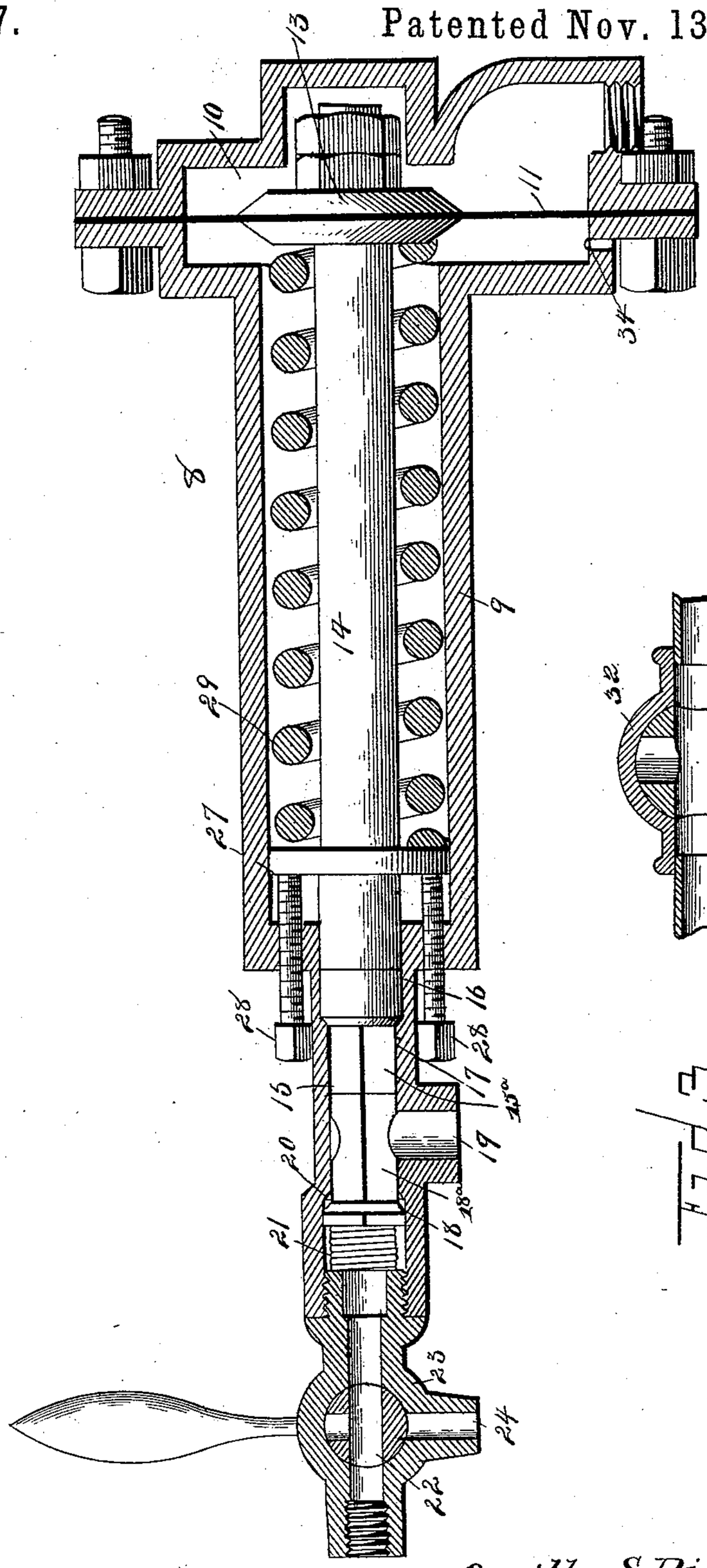

Fig. 1.

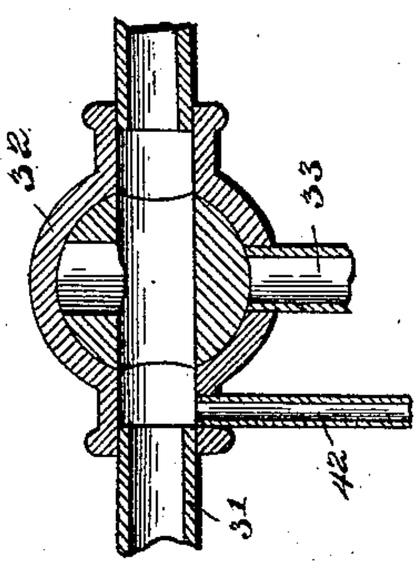

Fig. 2.

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UNITED STATES PATENT OFFICE.

ORVILLE S. PIKE, OF NEW LISBON, OHIO.

AUTOMATIC PRESSURE-RETAINING VALVE FOR AIR-BRAKES.

SPECIFICATION forming part of Letters Patent No. 529,137, dated November 13, 1894.

Application filed October 11, 1893. Serial No. 487,855. (No model.)

To all whom it may concern:

Be it known that I, ORVILLE S. PIKE, a citizen of the United States, residing at New Lisbon, in the county of Columbiana and State of Ohio, have invented a new and useful Automatic Pressure-Retaining Valve for Air-Brakes, of which the following is a specification.

My invention relates to an automatic retaining valve for use in connection with air-brake mechanisms, and it has for its object to provide means whereby the auxiliary reservoirs, which communicate with the brake-cylinders, may be recharged without releasing the brakes; and whereby pressure in the train pipe may be automatically regulated.

Further objects and advantages of this invention will appear in the following description, and the novel features thereof will be particularly pointed out in the appended claims.

In the drawings: Figure 1 is a view of a brake mechanism provided with a retaining valve embodying my invention, and an auxiliary limiting valve, which may be, and preferably is, employed in connection with the retaining valve. Fig. 2 is a view of the retaining valve detached from the brake mechanism and shown upon an enlarged scale. Fig. 3 is a detail sectional view of the three-way cock.

Similar numerals of reference indicate corresponding parts in all the figures of the drawings.

1 designates the main reservoir; 2, the engineer's brake-valve, which may be of the ordinary or any preferred construction and forms no part of my invention; 3, the train pipe; 4, an auxiliary reservoir which is connected with the train pipe by a branch pipe 5, which communicates with a triple-valve 6, and 7 represents a brake-cylinder which is connected with the auxiliary reservoir through the triple valve.

The above mechanism which I have shown as a means of illustrating the operation and functions of my improved retaining valve, may be substituted by any ordinary form of fluid-pressure brake-mechanism.

The retaining valve embodying my invention is shown at 8, and is constructed as follows: 9 represents a casing, which is enlarged at one end to form a receiving chamber 10, which is separated from the main portion of the interior of the casing by a diaphragm 11, a small conductor 12 being employed to connect said receiving chamber with the branch pipe 5, or a portion of the train pipe, as may be preferred.

Connected by means of the diaphragm plates 13 to the center of the diaphragm is a stem 14, which extends axially through the casing and is provided with a plug-valve 15, fitting in a reduced portion 16, of the casing. This plug-valve is arranged to fit the annular valve-seat 17, which is formed by an offset in the walls of the reduced portion 16 of the casing.

18 represents a check-valve, which is slidably fitted in the reduced portion of the casing adjacent to the exhaust opening 19, and is adapted to fit the annular seat 20, which is formed by an offset in the walls of the casing. This check-valve is normally held to its seat by means of the actuating coiled spring 21.

22 represents a cut-out valve arranged in the casing 23, which communicates with the reduced portion of the casing 9, said casing of the cut-out valve being provided with an outlet 24, which may be opened by means of said valve. The casing of the cut-out valve is connected by an intermediate pipe 25, to the exhaust opening 26 of the triple valve.

The stem 14 carries a follower 27, engaged by the set-screws 28, and 29 represents the diaphragm spring, which is coiled upon the stem between the follower and the diaphragm plates.

The valves 15 and 18 are provided with contacting stems or extensions 15^a and 18^a, respectively, whereby motion is communicated from the valve 15 to the valve 18 to unseat the latter when the stem 14 is moved longitudinally by the repression of the diaphragm by an excess of pressure in the compartment 10, the valve 18 being returned to its seated position upon the reverse movement of said stem by the expansion of the spring 21.

The diaphragm which is preferably employed has an area of about twelve square inches, and the spring 29 has a resisting force of six hundred and twenty-four pounds. When the pressure in the train pipe exceeds fifty-two pounds to the square inch it over-

comes the spring 29 by pressure upon the surface of the diaphragm, forces the stem forward, and thereby seats the valve 15 and unseats the valve 18, by repressing the latter against the tension of the spring 21. This opens communication between the exhaust 26 and the outlet 19, through the intermediate cut-off valve. Thus, the exhaust from the brake-cylinder is under the direct control of the improved pressure valve, and if the pressure in the brake-pipe is maintained within the limit above described the auxiliary reservoirs may be recharged, as often as desired, without releasing the brakes, the parts of the apparatus meanwhile being in the positions shown in Fig. 1; but when the pressure in the brake-pipe exceeds this limit, the apparatus operates to exhaust the brake cylinder and release the brakes, the positions of the parts while the brake-cylinders are exhausting being shown in Fig. 2.

It will be understood that the resistance of the spring 29, as above set forth, is not arbitrary, but may be regulated to suit the character of the brake-mechanism and the circumstances under which the apparatus is employed, this pressure having been named for the reason that fifty pounds pressure in the auxiliary reservoirs has been accepted as sufficient for the proper operation of the brakes, and is preferable to a higher pressure for the reason that it does not cause the wheels to skate. When the resistance of the spring 29 is set for fifty-two pounds pressure in the train pipe, it enables the engineer to recharge the auxiliary reservoirs at a pressure of fifty pounds without releasing the brakes, whereas, if the applied pressure exceeds this margin of two pounds the brakes will be released in the manner above described.

I preferably employ a diaphragm in the connection above described, for the reason that the extent of movement required to open and close the valves is very slight and may not exceed one-fourth of an inch, and the diaphragm is capable of movement to give this throw to the stem without frictional contact with any part of the casing, and therefore it is more sensitive to the pressure.

34 represents a vent, which is formed in the main casing 9 of the retaining valve, to maintain the ordinary atmospheric pressure in this portion of the casing, and permit the escape of a portion of the contained air when the diaphragm is actuated by the pressure in the receiving chamber.

The valve 15 is designed to prevent the pressure of air in the reduced portion of the casing or the valve-casing portion thereof from being communicated to the interior of the body-portion 9, in which the air must be maintained at atmospheric pressure at all times in order to insure the proper operation of the parts when the pressure in the chamber 10 exceeds a certain limit hereinbefore described.

As a means for preventing the overcharging of the auxiliary reservoirs, I employ a regulating or limiting valve 30, which taps the brake-pipe between the main reservoir and the engineer's valve 2. Located at an intermediate point in the short section of the brake-pipe which connects the main reservoir with the engineer's valve, said section of the brake-pipe being indicated by the numeral 31, is a three-way cock 32, of the ordinary construction, and communicating with the casing of this cock is a tube 33, which communicates with one end of the valve 30. The latter is provided with an intermediate enlarged chamber 34, in which is located a sensitive diaphragm 35, and bearing against the rear side of the diaphragm is a tension spring 36 seated at the opposite end on an adjustable block 37.

The stem 38 of the diaphragm extends upward and bears against the stem of a check-valve 39, arranged to fit a seat 40 adjacent to the inlet pipe 33, and the enlarged chamber 34 communicates with the brake-pipe, between the cock 32 and the engineer's valve, by means of a channel 41 formed in the wall of the limiting valve, and a short tube 42, or by any other suitable means, according to the location and relative positions of the other parts of the apparatus.

To release the brakes, or when the entire or any desired pressure in the brake-pipe is desired, the cock 32 is opened to allow a direct passage of the air therethrough, but when it is desired to recharge the auxiliary reservoirs without releasing the brakes, and therefore without allowing a greater pressure in the brake-pipe than is necessary to accomplish said object, the cock is turned to cause the fluid to pass through the limiting-valve. When the parts are in this position, the check-valve 39 being unseated, as shown in Fig. 1, the air passes down through the inlet-pipe 33, into the limiting valve casing to the enlarged chamber 34, and thence through the passage 41 to the brake-pipe.

When the pressure in the brake-pipe is in excess of that required for charging the auxiliary reservoirs, and therefore sufficient to operate the parts of the retaining-valve to exhaust the brake-cylinders, the diaphragm 35 is repressed, against the tension of the spring 36, and the check-valve returned to its seat, from which it is normally held by the stem of the diaphragm.

Various changes in the form, proportion, and the minor details of construction may be resorted to without departing from the principle or sacrificing any of the advantages of this invention.

Having described my invention, what I claim is—

1. In a fluid-pressure brake mechanism, the combination with a main-reservoir, brake-pipe, engineer's valve, an auxiliary reservoir, a triple-valve forming the connection between the brake-pipe and the auxiliary reservoir, a brake-cylinder connected to exhaust through the triple valve, and a retaining-valve having

a chamber in communication with the brake-pipe between the engineer's valve and the triple-valve, a sensitive diaphragm forming one side of said chamber and exposed to the brake-pipe pressure, an outlet in communication with the brake-cylinder-exhaust of the triple-valve, a check-valve arranged to control said outlet, and means for communicating the motion of the diaphragm to the check-valve to unseat the latter and open the outlet, of a three-way cock arranged in the brake-pipe between the main-reservoir and the engineer's valve, a limiting-valve having a chamber in communication with the three-way cock, a second chamber in communication with the first chamber, a diaphragm in the second chamber, a check-valve controlling the communication between the chambers, means carried by the diaphragm for normally unseating the check-valve, and a passage connecting said second chamber with the brake-pipe between the three-way cock and the engineer's valve, substantially as specified.

2. In a fluid-pressure brake mechanism, the combination with a main-reservoir, a brake-pipe, an engineer's valve, an auxiliary reservoir, a triple-valve forming the connection between the brake-pipe and the auxiliary reservoir, a brake-cylinder connected to exhaust through the triple-valve, and a retaining-valve communicating with the brake-pipe and the brake-cylinder-exhaust of the triple-valve and having means for controlling said exhaust by opening the same when the pressure in the brake-pipe exceeds a certain limit and closing the same when the brake-pipe pressure falls below such limit, of a limiting-valve tapping the brake-pipe between the main-reservoir and the engineer's valve and having communicating chambers connected independently with the brake-pipe, and pressure-operated means for controlling the passage connecting the chambers, and a three-way cock arranged in the brake-pipe in operative relation with the inlet pipe of the limiting-valve, and adapted to direct the flow of the fluid through the limiting-valve or cut it out of the same, substantially as specified.

3. In a fluid-pressure brake mechanism, the combination with a brake-pipe, an auxiliary reservoir, an intermediate triple valve, and a brake cylinder connected to exhaust through said triple valve, of a retaining valve having a receiving chamber of large diameter in communication with the brake-pipe, a diaphragm forming one side of said receiving chamber, a check-valve casing in communication with the exhaust of the triple valve and provided with an exhaust opening, a spring-actuated check-valve fitted in said casing and normally held in position to close the exhaust opening therein, a stem connected to the center of the diaphragm, connections between said stem and the check-valve, a retaining spring coiled upon the stem, and adapted to have a resistance in excess of the required pressure in the auxiliary reservoir and adjusting devices connected to one end of the spring whereby the tension of the latter and hence the margin of excess over the required pressure in the auxiliary reservoir may be adjusted, substantially as specified.

4. A fluid pressure retaining valve having a casing 9, a receiving chamber 10, a sensitive diaphragm arranged to form one wall of said receiving chamber, a valve-casing having valve seats 17 and 20, a check-valve 18 arranged to engage the seat 20 and having a stem 18^a, a valve 15 arranged to engage the seat 17 and provided with a stem 15^a to bear normally against the stem 18^a, means for connecting the valve-casing with the outlet of a triple-valve of a brake-mechanism, and means for connecting the receiving chamber 10 with the air supply-pipe of a brake-mechanism, said diaphragm having a stem bearing at its extremity against the valve 15, substantially as specified.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in the presence of two witnesses.

ORVILLE S. PIKE.

Witnesses:
JAMES A. MARTIN,
LILLIE S. MARTIN.