No. 836,720. PATENTED NOV. 27, 1906.

W. V. TURNER.

REGULATOR VALVE FOR AIR BRAKE SYSTEMS.

APPLICATION FILED JAN. 2, 1903.

2 SHEETS—SHEET 1.

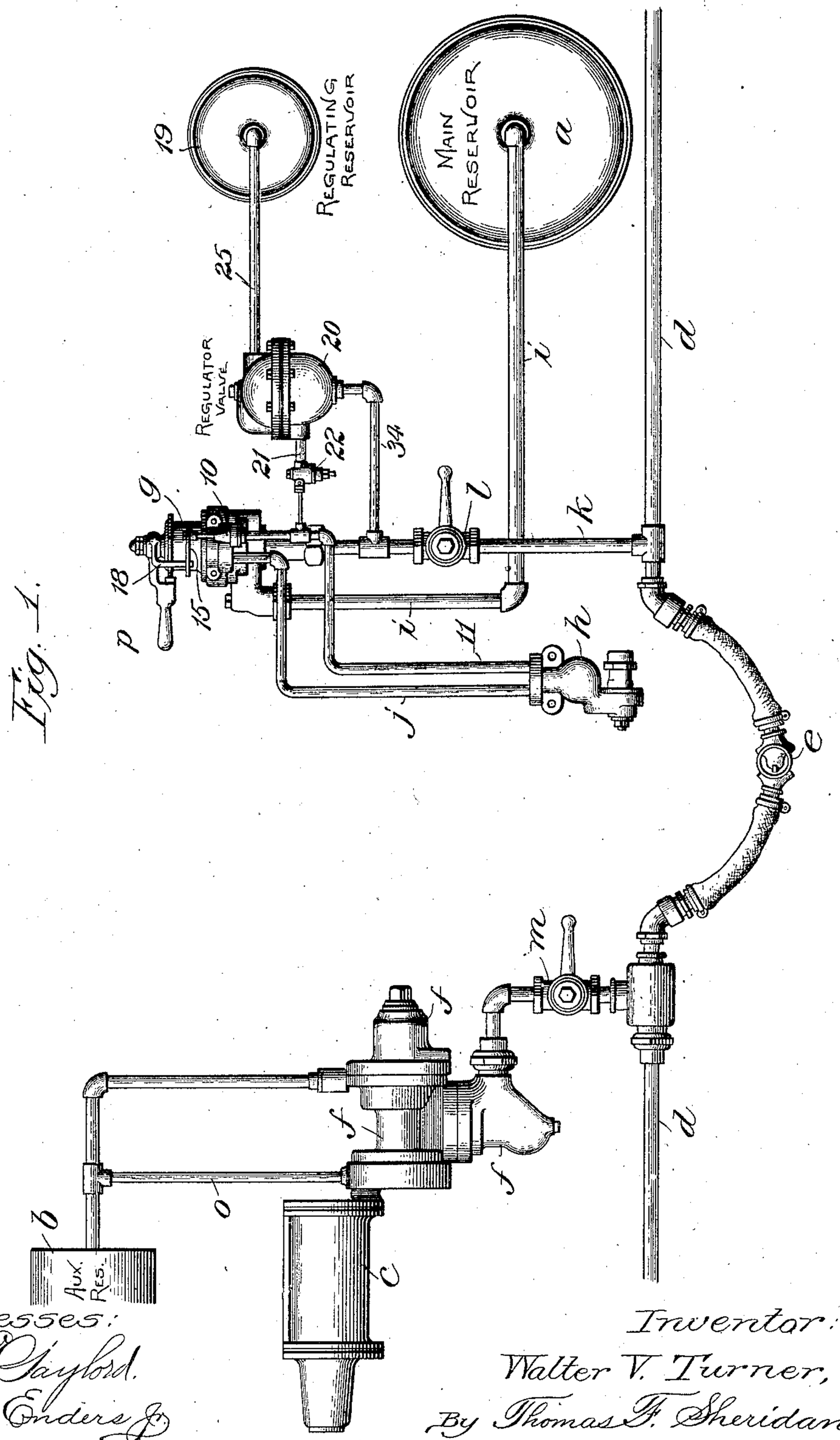

Fig. 1.

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John Enders Jr.

Inventor:
Walter V. Turner,
By Thomas F. Sheridan,
Att'y.

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2 SHEETS—SHEET 2.

Fig. 2.

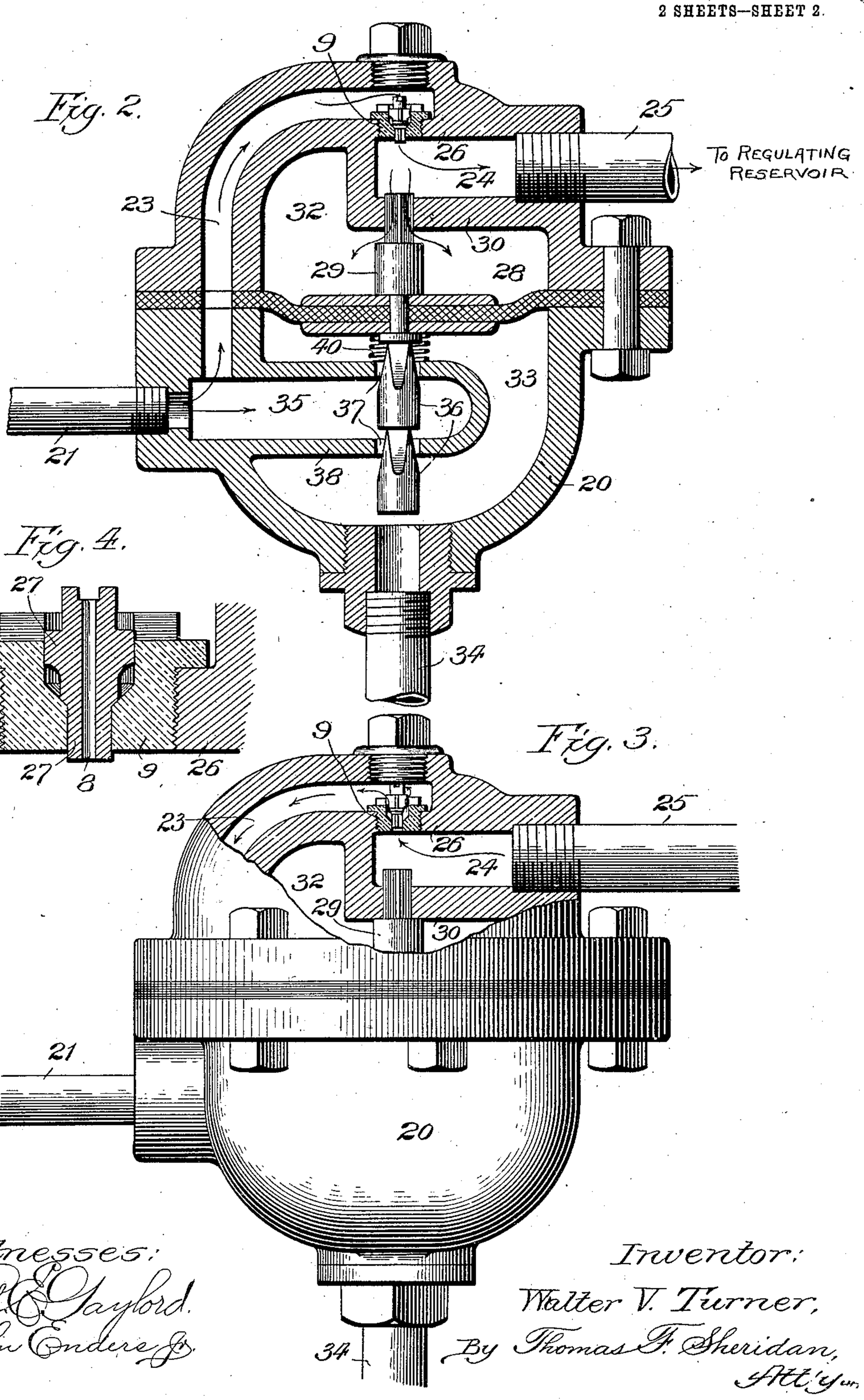

Fig. 4.

Fig. 3.

Witnesses:
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UNITED STATES PATENT OFFICE.

WALTER V. TURNER, OF TOPEKA, KANSAS, ASSIGNOR TO THE WESTINGHOUSE AIR BRAKE COMPANY, OF PITTSBURG, PENNSYLVANIA, A CORPORATION OF PENNSYLVANIA.

REGULATOR-VALVE FOR AIR-BRAKE SYSTEMS.

No. 836,720. Specification of Letters Patent. Patented Nov. 27, 1906.

Application filed January 2, 1903. Serial No. 137,554.

To all whom it may concern:

Be it known that I, WALTER V. TURNER, a citizen of the United States, residing at Topeka, in the county of Shawnee and State of Kansas, have invented certain new and useful Improvements in Regulator-Valves for Air-Brake Systems, of which the following is a specification.

This invention relates to that class of regulator-valves for use in connection with the Westinghouse and New York air-brake systems, and is intended to be an improvement upon the regulator-valve shown and described in the joint application of myself and George R. Henderson, Serial No. 131,240½, filed the 13th day of November, 1902.

The principal object of the invention is to provide a simple, economical, and efficient regulator-valve with supplementary controlling-valve mechanism to govern the inlet and exhaust of fluid-pressure to and from the regulating-reservoir, as will more fully hereinafter appear.

The invention consists principally in the combination of a brake-valve having the usual construction, a train-line governor connected therewith, a supplementary cut-off valve arranged between the train-line governor and the train-line to open and close the usual connections and operatable by and during the movements of the brake-valve mechanism, a regulating-reservoir, and a regulating-valve connected therewith and with the train-line governor and train-line formed of a casing having a main movable piston or diaphragm therein responsive to variations of pressure in the regulating-reservoir, a passage around the same from the train-line governor to the regulating-reservoir, automatic valve mechanism for increasing and decreasing the size of such passage and responsive to the pressure in the regulating-reservoir, and valve mechanism connected with and below the main diaphragm to open and close a passage through the regulating-valve from the train-line governor to the train-line pipe.

The invention consists, further and finally, in the features, combinations, and details of construction hereinafter described and claimed.

In the accompanying drawings, Figure 1 is a diagrammatic view of an air-brake system for railway-trains as it appears when constructed and fitted with these improvements; Fig. 2, an enlarged sectional elevation of a regulating-valve constructed in accordance with these improvements, with the automatic valve in one position; Fig. 3, an enlarged elevation, partly in section, of the regulating-valve with the automatic valve in a second position; and Fig. 4, an enlarged sectional elevation of the automatic valve.

In illustrating and describing these improvements I have only shown and will here describe so much of the invention as is new in connection with what is old, as will properly disclose the same and enable those skilled in the art to practice the same, leaving out of consideration other and well-known mechanisms, which if described and shown herein would only tend to confusion, prolixity, and ambiguity.

In carrying out these improvements an air-brake system is provided having a main reservoir *a*, auxiliary reservoir *b*, brake-cylinder *c*, train-line pipe *d*, connections or couplings *e*, triple valve *f*, brake-valve *g*, and train-line governor *h*, all constructed and arranged substantially in any well-known or usual manner and which is fully understood and appreciated by those skilled in the art.

The brake-valve is connected with the main reservoir through the usual pipe *i*, with train-line governor through a pipe *j*, and with the train-line through a pipe *k*, which pipe is provided with the usual cut-off valve *l*. The triple valve is connected with the train-line pipe by the usual connecting-pipe and valve mechanism *m*, with the brake-cylinder at *n*, as is usual in passenger equipment, and with the auxiliary reservoir by means of a pipe *o*, also usual in passenger equipment. The brake-valve is provided with a valve lever or handle *p*.

I prefer to use in connection with this system a supplementary cut-off valve 10, which is connected with the train-line governor *h* by means of a pipe 11. This supplementary cut-off valve is so constructed and arranged that a second arm or projection 18 on the brake-valve lever *p* may contact the stem 15 thereof and move it with said cut-off valve to the desired positions, so as to open and close the usual passage from the train-line governor to the train-line pipe, as well as govern

or control another means of communication between the train-line governor and the train-pipe through a regulating-valve, as will more fully hereinafter appear.

To provide the supplementary means of communication between the train-line governor and the train-pipes, a regulating-reservoir 19 is provided, and a regulating-valve 20 is connected therewith. This regulating-valve is provided with a branch-pipe connection 21, which connects it with the train-line governor-pipe 11, and is provided with an ordinary reducing-valve 22, set so as to govern or reduce the fluid-pressure to a predetermined amount—say, sixty-three pounds—that is, when the fluid-pressure in the regulating-reservoir equals or exceeds sixty-three pounds per square inch the reducing-valve will close the pipe 21 against a further supply of fluid-pressure to the regulating-reservoir. This regulating-valve 20 is provided with passages 23 and 24, the passage 23 being connected with the pipe 21 and the passage 24 with the pipe 25, which connects it with the regulating-reservoir. These two passages 23 and 24 are separated by means of a wall or partition 26, in which is located a perforated movable valve 27, mounted in a threaded bushing 9.

The regulating-valve is further supplied with a main movable diaphragm 28, having a stem 29, grooved where it is loosely fitted in a division-wall 30, which acts as a guide therefor, so as to permit a quantity of air to flow from the passage 24 into the chamber 32 above the diaphragm. A chamber 33 is arranged below the diaphragm and is connected with the train-line branch pipe *k* by means of a pipe 34. The valve-casing also has a chamber 35, the walls of which project into the chamber 33 and are perforated, so as to form valve-seats in which balanced valves 36 play and operate, so as to open and close the perforations 37 in the walls 38 of the chamber 35.

The size and arrangement of parts are such that when the fluid-pressure as it feeds into the regulating-reservoir, and at the same time into the chamber 32 of the regulating-valve, exceeds that on the chamber 33 on the train-line side of the diaphragm the superior pressure on the regulating-reservoir side of such diaphragm forces it with its valves 36 downwardly and permits fluid-pressure from the train-line governor to pass through pipe 21, chamber 35, perforations 37 into chamber 33 and out through pipes 34 and *k* into the train-pipe *d* until the train-line pressure slightly exceeds that of the regulating-reservoir, when such pressure below the diaphragm acts to raise it with valves 36 and cuts off further supply by this route to the train-line. The perforation 8 in the valve 27, that is inserted in partition 26 of the regulating-valve, is large enough to ordinarily permit the required volume of air under pressure to pass therethrough in a gradual manner without affecting in any objectionable manner the desired operation of the parts. It will be seen, however, that should there be a large reduction of train-pipe pressure below the diaphragm of such valve the superior regulating-reservoir pressure above the diaphragm instead of passing through the perforation as quickly as desired would objectionably affect the diaphragm by causing it to move downwardly and holding it down longer than is desirable for the perfect operation of the system. In order, therefore, to overcome this objectionable feature, the perforated valve 27 is made in the form of a check-valve that is responsive to variations of pressure in the regulating-reservoir, so that when it largely exceeds that on the train-line governor side of the check-valve it raises it to provide a maximum opening and permit fluid-pressure to pass therethrough without objectionably affecting the movable diaphragm with its valves. A spring 40 is inserted below and between the diaphragm and the wall 38 to assist in returning the diaphragm to its normal position.

I claim—

1. In mechanisms of the class described, the combination of a brake-valve having the usual connections, a train-line governor connected therewith, a supplementary cut-off valve arranged between the train-line governor and the train-line to open and close the usual connections operable by and during the movements of the brake-valve mechanism, a regulating-reservoir, a regulating-valve connected therewith and with the train-line governor and train-line formed of a casing having a main movable piston or diaphragm therein responsive to variations of pressure in the regulating-reservoir, a passage around the same from the train-line governor to the regulating-reservoir, automatic valve mechanism for increasing and decreasing the size of such passage responsive to the pressure in the regulating-reservoir, and valve mechanism connected with and below the main diaphragm to open and close a passage through the regulating-valve from the train-line governor to the train-line, substantially as described.

2. In mechanisms of the class described, the combination of a brake-valve having the usual connections, a train-line governor connected therewith, a supplementary cut-off valve arranged between the train-governor and the train-line to open and close the usual connections therewith and operable by and during the movements of the brake-valve lever, a regulating-reservoir, a regulating-valve connected therewith and with the train-line and train-line governor comprising a casing, a movable piston or diaphragm therein dividing it and responsive to pressure in the train-

line and regulating-reservoir, a passage around the diaphragm from the train-line governor to the regulating-reservoir, a perforated check-valve in said passage for decreasing and increasing the effective area of such passage and responsive to the variations of pressure between the regulating-reservoir and train-line, and valve mechanism connected with and arranged below the diaphragm to open and close a passage through the regulating-reservoir and between the train-line governor and train-line, substantially as described.

3. In mechanisms of the class described, the combination of a brake-valve having the usual connections, a train-line governor connected therewith, a supplementary cut-off valve arranged between the train-governor and the train-line to open and close the usual connections therewith and operable by and during the movements of the brake-valve lever, a regulating-reservoir, a regulating-valve connected therewith and with the train-line and train-line governor comprising a casing, a movable piston or diaphragm therein dividing it and responsive to pressure in the train-line and regulating-reservoir, a passage around the diaphragm from the train-line governor to the regulating-reservoir, a perforated check-valve in said passage for decreasing and increasing the effective area of such passage and responsive to the variations of pressure between the regulating-reservoir and train-line, valve mechanism connected with and arranged below the diaphragm to open and close a passage through the regulating-reservoir and between the train-line governor and train-line, and spring mechanism to assist the diaphragm in returning to its normal position, substantially as described.

4. In a fluid-pressure brake, the combination with a train-pipe and brake-valve, of a regulating-valve for controlling the supply of air to the train-pipe while the brakes are applied, a regulating-chamber having a restricted inlet-opening, a movable abutment subject to the opposing pressures of the train-pipe and said chamber for operating the regulating-valve, and means for opening a larger outlet-passage from the regulating-chamber during train-pipe reductions.

5. In a fluid-pressure brake, the combination with a train-pipe, and a regulating-chamber having a restricted inlet-port, of a valve device operated by the opposing pressures of the train-pipe and the regulating-chamber for controlling the supply of air to the train-pipe while the brakes are applied, and a valve for automatically opening a larger outlet from the regulating-chamber to the train-pipe during train-pipe reductions.

6. In a fluid-pressure brake, the combination with a train-pipe, and a regulating-chamber having a restricted inlet-port, of a valve device operated by the opposing pressures of the train-pipe and the regulating-chamber for controlling the supply of air to the train-pipe while the brakes are applied, and a check-valve for opening communication from the regulating-chamber to the train-pipe.

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Witnesses:
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