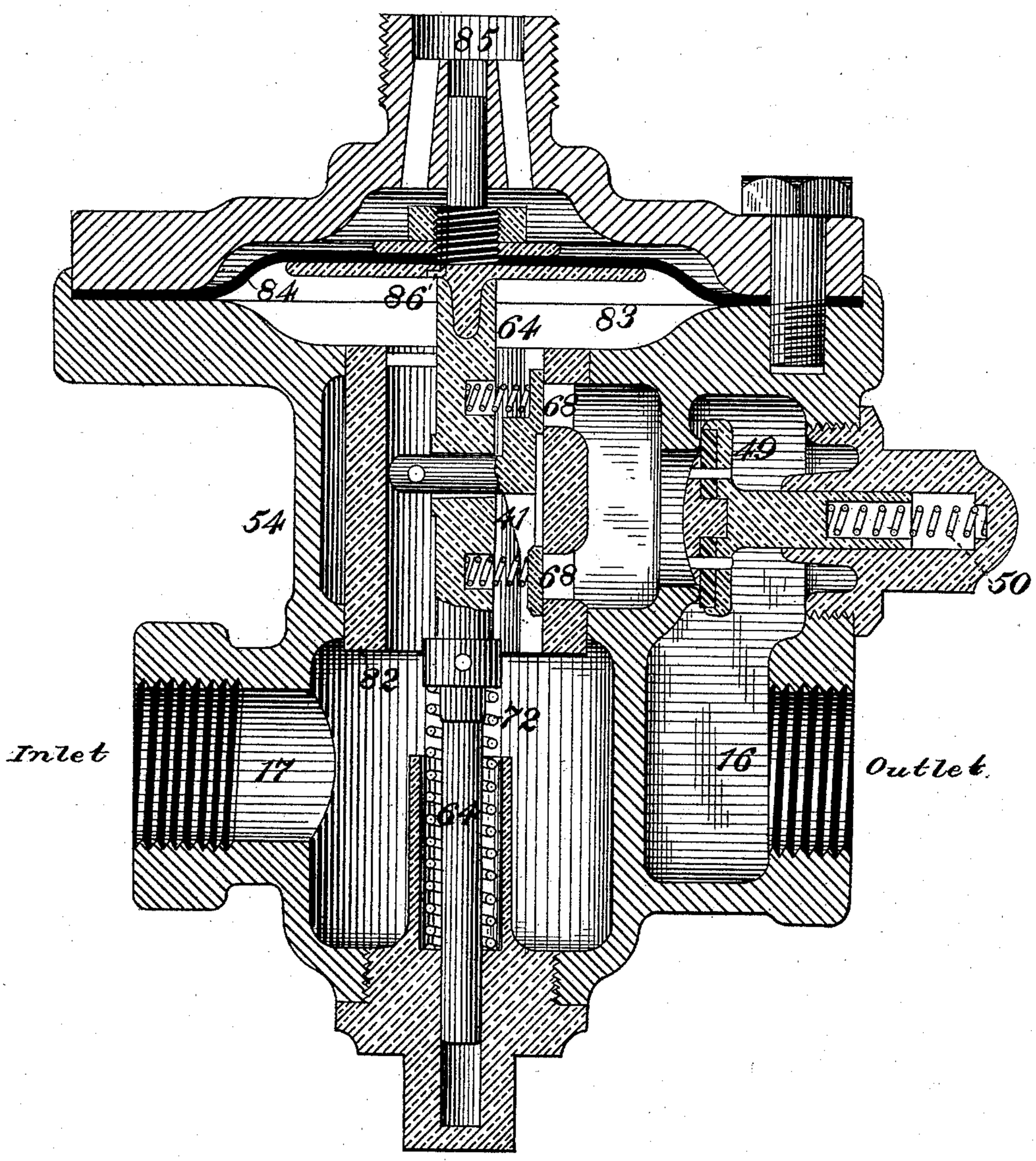
(No Model.) 3 Sheets—Sheet 1.

G. WESTINGHOUSE, Jr.

AIR BRAKE.

No. 448,827. Patented Mar. 24, 1891

Fig. 1.



WITNESSES:

C. M. Clarke.

F. E. Gaither.

INVENTOR,

Geo. Westinghouse Jr.

by J. Snowden Bell,

Att'y.

(No Model.) 3 Sheets—Sheet 2.

G. WESTINGHOUSE, Jr.

AIR BRAKE.

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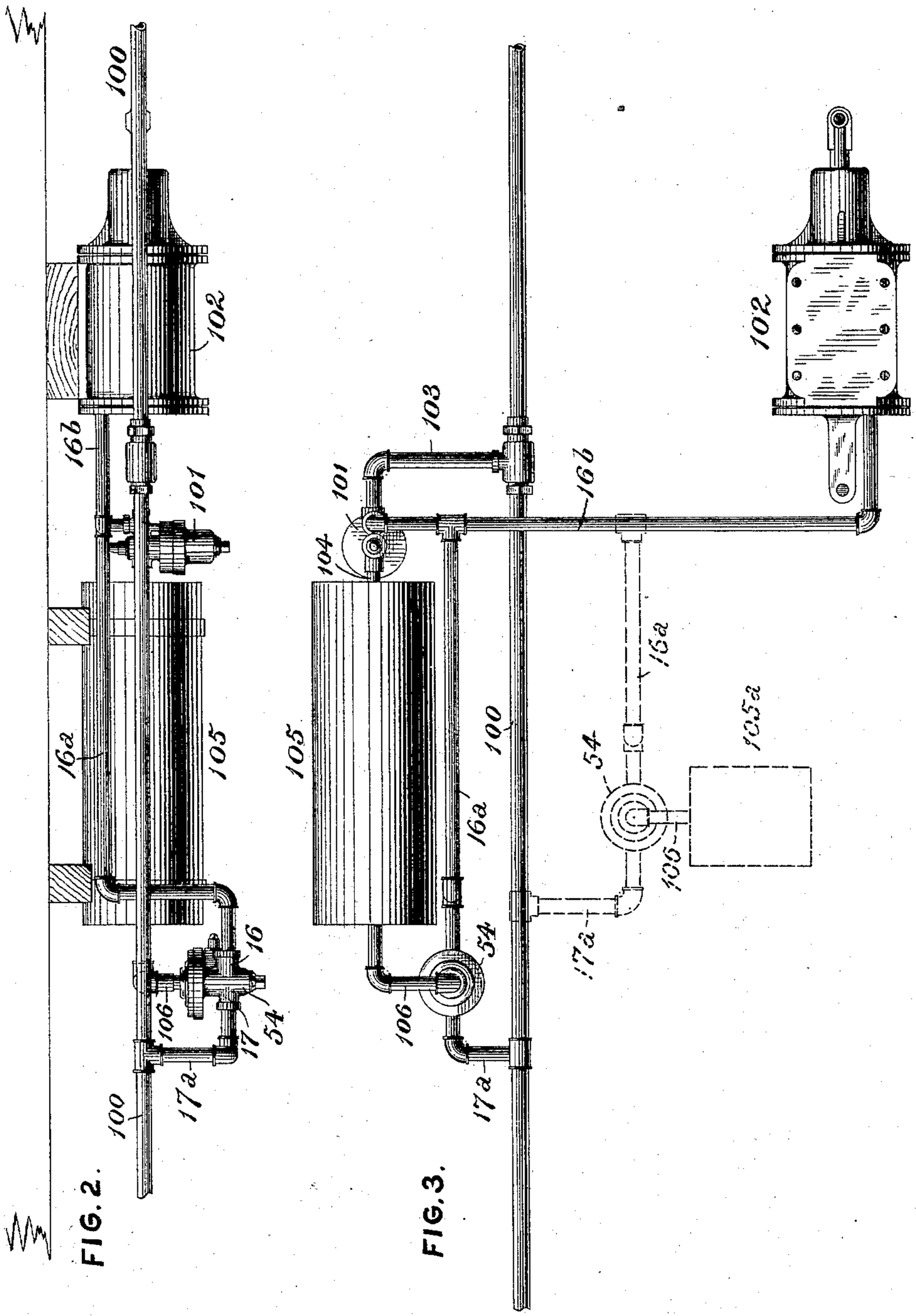

WITNESSES:

George H. Howard

Edwin Luce

INVENTOR,

Geo. Westinghouse Jr.

by J. Snowden Bell.

Att'y.

(No Model.) 3 Sheets—Sheet 3.

G. WESTINGHOUSE, Jr.

AIR BRAKE.

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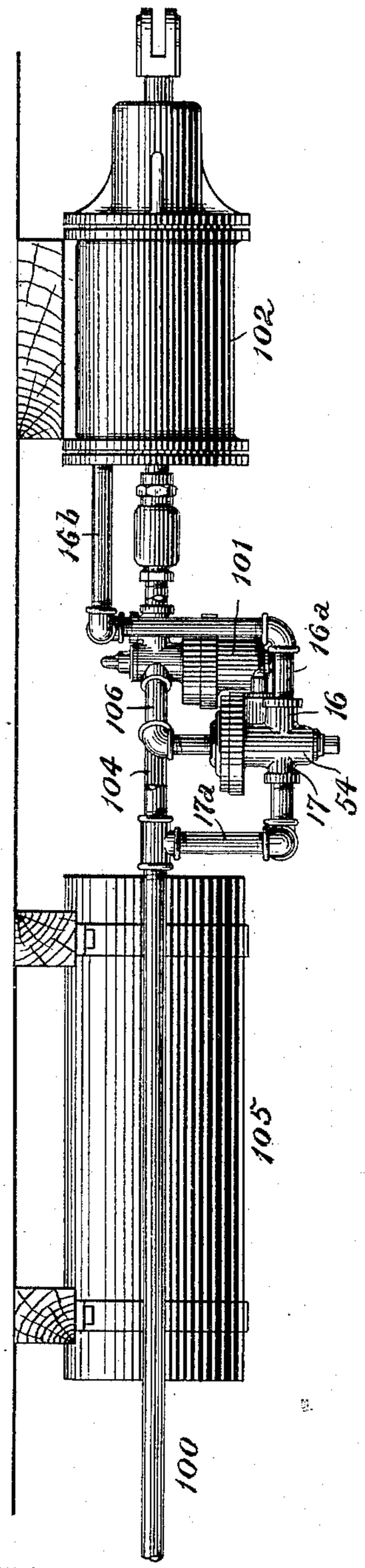

FIG. 4.

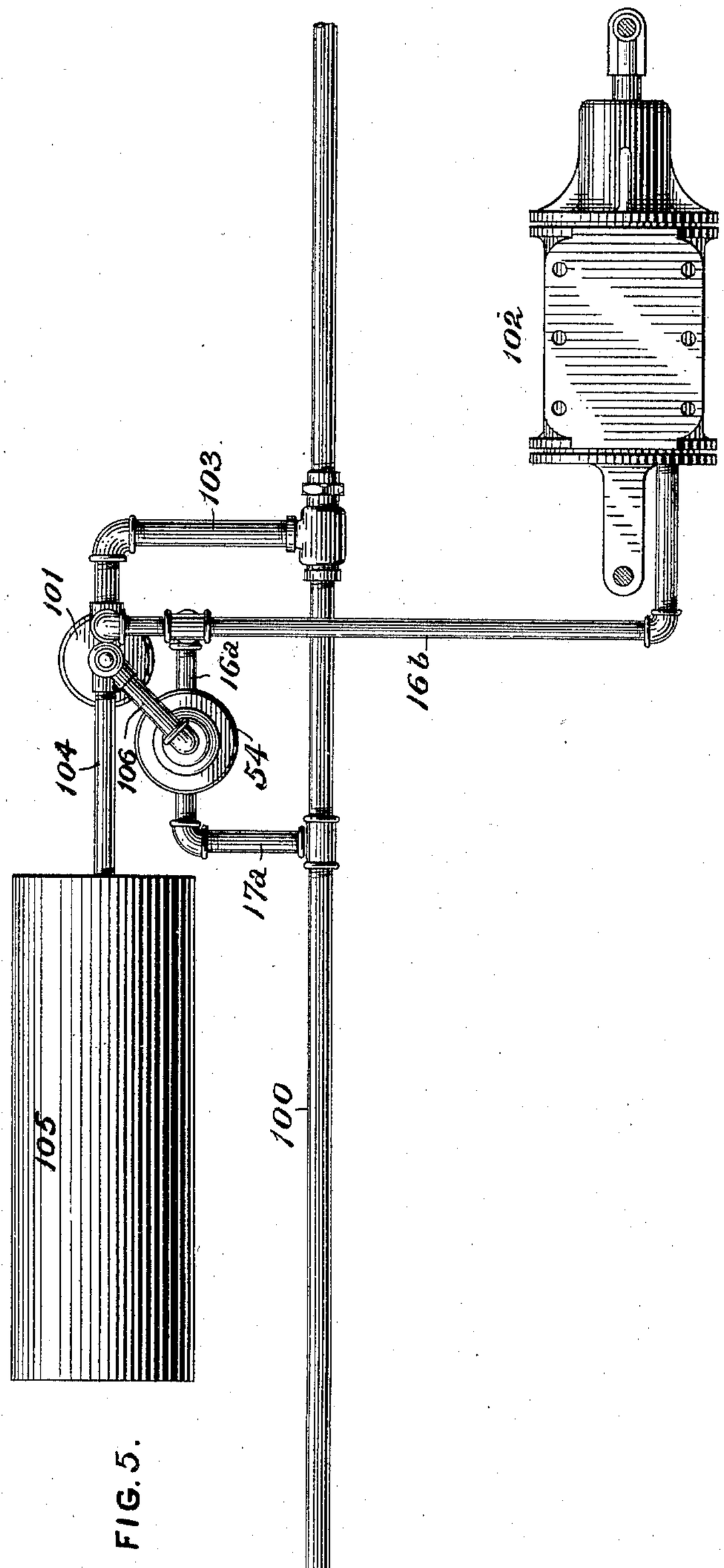

FIG. 5.

WITNESSES.

George H. Graves.
Edwin Tenney.

INVENTOR.

Geo. Westinghouse Jr.
by Johnson Dyer.
atty.

UNITED STATES PATENT OFFICE.

GEORGE WESTINGHOUSE, JR., OF PITTSBURG, PENNSYLVANIA.

AIR-BRAKE.

SPECIFICATION forming part of Letters Patent No. 448,827, dated March 24, 1891.

Original application filed October 1, 1887, Serial No. 251,195. Divided and this application filed January 20, 1888. Serial No. 261,370. (No model.) Patented in France December 3, 1887, No. 187,385; in Belgium December 3, 1887, No. 79,787; in Germany December 4, 1887, No. 46,949; in England January 6, 1888, No. 275; in Sweden January 24, 1888, No. 1,593; in Victoria March 1, 1888, No. 5,659; in South Australia March 5, 1888, No. 980; in Queensland March 7, 1888, No. 440; in New Zealand March 19, 1888, No. 2,869; in India April 17 and May 4, 1888, 42/557; in Austria-Hungary May 17, 1888, No. 4,702 and No. 16,292; in Spain May 18, 1888, No. 7,824, and in West Australia July 12, 1888.

To all whom it may concern:

Be it known that I, GEORGE WESTINGHOUSE, Jr., a citizen of the United States, residing at Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented or discovered a certain new and useful Improvement in Fluid-Pressure-Valve Mechanism, of which improvement the following is a specification.

My present application is a division of that filed by me October 1, 1887, Serial No. 251,195, and patented January 24, 1888, No. 376,837. Its subject-matter is likewise embodied in the following Letters Patent granted to me in foreign countries, to wit: in Great Britain January 6, 1888, No. 275; in France December 3, 1887, No. 187,385; in Belgium December 3, 1887, No. 79,787; in Germany December 4, 1887, No. 46,949; in Austria-Hungary May 17, 1888, No. 4,702 and No. 16,292; in Spain May 18, 1888, No. 7,824; in Sweden January 24 and November 1, 1888, No. 1,593; in India April 17 and May 4, 1888, No. 42-88/557; in New Zealand March 19, 1888, No. 2,869; in Queensland March 7 and July 25, 1888, No. 440; in South Australia March 5, 1888, No. 980; in Victoria March 1, 1888, No. 5,659, and in West Australia July 12, 1888.

The object of my invention is to provide means for effecting the rapid admission of fluid under pressure to a desired delivery-receptacle by means of and coincidently with a reduction of pressure in the receptacle of fluid-supply.

The improvement claimed is hereinafter fully set forth.

In the accompanying drawings, Figure 1 is a vertical central section through a valve mechanism embodying my invention; Fig. 2, a view in elevation and on a smaller scale, showing the same connected in operative relation with the train-pipe, brake-cylinder, auxiliary reservoir, and triple valve of the Westinghouse automatic air-brake system; Fig. 3, a plan or top view of the construction shown in Fig. 2; Fig. 4, a view in elevation of the members shown in Fig. 2, with my improved valve mechanism differently located; and Fig. 5, a plan or top view of the construction shown in Fig. 4.

In the practice of my invention I provide a valve chamber or casing 54, having a supply-passage 17, adapted to be connected to a pipe communicating with a receptacle of fluid under pressure and in which a fluid-pressure is maintained, and a delivery-passage 16, adapted to be connected with a pipe leading to any desired delivery-receptacle—as, for example, a cylinder fitted with a piston. Communication between the supply and delivery passages 17 and 16 is controlled by a valve 41, which, as illustrated, is of the slide type, but may be of any other preferred construction, and governs a port or ports 68, formed in a sleeve or bushing 82, fixed in the casing 54 and serving as a valve-seat. The valve 41 is connected to a valve-stem 64, and is normally held in position to close the ports 68 by a spring 72, bearing against a collar on the valve-stem and against the cap of the casing 54. A check or non-return valve 49, which opens in the direction of the delivery-passage 16, is interposed between said passage and the ports 68, and is normally seated to close communication between the ports and passage by a spring 50. One end of the chamber or casing 54, on the side of the valve 41 which is open to the supply-passage 17, constitutes part of a differential-pressure chamber 83, within which is fitted a movable piston or, as illustrated, a diaphragm 84, which divides the chamber 83 into two compartments and bears at its center upon the valve-stem 64. The outer compartment of the chamber 83, or that on the side of the piston or diaphragm 84 farthest from the supply and delivery passages 17 and 16, communicates by a free and open valve-actuating passage 85 with a special reservoir, which is charged with fluid under pressure equal to or approximating that in the supply-passage, for which purpose a small charging-passage 86 may be formed in the piston or diaphragm for the admission of fluid from the supply-passage 17 through the valve-

chamber 54; or the special reservoir may be charged through any other suitable pipe or passage communicating with a supply-source.

The special reservoir referred to is an auxiliary reservoir, which may be either the ordinary auxiliary reservoir of the brake mechanism in the case where the appliance is used in connection with a triple valve, or a small special reservoir when used as a special-emergency brake apparatus without a triple valve.

The valvular mechanism or appliance above described is shown in Figs. 2 to 5, inclusive, as connected in operative relation to the other members of an automatic-air-brake system of the Westinghouse type, in which it is applied, the specific details of which, being familiar to those skilled in the art and not forming in and of themselves part of my present invention, need not be fully and at length herein described.

Referring to Figs. 2 and 3, the supply-passage 17 of the valve-casing 54 is connected by a pipe 17^a with the main air or train pipe 100, to which air under pressure is supplied in the ordinary manner. The delivery-passage 16 is connected by a pipe 16^a to a pipe 16^b, leading to a triple valve 101, of the ordinary type, without quick-action attachment, and to a brake-cylinder 102, fitted with the usual piston and rod, from which, through the proper connections, the brakes are actuated. The train-pipe 100 is connected to the triple valve by a branch pipe 103, and the triple valve is connected by a pipe 104 to the auxiliary reservoir 105. The passage 85 above the diaphragm 84 of the valve-casing 54 is connected by a pipe 106 with the auxiliary reservoir 105. The auxiliary reservoir 105 is that ordinarily employed in the system, and in lieu of connecting the pipe 106 therewith it may be connected with a small special reservoir 105^a, as indicated in dotted lines in Fig. 3. When such special reservoir is employed, it may be charged through the small charging-passage 86. (Shown in Fig. 1.

Figs 4. and 5 illustrate the same combination of members, the arrangement differing only in the particular that the pipe 106 from the passage 85 of the valve-casing 54 leads into the slide-valve chamber of the triple valve 101, (which is continuously in communication with the auxiliary reservoir 105,) instead of leading directly into said reservoir, as in the prior instance.

In operation, there being an equilibrium of pressure on opposite sides of the diaphragm 84 by reason of the pressure admitted to the special reservoir, which communicates with the passage 85, the valve 41 will be normally maintained in position to close the ports 68. Upon a sudden and material reduction of pressure in the supply-pipe 17, such as is effected in an automatic-brake system in making emergency stops, and which, as is well known, is quicker and greater in degree than the normal reduction by which the movement of the triple-valve piston is effected in making ordinary or service stops, the excess of pressure in the chamber 83 on the face of the diaphragm 84, which is in communication with the valve-actuating passage 85, moves the diaphragm and with it the valve-stem 64 and valve 41 downwardly, and thereby opens the ports 68. Fluid from the supply-pipe 17, passing through said ports, unseats the check-valve 49 and passes through the delivery-passage 16 to the cylinder or other vessel communicating therewith in which it is desired that its pressure shall be exerted. The reinstatement of pressure in the supply-pipe 17 moves the diaphragm 84 in the opposite direction, causing the valve 41 to close the ports 68 and the reservoir communicating with the pipe 85 to be recharged. The check-valve 49, which closes in the direction of the delivery-passage 17, prevents the return of fluid from the cylinder or other receptacle with which said passage is in communication.

My improvement is applicable under various conditions in which the rapid opening of a fluid-supply valve is necessary or desirable, among which may be mentioned the application of fluid-pressure brakes quickly and with great force by the direct admission of air from the brake-pipe to the brake-cylinder. A valve mechanism substantially such as above described may be employed in connection with and supplementary to any preferred form of triple-valve mechanism adapted to effect the admission and release of air to and from a brake-cylinder in the manner well known in ordinary railroad practice, or may be used in connection with proper means for releasing the brakes independently of a triple valve, as a special or emergency brake apparatus.

In connection with my invention it will readily be seen that in so far as relates to the operation and function of the valvular mechanism shown and described in reducing fluid-pressure in the passage 17 and its connections, such operation and function are substantially performed when such fluid-pressure has passed over to or reached the passage 16, and in the respect referred to what then becomes of such fluid-pressure is comparatively immaterial. Hence the presence of a receptacle for the utilization of such fluid-pressure in the actuation of a piston, which, as before stated, is within the capacity of my invention, is not in all cases absolutely essential.

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

1. In a fluid-pressure-brake apparatus normally operated by a triple-valve device, the combination, with such an apparatus, of a valvular appliance having a casing provided with supply and discharge passages or connections, and a valve controlling an exhaust-port from the supply-passage to the discharge-passage for quickly releasing pressure in the supply-passage, said valve being actuated to open the exhaust-port by a greater than nor-

mal reduction of pressure in the supply-passage independently of the action of the triple-valve device, substantially as set forth.

2. The combination, with a triple-valve mechanism, of a discharge-valve controlling an exhaust-port from a supply-passage to a discharge-passage for quickly releasing the pressure in the supply-passage, said valve being actuated to open the exhaust-port by fluid-pressure in an auxiliary reservoir on reduction of pressure in the supply-passage below the normal degree in whatever position the slide-valve of the triple-valve mechanism may be brought by such reduction, substantially as set forth.

3. The combination, with a triple-valve mechanism, of a discharge-valve controlling an exhaust-port from a supply-passage to a discharge-passage for quickly releasing the pressure in the supply-passage, said valve being actuated to open the exhaust-port by fluid-pressure in an auxiliary reservoir on reduction of pressure in the supply-passage below the normal degree in whatever position the slide-valve of the triple-valve mechanism may be brought by such reduction, and an independent valve controlling the discharge-passage, substantially as set forth.

4. In a fluid-pressure-brake apparatus normally operated by a triple-valve device, the combination, with such an apparatus, of a valvular appliance having a casing provided with supply and discharge passages or connections, a valve controlling an exhaust-port from the supply-passage to the discharge-passage, and a second valve located between the supply and discharge passages and normally closing communication between said passages, said valve being adapted to be opened by the pressure in the supply-passage when the valve first specified is opened by a reduction of pressure in the supply-passage, substantially as set forth.

In testimony whereof I have hereunto set my hand.

GEO. WESTINGHOUSE, JR.

Witnesses:
J. SNOWDEN BELL,
F. E. GAITHER.