

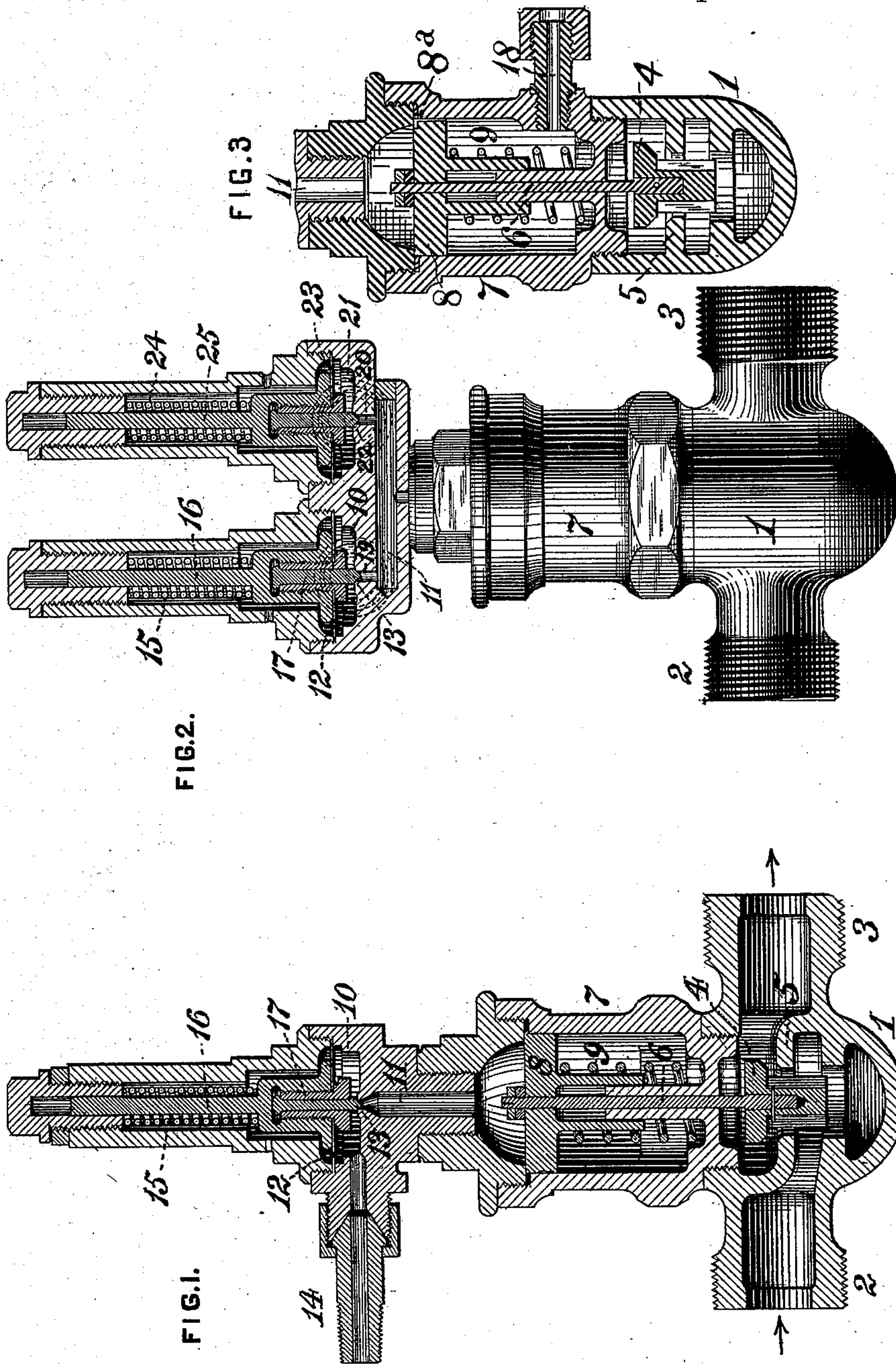
(No Model.)

G. WESTINGHOUSE, Jr.

AUTOMATIC PUMP GOVERNOR FOR BRAKE MECHANISMS.

No. 401,915.

Patented Apr. 23, 1889.



Witnesses;
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UNITED STATES PATENT OFFICE.

GEORGE WESTINGHOUSE, JR., OF PITTSBURG, PENNSYLVANIA.

AUTOMATIC PUMP-GOVERNOR FOR BRAKE MECHANISMS.

SPECIFICATION forming part of Letters Patent No. 401,915, dated April 23, 1889.

Application filed January 2, 1889. Serial No. 295,206. (No model.)

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 Automatic Pump-Governors for Brake Mechanisms, of which improvement the following is a specification.

My invention relates to devices by which the supply of steam to the air-compressing pump of a fluid-pressure-brake mechanism is automatically cut off when the brake-pipe or the main air-reservoir pressure exceeds a determined limit, and restored when the pressure falls below said limit, in order to prevent such an excess of pressure as would tend to cause the sliding of the wheels, and to obviate the unnecessary operation of the pump, as well as to provide for the accumulation of such surplus of pressure in the main reservoir when the brakes are applied to the wheels as will insure their prompt and certain release when required.

My present invention is an improvement upon that for which Letters Patent of the United States, No. 240,062, were granted and issued to me under date of April 12, 1881; and its object is to effect a simplification of construction and attain a higher degree of effectiveness in operation than has been found uniformly practicable under the specific construction set forth in said patent.

The improvement claimed is hereinafter fully set forth.

In the accompanying drawings, Figure 1 is a central section through a pump-governor embodying my invention; Fig. 2, a view, partly in elevation and partly in section, illustrating the application of an additional air-pressure valve; and Fig. 3, a section through the valve-casing and piston-chamber in a plane at right angles to that of Figs. 1 and 2.

In the practice of my invention I provide a valve-casing or body, 1, having on its opposite sides nozzles or passages 2 3, which are adapted to be connected, respectively, to a pipe leading from the boiler and to a pipe leading to the valve-chest of the steam-cylinder of the air-compressing pump. Communication between the supply and delivery

nozzles 2 3 is controlled by a regulating-valve, 4, which is of the unbalanced or single puppet-type, and is adapted to seat upon a face formed on the delivery side of an opening in a partition, 5, extending across the valve-chest between the nozzles 2 3. The regulating-valve is thus subject to be unseated or opened by the pressure of steam on its lower side, except when positively held to its seat, as presently to be described. The stem 6, to which the valve 4 is secured, passes through an opening in which it fits truly into a piston-chamber, 7, secured to the valve-casing 1, and has fixed upon its opposite end a piston, 8, fitting the bore of the chamber 7, and having a range of reciprocating movement therein equal to the lift of the regulating-valve 4. A spring, 9, bears against the piston 8 and against the end of the piston-chamber adjacent to the valve 4, the tension of said spring upon the piston acting, in conjunction with the supply steam-pressure and as transmitted through the positive connection of the latter to the valve, to raise the valve to its full opening, except when overcome by the exertion of greater pressure upon the opposite side of the piston.

A pressure-chamber, 10, secured to the top of the piston-chamber 7, communicates therewith by a port or passage, 11, leading into the piston-chamber on the side of the piston opposite the spring 9. A movable abutment, 12, by preference a flexible diaphragm, as shown, is fitted to work in the chamber 10, and is connected to an air-pressure valve, 13, which controls the port 11, and by the elevation and depression of the abutment 12 establishes and cuts off, respectively, communication between said port and a pipe or passage, 14, to which is connected a pipe leading to the main air or brake pipe. A spring, 15, bears against a shoulder on the stem 16 of the abutment 12, and against an adjustable nut or other suitable stop, the tension of said spring being such as to exert upon the abutment a pressure equal to the maximum which is to be maintained in the brake-pipe, which pressure acts to force the abutment downwardly and seat the valve 13 on the port 11. The stem of the valve 13 is connected to the abutment-stem by a tubular nut, 17, a suffi-

cient amount of play being allowed to the valve to insure its accurate seating by the downward movement of the abutment 12. An exhaust-pipe, 18, which, being in a plane at right angles to that of the section Fig. 1, as shown in Fig. 3, is connected to the piston-chamber 7, leading therefrom to the atmosphere at a point below the piston 8, when the latter is at the lower limit of its traverse, and a small leakage-groove, 8^a, may, if desired, be formed in the piston to facilitate the passage of air past the same to the exhaust-port.

In operation the parts being in the positions shown in Fig. 1, the valve 4, which is held fully open by the pressure of the spring 9 upon the piston 8, and by the supply pressure, admits steam from the boiler through the nozzle 3 to the steam-cylinder of the air-pump, which is thereby actuated to effect the compression of air for charging the main air-reservoir and brake-pipe to the required pressure. As soon as the limit of pressure in the brake-pipe has been exceeded, the excess, acting through the brake-pipe connection 14 on the abutment 12, overcomes the downward pressure of the spring 15 on the abutment and raises the latter, thereby opening the air-pressure valve 13 and admitting air from the brake-pipe through the port 11 to the upper side of the piston 8. The air-pressure thus admitted, overcoming the tension of the spring 9 and the unbalanced upward steam-pressure on the regulating-valve, forces the piston 8 and connected regulating-valve 4 downwardly, seating the valve 4, and thereby cutting off the supply of steam to the pump.

Upon a decrease of pressure in the brake-pipe below the determined maximum, as occasioned by the discharge of air in the application of the brakes or from any other cause, the then greater pressure of the spring 15 on the abutment 12 moves the latter downwardly, seating the valve 13 and cutting off the air supply to the piston 8. The air above said piston thereupon leaks past the same and escapes through the exhaust-pipe 18, and the spring 9, together with the steam-pressure on the lower side of the regulating-valve 4, raises the piston and reopens the regulating-valve, by which the supply of steam to the pump is renewed and continued until, by the operation of the latter, the brake-pipe pressure is again raised to the determined maximum, upon excess of which it is cut off, as before explained.

The construction illustrated in Fig. 2 is similar to that above described, except in the particular that an additional air-pressure valve, actuated by a movable abutment subject to the pressure in the main air-reservoir, is provided. The air-pressure port 11 is in this construction provided with two inlet-passages, 19, 20, one of which, 19, leads to and is governed by a valve, 13, connected to an abutment, 12, which works in a chamber, 10, having a connection leading to the brake-pipe, and is subject, on the side opposite the valve, to the ten-

sion of a spring, 15, as before described. The other inlet-passage, 20, communicates with a chamber, 21, having a connection leading to the main air-reservoir, and is controlled by a valve, 22, connected, similarly to the valve 13, to a movable abutment, 23, fitted to work in the chamber 21 and pressed downwardly therein by a spring, 24, the tension of which is adjusted to impart to the abutment a corresponding pressure per square inch to the maximum which is desired to be maintained in the main air-reservoir, which pressure exceeds in a determined degree the maximum in the brake-pipe, in order to provide a surplus pressure sufficient to insure the release of the brakes.

The operation in opening and closing the regulating-valve by diminution or excess, respectively, of the determined maximum pressure in the brake-pipe or in the main air-reservoir is in each case similar to that first described. The provision of the supplemental air-pressure valve and abutment subject to main air-reservoir pressure is particularly advantageous in preventing the main air-reservoir from being charged with an undue or excessive pressure during the periods in which it is out of communication with the brake-pipe, and during which, consequently, the regulating action of the air-pressure valve and abutment first described would not be exerted, as there would be no accretion of pressure in the brake-pipe.

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

1. The combination of a valve-body having supply and delivery connections, an unbalanced regulating-valve controlling communication between said connections and having its opening movement in the direction of delivery, a piston positively connected to the regulating-valve and working in a chamber secured to the valve-body, a spring exerting pressure upon said piston conjointly with the unbalanced supply-pressure on the regulating-valve, a movable abutment working in a chamber having a connection communicating with a brake-pipe, an air-pressure valve connected to said abutment and controlling an air-supply port leading from the chamber thereof to the piston-chamber, a spring exerting pressure on said abutment in opposite direction to the brake-pipe pressure thereon, and an exhaust-port leading out of the piston-chamber, substantially as set forth.

2. The combination of a valve-body having supply and delivery connections, an unbalanced regulating-valve controlling communication between said connections and having its opening movement in the direction of delivery, a piston positively connected to the regulating-valve and working in a chamber secured to the valve-body, a spring exerting pressure upon said piston conjointly with the unbalanced supply-pressure on the regulating-valve, two movable abutments working in chambers having connections communicating,

respectively, with a brake-pipe and with a
main air-reservoir, two air-pressure valves
each connected to one of said abutments and
controlling an air-supply port leading from
5 the chamber thereof to the piston-chamber,
springs exerting pressure on the abutments
in opposite direction to the brake-pipe and
reservoir-pressure thereon, and an exhaust-

port leading out of the piston-chamber, sub-
stantially as set forth. 10

In testimony whereof I have hereunto set
my hand.

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Witnesses:

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W. D. UPTGRAFF.