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J. G. McCARTHY.

PRESSURE REGULATOR FOR BRAKE APPARATUS.

(Application filed Sept. 8, 1900.)

(No Model.)

2 Sheets—Sheet 1.

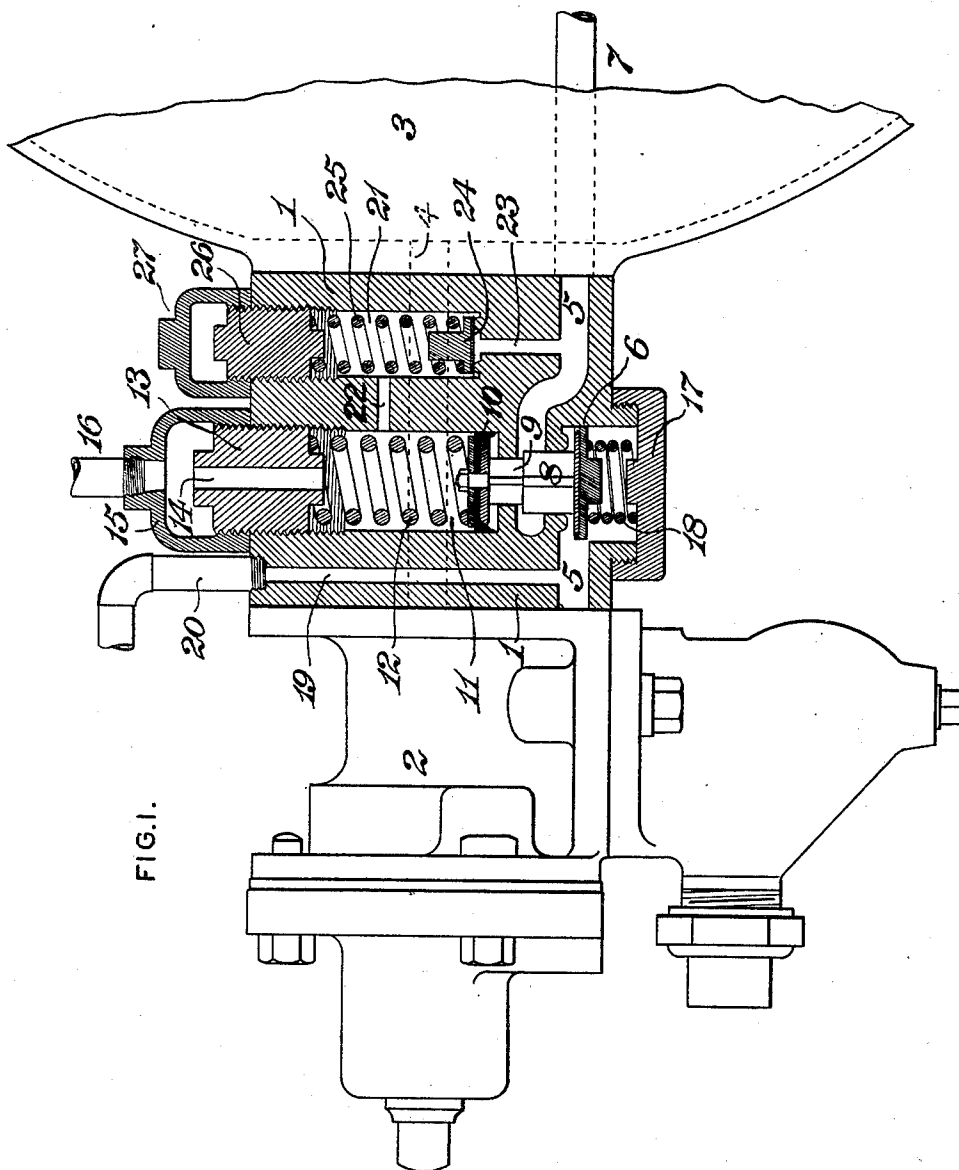


FIG. 1.

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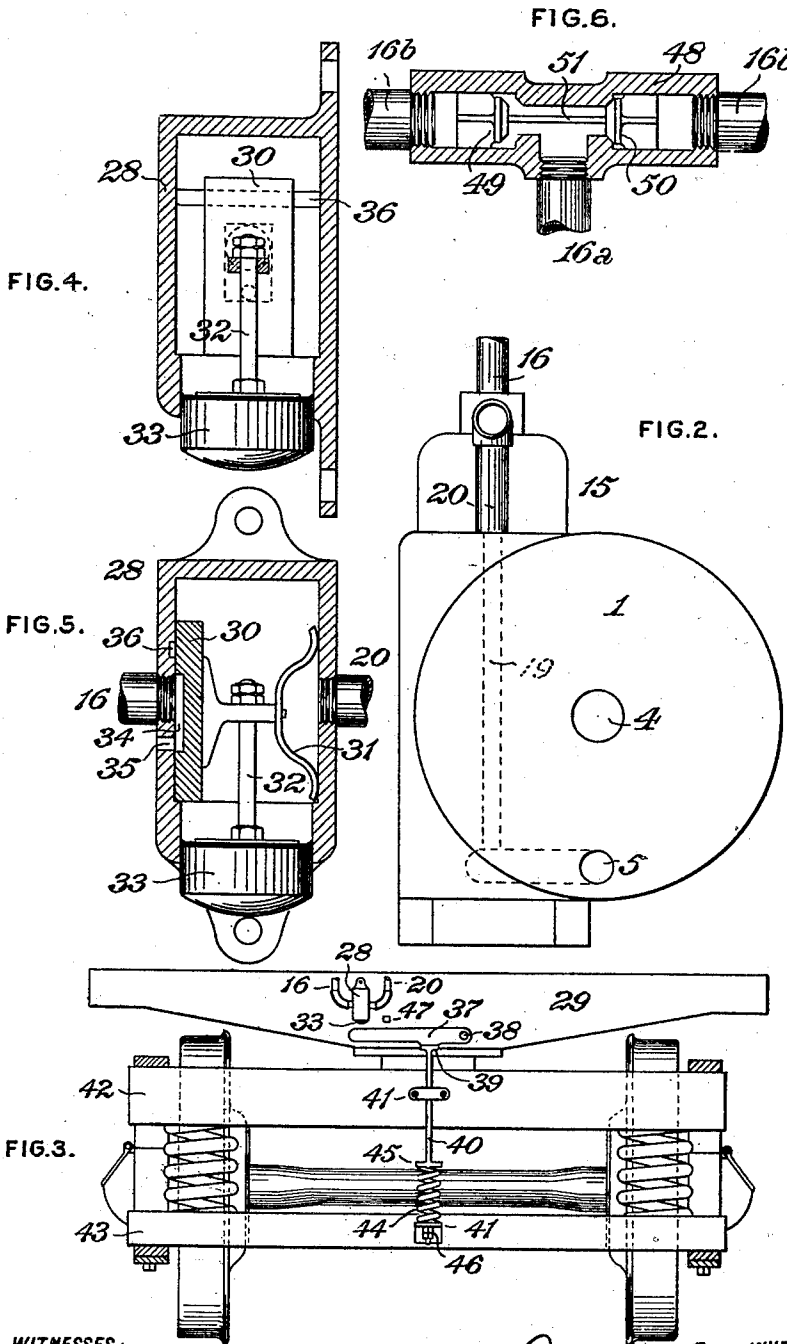
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2 Sheets—Sheet 2.



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PRESSURE-REGULATOR FOR BRAKE APPARATUS.

SPECIFICATION forming part of Letters Patent No. 668,880, dated February 26, 1901.

Application filed September 8, 1900. Serial No. 29,386. (No model.)

To all whom it may concern:

Be it known that I, JAMES G. MCCARTHY, of the borough of Brooklyn, in the city and State of New York, have invented a certain new and useful Improvement in Pressure-Regulators for Brake Apparatus, of which improvement the following is a specification.

The object of my invention is to provide means for automatically regulating the degree of pressure admitted to the brake-cylinders of a fluid-pressure brake apparatus in effecting applications of the brakes in order that the same may be greater or less in such relation to the loaded and the light weight of the car, respectively, that the braking pressure shall be fully and effectively exerted without liability to wheel-sliding.

The improvement claimed is hereinafter fully set forth.

In the accompanying drawings, Figure 1 is a view, partly in elevation and partly in section, showing the triple valve and portion of the auxiliary reservoir of an automatic air-brake apparatus and an intermediate regulating-valve casing and connections in accordance with my invention; Fig. 2, an end view of the regulating-valve casing as seen from the left; Fig. 3, a transverse section through a car frame and truck, showing in elevation the mechanism for actuating the controlling-valve by the load of the car; Figs. 4 and 5, vertical central sections at right angles one to the other through the controlling-valve casing, and Fig. 6 a central section through a check-valve device for providing for regulation of brake-cylinder pressure in cars which may be loaded at one end only.

In the practice of my invention I provide a regulating-valve casing or chest 1, the opposite ends of which are faced off to make tight joints with the triple valve 2 and the auxiliary reservoir 3, respectively, of an automatic air-brake car equipment, between which members the regulating-valve casing is interposed and to which it is connected. A port 4 extends through the casing 1 from the auxiliary-reservoir connection of the triple valve to the auxiliary reservoir, and a port 5, controlled by a regulating-valve 6, extends through the casing from the brake-cylinder connection of the triple valve to a pipe 7,

leading to the brake-cylinder. The regulating-valve 6 is adapted to seat upwardly against a valve-face in a partition extending across the brake-cylinder port 5 and is provided with wings 8 on its upper side, which serve both to guide the valve in its movements and to form an abutment which bears against wings 9 on the lower side of a piston 10, which is suitably packed and is fitted to move in line axially with the regulating-valve in a piston-chamber 11 in the valve-casing 1. The wings 9 of the piston 10 pass through and fit truly in the bore of a central port or passage in the lower end of the piston-chamber 11, and said chamber is thus continuously in open communication at its lower end with the brake-cylinder port 5 through the spaces between the wings 9 in order to permit brake-cylinder pressure to act on the lower side of the piston 10 in an application of the brakes, as presently to be described. A spring 12 bears on the top of the piston 10 and bears at its opposite end against an adjusting-nut 13, engaging a screw-thread in the upper end of the piston-chamber and having a port 14 extending through it. The upper end of the piston-chamber is closed by a cap 15, to which is connected a pipe 16, leading to a controlling-valve casing 28, to be presently described. The regulating-valve 6 is inserted and removed through an opening in the casing closed by a cap 17, and a spring 18 bears on said cap and on the lower side of the valve, with a tendency to bring the valve to and hold it on its seat. A port 19 leads through the casing 1 from the brake-cylinder port 5 between the triple-valve end of said port and the regulating-valve to a connection with a pipe 20, leading to the controlling-valve casing 28 before referred to.

An auxiliary-valve chamber 21 is preferably formed in the casing 1 adjacent to the piston-chamber 11, with which it is connected by a continuously-open port 22, and a port 23, controlled by a downwardly-seating auxiliary valve 24, connects the chamber 21 with the brake-cylinder port 5 between the regulating-valve and the brake-cylinder-connecting pipe 7. The auxiliary valve 24 is normally held to its seat by a spring 25, the tension of which may be regulated as desired by an adjust-

ing-nut 26 engaging a thread in the upper end of the chamber 21, and the upper end of said chamber is closed by a cap 27.

The controlling-valve casing 28 is secured 5 to one of the body-bolsters 29 of the car on which the brake apparatus is applied, and the pipes 16 and 20, leading from the piston-chamber 11 and port 19, respectively, lead into it on opposite sides. The end of the pipe 10 20 is continuously open to the interior of the casing 28, while communication between the pipe 16 and the interior of the casing is governed by a controlling-valve 30, which is held up to a valve-face on the side of the casing 15 to which the pipe 16 is connected by a spring 31 and is fixed to a stem 32, carrying a piston 33, which is suitably packed to make a tight joint with the wall of a cylindrical opening in the bottom of the casing through 20 which it passes and has a bearing-face on its lower end exterior to said opening. If desired, a spring may be applied to the valve or its stem in order to return it to the normal position shown in Fig. 5. A recess or cavity 25 34 is formed in the face of the valve 30, through which recess the pipe 16 may be caused to communicate either with a port 35, leading to the atmosphere, or with a port 36, opening at its ends into the casing, accordingly as the valve 30 may stand at a lower or 30 a higher level on the valve-face.

A regulating-lever 37 is pivoted by a pin or bolt 38 to the body-bolster 29, below and adjacent to the lower bearing-surface of the 35 piston 33. The lever 37 abuts intermediately of its ends on a bearing 39, fixed to the upper end of a rod or stem 40, which is fitted to move vertically in guides 41, fixed to the truck-bolster 42 and spring-plank 43. The 40 bearing 39 is held up to the lever 37 by a spring 44, abutting against a stop 45 on the stem 40 and against the lower guide 41, and the tension of the spring 44 may be adjusted as desired by nuts 46 engaging a thread on 45 the lower end of the stem 40. The parts are so adjusted that when the car is light or unloaded the lever 37 will stand a short distance below the piston 33; but when the car-body is moved down upon the springs of the truck 50 by the car being loaded to a substantial degree—as, say, to one-half or more of its capacity—the lever 37 and piston 33 will be brought into contact and the piston 33 and connected controlling-valve 30 will be raised 55 in the casing 28. A stop 47 may be fixed to the body-bolster 29 to limit the upward traverse of the lever 37.

Fig. 6 illustrates a check-valve mechanism designed for use in the application of my improvement upon cars which may in service 60 be loaded at and near one end only, whereby the car-body would be depressed at the loaded end and would stand at a higher level at the opposite end. In such case two controlling- 65 valve casings 28 are preferably employed, one being located on each of the body-bolsters 29 in proper relation to a regulating-lever 37 and

actuating mechanism, as before described. A pipe 20 leads from the port 19 of the regulating-valve casing to each of the controlling- 70 valve casings and communicates continuously therewith, as before described. Pipes 16^b are connected to the opposite sides of the controlling-valve casings, opening thereinto 75 beneath the recesses 34 of the controlling-valves 30, similarly to the pipes 16, before described, and are connected at their opposite ends to the opposite ends of a check- 80 valve casing 48, in which are fitted two inwardly-seating check-valves 49 50, which are connected by a stem 51. A pipe 16^a communicates with the interior of the casing 48 between the check-valves 49 and 50, and the 85 opposite end of said pipe is connected to the cap 15 of the piston-chamber 11, with which the pipe 16^a communicates similarly to the pipe 16, before described. It will be seen that application of pressure in either of the pipes 16^b will cause the adjacent check-valve 49 or 50 to be seated and that upon the applica- 90 tion of pressure in the pipe 16^a air under pressure will pass the unseated check-valve and into the adjacent pipe 16^b.

In the operation of a brake apparatus embodying my invention the auxiliary reservoirs 95 are charged through the ports 4 and the triple-valve pistons moved to release position in the ordinary manner. In this position, assuming the car to be light or unloaded, the piston 10 will be subjected to atmospheric 100 pressure on opposite sides and will be pressed down and held in its lowest position by the spring 12, which is of greater tension than the closing-spring 18, and the regulating- 105 valve will be held unseated by the end contact of the wings 9 and 8, free communication being thereby established between the brake-cylinder port of the triple valve and the brake-cylinder through the port 5. Upon the 110 movement of the triple-valve piston and slide valve to service or to emergency position, effected by a reduction of train-pipe pressure in the usual manner, air will pass from the auxiliary reservoir to the brake-cylinder through the triple valve, the port 5, and the pipe 7 and 115 the brakes will be applied. Air will also pass into and fill the controlling-valve casing 28, through the port 19 and pipe 20. As soon as the pressure in the brake-cylinder reaches the limit considered to be proper for the light 120 weight of the car, which is determined by previous adjustment of the tension of the spring 12, which bears on the piston 10, said piston will be raised by the brake-cylinder pressure acting on its lower side, and its bearing on the 125 regulating-valve 6 being thereby released said valve will be closed by the spring 18, and the excess of air-pressure on the lower side of the valve and further supply of air to the brake-cylinder will be cut off. In the event of leakage 130 of the regulating-valve after its closure when the auxiliary valve 24 is employed excess of brake-cylinder pressure will be released by the unseating of the auxiliary valve, the ex-

cess air being thereupon discharged through the port 22 into the piston-chamber 11 and thence through the pipe 16, valve-cavity 34, and port 35 to the atmosphere. During the periods in which the car is light or unloaded the controlling-valve 30 will be held in its lower position, as shown in Figs. 4 and 5, by gravity or by gravity and brake-cylinder pressure combined, as the case may be, thereby maintaining open communication between the piston-chamber 11 on the upper side of the piston 10 and the atmosphere and providing for the closure of the regulating-valve when the desired limit of brake-cylinder pressure has been reached, as above described. When, however, the car-body is depressed by a load, the consequent lowering of the body-bolster 29 and the connected controlling-valve casing 28 and regulating-lever 37 brings the free end of said lever into contact with the lower bearing of the piston 33, which through the pressure of the spring 44 and stem 40 on the lever 37 raises the free end of said lever, and consequently raises the piston 33 and connected controlling-valve 30. Communication between the pipe 16 and atmospheric discharge-port 35 is thereby cut off and communication between the pipe 16 and the pipe 20 and ports 19 and 5 is established through the valve-cavity 34, the port 36, and the interior of the valve-casing 28. Under the conditions last above stated when air is admitted from the auxiliary reservoir to the brake-cylinder to effect an application of the brakes it is coincidentally admitted through the port 19 and the then communicating pipes 16 and 20 to the piston-chamber 11 on the upper side of the piston 10. Said piston being then and thereby subject to an equilibrium of brake-cylinder pressure on its opposite sides is held in its lowest position in the piston-chamber 11 by the spring 12, its wings 9 bearing on the wings 8 of the regulating-valve 6 and maintaining said valve unseated, thereby permitting the maximum braking pressure deliverable by the triple valve to be admitted to and maintained in the brake-cylinder in an application of the brakes. If the auxiliary valve 24 is employed, it is also subject under the above conditions to an equilibrium of brake-cylinder pressure on its opposite sides and is held to its seat by its spring 25.

Where, by reason of the liability of the car being loaded at one of its ends only, it is deemed desirable to employ a controlling-valve chamber and its accessories at each end of the car, the operation either when the car is unloaded or is loaded substantially equally throughout its length is similar to that before described. When the car is loaded at either one of its ends and light at the other, the controlling-valve at the loaded end will be raised by the adjacent regulating-lever by the depression of the car-body, and communication will be established between the brake-cylinder port 5 and connected port 19 and the check-valve 49 or 50, as the case may be, at the ad-

jacent end of the valve-casing 48, through the connected pipe 16^b, the controlling-valve casing with which it communicates, and the pipe 20 connected thereto. The check-valve 49 or 50 will thereupon be closed by the brake-cylinder pressure, and the controlling-valve at the loaded end of the car will consequently fail to admit pressure to the piston-chamber 11, so that the regulating-valve 6 will be closed and the admission of air to the brake-cylinder cut off in the manner before described when the limit of pressure determined for braking the unloaded car has been admitted to the brake-cylinder.

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

1. In a fluid-pressure brake apparatus, the combination, with a triple valve, auxiliary reservoir, and brake-cylinder, of a regulating-valve controlling communication between the triple valve and brake-cylinder, a piston which is normally exposed to atmospheric pressure on opposite sides, a spring abutting against the piston, intermediate bearing members through which the regulating-valve is normally held unseated by the pressure of the spring, a port through which brake-cylinder pressure is exerted upon the piston, in an application of the brakes, in opposite direction to the pressure of the spring, and a closing-spring bearing on the regulating-valve.

2. In a fluid-pressure brake apparatus, the combination, with a triple valve, auxiliary reservoir, and brake-cylinder, of a regulating-valve controlling communication between the triple valve and the brake-cylinder, a piston which is normally exposed to atmospheric pressure on opposite sides, a spring abutting against the piston, means for adjusting the tension of the spring, intermediate bearing members through which the regulating-valve is normally held unseated by the pressure of the spring, a port through which brake-cylinder pressure is exerted upon the piston, in an application of the brakes, in opposite direction to the pressure of the spring, and a closing-spring bearing on the regulating-valve.

3. In a fluid-pressure brake apparatus, the combination, with a triple valve, auxiliary reservoir, and brake-cylinder, of a regulating-valve controlling communication between the triple valve and brake-cylinder, a piston which normally bears on the regulating-valve and holds the same unseated, means for releasing said piston from its bearing on the regulating-valve by the action of brake-cylinder pressure in an application of the brakes, means for seating the regulating-valve when the bearing of the piston thereon is released, and an auxiliary valve controlling communication between the brake-cylinder and the atmosphere, for relieving excess of brake-cylinder pressure after the seating of the regulating-valve.

4. In a fluid-pressure brake apparatus, the

combination, with a triple valve, auxiliary reservoir, and brake-cylinder, of a regulating-valve controlling communication between the triple valve and brake-cylinder, a piston, normally exposed to atmospheric pressure on opposite sides, which bears on the regulating-valve and holds the same unseated, and means, actuated by the pressure of a load on the car on which the apparatus is applied, for establishing an equilibrium of brake-cylinder pressure on opposite sides of the piston in an application of the brakes.

5. In a fluid-pressure brake apparatus, the combination, with a triple valve, auxiliary reservoir, and brake-cylinder, of a regulating-valve controlling communication between the triple valve and brake-cylinder, a piston, normally exposed to atmospheric pressure on opposite sides, which bears on the regulating-valve and holds the same unseated, a controlling-valve governing, in one position, communication between the atmosphere and the chamber of the piston, and, in another position, governing communication between said chamber and the brake-cylinder, and means, actuated by the pressure of a load on the car on which the apparatus is applied, for imparting movement to the controlling-valve.

6. In a fluid-pressure brake apparatus, the combination, with a triple valve, auxiliary reservoir, and brake-cylinder, of a regulating-valve controlling communication between the triple valve and brake-cylinder, a piston, normally exposed to atmospheric pressure on opposite sides, which bears on the regulating-valve and holds the same unseated, a controlling-valve normally governing communication between the atmosphere and the chamber of the piston, and governing, when moved from normal position, communication between said chamber and the brake-cylinder, means, actuated by the pressure of a load on the car on which the apparatus is applied, for moving the controlling-valve into position to establish said last-named communication, and means for returning the controlling-valve to normal position.

7. In a fluid-pressure brake apparatus, the combination, with a triple valve, auxiliary reservoir, and brake-cylinder, of a regulating-valve controlling communication between the triple valve and brake-cylinder, a piston, normally exposed to atmospheric pressure on opposite sides, which bears on the regulating-valve and holds the same unseated, a controlling-valve casing fixed to a body-bolster of the car on which the apparatus is applied, a controlling-valve fitted to traverse in said casing, said controlling-valve governing, in one position, communication between the atmosphere and the chamber of the piston, and, in another position, governing communication between said chamber and the brake-cylinder, a stem fixed to the controlling-valve and extending outwardly through the casing thereof, an outer bearing-face carried by said stem, a regulating-lever pivoted to the body-

bolster and having its free end in position to be brought into contact with said bearing-face, a stem fitted to traverse in guides on the spring-plank or spring-seat of the truck adjacent to the body-bolster, and having a bearing abutting against the regulating-lever, and a spring abutting against a stop on the stem and against one of the fixed guides thereof.

8. In a fluid-pressure brake apparatus, the combination, with a triple valve, auxiliary reservoir, and brake-cylinder, of a regulating-valve casing fitting between and connected to the triple valve and auxiliary reservoir, a brake-cylinder port in said casing connecting the triple valve and brake-cylinder, a regulating-valve controlling said port, a piston-chamber in the casing, communicating with the brake-cylinder port between the regulating-valve and brake-cylinder, a piston fitted in said chamber and abutting against the regulating-valve, a spring bearing on said piston, a closing-spring bearing on the regulating-valve in opposite direction to the spring of the piston, a controlling-valve casing fixed to a body-bolster of the car on which the apparatus is applied, a pipe leading from the piston-chamber to the controlling-valve casing, a continuously-open pipe leading from the brake-cylinder port, between the triple valve and the regulating-valve, to the controlling-valve casing, a controlling-valve fitted to traverse in the controlling-valve casing and controlling communication between the piston-chamber pipe and an atmospheric discharge-port and between said pipe and the brake-cylinder-port pipe, respectively, a stem fixed to the controlling-valve and extending outwardly through the casing thereof, an outer bearing-face carried by said stem, a regulating-lever pivoted to the body-bolster and having its free end in position to be brought into contact with said bearing-face, a stem fitted to traverse in guides on the spring-plank or spring-seat of the truck adjacent to the body-bolster, and having a bearing abutting against the regulating-lever, and a spring abutting against a stop on the stem and against one of the fixed guides thereof.

9. In a fluid-pressure brake apparatus, the combination with a triple valve, auxiliary reservoir, and brake-cylinder, of a regulating-valve controlling communication between the triple valve and brake-cylinder, a piston, normally exposed to atmospheric pressure on opposite sides, which bears on the regulating-valve and holds the same unseated, two controlling-valve mechanisms, substantially as set forth, each located on one of the body-bolsters of the car on which the apparatus is applied, and having its controlling-valve actuated by the pressure of a load on the adjacent end of the car, continuously-open pipes connecting the casings of said controlling-valves with the brake-cylinder port of the triple valve, a check-valve casing or chamber connected centrally by a pipe to the chamber of the regulating-valve piston, pipes each

connecting one end of the check-valve chamber with one of the controlling-valve casings and governed by the valve thereof, and two connected check-valves, working in the check-valve chamber, and controlling the end pipes thereof, the check-valve of each end pipe being adapted to be seated, and the connected

check-valve unseated, upon the admission of pressure to said end pipe by the controlling-valve of the casing to which it is connected. 10
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