No. 822,073. PATENTED MAY 29, 1906.

A. I. PERRY.

AIR BRAKE SYSTEM.

APPLICATION FILED MAY 26, 1905.

FIG. 1

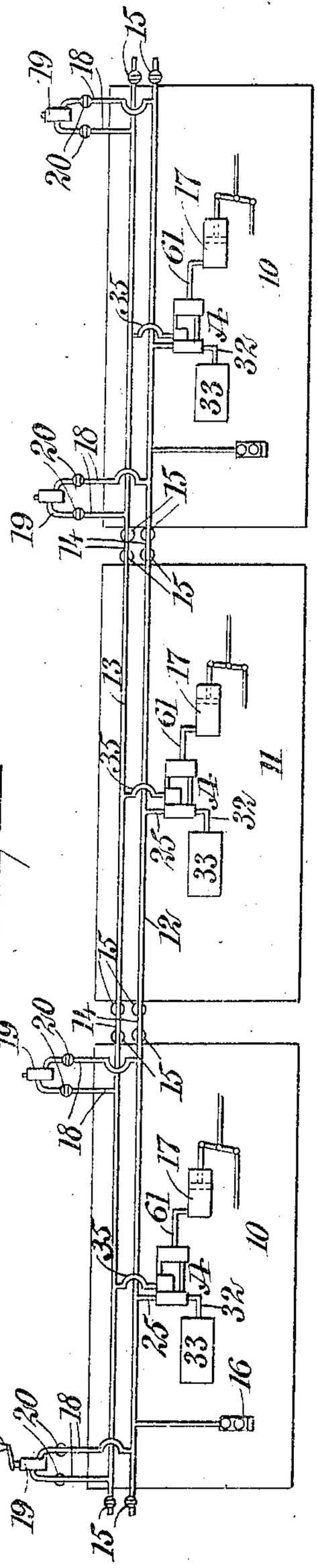
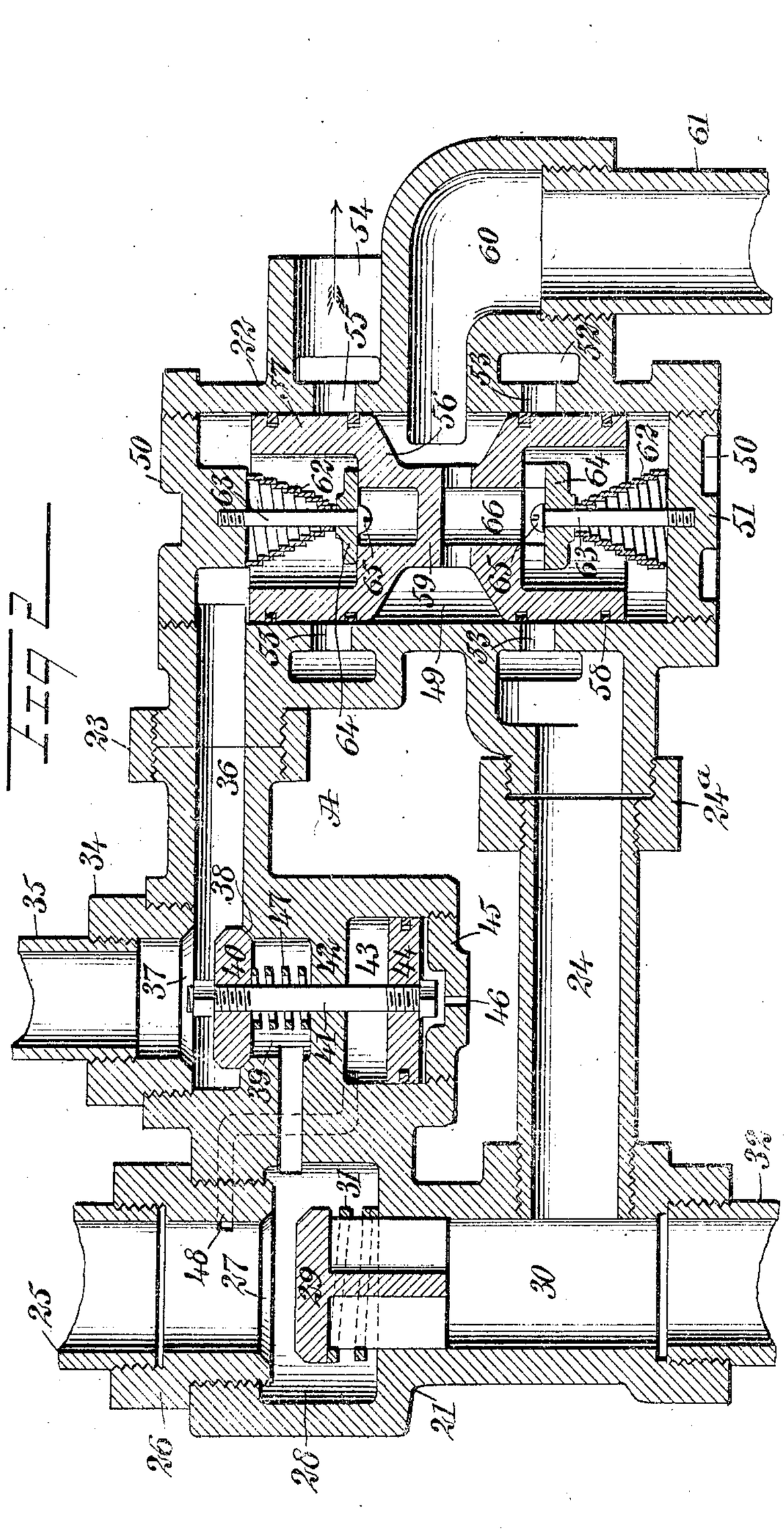


FIG. 2



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AIR-BRAKE SYSTEM.

No. 822,073. Specification of Letters Patent. Patented May 29, 1906.

Application filed May 26, 1905. Serial No. 262,363.

To all whom it may concern:

Be it known that I, ARTHUR IRVING PERRY, a citizen of the United States, and a resident of the city of New York, borough of Brooklyn, in the county of Kings and State of New York, have invented a new and Improved Air-Brake System, of which the following is a full, clear, and exact description.

My invention relates to air-brake systems, and more particularly to those in which the braking action is to be effective throughout a train consisting of a plurality of cars. Its principal objects are to provide means for simultaneously applying the brakes with a definite and controllable pressure, and for securing an automatic application if the train parts.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar characters of reference indicate corresponding parts in both the views.

Figure 1 is a diagrammatic view of a train having my invention applied thereto, and Fig. 2 is a central vertical longitudinal section through the controlling-valve.

I have here illustrated three cars, (designated as 10, 10, and 11,) the first two of which are equipped with operating mechanism for the brakes, while the last is a trailer. The cars are connected by a train or supply pipe 12, which is paralleled by a controlling-pipe 13. Hose-sections 14 join the pipes between the cars, and at the ends of these, in the main portions of the two pipes, are cocks 15, those at the ends of the pipes being closed, while the others are open. As the mechanism upon the cars 10 may be identical, but one will be described in detail.

Mounted upon the car is a compressor 16, adapted to maintain in the system a substantially uniform pressure and which is connected to the supply-pipe. The car also carries a brake-cylinder 17, associated with which is the usual brake mechanism for coöperation with the car-wheels. The supply-pipe and controlling-pipe are connected by pipes 18 with a primary controlling-valve 19, having an operating-lever 19ª. The connection is preferably through cocks 20, to permit any valve in the system to be cut out. This valve 19 is of such a character that it will reduce the pressure in the supply-pipe to any desired extent within proper limits in the controlling-pipe and maintain it constant until the operator desires to vary it. A suitable device for this purpose is the valve which is the subject of my application, filed December 21, 1904, Serial No. 237,809.

Mounted upon each car adjacent to the brake-cylinder is a secondary automatic controlling-valve A, the casing of which is in two sections 21 and 22, these having threaded portions at their adjacent sides near the top and bottom, which are connected, respectively, by a coupling 23 and a nipple 24 and coupling 24ª. The section 21 has at its upper side an opening to receive a pipe 25, leading from the supply-pipe, the connection being shown as made through a reducer 26, which is provided with a valve-seat 27. Just inside this seat is a chamber 28, in which operates a check-valve 29, extending into and being guided by a downwardly-extending passage 30, and which is conveniently supported upon a spring 31, its normal position being a short distance from the seat 27. From the passage 30 a pipe 32 leads to an auxiliary reservoir 33, this auxiliary source of pressure communicating directly with the nipple 24, which furnishes a portion of the supply-passage. Connected with an opening adjacent to that of the main supply-pipe, through a reducer 34, is a pipe 35, which is joined to the controlling-pipe and leads to a controlling-passage 36 within the two castings. At the inner side of the reducer is a seat 37, which has opposite it a seat 38, surrounding the upper end of a passage 39, connecting the main supply-passage with the controlling-passage. With the seats 37 and 38 coöperates a check-valve 40, having a stem 41, extending through the passage 39 and through a wall 42 into a chamber 43, where it has fixed upon it a piston 44 of greater area than the check-valve and fitting the chamber. The lower end of this chamber 43 is shown as closed by a head 45, in which is an opening 46, serving to permit the passage of air, thus preventing its interfering with the movement of the piston. A spring 47, situated between the valve and the wall 42, exerts its tension to force said valve toward the seat 37. The chamber 43 is connected with the main supply-passage by a passage 48, which, as illustrated, opens at its outer end into the reducer 26.

The section 22 of the valve-casing has a preferably cylindrical chamber 49, the open ends of which are closed by heads 50 and into the upper portion of which opens the controlling-passage 36. The supply-passage

through the nipple 24 is continued within the section 22 to surround the chamber at 52, and from this portion of the passage supply-ports 53 open into the chamber. Surrounding the upper portion of the chamber and opening into the atmosphere is an exhaust-passage 54, provided with chamber-ports 55. Fitting within the chamber 49 is a valve-body in the form of a piston 56, having upper and lower heads 57 and 58, respectively, which may be provided with suitable peripheral packing and are equal in area. The piston has a central contracted portion 59, and with this space in the chamber communicates an admission-passage 60, from which a pipe 61 leads to the brake-cylinder. The valve is shown as balanced between opposite springs 62 62, which surround rods 63, projecting from the heads 50. The outer ends of the springs contact with the heads, while their inner ends abut against contact members 64, surrounding the rods and retained from displacement by heads 65 thereon. Normally the piston is held in its central position without either of the springs under appreciable tension and with the piston-heads closing the ports 53 and 55. Movement in either direction causes the contact member at that side to pass along its rod, the opposite member not being affected. Through the contracted portion of the piston and through the lower contact member is a passage 66, which communicates with that portion of the chamber 49 which is beyond the head 58.

In using the system the compressor maintains in the supply-pipe, and therefore in the passages 24 and 30, in the chamber 28, and in the auxiliary reservoir, a substantially uniform pressure. At this time the piston-valve is in its central position, closing the admission and exhaust ports, and the check-valve 40 is in coöperation with the seat 38, it being there held against the tension of the spring by the excess of pressure upon the piston. If it is desired to apply the brakes, the operator moves the lever 19ª until the proper pressure is admitted to the controlling-pipe from the supply-pipe. This flows through the pipe 35 into the passage 36 and exerting its force against the upper head of the piston forces it downwardly against the lower spring. This opens the admission-ports, permitting the supply-pipe pressure to flow through the passages 24 and 60 and the pipe 61 into the brake-cylinder. This continues until the pressure in said cylinder equals the pressure in the controlling-pipe, at which time the former, passing through the piston-passage 66, becomes effective upon the outer side of the head 58, balancing the controlling-pipe pressure and allowing the springs to restore the piston to its initial position, thus retaining this working pressure within the brake-cylinder. If a still stronger application of the brakes is desired, further pressure is admitted to the controlling-pipe by means of the primary controlling-valve, whereupon the operation just described is repeated, augmenting the brake-cylinder pressure. If, on the other hand, the operator wishes to decrease the pressure, he moves the lever 19ª of the primary controlling-valve in the opposite direction to diminish the pressure in the controlling-pipe. This gives an excess of pressure upon the under side of the piston-head 58 through the piston-passage from the brake-cylinder, causing the piston to rise and open the exhaust-ports. When the pressure has been reduced to the point indicated by the setting of the lever 19ª, the piston is again balanced and the exhaust-ports closed. Of course the reduction of controlling-pipe pressure to zero allows the exhaust of the entire brake-cylinder pressure, restoring the elements to their original positions. It will thus be seen that the operator is able to secure throughout the train the substantially simultaneous application of all the brakes with exactly the force necessary to best accomplish the desired result and may continue this application constant or vary it by exact predetermined amounts. If the train accidentally parts, the supply-pipe and controlling-pipe are separated, thus reducing their pressure to that of the atmosphere at the open ends. The excess of reservoir-pressure at once seats the check-valve 29, closing the supply-pipe. The force upon the piston 44 and upon the outer side of the check-valve 40 is also that of the atmosphere, and the spring 47 now becomes effective, bringing the valve 40 into coöperation with the seat 37 and closing the controlling-pipe. This opens a passage from the auxiliary reservoir through the passage 30, the chamber 28, the connecting-passage 39, and the controlling-passage 36 to the upper end of the head 57. As a consequence the piston is forced downwardly, opening the admission-ports and permitting the air from the auxiliary reservoir to enter the brake-cylinder, thus automatically setting the brakes.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. In an air-brake system, the combination with a supply-pipe and a controlling-pipe, of a source of pressure connected with the supply-pipe, primary and secondary controlling-valves connected with the supply-pipe and controlling-pipe, said secondary controlling-valve comprising a piston-valve which may be simultaneously subjected to the influence of the pressure in the supply and controlling pipes and check-valves for closing the supply-pipe and controlling-pipe, and a brake-cylinder communicating with the secondary controlling-valve.

2. A valve comprising a casing provided

with admission and exhaust ports and controlling and supply passages, a body portion having opposite heads between which is a space and one of which coacts with each of the ports, and opposed springs situated at opposite ends of the body portion and operating to maintain normal closure of the ports.

3. A valve comprising a casing provided with admission and exhaust ports, controlling and main and auxiliary supply-passages and a passage connecting the controlling-passage and a supply-passage, a piston coöperating with the ports, and a check-valve operating between the connecting-passage and the controlling-passage.

4. A valve comprising a casing provided with admission and exhaust ports, controlling and main and auxiliary supply-passages and a passage connecting the controlling-passage and a supply-passage, a piston coöperating with the ports, a check-valve operating between the connecting-passage and the controlling-passage, and a piston movable with the check-valve and being under the influence of conditions in the supply-passages.

5. A valve comprising a casing provided with admission and exhaust ports, controlling and main and auxiliary supply-passages and a passage connecting the controlling-passage and the auxiliary supply-passage, a piston coöperating with the ports, a check-valve operating between the connecting-passage and the controlling-passage, a piston movable with the check-valve and being under the influence of conditions in the supply-passages, and a check-valve coöperating with the main supply-passage.

6. An air-brake system having a source of fluid-pressure, a brake-cylinder, a valve controlling the communication between the source of pressure and the cylinder, said valve also controlling the exhaust from the brake-cylinder, means tending yieldingly to hold the valve in one position, devices for applying fluid-pressure to the valve to move it from said position, means establishing communication between said devices and the source of fluid-pressure, a manually-operated valve controlling such communication, an auxiliary-reservoir means establishing communication between the auxiliary reservoir and said devices for applying fluid-pressure to the valve, and an automatic valve controlling the last-named communication, for the purpose specified.

7. A brake system having a train-pipe adapted to communicate with the source of fluid-pressure, a controlling-pipe, a valve-controlled communication between the two pipes to permit any desired pressure to be introduced into the controlling-pipe, a brake-cylinder, an auxiliary reservoir with which the train-pipe and brake-cylinder communicate, a check-valve serving to prevent the return of pressure from the auxiliary reservoir to the train-pipe, a valve controlling the communication between the auxiliary reservoir and train-pipe, and the brake-cylinder, said valve also controlling the brake-cylinder exhaust, means connecting the controlling-pipe with said valve to operate the valve by the controlling-pipe pressure, means establishing communication between the auxiliary reservoir and said means connecting the controlling-pipe with the valve, and devices controlled by the train-pipe pressure for normally closing the communication between the auxiliary reservoir and the means connecting the control-pipe with the valve, said devices being capable of movement to open such communication and close communication between the control-pipe and the means connecting it with the valve, whereby upon the rupture of the train and controlling pipes to permit the auxiliary-reservoir pressure to operate the valve.

8. A brake system having a train-pipe adapted to communicate with the source of fluid-pressure, a controlling-pipe, a valve-controlled communication between the two pipes to permit any desired pressure to be introduced into the controlling-pipe, a brake-cylinder, an auxiliary reservoir with which the train-pipe and brake-cylinder communicate, a check-valve serving to prevent the return of pressure from the auxiliary reservoir to the train-pipe, a valve controlling the communication between the auxiliary reservoir and train-pipe, and the brake-cylinder, said valve also controlling the brake-cylinder exhaust, means connecting the controlling-pipe with said valve to operate the valve by the controlling-pipe pressure, means establishing communication between the auxiliary reservoir and said means connecting the controlling-pipe with the valve, and devices controlled by the train-pipe pressure for normally closing the communication between the auxiliary reservoir and the means connecting the control-pipe with the valve, said devices being capable of movement to open such communication and close communication between the control-pipe and the means connecting it with the valve, whereby upon the rupture of the train and controlling pipes to permit the auxiliary-reservoir pressure to operate the valve, said devices for normally closing the communication between the auxiliary reservoir and means connecting the control-pipe with the valve comprising a double-face valve movable between two seats, for the purpose specified, a spring tending yieldingly to hold the valve in one position, and means for exerting the train-line pressure on the valve to hold it against the spring in its second or normal position.

9. An air-brake system comprising a train-line adapted to communicate with the source of pressure, a brake-cylinder, a double-headed valve controlling communication be-

tween the train-line and brake-cylinder, and also controlling the exhaust from the brake-cylinder, means tending yieldingly to hold the valve in an intermediate position, in which position the brake-cylinder is cut off from the train-line and exhaust-orifice, said valve having a passage therein permitting the train-line pressure to be exerted on one head of the valve, a control-pipe, means for permitting the control-pipe pressure to be exerted on the opposite head of the valve, and a valve-controlled communication between the train-pipe and control-pipe whereby the pressure of the control-pipe may be varied to move the valve to the desired position.

10. An air-brake system comprising a train-line adapted to communicate with the source of pressure, a brake-cylinder, a double-headed valve controlling communication between the train-line and brake-cylinder, and also controlling the exhaust from the brake-cylinder, means tending yieldingly to hold the valve in an intermediate position, in which position the brake-cylinder is cut off from the train-line and brake-orifice, said valve having a passage therein permitting the train-line pressure to be exerted on one head of the valve, a control-pipe, means for permitting the control-pipe pressure to be exerted on the opposite head of the valve, and a valve-controlled communication between the train-pipe and control-pipe whereby the pressure of the control-pipe may be varied to move the valve to the desired position, an auxiliary reservoir, and emergency devices for permitting the auxiliary-reservoir pressure to act on the said second head of the valve upon the rupture of the train-pipe.

11. An air-brake system having a source of fluid-pressure, a brake-cylinder, a valve controlling communication between the source of pressure and the cylinder and also controlling the exhaust from the brake-cylinder, devices for applying fluid-pressure to the valve to operate it, means establishing communication between said devices and the source of pressure, a manually-operated valve controlling such communication, an auxiliary means establishing communication between the source of pressure and said devices, and an automatic valve controlling said auxiliary means.

12. An air-brake system comprising a train-line adapted to communicate with the source of pressure, a brake-cylinder, a double-headed valve controlling communication between the train-line and brake-cylinder and also controlling the exhaust from the brake-cylinder, means tending yieldingly to hold the valve in an intermediate position, in which position the brake-cylinder is cut off from the train-line and exhaust-orifice, said valve having a passage therein permitting the train-line pressure to be exerted on one head of the valve, a control-pipe, means permitting the control-pipe pressure to be exerted on the opposite head of the valve, a valve-controlled communication between the train-line and control-pipe whereby the pressure of the control-pipe may be varied to move the valve to the desired position, an auxiliary reservoir, means establishing communication between the same and said means permitting the control-pipe pressure to be exerted on the valve, and valve devices automatically controlling the last-named communication for the purpose specified.

13. An air-brake system having a source of fluid-pressure, a brake-cylinder, a valve controlling communication between the source of pressure and the brake-cylinder, and also controlling the exhaust from the brake-cylinder, devices for applying fluid-pressure to the valve to operate it, means establishing communication between said devices and the source of pressure, a manually-operative valve controlling such communication, an auxiliary means establishing communication between the source of pressure and said devices, an automatic valve controlling said auxiliary means, and an auxiliary reservoir communicating with the source of pressure and with said auxiliary means.

14. An air-brake system having a source of fluid-pressure, a brake-cylinder, a valve controlling communication between the source of pressure and the brake-cylinder, and also controlling the exhaust from the brake-cylinder, devices for applying fluid-pressure to the valve for operating it, means establishing communication between said devices and the fluid-pressure, a manually-operative valve controlling said communication, an auxiliary means establishing communication between the source of pressure and said devices, an automatic valve controlling said auxiliary means, an auxiliary reservoir communicating with the source of pressure and said auxiliary means, and an automatic valve for closing communication between the source of pressure and the auxiliary reservoir upon a rapid decrease of pressure in the source.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

ARTHUR IRVING PERRY.

Witnesses:

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EDMUND OTIS COX.