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M. W. HIBBARD.

FLUID PRESSURE BRAKE SYSTEM.

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Fig 1.

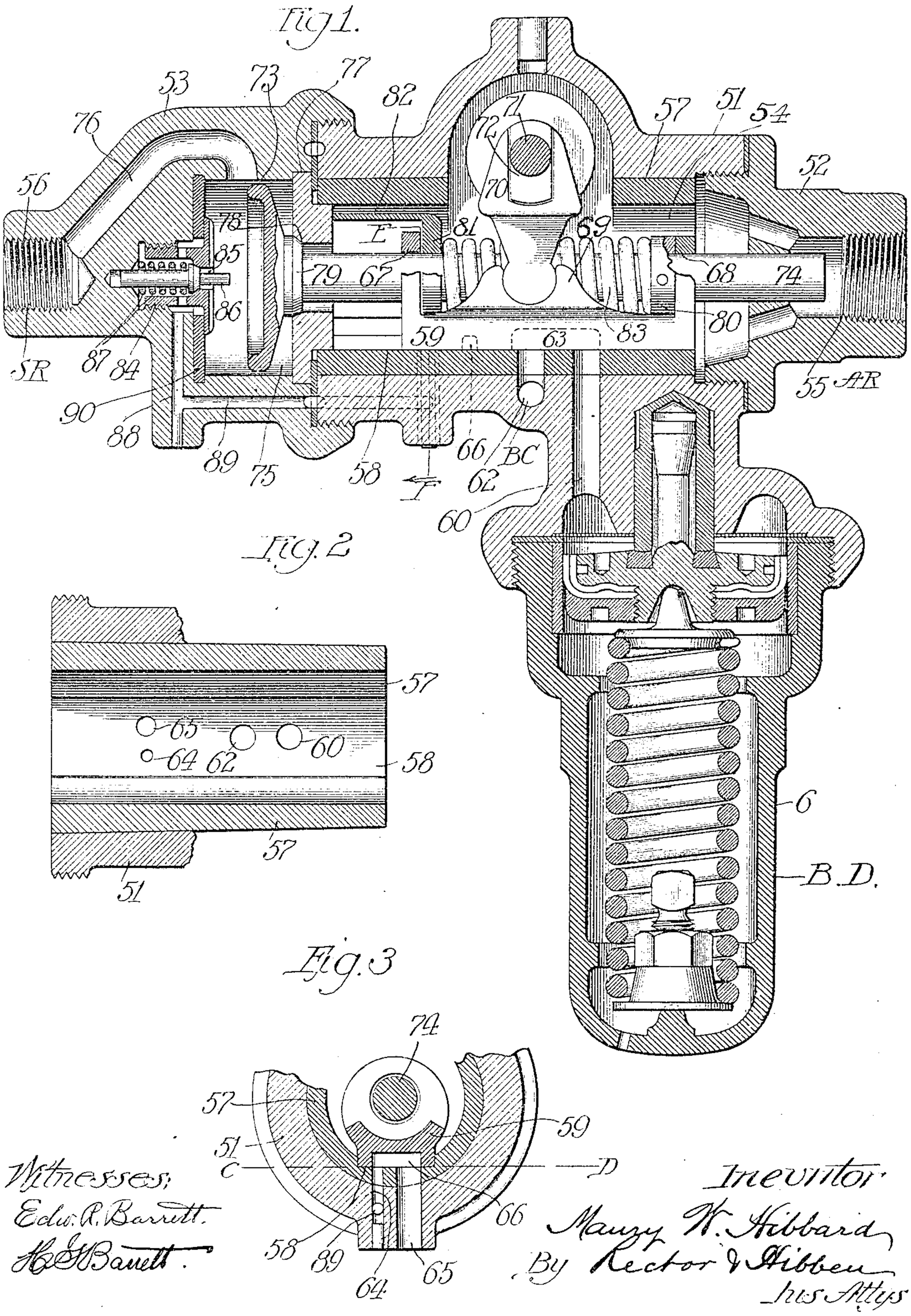

Fig. 2

Fig. 3

Witnesses;
Edw. R. Barrett.
H. E. Barrett.

Inventor
Maury W. Hibbard
By Rector & Hibben
his Attys

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UNITED STATES PATENT OFFICE.

MAURY W. HIBBARD, OF CHICAGO, ILLINOIS, ASSIGNOR TO RICHARD FITZGERALD, OF CHICAGO, ILLINOIS.

FLUID-PRESSURE BRAKE SYSTEM.

SPECIFICATION forming part of Letters Patent No. 787,332, dated April 11, 1905.

Original application filed February 25, 1903, Serial No. 145,018. Divided and this application filed April 23, 1903. Serial No. 153,966.

To all whom it may concern:

Be it known that I, MAURY W. HIBBARD, residing at Chicago, Cook county, Illinois, have invented certain new and useful Improvements in Fluid-Pressure Brake Systems, of which the following is a specification.

My invention pertains to the same general character and operation of mechanism described in prior Letters Patent of the United States, Nos. 683,205 and 699,386, issued on September 24, 1901, and May 6, 1902, respectively, which mechanism acts in aid of the usual air-brake system and provides a partial brake-pressure for a car empty and a full or increased braking pressure for a car loaded.

In the drawings, Figure 1 is a sectional elevation of a valve apparatus embodying my present invention; Fig. 2, a section taken on the line C D of Fig. 3 with the slide-valve removed and showing the valve-seat and ports opening thereon; and Fig. 3, a section on the line E F of Fig. 1.

My present device comprises a casing 51, having end caps 52 and 53 and containing a valve-chamber 54. The cap 52 has a passage 55 communicating with the auxiliary reservoir A R and the cap 53 a passage 56 communicating with the supplemental reservoir S R. The valve-chamber has a bushing 57, in which is formed a valve-seat 58, on which the main valve 59 travels. On the valve-seat terminates a port or passage 60, communicating with a blowdown 6 B D, similar to the one referred to in my prior patent, No. 699,386, and arranged to be connected in "empty-car" position with the brake-cylinder port or passage 62 B C by means of a recess 63 in the face of the main valve. The passage 63 leads to the brake-cylinder in suitable manner by proper piping. The valve-seat also has a vent-port 64 and an exhaust-port 65, used for a purpose hereinafter made apparent, which ports are controlled by a cross-recess 66 in the main valve.

The main valve 59 has upturned end flanges 67 and 68 and also side flanges 69, each having a socket in which bear depending arms of an operating-lever 70. An operating-stem 71, having a web 72 fitting into a vertical slot in the lever 70, enters the side of the valve-casing at a point above the main valve, all as clearly shown in Fig. 1. When the operating-lever is in its upright position, as shown in the drawings, the main valve is in normal or empty-car position. When such lever is actuated in one direction, its depending arm is rotated toward the left, Fig. 1, and the main valve is also moved in that direction to "loaded-car" position. Likewise, when such lever is actuated in the opposite direction the main valve is moved to the right, Fig. 1, to "bleed" position. This lever is connected to and operated by rods extending to opposite sides of the car in substantially the same way as the lever or actuating rod or shaft of the construction described in my original application.

In the form of construction now being described the automatic valve-locking device operates on the same general principle as the one shown in Fig. 3 of my original application; but such device instead of being integral with the main valve is physically independent, but operatively connected and associated with the main valve and arranged in the same structure or casing. This valve-locking device here consists of a flanged disk or cup 73, having a stem 74 extending longitudinally of the valve-chamber 54 and passing loosely through the valve-flanges 67 and 68. The disk 73 operates in a chamber 75, formed in the end cap 53 and communicating with the supplemental reservoir through the passage 76, leading to the passage 56. This supplemental-reservoir chamber 75 is separated from the valve-chamber 54 by a diaphragm 77, having a central bore or opening 78 provided with a valve-seat for the valve 79, formed on the back of the disk or cup 73 at the junction between it and its stem. When, therefore, the automatic lock is in the position indicated in Fig. 1, the valve 79 acts as a check-valve to prevent the supplemental-reservoir air from passing to the main-valve chamber and escaping there-

from when the bleed-port is open. The stem 74 is secured to a ring or collar 80, arranged adjacent to and inside the valve-flange 68 and passes freely through a plate or collar 81, adjacent the other valve-flange 67, which plate is provided with a lateral flange 82, adapted to substantially contact a part of the casing, or, as shown, the diaphragm 77. A coiled spring 83 surrounds the stem 74 and abuts at one end the collar 80 and at its other end the plate 81, with the result that the main valve and the automatic lock as well are kept in the normal position, as shown, but permitted to be shifted or moved, as hereinafter explained.

The supplemental-reservoir chamber 75 is provided with a small valve-chamber in which is fitted a flanged bushing 84, having a passage 85 governed by a valve 86. This valve is normally held seated by a coiled spring 87, and thereby closes communication between chamber 75 and the vertical passage 88 and horizontal passage 89, the latter of which leads to the vent-port 64, opening on the face of the valve-seat.

Starting with the parts in the normal position, as shown, the main valve brings the blow-down device in coöperative relation with the brake-cylinder and closes the two ports 64 and 65. The air-pressure is fed from the train-pipe to the auxiliary reservoir in the usual manner and passes through the valve-chamber 54 and into the supplemental reservoir, the valve-lock device being capable of moving sufficiently to permit the air to pass by its valve 79. The car can now be braked with a force sufficient for an empty car, and greater pressure than a predetermined amount is prevented by the blow-down device.

For loaded-car braking the trainman shifts the main valve to the left, Fig. 1, whereupon the blow-down device is cut out of service and the passages 86, 88, 89, and 64 vented to atmosphere through bleed or exhaust port 65 by means of the recess 66 in the main valve, whose shifting brings this recess into register with ports 64 and 65. At substantially the same time the disk 73 of the valve-lock is moved to the left and its flange caused to seat upon the gasket-seat 90. About the time that this disk is seating it strikes the inwardly-projecting stem of the small valve, which is thereby unseated and the air pressure within the flanged disk vented to atmosphere through passages 88, 89, and 64, recess 66, and port 65, with the result that the valve-lock device and consequently the main valve are held to shifted position—that is, loaded-car position—by the pressure of the air upon the right-hand face, Fig. 1, of the disk 73. Both reservoirs are now in free communication and the available braking pressure is augmented to the extent of the capacity of the supplemental reservoir, so that increased braking pressure is obtained as compared with the braking pressure for an empty car. The valve-lock is held to loaded-car position against the tension of the spring 83, which is compressed, inasmuch as the spring abutment or collar 80 moves with the stem 74 and the other abutment 81 is stopped by contact of its flange 82 against diaphragm 77 when the parts are adjusted to loaded-car position, as explained. Hence after the car has remained set out of a live train for unloading purposes or otherwise or whenever the car equipment has ceased to be charged with air-pressure, whether loaded or unloaded, the spring 83 will automatically restore the parts to empty-car position—that is, normal position. Thus my device is not dependent upon the trainman for restoration to normal position and the same is true of the device described in my original application as well as that of my prior patent, No. 699,386. Consequently there is no danger of sliding or skidding the wheels of a car whose valve device was adjusted for load or which was unloaded and picked up empty.

To bleed the auxiliary reservoir, the operating-rods are actuated to move the main valve to the right, Fig. 1, whereby the bleed-port 65 is uncovered and the auxiliary-reservoir pressure exhausted to the atmosphere. At this time the valve portion 79 of the valve-lock device is held seated and the supplemental reservoir cut off from communication with the valve-chamber 54, wherefore the auxiliary reservoir may be bled without bleeding the supplemental reservoir. When the main valve is thus moved to the right, the valve-flange 67 will carry the spring-plate 81 to the right and compress the spring 83, inasmuch as the collar or plate 80 is stationary at this time. When the pull on the operating-rods and lever is relieved, this spring will return the parts to normal position.

The locking disk or cup acts in the manner of a piston, inasmuch as it is acted upon in loaded-car braking by the pressure in the valve-chamber which holds it seated during this time. The disk is normally exposed on both sides or faces to the pressure in such chamber, but continually exposed to that pressure on one side only, inasmuch as in loaded-car position of the parts the pressure on the other side of the piston-like disk is vented or relieved, thereby permitting the pressure of the valve-chamber to act on one side of the disk against atmospheric pressure on the other. So far as the broad idea of this feature of operation is concerned the precise construction and arrangement of parts shown is immaterial, for it is evident that the locking device may be differently constructed and arranged elsewhere than in the valve-chamber itself or in substantially direct connection with the valve so long as the described functions are performed. How-

ever, to obtain the advantage of simplicity and compactness I prefer to construct and arrange the parts as shown.

To avoid any possibility of a too rapid feeding of the supplemental reservoir and a consequent depletion of considerable reduction in the pressure in the valve-chamber and auxiliary reservoir, which reduction might be such as that the air-pressure remaining would be insufficient to hold the locking device to loaded-car position when so adjusted, suitable means may be employed in the passage to the supplemental reservoir to restrict the rate of feed or charging thereof—such as, for instance, any of the restricting means described and claimed in my patent for improvements in fluid-pressure brakes, No. 723,386, dated March 24, 1903.

I claim—

1. In combination with an air-brake system of a car, a supplemental reservoir, means for connecting such supplemental reservoir and the auxiliary reservoir of the brake system and separate means for bleeding the auxiliary reservoir without releasing the supplemental reservoir.

2. In combination with an air-brake system of a car, a supplemental reservoir, valve mechanism coöperating therewith to produce a predetermined braking pressure in the brake-cylinder and arranged to connect such supplemental reservoir with the auxiliary reservoir of the brake system to produce an increased braking pressure for a loaded car, and separate means for bleeding the auxiliary reservoir alone, without bleeding the supplemental reservoir.

3. In combination with an air-brake system of a car, a supplemental reservoir, means for connecting such supplemental reservoir and the auxiliary reservoir of the brake system, means for bleeding the auxiliary reservoir, and independent means for closing the connection between the reservoirs during the bleeding operation.

4. In combination with an air-brake system of a car, a supplemental reservoir, valve mechanism for connecting such supplemental reservoir and the auxiliary reservoir of the brake system and for bleeding the auxiliary reservoir, said valve mechanism being provided with separate means for disconnecting said reservoirs during the bleeding operation.

5. In combination with an air-brake system of a car, a supplemental reservoir, valve mechanism for connecting such supplemental reservoir and the auxiliary reservoir of the brake system and for bleeding the auxiliary reservoir, and means arranged to lock the valve mechanism in loaded-car position and also arranged to disconnect the two reservoirs during the bleeding operation.

6. In combination with an air-brake system of a car, a supplemental reservoir, valve mechanism for connecting such supplemental reservoir and the auxiliary reservoir of the brake system and for bleeding the auxiliary reservoir, a locking device actuated by the valve mechanism for locking the latter in loaded-car position, and a valve actuated by said locking device for closing communication between the two reservoirs during the bleeding operation.

7. In combination with an air-brake system of a car, a supplemental reservoir, valve mechanism for connecting such supplemental reservoir and the auxiliary reservoir of the brake system and for bleeding the auxiliary reservoir, a locking device actuated by the valve mechanism for locking the latter in loaded-car position, and a valve carried by said locking device for closing communication between the two reservoirs during the bleeding operation.

8. In combination with an air-brake system of a car, a supplemental reservoir, valve mechanism for connecting such supplemental reservoir and the auxiliary reservoir of the brake system and for bleeding the auxiliary reservoir, an air-controlled locking device actuated by the valve mechanism for locking the latter in loaded-car position, and means controlled by said locking device for disconnecting the two reservoirs during the bleeding operation.

9. In combination with an air-brake system of a car, a supplemental reservoir, valve mechanism for connecting such supplemental reservoir and the auxiliary reservoir of the brake system and for bleeding the auxiliary reservoir, a locking device controlled by the pressure of the brake system and operatively connected with the valve mechanism, and means carried by said locking device for disconnecting the two reservoirs during the bleeding operation.

10. In combination with an air-brake system of a car, a supplemental reservoir, valve mechanism for connecting such supplemental reservoir and the auxiliary reservoir of the brake system and for bleeding the auxiliary reservoir, a locking-disk continually exposed on one side to the auxiliary-reservoir pressure and operatively connected with the valve mechanism, means for relieving the pressure, during loaded-car braking, from the other side of said disk, and means for disconnecting the two reservoirs during the bleeding operation.

11. In combination with an air-brake system of a car, a supplemental reservoir, a valve-casing having a chamber for connecting such supplemental reservoir and the auxiliary reservoir of the brake system, a pressure-reducing valve having communication with the brake-cylinder, a main valve in said chamber for controlling said communication, and valve-locking mechanism carried by said main valve but having a movement independent thereof.

12. In combination with an air-brake system of a car, a supplemental reservoir, a valve-casing having a chamber for connecting such supplemental reservoir and the auxiliary reservoir of the brake system, a pressure-reducing valve having communication with the brake-cylinder, a main valve in said chamber for controlling said communication, a flanged holding-disk and cut-off valve carried by the main valve, said cut-off valve being arranged to interrupt communication between the reservoirs, and means for exhausting air-pressure from one side of said disk when moved in one direction.

13. In combination with an air-brake system of a car, a supplemental reservoir, a valve-casing having a chamber for connecting such supplemental reservoir and the auxiliary reservoir of the brake system, a pressure-reducing valve having communication with the brake-cylinder, a main valve in said chamber for controlling said communication, a ported partition arranged in said chamber, a flanged holding-disk and cut-off valve carried by the main valve, said cut-off valve being arranged to seat upon said partition to interrupt communication between the reservoirs, and means for exhausting air-pressure from one side of said disk when moved in one direction.

14. In combination with an air-brake system of a car, a supplemental reservoir, a casing having a valve-chamber and provided with a ported partition to form a supplemental chamber 75, a main valve working in said valve-chamber and having a stem projecting through said partition and into said chamber 75 and there provided with a flanged holding-disk arranged to seat at one end of the chamber 75, said stem also being provided with a cut-off valve 79, arranged to seat on said partition when the disk is unseated and to be unseated when the disk is seated, and means for holding the disk seated when seated.

15. In valve mechanism of the character described, the combination of a casing having a valve-chamber communicating between the usual auxiliary reservoir and a supplemental reservoir, a main valve therein having ears 67, 68, plates 80, 81 arranged between such ears, a stem 74 passing through said ears and plates and secured to the plate 80, a flanged disk 73 arranged on the end of such stem and adapted to seat on one end of the valve-chamber, the casing having passages between such end of the chamber and that part of such chamber adjacent the main valve which is adapted to govern such passages, and a spring arranged between said plates 80, 81.

16. In combination with an air-brake system of a car, a supplemental reservoir, valve mechanism for connecting such supplemental reservoir and the auxiliary reservoir of the brake system and for bleeding the auxiliary reservoir, and means carried by and having a yielding connection with said valve mechanism for disconnecting said reservoirs during the bleeding operation.

MAURY W. HIBBARD.

Witnesses:
S. E. HIBBEN,
LOUIS B. ERWIN.