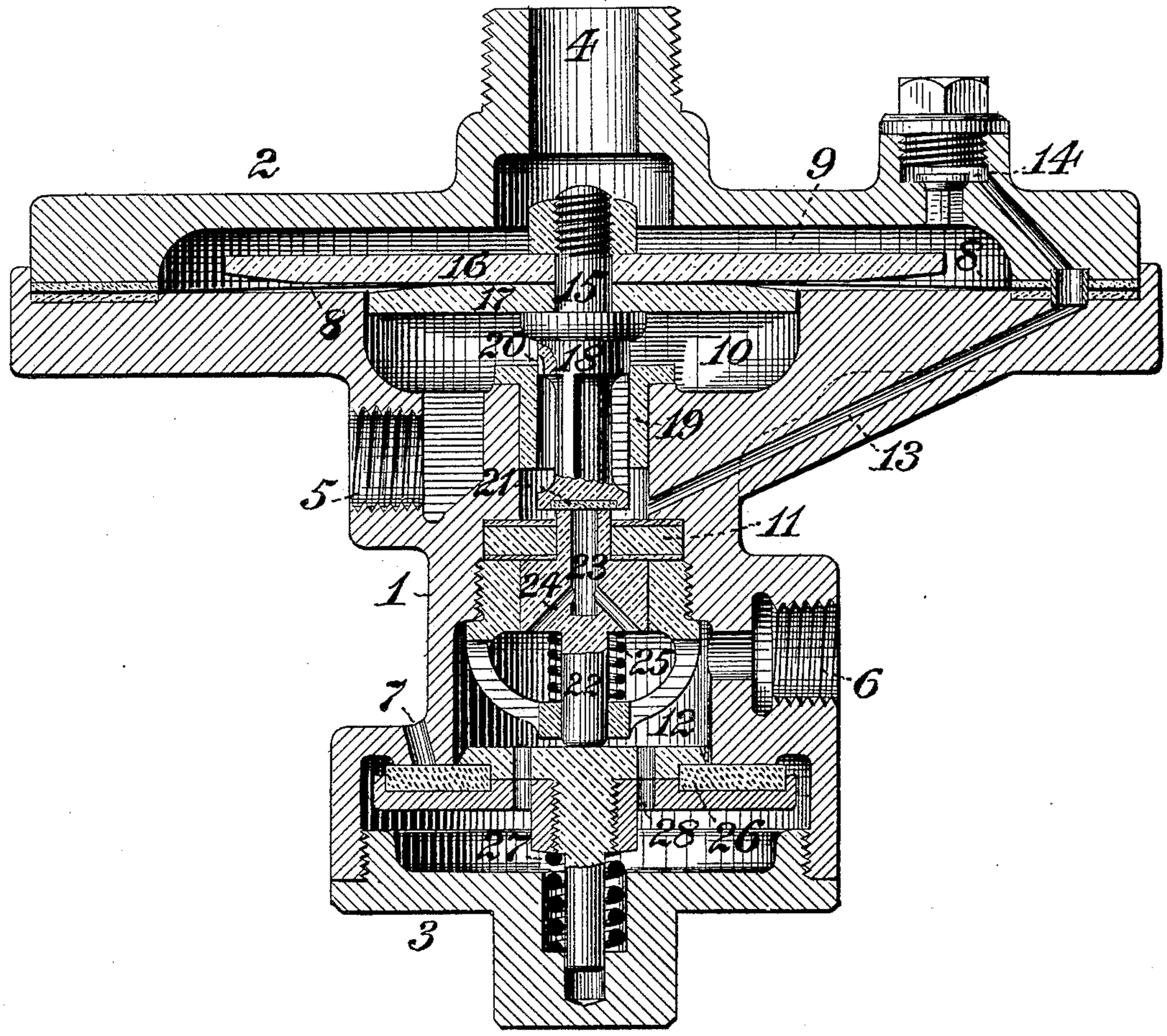
(No Model.)

F. MOORE.

TRIPLE VALVE FOR AUTOMATIC BRAKE MECHANISM.

No. 435,762. Patented Sept. 2, 1890.



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TRIPLE VALVE FOR AUTOMATIC BRAKE MECHANISM.

SPECIFICATION forming part of Letters Patent No. 435,762, dated September 2, 1890.

Application filed January 2, 1890. Serial No. 335,620. (No model.)

To all whom it may concern:

Be it known that I, FRANK MOORE, 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 Triple Valves for Automatic Brake Mechanisms, of which improvement the following is a specification.

My invention relates to appliances of the class known as "triple valves," which are employed in automatic brake apparatus to effect and control the admission of air under pressure from a main air-pipe to an auxiliary reservoir, and from the auxiliary reservoir to a brake-cylinder and the exhaust of air from the brake-cylinder, in order to apply and release the brakes as from time to time required by the reduction and increase, respectively, of pressure in the main air-pipe.

The object of my invention is to provide a simple and effective triple valve which shall be more rapid in action than those of the ordinary type, as well as to admit of a graduated discharge of air from the brake-cylinder after the application of the brakes, in order that they may be held to the wheels under such degree of pressure, less than the maximum, as may be desired.

To this end my invention, generally stated, consists in the combination of a casing, a movable abutment working therein, and two valves independently actuated by said abutment and controlling communication between a main air-pipe and the auxiliary reservoir, an auxiliary reservoir and a brake-cylinder, and a brake-cylinder and the atmosphere.

The improvement claimed is hereinafter fully set forth.

The accompanying drawing is a longitudinal central section through a triple valve embodying my invention.

In the practice of my invention I provide a valve-casing composed of a body 1, a cap-plate 2, and a bottom plate 3, which are suitably secured together, making tight joints. A nozzle 4 is formed upon the cap-plate 2 for the connection of a pipe leading to the main air or train pipe, and the body 1 is provided at different points in its length with lateral nozzles or threaded passages 5 6, for the connection of pipes leading to an auxiliary reservoir and to a brake-cylinder, respectively. An exhaust port or passage 7, leading from the interior of the body 1 to the atmosphere, is also formed in the body below the brake-cylinder connection 6.

The interior of the valve-casing is divided by a movable imperforate abutment 8—that is to say, one which forms a wholly-closed partition or division between chambers on its opposite sides and which is preferably, as shown, a flexible diaphragm secured at and near its periphery between the cap-plate and the adjacent face of the body into two chambers or compartments 9 10, one of which 9 communicates with the train-pipe connection 4 and the other 10, which is located within the body 1, communicates with the auxiliary-reservoir connection 5. A partition 11, having a central opening and secured in the body 1 at the lower end of the compartment 10, separates the latter from a chamber or compartment 12, located below it, said compartment 12 communicating with the brake-cylinder connection 6 and exhaust-passage 7. Communication is established between the train-pipe connection 4 and chamber 9 and the chamber 10 by a passage 13, extending through the cap-plate and shell of the body and through the diaphragm, said passage being controlled by a check or non-return valve 14, which is adapted to seat on the cap-plate, closing in the direction of the train-pipe connection 4. A stem 15 is secured centrally to the movable abutment 8 and to stiffening-plates 16 17 on opposite sides thereof, said stem carrying a supply-valve 18, having an upper piston adapted to fit closely in a bushing 19, secured in the chamber 10, and to thereby close communication between the auxiliary-reservoir connection 5 and the passage 13, leading to the train-pipe connection, except in so far as is in certain positions of the valve permitted by a small lateral charging-groove 20 cut in one side of the valve-piston. The valve 18 is reduced in diameter below its piston and provided with lateral guiding-wings fitting in the bushing, and its lower end is provided with a face 21, adapted to seat accurately

upon the upper end of a stem 22, passing through the partition 11 and having a central bore or passage 23, which is open at its end adjoining the valve-face, and communicates at its lower end by lateral passages 24 with the chamber 12. The stem 22 is provided with a shoulder which abuts against the partition 11, and is normally held in contact therewith and in position for the closing of the passage 23 by the valve-face 21 by a spring 25. The lower end of the chamber 12 is normally closed, and communication between the brake-cylinder connection 6 and exhaust-passage 7 thereby cut off by a flat discharge-valve 26, which is held up to an annular face at the lower end of the chamber 12 by a spring 27. Equilibrium of pressure on opposite sides of the valve 26 is maintained by passages 28, extending through the same. The lower end of the stem 22 closely adjoins, without exerting bearing-pressure against, the valve 26, when the stem and valve are normally seated by the springs 25 and 27.

In operation air under pressure passes from the main air or train pipe through the nozzle 4, chamber 9, and passage 13 into the chamber 10 below the piston of the supply-valve 18, and passes through the charging-groove 20 and nozzle 5 to the auxiliary reservoir, charging the latter and the chamber 10 to a pressure equal to that in the main air-pipe. The passage 23 being meanwhile closed by the valve-face 21, air is prevented from passing to the brake-cylinder connection 6. To effect the application of the brakes, the engineer reduces the pressure in the main air-pipe by discharging air therefrom through the valve on the engine, and the then greater pressure in the auxiliary reservoir raises the movable abutment 8 and valve 18, thereby unseating the valve-piston from the bushing 19 and the valve-face 21 from the opening of the passage 23 and admitting air from the auxiliary reservoir through the chamber 10, passages 23 and 24, chamber 12, and connection 6 to the brake-cylinder, the pressure of the air thus admitted applying the brakes through the piston of the brake-cylinder and the usual connections. The release of the brakes is effected by restoring the pressure in the main air-pipe, such restoration of pressure moving the abutment 8 and supply-valve 18 downwardly, and primarily closing communication between the main air-pipe and the auxiliary reservoir by the piston of the supply-valve, and between the main air-pipe and auxiliary reservoir and the brake-cylinder by the piston of the supply-valve and by its lower face 21. The continued downward movement of the abutment, under the action of the restored pressure in the main air-pipe and connected chamber 9, forces the stem 22 downwardly, and through said stem unseats the discharge-valve 26, thereby establishing communication between the brake-cylinder connection 6 and exhaust-passage 7 and releasing the brakes by permitting the air to be discharged from the brake-cylinder. The check-valve 14, which is normally seated, prevents the escape of air from the auxiliary reservoir to the main air-pipe in the application of the brakes or in the event of the rupture of the brake-pipe or its separation by the breaking in two of the train. If it be desired to graduate the application of the brakes or to hold them applied to the wheels under a degree of pressure less than that originally imparted, a greater or less degree of air, as desired, may be discharged from the brake-cylinder without completely releasing the brakes. This end is attained by imparting a greater or less degree of opening, as may be required, to the discharge-valve 26 by a partial restoration of pressure in the main air-pipe, and thereafter cutting off the supply to the main air-pipe when the pressure on opposite sides of the movable abutment is equalized by the passage of air through the feeding-groove to the auxiliary reservoir, and the springs 25 and 27 return the stem 22 and discharge-valve 26 to normal position, thereby reseating the discharge-valve and cutting off the exhaust of air from the brake-cylinder. It will be obvious that the brakes may be originally applied with greater or less force, as required, by a correspondingly greater or less degree of reduction of pressure in the main air-pipe.

A supply-valve connected to and actuated by an imperforate movable abutment and an independent discharge-valve actuated by the movement of the abutment in one direction, said members being structurally substantially similar to those correspondingly entitled herein, are set forth in a separate application filed by me February 13, 1890, Serial No. 340,575, which relates to a construction in which the supply-valve controls preliminarily, in the application of the brakes, communication between a main air-pipe and a brake-cylinder, and, secondarily, communication between an auxiliary reservoir and the brake-cylinder, which operation differs from that of the devices herein set forth in the particular that in my present application the preliminary and direct admission of air from the main air-pipe to the brake-cylinder is not contemplated or provided for. The above-recited members are claimed in said application, Serial No. 340,575, only in such relation and combination as to be adapted for operation as specified therein and as above stated.

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

1. The combination of a valve-casing, a movable imperforate abutment working therein, a supply-valve actuated by said abutment and controlling communication between a main air-pipe connection and an auxiliary-reservoir connection and between the auxiliary-reservoir connection and a brake-cylinder connection, and an independent discharge-valve fitted in the casing and actuated by the movable abutment, said valve con-

trolling communication between the brake-cylinder connection and an exhaust-passage, substantially as set forth.

2. The combination of a valve-casing, a movable imperforate abutment working therein, a supply-valve actuated by said abutment and controlling communication between a main air-pipe connection and an auxiliary-reservoir connection and between the auxiliary-reservoir connection and a brake-cylinder connection, an independent discharge-valve controlling communication between the brake-cylinder connection and an exhaust-passage, and a stem interposed between the supply and discharge valves and acting to impart movement to the discharge-valve in and by the closing movement only of the supply-valve, substantially as set forth.

3. The combination of a valve-casing, a movable imperforate abutment working therein, a supply-valve actuated by said abutment and controlling communication between a main air-pipe connection and an auxiliary-reservoir connection and between the auxiliary-reservoir connection and a brake-cylinder connection, an independent discharge-valve fitted in the casing and actuated by the movable abutment, said valve controlling communication between the brake-cylinder connection and an exhaust-passage, a stem interposed between the supply and discharge valves and provided with a passage for air from the auxiliary-reservoir connection to the brake-cylinder connection, and a check or non-return valve controlling communication between the supply-valve and the main air-pipe connection, substantially as set forth.

4. The combination of a valve-casing divided into three compartments, the first of which is provided with a main air-pipe connection, the second with an auxiliary-reservoir connection, and the third with a brake-cylinder connection and exhaust-passage, a movable imperforate abutment interposed between the first and second compartments, a passage controlled by a check or non-return valve and leading from the first to the second compartment, a supply-valve connected to said abutment and provided at one end with a piston controlling communication between the first and the second compartment and at the other with a seating-face, a stem adapted to abut against said face and provided with passages establishing communication between the second and the third compartments when the seating-face of the valve is out of contact with the stem, a discharge-valve closing the exhaust-passage of the third compartment and located in position to be unseated by the movement of the stem out of normal position, and springs bearing against the stem and the discharge-valve and acting to maintain said members normally seated, substantially as set forth.

In testimony whereof I have hereunto set my hand.

FRANK MOORE.

Witnesses:
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R. H. WHITTLESEY.