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AUTOMATIC RELEASE VALVE FOR AIR BRAKE SYSTEMS.

APPLICATION FILED MAR. 13, 1912.

1,067,738. **Patented July 15, 1913.**

Fig. 1.

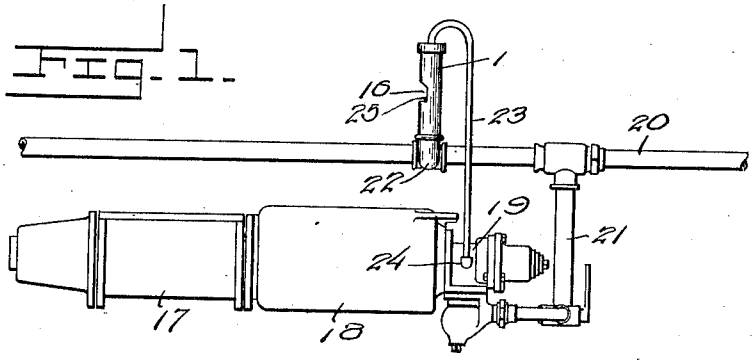


Fig. 2.

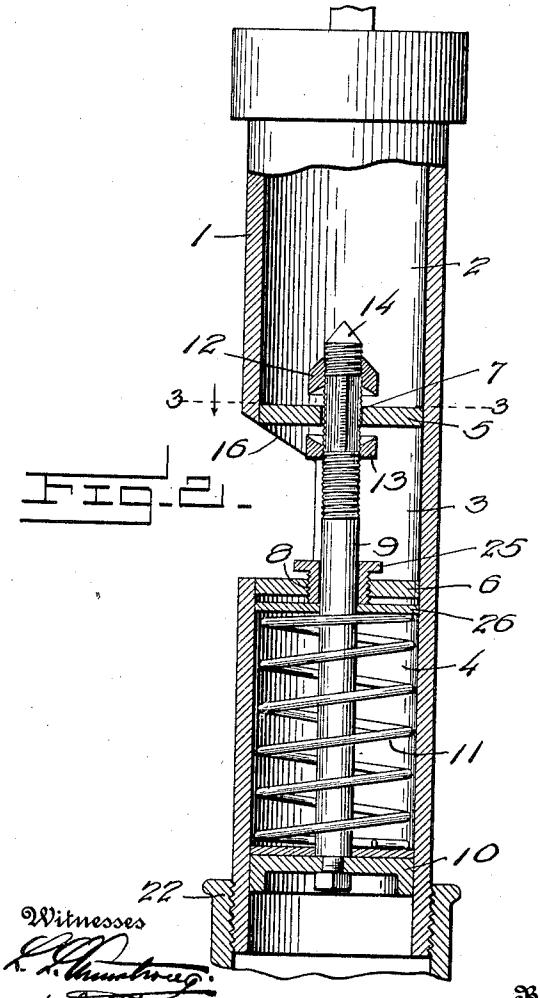
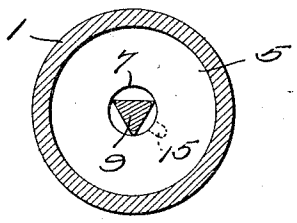


Fig. 3.



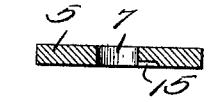


Fig. 4.

Witnesses

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UNITED STATES PATENT OFFICE.

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AUTOMATIC RELEASE-VALVE FOR AIR-BRAKE SYSTEMS.

1,067,738. Specification of Letters Patent. Patented July 15, 1913.

Application filed March 13, 1912. Serial No. 683,615.

To all whom it may concern:

Be it known that I, CHARLES W. HURL, a citizen of the United States, residing at Johnstown, in the county of Cambria and State of Pennsylvania, have invented certain new and useful Improvements in Automatic Release-Valves for Air-Brake Systems, of which the following is a specification.

This invention relates to air brake systems, and has for its main object to provide for recharging the auxiliary reservoir while the brakes are applied.

The invention is embodied in the form of an attachment capable of being applied to any ordinary air brake system without requiring any change or alteration therein whatsoever and without interfering with any of the usual operations of the apparatus, while at the same time permitting of the recharging of the auxiliary reservoir, as hereinbefore stated, and also enabling the engineer to successively release the brakes from the rear to the front of the train, which is a very important advantage in that it prevents the sudden increase of speed on the front cars and the dragging along of the rear portion of the train with the brakes applied.

Other objects and advantages of this invention will appear as the nature of this invention is better understood from the following description and it will of course be understood that changes in the form, proportion, size and minor details may be made, within the scope of the claims, without departing from the spirit or sacrificing any of the advantages of the invention.

In the drawings: Figure 1 is a side elevation of an ordinary Westinghouse brake cylinder, auxiliary reservoir, triple valve and train pipe having the controlling valve of the present invention applied thereto. Fig. 2 is an enlarged longitudinal sectional view of the valve. Fig. 3 is a cross sectional view on the line 3—3 of Fig. 2. Fig. 4 is a detail sectional view taken through the partition having the exhaust port and showing the leakage port.

Like numerals of reference indicate corresponding parts in the figures of the drawings.

As hereinbefore indicated, the present invention is embodied in the form of an attachment and includes a casing 1, preferably tubular in shape and divided into three compartments designated 2, 3 and 4, by means of spaced partitions 5 and 6. Each of these partitions is provided with a central opening 7 and 8, respectively, preferably circular in shape. The opening 7 in the upper partition 5 constitutes an air port, as will hereafter appear. Working endwise through the ports is a valve stem 9 provided on its lower end with a head or piston 10 having a working fit in the compartment 4. A helical spring 11 is contained in the compartment or chamber 4 and bears in opposite directions against the partition 6 and the head or piston 10 with a tendency to force the piston downwardly. Above the partition 5 is an upper valve 12 having a central threaded opening receiving the threaded upper end of the stem 9, and a similar lower valve 13 is threaded upon the stem and located below the partition 5. The upper valve is adapted to seat against the upper side of the partition 5 and the lower valve 13 is adapted to seat against the lower side of the partition 5, the seating face of each valve being dished or concave, so that its peripheral edge only seats against the valve seat formed by the partition 5.

By reference to Fig. 3 of the drawings, it will be noted that the valve stem is triangular in cross section where it passes through the partition or diaphragm 5, the purpose of which is to leave sufficient opening between the sides of the valve stem and the walls of the port 7 to permit of the escape of air therethrough. It will, of course, be understood that the portions of the valve stem to which the valves 12 and 13 are fitted are cylindrical in shape in order that there may be no open passage between the interior walls of the valves and the valve stem. The threads are of course cut on the three corners of the valve stem so as to accommodate the threaded valves 12 and 13 should said valves overlap the angular cross-sectional part of the stem. While triangular cross-section has been shown and described, it will of course be understood that other shapes may be employed if desired.

By having the valves threaded upon the stem, each of them may be independently

adjusted upon the stem to suit the conditions surrounding the particular use of the device. By preference, the top of the valve 12 is conical in shape or tapered upwardly, while the top of the valve stem is conical or tapered as at 14, thereby to reduce the area subjected to air pressure, as will be hereinafter explained. The under side of the valve seat 5 is provided with a leakage port 15, preferably in the nature of a notch formed in the lower edge of the port 7. An opening or escape port 16 is formed in one side of the casing 1 in the intermediate or exhaust chamber 3.

For an understanding of the practical application of the present invention, there has been shown, in Fig. 1 of the drawings, a brake cylinder 17, auxiliary reservoir 18, triple valve 19, train pipe 20 and a suitable connection 21 between the train pipe and the triple valve, which parts are common and well known and need no further description. The present device is connected directly with the train pipe by the use of a T-coupling or joint 22, preferably located adjacent the triple valve. A small pipe 23 is connected with the exhaust port 24 of the triple valve and communicates with the upper compartment 2 of the casing 1 in any suitable manner, preferably being lead through the center of the top of the casing. At this point it will be noted that the present device may be attached to an air brake system already in use by merely including the T-coupling 22 in the train pipe and connecting up the pipe 24 with the exhaust of the triple valve, without rearranging any of the old parts of the air brake system and without requiring any substitutions or changes whatsoever.

In the operation of this invention, assuming that the train is running with the brakes off and the pressure in the train pipe and auxiliary reservoir at normal, the two valves 12 and 13 will be unseated, for the reason that the normal train pipe pressure operating against the under side of the piston 10 substantially equals the downward pressure of the spring 11, whereby the piston will be balanced in the intermediate position with the two valves unseated and the valve port 7 open. To apply the brakes, pressure is reduced in the train pipe, in any common or ordinary way, resulting as usual in the admission of pressure into the brake cylinder, whereby the brakes are applied. During this operation, the pressure in the train pipe is of course reduced, from which it will be clearly understood that the pressure on the under side of the piston 10 is also reduced, and therefore the spring 11 will force the piston downwardly resulting in the seating of the upper valve 12 and closing the port 7. It will here be explained that whatever reduction of pressure in the train pipe will be necessary to apply the brakes is a sufficient reduction in pressure to permit the spring 11 to force the piston downwardly and seat the upper valve 12.

Under the conditions thus far described, under the practice now in general use, the auxiliary reservoir can not be recharged without releasing the brakes. As hereinbefore indicated, it is an important object of the present invention to permit recharging of the auxiliary reservoir without releasing the brakes, and this is accomplished in the following manner: The engineer merely replaces in the train pipe slightly less than the amount of air pressure discharged to apply the brake, whereby the auxiliary reservoir will be recharged. This is made possible by keeping the train pipe pressure slightly below normal, whereby the upper valve 12 will remain seated and no escape of air from the brake cylinder is possible, consequently the brakes will remain applied while the auxiliary reservoir is being recharged.

To release the brakes, the train pipe pressure is brought up to normal, whereupon the upper valve 12 will be unseated because the train pipe pressure will be sufficient to lift the piston 10. When the upper valve is unseated, the air is permitted to escape from the triple valve exhaust port 24 in the usual manner, except that it is conveyed through the pipe 23 into the upper compartment 2 from which it escapes to the atmosphere through the port 7 and into the exhaust compartment 3 and thence through the exhaust opening 16 in one side of the compartment.

In the present device, it will be noted that motion is transmitted from the piston 10 to the two valves directly and in a straight line, so that there is no lost motion whatsoever, and the movement of the valves is always in a straight line. Moreover, by employing dished or concave valves seating against the valve seat outside of the valve port, if there should be a slight lateral play, the valve will, nevertheless, seat against the seat 5 in a positive manner to effectually close the valve port.

With the valve 13 seated against the seat 5 due to excess pressure in the train pipe, any leakage from the exhaust port of the triple valve will be carried through the pipe 24 into the chamber or compartment 2, through the port 7 and through the leakage port 15 into the compartment 3 and thence to the atmosphere which prevents an accumulation of air pressure in the chamber 2 sufficient to open the valve 13 against the air pressure in the train pipe acting against the piston 10.

In releasing the brakes, the engineer opens up communication between the main reservoir and the train pipe, thereby throwing into the latter an air pressure vastly exceeding the normal pressure, which excessive

pressure maintains the lower valve 13 closed on the cars at the front of the train, whereby the brakes on the front cars will continue to be applied. For instance, when the air pressure is thus introduced into the train pipe, such pressure throughout the cars at the front of the train will raise to, say 85 pounds, which is 15 pounds above a normal pressure of 70 pounds.

The reason that the pressure will rise so far above normal on the cars at the front of the train, is due to the fact that the resistance offered to the passage of the air throughout the entire system is such as to momentarily hold up the pressure at the front of the train.

Due to application of the brakes, the pressure at the rear of the train will have dropped to say 65 pounds or five pounds below normal. Under these conditions, there will be a high pressure in the system at the front of the train and a low pressure in the system at the rear of the train, and as these pressures begin to equalize, the brakes on the rear car will be released first, for the reason that the pressure will rise from 65 to 70 at the rear of the train more quickly than it will drop from 85 to 70 at the front of the train, and therefore it will be understood that the brakes will be automatically and successively released from the rear of the train toward the front of the train, which prevents the sudden starting of the forward portion of the train and the dragging along of the rear portion of the train with the brakes on, as would occur if the brakes were released at the front of the train first and thereafter successively to the rear of the train.

For the purpose of adjusting the tension of the spring 11 the walls of the opening 8 are threaded so as to receive a threaded bushing 25, the inner end of which bears against a washer or follower 26 engaging the adjacent end of the spring, so that by adjusting the bushing the tension of the spring may be adjusted. The bushing 25 is provided on its outer end with an external flange or head of square or other suitable shape for engagement by a spanner introduced through the opening 16, for adjustment of the bushing.

What is claimed is:—

1. An automatic release valve for air brake systems comprising a casing divided into an inlet compartment, a piston compartment and an exhaust compartment located between the two first-mentioned compartments, the exhaust compartment having an opening communicating with the atmosphere, a piston working in the piston compartment, a stem carried by the piston and extending through the exhaust compartment into the inlet compartment, there being a port communicating between the inlet compartment and the exhaust compartment, a double acting valve carried by the stem for controlling the port, and a tension device tending to force the piston outwardly, substantially as described.

2. An automatic release valve for air brake systems comprising a casing divided into an inlet compartment, a piston compartment and an exhaust compartment located between the two first-mentioned compartments, the exhaust compartment having an opening communicating with the atmosphere, a piston working in the piston compartment, a stem carried by the piston and extending through the exhaust compartment into the inlet compartment, there being a port communicating between the inlet compartment and the exhaust compartment and having a leakage notch in one edge thereof, a double-acting valve carried by the stem for controlling the port, and a tension device tending to force the piston outwardly, substantially as described.

3. An automatic release valve for air brake systems including an inlet compartment, a piston compartment and an exhaust compartment interposed between the two first-mentioned compartments, the three compartments being disposed in longitudinal alinement, there being an exhaust port communicating between the inlet compartment and the exhaust compartment, a double-acting valve controlling the port, a spring-actuated piston in the piston compartment, and means for transferring motion from the piston to the valve in a straight line, substantially as described.

4. In an air brake system, the combination with a train pipe and a triple valve, of a valve casing having an inlet compartment, an exhaust compartment and a piston compartment in longitudinal alinement with one another, a pipe connecting the inlet compartment with the exhaust of the triple valve, there being a port communicating from the inlet compartment to the exhaust compartment, a double-acting valve controlling the port, a piston in the piston compartment and subject to the pressure in the train pipe, and a spring bearing against the piston in opposition to the train pipe pressure and having a strength to balance the piston and hold the valve members unseated, substantially as described.

5. In an air brake system including a train pipe, a triple valve connected with the train pipe and having an outlet, a connection between the train pipe and the outlet of the triple valve including a cylinder having an outlet to atmosphere, a ported diaphragm between said outlet and the outlet of the triple valve, a piston movable in the cylinder between the feed pipe and the outlet and having a stem guided through the ported diaphragm, valves on said stem

adapted to seat on opposite sides of the diaphragm and a spring actuating the piston against the air pressure in the feed pipe.

6. A release valve for air brake systems including a casing connected at one end with the outlet of a triple valve and at the other end with the train pipe, said casing having an outlet to atmosphere and a ported diaphragm between said outlet and the outlet of the triple valve, a piston operable in the casing, a spring whereby said piston is actuated against the pressure in the train pipe, means for regulating the tension of the spring, a stem connected with the piston and extending through the ported diaphragm, and valves adjustable on said stem and adapted to seat on opposite sides of the diaphragm.

7. A release valve for air brake systems including a casing connected at one end with the outlet of a triple valve and at the other end with the train pipe, said casing having an outlet to atmosphere and a ported diaphragm between said outlet and the outlet of the triple valve, a piston operable in the casing, a spring whereby said piston is actuated against the pressure in the train pipe, means for regulating the tension of the spring, a stem connected with the piston and extending through the ported diaphragm, the portion of the stem extending through the ported diaphragm having angular edges engaging the wall of the diaphragm to guide the stem, and valves adjustable on said stem and adapted to seat on opposite sides of the diaphragm.

In testimony whereof I affix my signature in presence of two witnesses.

CHARLES W. HURL.

Witnesses:

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CHRIST E. BLOCH.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents. Washington, D. C."