D. F. KNERR.

AUTOMATIC AIR BRAKE RETAINING AND RELEASE VALVE.

APPLICATION FILED MAR. 29, 1909.

943,602.

Patented Dec. 14, 1909.

2 SHEETS—SHEET 1.

Fig. 1.

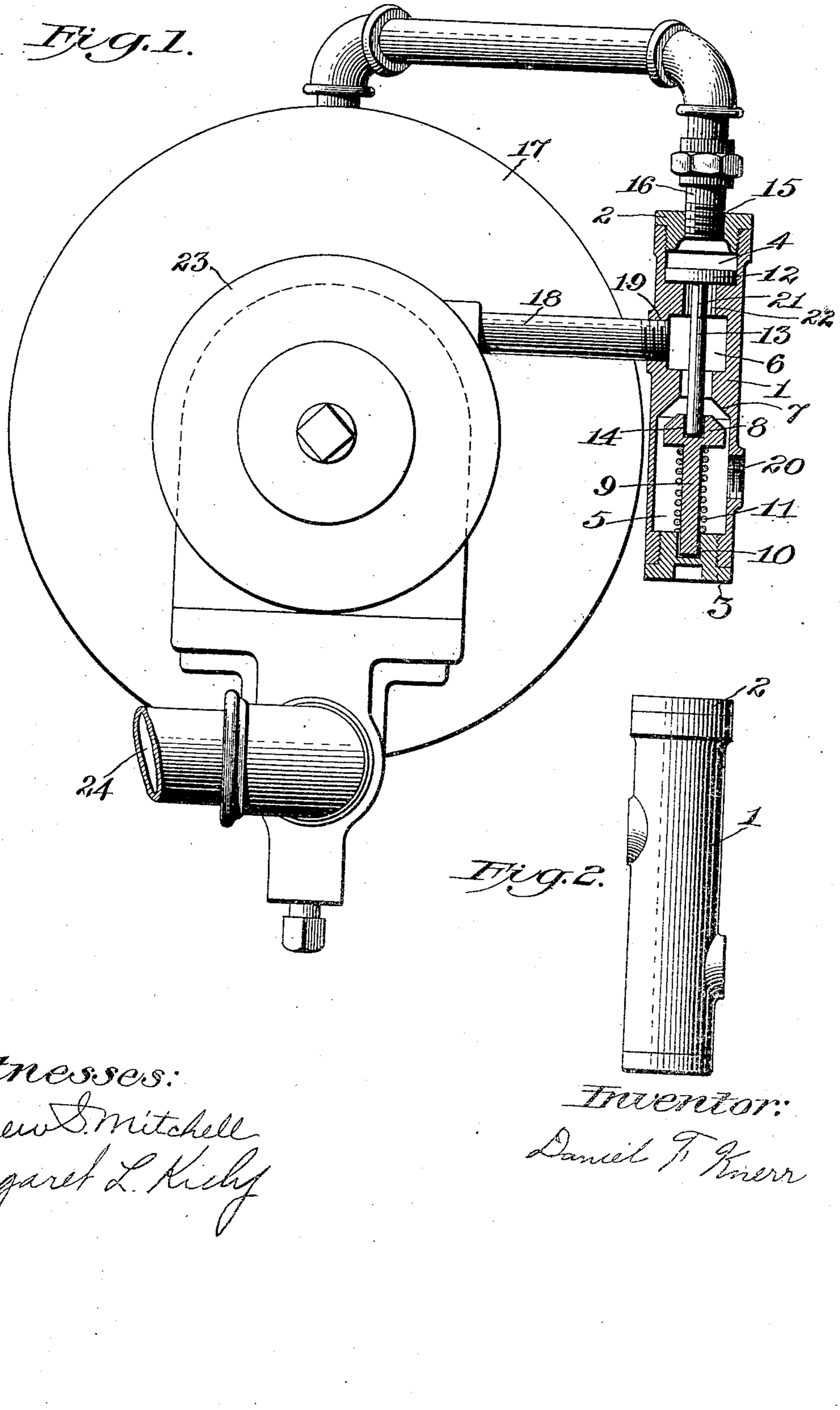

Fig. 2.

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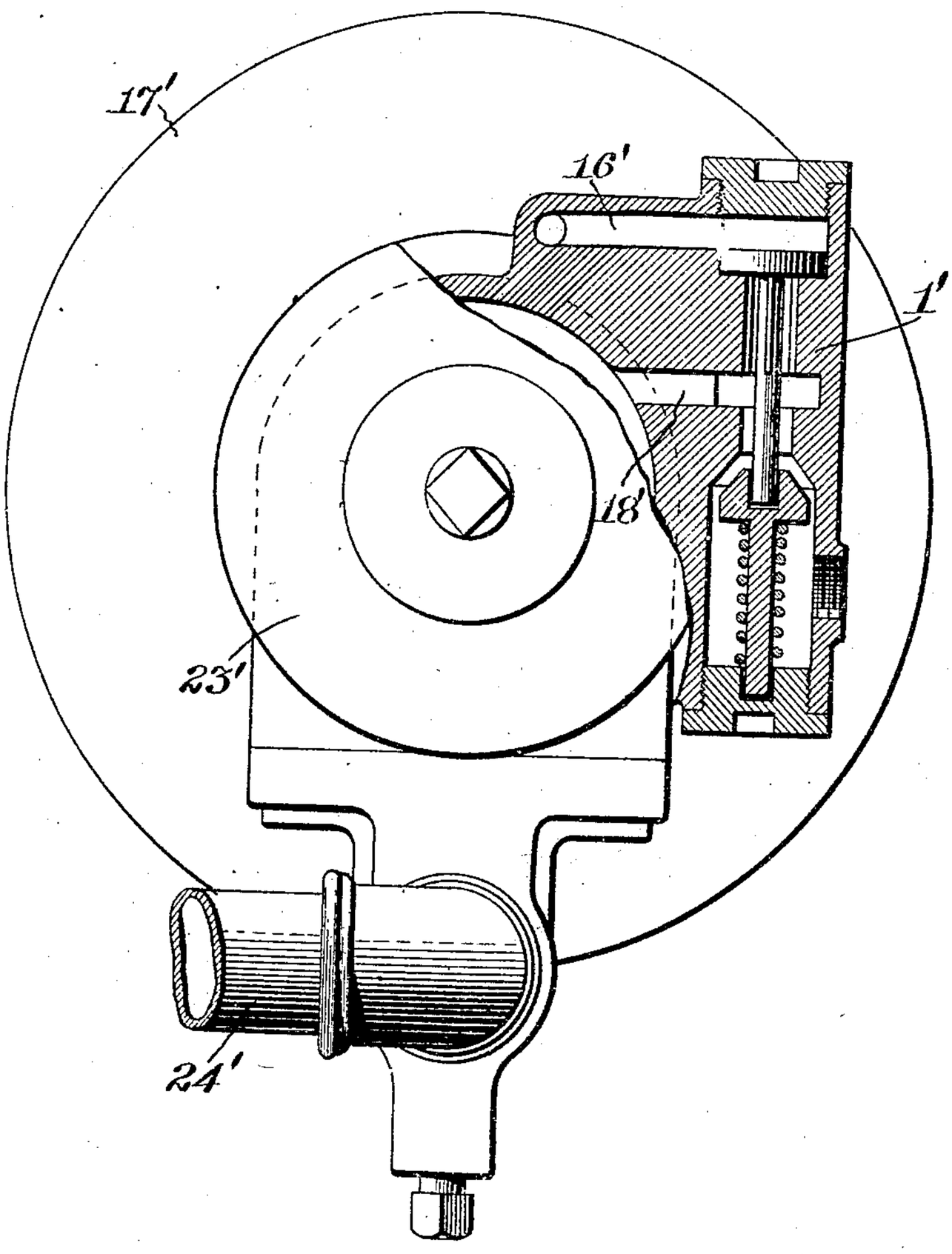

Fig. 3.

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UNITED STATES PATENT OFFICE.

DANIEL F. KNERR, OF NEWARK, OHIO.

AUTOMATIC AIR-BRAKE RETAINING AND RELEASE VALVE.

943,602. Specification of Letters Patent. Patented Dec. 14, 1909.

Application filed March 29, 1909. Serial No. 486,635.

To all whom it may concern:

Be it known that I, DANIEL F. KNERR, a citizen of the United States, residing at Newark, in the county of Licking and State of Ohio, have invented a new and useful Improvement in Automatic Air-Brake Retaining and Release Valves, of which the following is a specification.

This invention relates to pressure retaining valves adapted for use with automatic air brake systems, and, while this valve may be used with other systems, it has been especially designed with reference to the Westinghouse air-brake system, and will herein be described in connection therewith.

In the Westinghouse system as generally practiced, the brake cylinders receive their air pressure directly from auxiliary reservoirs, and each time an application of the brakes is made the pressure in these reservoirs becomes lowered. To charge the auxiliary reservoirs they must be connected through the triple valves to the train pipe. This operation opens the exhaust from the brake cylinder and allows the pressure therein to become reduced to such an extent that the brakes will not remain applied.

It is the object of this invention to provide a simple and efficient valve which will automatically close the exhaust from the brake cylinder when the pressure in its auxiliary reservoir falls below a predetermined amount, as, for example, when the brakes are applied, thereby enabling the auxiliary reservoir to be recharged without necessarily releasing the brakes. The reason for this recharging at such times is well understood by those familiar with air-brake systems, and therefore need not here be further enlarged upon.

In order to more fully describe my said invention, reference will be had to the accompanying drawings, wherein,

Figure 1, represents in vertical central section a form of my improved valve with its connections to the auxiliary reservoir and triple valve, the said reservoir and triple valve being shown in end elevation; Fig. 2, is a side elevation of the casing of the valve shown in Fig. 1; and, Fig. 3, a central vertical section of a form of my improved valve and a portion of the triple valve, in which the casing of my valve is cast integral with the triple valve casing, the said figure showing the auxiliary reservoir in end elevation.

In the form shown in Figs. 1 and 2, my improved valve comprises a casing 1, having its ends closed by screw plugs 2 and 3 respectively, and provided with two chambers 4 and 5, which connect with each other through a central port 6. The wall of chamber 5 opposite screw plug 3, forms a tapered seat 7, for a valve 8, the seating surface of which is ground to form a truncated cone to fit said seat. This valve is provided with an elongated stem 9, which extends into a cavity 10, in the screw plug 3, with which the said stem makes a sliding fit. The stem of this valve 8, carries a coil spring 11, held between the head of the valve and the plug 3. This spring exerts against said valve 8, in a direction to cause it to close its port, a pressure equal to the normal pressure in the auxiliary. This pressure is usually seventy pounds.

Mounted to make an air-tight sliding fit in the chamber 4, is a piston 12, which is provided with an elongated stem 13, extending through port 6, into a cavity 14, formed in the valve 8, the said stem fitting said cavity loosely.

The plug 2, is provided with a central opening 15, from which suitable pipe connection 16, passes to the auxiliary reservoir 17.

The port 6, is in constant communication with the exhaust of the triple valve through pipe connection 18, extending from the triple valve to an opening 19, in the casing 1, leading into port 6.

The chamber 5, is constantly open to atmosphere through opening 20, in the valve casing.

The piston stem 13, is guided in its longitudinal movement by flanges or keys 21, which slide in grooves 22, in the valve casing. It will thus be seen that port 6, forms a clearance around the stem 13, extending from the seat of valve 8, to the chamber 4. This is important, inasmuch as the pressure from pipe 18, must act at times upon both piston 12, and valve 8.

In Fig. 1, 23 indicates the front end or head of the triple valve, and 24 the "cross-over" from the train pipe.

The operation is as follows: When the brakes are applied, air from the auxiliary reservoir passes into the brake cylinder and thereby reduces the pressure in said reservoir. The pressure acting upon piston 12, therefore becomes reduced below seventy pounds. When this occurs, spring 11, sends

valve 8 to its seat and closes the exhaust from the brake cylinder through pipe 18, holding said exhaust closed against seventy pounds pressure, the force exerted by spring 11. This will maintain the pressure in the brake cylinder sufficiently to keep the brake strongly applied. During this time the engineer may charge the auxiliary reservoir. As soon as valve 8, closes and the triple valve places the brake cylinder to exhaust, which latter will occur as soon as the engineer commences to recharge the auxiliary, there will be a pressure through pipe 18, from the brake cylinder which will act on piston 12, and valve 8. This pressure, however, will not be sufficient to unseat valve 8, but will cause piston 12, to rise off its seat until the pressure in the auxiliary reservoir rises sufficiently to counter-balance the pressure on the lower side of the piston 12, from pipe 18. Therefore, when the auxiliary pressure reaches normal there will be a balance of pressure on the opposite side of piston 12. This will prevent the unseating of valve 8, until the proper time arrives. When the engineer places the brake valve to full release this raises the pressure in the auxiliary reservoir to slightly above seventy pounds. This pressure will overcome the balance of pressure on the opposite side of piston 12, causing said piston to descend a short distance rather slowly. As soon, however, as the stem 13, engages valve 8, and unseats it sufficiently to allow air to pass from port 6, around said valve into the open chamber 5, this causes such a reduction of pressure against the lower side of piston 12, as to cause said piston to jump quickly down upon its seat, its stem 13 imparting a like motion to valve 8, which opens port 6, wide to atmosphere. The brake cylinder is then fully open to exhaust.

In the form of my invention shown in Fig. 3, the parts of the valve are substantially identical with those above described, with the exception of the valve casing. In this instance, the valve casing 1′ is cast integral with the stem of the triple valve, thereby doing away with pipe connections. In Fig. 3, 16′ represents the port leading to the auxiliary reservoir, and 18′ the port leading to the exhaust of the triple valve. In Fig. 3, parts indicated 17′, 23′ and 24′ correspond to parts indicated 17, 23 and 24 in Fig. 1. The operation of the valve indicated in Fig. 3, is the same as that shown in Fig. 1.

Without confining my invention to specific details of construction further than set forth in the accompanying claims, what I claim as my invention is:—

1. The combination with an air brake system having an auxiliary reservoir and brake cylinder, of a pressure retaining device, comprising a valve casing having a chamber opening through a duct into the said auxiliary reservoir, a piston movable in said chamber and subject to pressure on one side from said auxiliary, said casing having a port on the other side of said piston communicating with the exhaust from said brake cylinder and opening to atmosphere, a valve controlling said last named opening, means coöperating with said piston to move said valve off its seat, and means exerting a pressure having a tendency to seat said valve to close said opening, the said piston when said valve is closed being subject to pressure from the auxiliary tending to move it in one direction and to pressure from the exhaust of the brake cylinder tending to move it in an opposite direction, substantially as described.

2. The combination with an air brake system having a brake cylinder, auxiliary reservoir and triple valve, of a pressure retaining device comprising a valve casing forming an integral part of the casting of the triple valve stem and having a chamber opening through a duct into the said auxiliary reservoir, a piston movable in said chamber and subject to pressure on one side from said auxiliary, said casing having a port on the other side of said piston communicating with the exhaust from said brake cylinder and opening to atmosphere, a valve controlling said last named opening, means coöperating with said piston to move said valve off its seat and means exerting a pressure having a tendency to seat said valve to close said opening, the said piston when said valve is closed being subject to pressure from the auxiliary tending to move it in one direction and to pressure from the exhaust of the brake cylinder tending to move it in an opposite direction, substantially as described.

3. The combination with an air brake system comprising an auxiliary reservoir and brake cylinder, of a pressure retaining device comprising a casing having two chambers opening into a port or recess common to both, said port being connected by a duct to the exhaust from said brake cylinder, one of said chambers being open to atmosphere through said casing and the other chamber connecting with the said auxiliary reservoir, a valve controlling the opening from the exhaust chamber to said common port, a spring the tension of which is exerted to seat said valve, and close said port to atmosphere, a piston movable in the chamber connected to said auxiliary reservoir and subject to pressure both from said auxiliary and from said port, means coöperating with said piston to unseat the said pressure retaining valve, against the tension of said spring, substantially as described.

4. The combination with an air brake system comprising an auxiliary reservoir and brake cylinder, of a pressure retaining de-

vice comprising a casing having two chambers opening into a port or recess common to both, said port being connected by a duct to the exhaust from said brake cylinder, one of said chambers being constantly open to atmosphere through said casing and the other chamber being in constant connection with the said auxiliary reservoir, a valve controlling the opening from the exhaust chamber to said common port, a spring the tension of which is exerted to seat said valve, a piston movable in the chamber connected to said auxiliary reservoir and subject to pressure both from said auxiliary and from said port, said piston being provided with a stem adapted to engage and unseat the said pressure retaining valve, substantially as described.

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