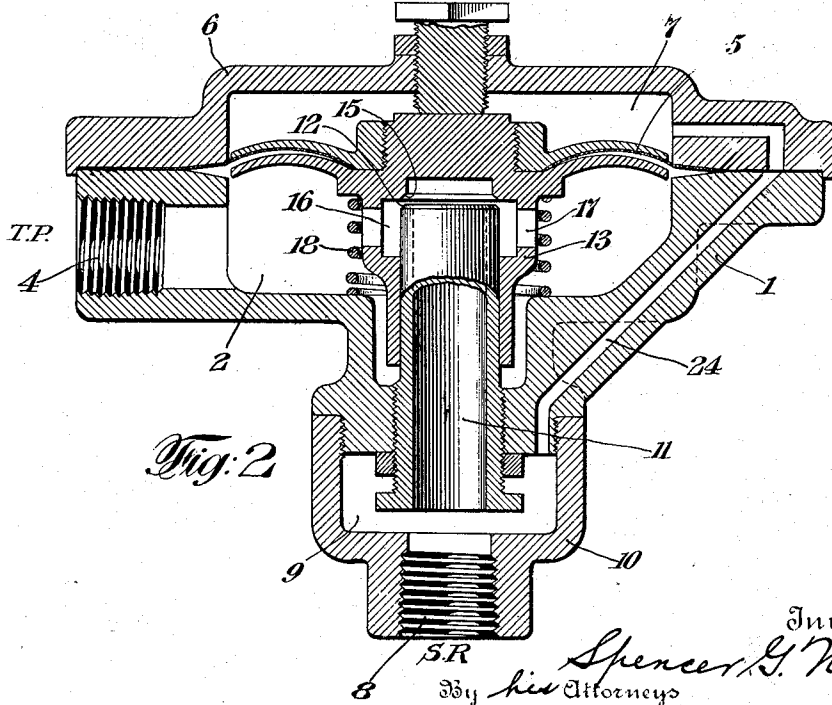
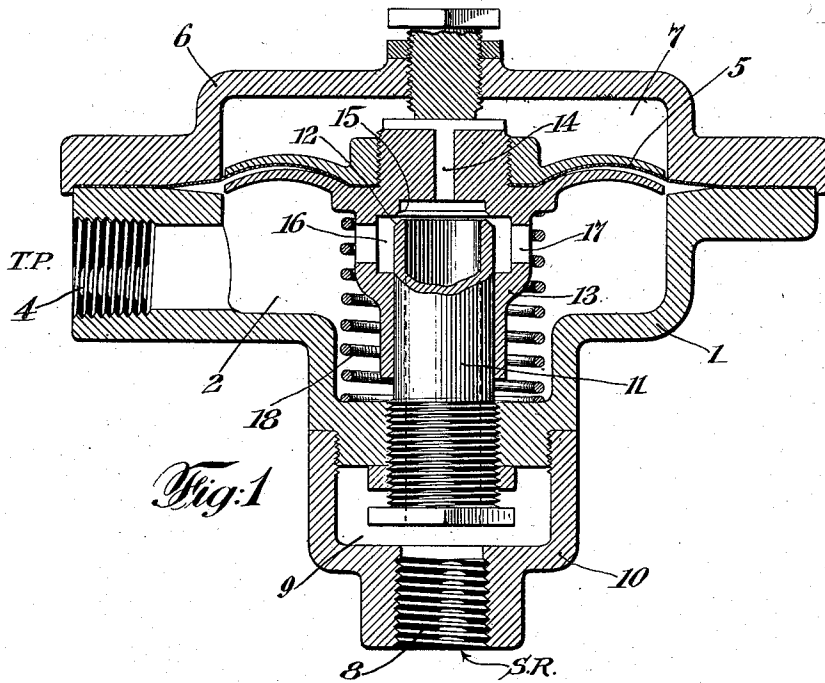


S. G. NEAL.

AIR RETAINING VALVE FOR AIR BRAKE APPARATUS.
APPLICATION FILED NOV. 18, 1916. RENEWED JUNE 7, 1919.

1,314,977.

Patented Sept. 2, 1919.



Inventor

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By his Attorneys

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UNITED STATES PATENT OFFICE.

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AIR-RETAINING VALVE FOR AIR-BRAKE APPARATUS.

1,314,977.

Specification of Letters Patent.

Patented Sept. 2, 1919.

Application filed November 18, 1916, Serial No. 131,994. Renewed June 7, 1919. Serial No. 302,630.

To all whom it may concern:

Be it known that I, SPENCER G. NEAL, a citizen of the United States, and residing in the borough of Manhattan, city, county, and State of New York, have invented certain new and useful Improvements in Air-Retaining Valves for Air-Brake Apparatus, of which the following is a specification.

This invention relates to improvements in that type of air retaining valve for air brake apparatus shown and described in Patents No. 1,183,103, dated May 16, 1916, and No. 1,157,954, dated October 26, 1915. The air retaining valve shown and described in said patents places the train pipe reservoir in communication with the train pipe during all service applications of the brakes, and means are provided whereby when the brake cylinder pressure is equal to or above train pipe pressure, or when, after an equalization of train pipe and brake cylinder pressures, the brake cylinder pressure leaks down below the train pipe pressure and augmenting reservoir pressure, the augmenting reservoir will be sealed against communication with the train pipe, and placed in communication with the brake cylinder so that the said reservoir capacity will be added to the brake cylinder capacity and disconnected from the train pipe.

In the present invention the augmenting or train pipe reservoir is in communication with the train pipe during all service applications of the brakes, but upon an emergency application of the brakes the train pipe reservoir is disconnected from the train pipe and sealed.

The main object of the invention is to provide a retaining valve which will be operated by the service reservoir pressure to seal the train pipe reservoir from the train pipe upon a reduction of the train pipe pressure sufficient to secure an emergency application of the brakes. It is desirable, upon a reduction of train pipe pressure, to secure an emergency application of the brakes, to reduce the train pipe capacity by sealing the train pipe reservoirs or disconnecting them from the train pipe. By sealing the train pipe reservoirs the volume of air contained therein is at once removed from the train pipe volume, thereby rendering it a simple matter to secure the proper reduction of

train pipe air throughout the length of the train in emergency applications.

In the drawing, Figure 1 is a vertical central sectional view of the air retaining valve; and

Fig. 2 a view similar to Fig. 1, showing a slightly modified method of controlling the operation of the valve.

The train pipe or augmenting reservoir is connected to the triple valve through the retaining valve for all service applications of the brakes, precisely as shown and described in Patent No. 1,157,954. This valve consists of an outer main casing 1 forming a large train pipe chamber 2, said chamber being connected to the train pipe through pipe connection 4. The upper wall of the chamber 2 is formed by a flexible diaphragm or movable abutment 5, which is clamped in position by the upper part 6 of the casing, said part forming an upper controlling chamber 7 above the diaphragm. The train pipe reservoir is connected to the lower end of the retaining valve by means of a pipe connection 8 opening into a chamber 9 formed by a cap 10 screwed on the lower end of the main casing 1.

Extending upwardly through the bottom of the valve casing 1 and into the chamber 2, is an open-ended tubular post 11 having a valve 12 formed at its upper end. Sliding on this post is a sleeve 13 carried by the diaphragm 5 and adapted to be seated on and unseated from the valve 12 by the variations in pressure in chambers 2 and 7. Through the center of the diaphragm is a passage 14 which places the chamber 2 in free communication with chamber 7. Around the lower margin of the aperture 14 is formed a valve seat 15 which is adapted to receive and cooperate with the valve 12 of the tubular post 11. The sleeve 13 is enlarged at its upper end to form the small chamber 16, and said chamber is in communication with the train pipe chamber 2 through the aperture 17, so that when the valve seat 15 is raised above the valve 12 on the upper end of the tubular post 11, chamber 2 will be in free communication with the train pipe reservoir and with the chamber 7. Within the chamber 2 is arranged a coil spring 18, said spring bearing on the bottom wall of said chamber, and on the under side of the diaphragm 5, and

tending to separate the valve seat 15 and valve 12 and to maintain the train pipe chamber 2 in communication with the train pipe reservoir.

5 The operation of the apparatus may be briefly described as follows:

Upon a sudden and prolonged reduction in train pipe pressure sufficient to secure the emergency application of the brakes, the pressure in chamber 2 will be sufficiently reduced to permit the air in chamber 7 to depress diaphragm 5 and bring the seat 15 of sleeve 13 down to valve 12, thereby closing communication between the train pipe reservoir and the chamber 2. The reduction in pressure in chamber 2 in an emergency application of the brakes, will take place more rapidly than air can flow from chamber 7 into chamber 2, so that the superior pressure in chamber 7 will depress diaphragm 5. It is manifest that by means of the air retaining valve shown in Fig. 1, the train pipe reservoir will be disconnected from the train pipe so that the air from said reservoir cannot flow into the train pipe upon an emergency application of the brakes. During all service applications of the brakes, however, the reduction of pressure in chamber 2 will be comparatively slow, thereby permitting an equalization of pressures in chambers 7 and 2 and preventing the seating of the valve seat 15 upon valve 12. The spring 18 maintains the diaphragm 5 in its upper position until there is a material preponderance of pressure in chamber 7. The excessive pressure in chamber 7 must be sufficient to overcome spring 18, and this preponderance of pressure will only occur when the pressure in chamber 2 is reduced suddenly sufficient to secure the emergency operation of the retaining valve. A preponderance of pressure in chamber 7 will seal the train pipe reservoir from the train pipe upon an emergency application of the brakes.

In the construction of valve shown in Fig. 2 the operation is precisely the same as in the valve illustrated in Fig. 1. In the construction shown in Fig. 2 the train pipe reservoir air passes to the chamber 7 through a port 24 in the valve casing, the diaphragm 5 being formed without the central apertures shown in Fig. 1.

What I claim is:

55 1. A retaining valve comprising a casing, means therein adapted to maintain a train pipe in communication with a train pipe reservoir during all slow variations in train pipe pressure, said means being operated by
60 train pipe reservoir air upon a sudden reduction in train pipe pressure to seal the train pipe reservoir from the train pipe to prevent the train pipe reservoir pressure lowering with the train pipe pressure.

55 2. A retaining valve for air brake appa-

ratus comprising a casing, a diaphragm within said casing and dividing it into a train pipe chamber and a controlling chamber, the train pipe chamber being adapted to be connected to a train pipe and to a train pipe reservoir, means carried by the diaphragm to control communication between the train pipe chamber and the train pipe reservoir during all slow variations in train pipe pressure, and means for maintaining open communication between the train pipe reservoir and the controlling chamber at all times, whereby upon a sudden reduction in train pipe pressure the train pipe reservoir pressure in the controlling chamber will move the diaphragm and seal said train pipe reservoir from the train pipe chamber.

3. A retaining valve for air brake apparatus comprising a casing, a diaphragm within said casing and dividing it into a train pipe chamber and a controlling chamber, the train pipe chamber being adapted to be connected to the train pipe and to the train pipe reservoir, and means for yieldingly maintaining open communication between the train pipe reservoir and train pipe chamber and the controlling chamber during all slow variations in train pipe pressure, said means being operated by train pipe reservoir air in the controlling chamber upon a sudden reduction in train pipe pressure to seal the train pipe reservoir from the train pipe chamber and to maintain open communication between the train pipe reservoir and the controlling chamber and to maintain said seal until there is a substantial equalization of pressures in the controlling chamber and the train pipe chamber.

4. A retaining valve for air brake apparatus comprising a casing, a diaphragm within said casing and dividing it into a train pipe chamber and a controlling chamber, the controlling chamber being always in open communication with the train pipe reservoir, and means in the train pipe chamber to yieldingly hold the diaphragm in position to maintain open communication between the train pipe chamber and the train pipe reservoir during all slow variations of pressure in the train pipe chamber, the train pipe reservoir air in the controlling chamber moving said diaphragm to seal the connection between the train pipe reservoir and the train pipe upon a sudden reduction of pressure in the train pipe chamber.

5. A retaining valve adapted to connect a train pipe reservoir with a train pipe during all slow variations in train pipe pressure and provided with means adapted to be operated by train pipe reservoir air upon a sudden reduction of train pipe pressure to seal the train pipe reservoir from the train pipe.

6. A retaining valve adapted to connect a train pipe reservoir with a train pipe dur-

ing all slow variations in train pipe pressure and adapted upon a sudden reduction of train pipe pressure for an emergency application of the brakes to be operated by train
5 pipe reservoir air and to seal the train pipe reservoir from the train pipe to prevent the depletion of the train pipe reservoir air upon an emergency application of the brakes.
7. A retaining valve adapted to connect a
10 train pipe reservoir to a train pipe for service applications of the brakes and during all slow variations in train pipe pressure and operated by train pipe reservoir air upon a sudden reduction in train pipe pressure for
15 an emergency application of the brakes to seal the train pipe reservoir from the train pipe to prevent the depletion of the train pipe reservoir upon an emergency application of the brakes.
20 8. A retaining valve for use in that type of air brake apparatus in which train pipe air is admitted to the brake cylinder for all service applications of the brakes and comprising a casing, and means therein main-
25 taining open communication between the train pipe reservoir and the train pipe during all slow reductions in train pipe pressure for service applications of the brakes, said means sealing the train pipe reservoir from
30 the train pipe by train pipe reservoir air upon a sudden reduction of pressure in the

train pipe chamber for securing an emergency application of the brakes whereby the train pipe reservoir will not be depleted during an emergency application of the
35 brakes.

9. An air brake apparatus comprising a valve device adapted to maintain a train pipe in communication with a train pipe reservoir during all slow variations in train
40 pipe pressure, said valve device being operated by train pipe reservoir air upon a sudden reduction in train pipe pressure to seal the train pipe reservoir from the train pipe and thereby prevent train pipe reservoir
45 pressure lowering with train pipe pressure.

10. In an air brake apparatus in which the train pipe volume is augmented by a train pipe reservoir during all service applications of the brakes, a valve device adapted
50 to maintain the train pipe reservoir in communication with the train pipe during all slow variations in train pipe pressure but operating on a sudden reduction in train pipe pressure to seal the train pipe reservoir
55 from the train pipe, and thereby reduce the volume of the train pipe and prevent the train pipe reservoir pressure being lowered with the train pipe pressure.

In testimony whereof I hereunto affix my
60 signature.

SPENCER G. NEAL.