W. V. TURNER.

TRIPLE VALVE DEVICE.

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1,136,063. Patented Apr. 20, 1915.

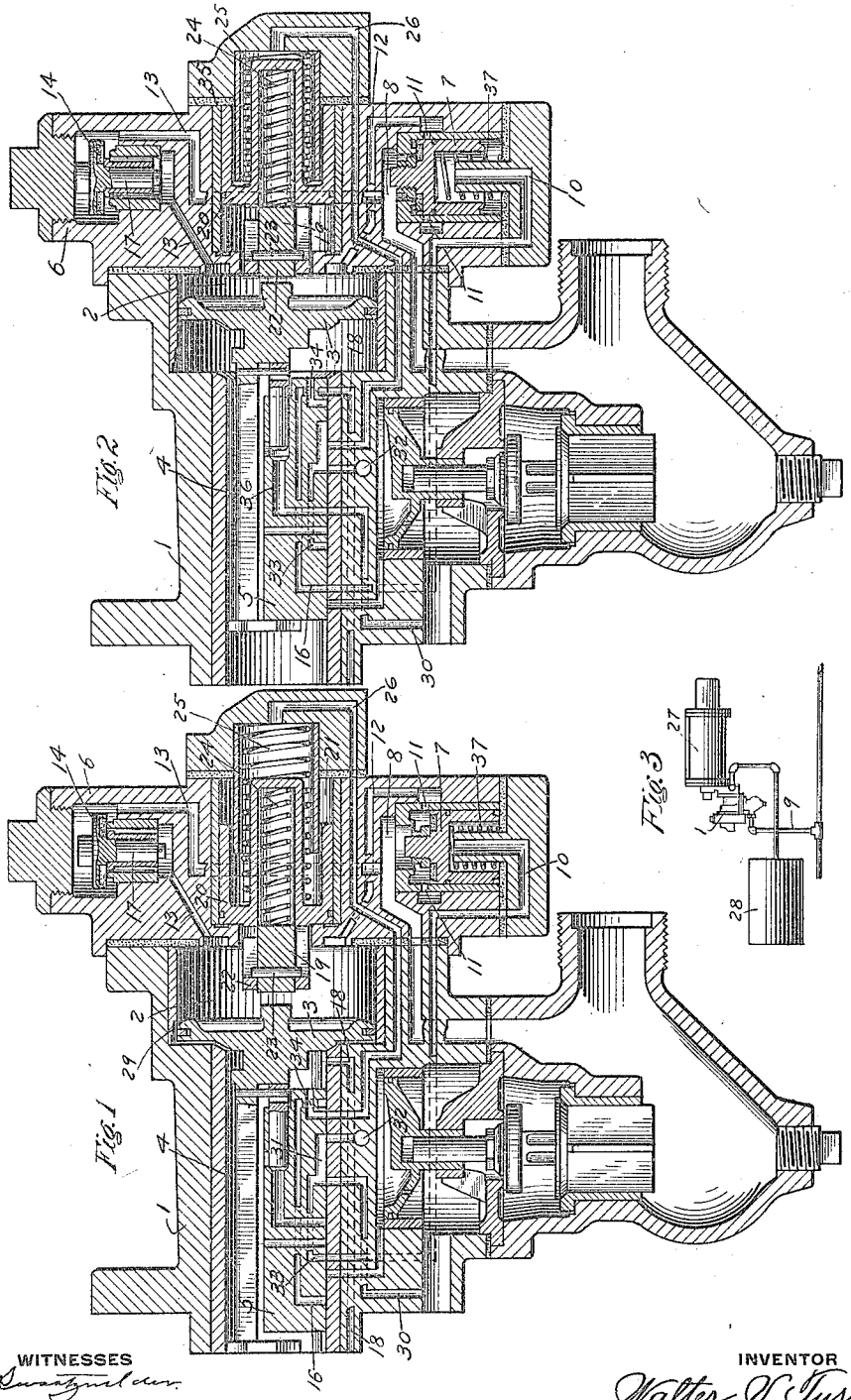

Fig. 2

Fig. 1

Fig. 3

WITNESSES

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UNITED STATES PATENT OFFICE.

WALTER V. TURNER, OF EDGEWOOD, PENNSYLVANIA, ASSIGNOR TO THE WESTINGHOUSE AIR BRAKE COMPANY, OF WILMERDING, PENNSYLVANIA, A CORPORATION OF PENNSYLVANIA.

TRIPLE-VALVE DEVICE.

1,136,063. Specification of Letters Patent. Patented Apr. 20, 1915.

Application filed December 28, 1912. Serial No. 739,013.

To all whom it may concern:

Be it known that I, WALTER V. TURNER, a citizen of the United States, residing at Edgewood, in the county of Allegheny and State of Pennsylvania, have invented new and useful Improvements in Triple-Valve Devices, of which the following is a specification.

This invention relates to fluid pressure brakes, and more particularly to a valve mechanism for controlling the application and release of the brakes.

Particularly where long trains of heavy cars are operated there has heretofore been some difficulty in securing the desired prompt release of the brakes throughout the train. This may occur from various causes, such as the fact that the large reservoirs necessarily employed on heavy cars require a large amount of fluid under pressure to recharge the same, so that upon releasing the brakes, the reservoirs on cars at the front end of the train take practically all of the fluid supplied to the train pipe and consequently the train pipe pressure is not increased sufficiently on the cars at the rear end of the train to shift the triple valves to release position. Another undesirable tendency is that of brakes creeping on by reason of accidental fluctuations in train pipe pressure, train pipe leaks, and the like.

One object of my invention is to provide means for insuring the prompt release of the brakes throughout the train.

Another object of my invention is to provide means for preventing the brakes from applying through slight unintentional reductions in train pipe pressure.

In order to secure a more uniform release of the brakes throughout the train my invention contemplates providing means for controlling communication from the train pipe to the triple valve piston and adapted upon a predetermined increase in train pipe pressure in releasing the brakes to open said communication. Thus the pressure in the train pipe is increased throughout the train including the rear cars before said pressure is sufficient to shift the triple valves at the head end of the train to release position, so that the reservoirs at the head end cannot take fluid from the train pipe and thus prevent an increase in train pipe pressure at the rear end of the train. In order to prevent the brakes from applying except at a predetermined reduction in train pipe pressure, I employ a yielding stop for holding back the brake controlling valve device from movement to brake application position and means operating upon a predetermined reduction in train pipe pressure for relieving said valve device from the resistance of said stop, so that the valve device may then move to application position.

In the accompanying drawing; Figure 1 is a central sectional view of a triple valve device embodying my invention and showing the parts in normal release position; Fig. 2 a similar view, showing the parts in service application position; and Fig. 3 a diagrammatic view of a car air brake equipment with the improved triple valve device applied thereto.

The triple valve device shown in the drawing comprises a casing 1 having piston chamber 2 containing piston 3 and valve chamber 4 containing main slide valve 5. According to my improvement the usual triple valve cap is replaced by a casing 6 having a piston chamber containing a valve piston 7 having one side open to passage 8 communicating with train pipe 9 and having a passage 10 leading from the opposite side to the seat of the main slide valve 5. The valve piston is adapted to seat in opposite directions and controls communication from train pipe passage 8 through side ports 11 to passage 12 leading to the triple valve piston chamber 2. Another passage 13 leads from train pipe passage 8 to the triple valve piston chamber 2 and this passage contains a check valve 14 adapted to prevent flow from the train pipe to the triple valve piston chamber but permitting flow from said chamber.

According to my invention, a graduating stem 19 is provided which is carried by a graduating stem sleeve 20 mounted in a piston chamber 21 in the cap casing 6. Said piston has a portion 22 projecting into the piston chamber 2 and this portion is slotted for a pin 23 carried by the stem 19. A graduating spring 24 acts on said stem and is held under an initial compression by the engagement of pin 23 with the outer end walls of said slot. A spring 25 acts on the graduating sleeve 20 and tends to hold the parts in normal position with the graduating stem 19 projecting into the piston chamber 2 and a passage 26 leads from the cham-

ber at the spring side of the sleeve 20 to the seat of the main slide valve 5.

In Fig. 3 of the drawing, the improved triple valve device is shown connected up with a car air brake equipment having the usual brake cylinder 27, auxiliary reservoir 28, and train pipe 9.

In charging the system, fluid from the train pipe 9 flows to the top of the release valve 7 and forces the same to its lower seat. Fluid then flows through the ports 11 and passage 12 to the piston chamber 2 and shifts the triple valve piston 3 to release position, as shown in Fig. 1. In release position, the auxiliary reservoir 28 is charged with fluid under pressure through the feed groove 29 in the usual manner and the main slide valve connects brake cylinder port 30 through cavity 31 with exhaust port 32. In this position, passage 10 is connected by port 33 opening into cavity 31 with exhaust port 32, so that the chamber below the valve piston 7 is subject to atmospheric pressure and the valve piston 7 is held open by train pipe pressure acting on the upper side. Passage 26 is also connected by port 34 in the main slide valve with the valve chamber 4, so that the spring side of the graduating sleeve 20 is subject to auxiliary reservoir pressure. Upon making a reduction in train pipe pressure to effect an application of the brakes, fluid flows from the triple valve piston chamber 2 through passage 13, lifting the check valve 14 and may also flow through ports 11 to the train pipe, at least on the initial reduction in train pipe pressure. The triple valve piston is thereupon moved outwardly, closing feed groove 29, until it engages with the graduating stem 19. As the reduction in train pipe pressure continues, the graduating spring 24 is slightly compressed and at this point the passage 26 is arranged to register with cavity 31 in the main slide valve. The chamber at the spring side of the graduating sleeve 20 is thereupon vented to the atmosphere and the train pipe pressure acting on the opposite side of the sleeve 20 forces the sleeve back so as to seat on gasket 35. The resistance of the graduating spring 24 being thus removed from the piston 3, the same moves quickly and positively to service application position, in which fluid is supplied from the auxiliary reservoir through port 36 to the brake cylinder port 30 in the usual manner, as shown in Fig. 2 of the drawing. This feature prevents the movement of the triple valve to apply the brakes under light reductions in train pipe pressure and the spring 24 may be such as to require any desired predetermined differential to compress same, for example; the total resistance to be overcome including the spring resistance and the main slide valve friction may be about five pounds, so that it will require a little more than a five pound reduction in train pipe pressure to move the triple valve piston and slightly compress the graduating spring 24. In service application position, the passage 10 leading to the chamber below the valve piston 7 is connected by port 16 in the main slide valve with a passage 18 which leads to the auxiliary reservoir, so that fluid at auxiliary reservoir pressure is admitted to said valve piston and consequently the pressure in said chamber substantially equalizes with the train pipe pressure on the opposite side and the spring 37 thereupon moves the piston to its upper seat, as shown in Fig. 2 of the drawing, thus closing communication from the train pipe through ports 11 to the passage 12 and the triple piston chamber 2. Since in service application position, fluid flows directly from the auxiliary reservoir to the small chamber below the valve piston 7, the pressure therein rapidly equalizes with the train pipe pressure on the opposite side, and consequently the valve piston moves to its upper seat before there is any appreciable pressure in the brake cylinder. Upon an increase in train pipe pressure to release the brakes, the valve piston 7 remains seated in its upper position until the train pipe pressure is increased a predetermined amount above the auxiliary reservoir pressure, dependent upon the differential area of the valve piston exposed to train pipe pressure and the resistance of spring 37. When the train pipe pressure slightly exceeds the predetermined degree for which the parts are adjusted, the valve piston 7 is moved from its upper seat and as the full area thereof is then exposed to train pipe pressure the same is quickly and positively shifted to the open position in which communication is open from the train pipe to the triple valve piston chamber. Fluid from the train pipe at a substantially higher pressure than the auxiliary reservoir pressure thereupon flows to the triple valve piston chamber and the triple valve piston is then promptly moved to release position.

An important feature of my invention consists in combining with the release controlling device, means for preventing an application of the brakes except at a predetermined reduction in train pipe pressure, for the reason that with the release valve device employed alone and arranged to open at a predetermined increase in train pipe pressure, say five pounds, if an application of the brakes should be made at a reduction in train pipe pressure less than five pounds, say three pounds, then in releasing, the train pipe pressure could only be increased three pounds and this would not be sufficient to effect the operation of the release valve device and consequently the brakes could not be released. By combining the means for preventing an application of the brakes,

until a predetermined reduction in train pipe pressure is made, with the release device, however, it will be evident that the brake application controlling means may be arranged to operate at a somewhat greater reduction in train pipe pressure than the degree of increase necessary to operate the release device, thus always insuring a sufficient margin to permit obtaining the desired increase in train pipe pressure necessary to operate the release device.

Having now described my invention, what I claim as new and desire to secure by Letters Patent, is:—

1. The combination with a valve device operated upon a reduction in train pipe pressure for effecting an application of the brakes, of means for controlling communication from the train pipe to said valve device and operated upon movement of said valve device from release position for closing said communication.

2. In a fluid pressure brake, the combination with a train pipe and a valve device for controlling the application and release of the brakes comprising valve means, and a piston operated upon a reduction in train pipe pressure for actuating said valve means to effect an application of the brakes, of valve means for controlling communication through which fluid from the train pipe is admitted to said piston and operated by the movement of said valve device to apply the brakes for closing said communication.

3. In a fluid pressure brake, the combination with a train pipe and a valve device operated upon a reduction in train pipe pressure to effect an application of the brakes, of a valve piston subject on one side to train pipe pressure for controlling communication through which fluid from the train pipe is supplied to said valve device to effect the release of the brakes, and means for equalizing the fluid pressures on opposite sides of said valve piston upon applying the brakes to close said communication, said valve piston being operated upon a predetermined increase in train pipe pressure to open said communication.

4. In a fluid pressure brake, the combination with a train pipe and a valve device operated upon a reduction in train pipe pressure to effect an application of the brakes, of a valve piston subject on one side to train pipe pressure for controlling communication through which fluid from the train pipe is supplied to said valve device to effect the release of the brakes, means controlled by said valve device for equalizing the fluid pressures on opposite sides of said valve piston in brake application position, and a spring for actuating said valve piston to close said communication upon equalization of fluid pressures, said valve piston being operated upon a predetermined increase in train pipe pressure to open said communication.

5. In a fluid pressure brake, the combination with a train pipe and a valve device operating upon a reduction in train pipe pressure to effect a service application of the brakes, of a stop device for checking the movement of said valve device to service application position and movable upon a predetermined reduction in train pipe pressure to permit free movement of the valve device to service position.

6. In a fluid pressure brake, the combination with a train pipe and a valve device operating upon a reduction in train pipe pressure to effect a service application of the brakes, of a stop device for resisting the movement of said valve device to service application position and means operated upon a predetermined reduction in train pipe pressure for shifting said stop device to permit unobstructed movement of said valve device to effect an application of the brakes.

7. In a fluid pressure brake, the combination with a train pipe and a valve device operating upon a reduction in train pipe pressure to effect an application of the brakes, of a graduating stem normally in position for opposing movement of said valve device to brake application position and means controlled by said valve device for shifting said stem to permit the movement of said valve device upon a predetermined reduction in train pipe pressure.

8. In a fluid pressure brake, the combination with a train pipe and a valve device operating upon a reduction in train pipe pressure to effect an application of the brakes, of a graduating stem for opposing movement of said valve device to brake application position, a piston device normally subject to opposing fluid pressures and carrying said stem, and means controlled by the movement of said valve device and operating upon a predetermined reduction in train pipe pressure to vent fluid from one side of said piston device and thereby shift said graduating stem to permit movement of the valve device to brake application position.

9. In a fluid pressure brake, the combination with a train pipe and a valve device operating upon a reduction in train pipe pressure to effect an application of the brakes, of a yielding stop for opposing movement of said valve device to brake application position, a piston normally subject on opposite sides to fluid pressure, in which said stop is mounted, said valve device being adapted upon a predetermined reduction in train pipe pressure to slightly move said stop and assume a position in which fluid is vented from one side of said piston to thereby effect the movement of said stop and permit the valve device to move the brake application position.

10. In a fluid pressure brake, the combination with a train pipe and a valve device operating upon a reduction in train pipe pressure for effecting an application of the brakes and upon an increase in train pipe pressure for effecting the release of the brakes, of means for preventing movement of said valve device to brake application position until a predetermined reduction in train pipe pressure is attained and means for closing communication for supplying fluid from the train pipe to said valve device when the brakes are applied and operating upon a predetermined increase in train pipe pressure for opening said communication.

11. In a fluid pressure brake, the combination with a train pipe, valve means for controlling the application and release of the brakes, and a piston operated by variations in train pipe pressure for actuating said valve means, of a yielding stop for preventing movement of said piston to brake application position, means for shifting said stop to permit movement of said valve device to application position upon a predetermined reduction in train pipe pressure, a valve piston for controlling communication through which fluid is supplied from the train pipe to said piston, and means for operating said valve piston to close said communication when the brakes are applied, said valve piston being operated upon a predetermined increase in train pipe pressure to open said communication.

12. In a fluid pressure brake, the combination with a train pipe and a valve device operating upon a reduction in train pipe pressure for effecting an application of the brakes and upon an increase in train pipe pressure for effecting the release of the brakes, of means for preventing movement of said valve device to brake application position until a predetermined reduction in train pipe pressure is effected and means for preventing the admission of fluid from the train pipe to said valve device to effect the release of the brakes until a predetermined increase in train pipe pressure is made.

13. In a fluid pressure brake, the combination with a train pipe and a valve device operating upon a reduction in train pipe pressure for effecting an application of the brakes and upon an increase in train pipe pressure for effecting the release of the brakes, of means for preventing movement of said valve device to brake application position until a predetermined reduction in train pipe pressure is effected and means for preventing the admission of fluid from the train pipe to said valve device to effect the release of the brakes until the train pipe pressure is increased to a predetermined degree but less than the degree of reduction required to permit movement of the valve device to brake application position.

14. In a fluid pressure brake, the combination with a train pipe and a valve device operating upon a reduction in train pipe pressure for effecting an application of the brakes and upon an increase in train pipe pressure for effecting the release of the brakes, of means for permitting movement of said valve device to brake application position only upon a predetermined reduction in train pipe pressure, and means for permitting movement of said valve device to release position only upon a predetermined increase in train pipe pressure which is a degree less than the reduction required to permit the brakes to be applied.

15. The combination with a valve device operating upon a reduction in train pipe pressure for effecting an application of the brakes, of menas for controlling a communication from the train pipe to said valve device and operated upon movement of said valve device in applying the brakes for closing said communication.

16. The combination with a valve device operating upon a reduction in train pipe pressure for effecting an application of the brakes, of means controlling the only communication through which fluid is supplied from the train pipe to said valve device and operated to close said communication upon movement of said valve device to application position.

17. The combination with a valve device operating upon a reduction in train pipe pressure for effecting an application of the brakes, of a stop device for checking the movement of said valve device to application position, means operating upon a predetermined reduction in train pipe pressure for releasing said stop device to permit movement of the valve device to application position, and a valve mechanism operating upon movement of said valve device in applying the brakes for closing communication through which fluid is supplied from the train pipe to said valve device.

In testimony whereof I have hereunto set my hand.

WALTER V. TURNER.

Witnesses:
A. M. CLEMENTS,
S. W. KEEFER.