W. V. TURNER & P. H. DONOVAN.

BRAKE PIPE VENT VALVE.

APPLICATION FILED JULY 8, 1912.

1,125,214. Patented Jan. 19, 1915.

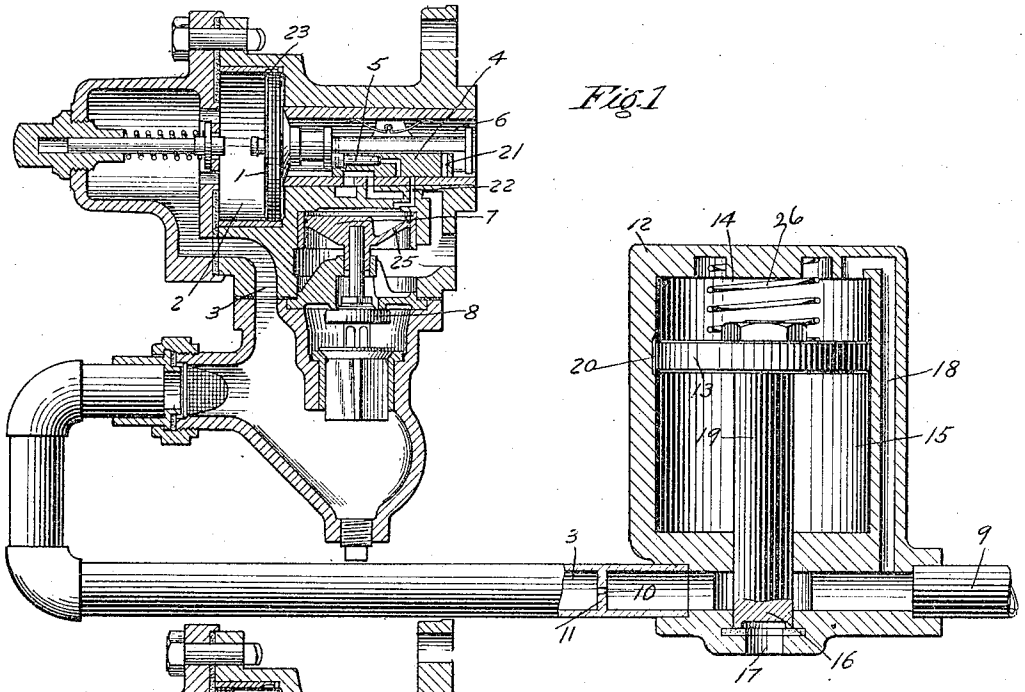


FIG. 1

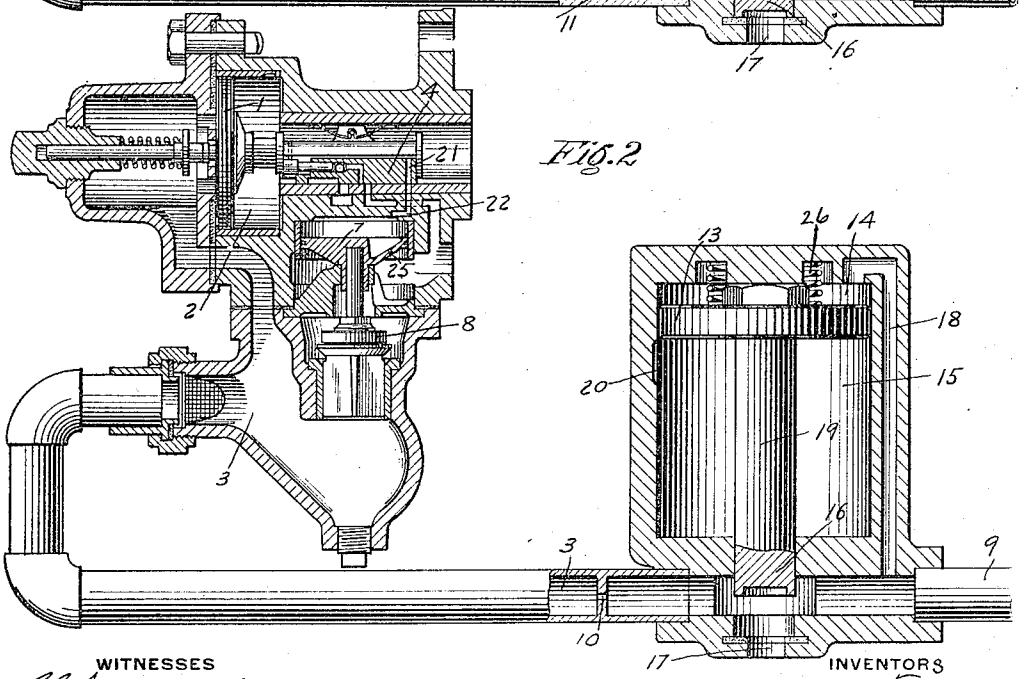


FIG. 2

WITNESSES

R. L. Swartzlander

C. M. Clements.

INVENTORS

Walter V. Turner

Patrick H. Donovan

by Wm. M. Cady Att'y.

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

WALTER V. TURNER AND PATRICK H. DONOVAN, OF EDGEWOOD, PENNSYLVANIA, ASSIGNORS TO THE WESTINGHOUSE AIR BRAKE COMPANY, OF WILMERDING, PENNSYLVANIA, A CORPORATION OF PENNSYLVANIA.

BRAKE-PIPE VENT-VALVE.

1,125,214. Specification of Letters Patent. Patented Jan. 19, 1915.

Application filed July 8, 1912. Serial No. 708,119.

To all whom it may concern:

Be it known that we, WALTER V. TURNER and PATRICK H. DONOVAN, citizens of the United States, residents of Edgewood, in the county of Allegheny and State of Pennsylvania, have invented a certain new and useful Improvement in Brake-Pipe Vent-Valves, of which the following is a specification.

This invention relates to fluid pressure brakes, and more particularly to means for controlling quick serial action and emergency applications of the brakes.

As well known, the quick action triple valve device heretofore employed is provided with a quick action valve mechanism adapted upon movement of the triple valve parts to emergency position to open a port for suddenly venting fluid in large volume from the train pipe to the atmosphere, the brake cylinder, or other receptacle. The wave of reduction in train pipe pressure thus produced causes the movement of the next succeeding triple valve to emergency position by the well known serial action, thus securing quick action of all the triple valves throughout the train.

In a train equipped with quick action triple valves, it sometimes happens that by reason of its peculiar condition, a particular triple valve will accidentally move to emergency application position under an ordinary service reduction in train pipe pressure or through excessive leakage from the train pipe. This movement of one triple valve to emergency position causes the operation of the corresponding quick action valve mechanism, and the consequent local venting of the train pipe, which thereupon produces quick serial action throughout the train when not desired or intended.

In emergency application position, the triple valve opens a large port for supplying fluid from the auxiliary reservoir or other source of fluid under pressure to the brake cylinder, so that the brake cylinder pressure very quickly rises to the maximum degree, in fact the rate of increase in brake cylinder pressure is so rapid that before quick serial action can travel to the rear end of a train, particularly on a long train, a high brake cylinder pressure is produced on those vehicles at the head end of the train or adjacent to the point where the sudden reduction in train pipe pressure is initiated, thus causing the brakes to be applied with considerable force at one portion of the train while the brakes have not commenced to apply or at least with much force at another point in the train. The consequence is that the momentum of the unbraked portion of the train causes the slack to run in on the braked portion and violent shocks or even derailments are very liable to be produced.

The principal object of our invention is to obviate the above difficulties, and for this purpose we provide means for preventing the accidental movement of a triple valve device from initiating quick action in the train and means for limiting the rate of increase in brake cylinder pressure in an emergency application of the brakes so as to prevent an undue rate of increase in brake cylinder pressure in one portion of the train over the rate of increase in brake cylinder pressure at another point in the train.

More specifically stated, we employ a restricted communication through which fluid is supplied in an emergency application of the brakes from the source of fluid pressure to the brake cylinder and we provide a predetermined train pipe volume, adjacent to the triple valve piston, which communicates with the train pipe proper through a choke or restricted port, a quick action train pipe vent valve being placed in the train pipe proper adjacent to the choke.

The restricted communication in the train pipe is large enough to permit the usual service operations, but should a triple valve accidentally go to emergency position, the restricted port prevents the flow from the train pipe at a rate sufficient to produce a sudden reduction in train pipe pressure and thus prevents the propagation of undesired quick action through the train. When the quick action train pipe vent valve is actuated, however, upon a sudden reduction in train pipe pressure, quick serial action is secured in the usual manner. In order to obtain a quick initial rise in brake cylinder pressure sufficient to force the brake cylinder piston out its full traverse, the usual quick action valve mechanism of the triple valve device is employed to vent air from the portion of the train pipe adjacent to the triple valve piston which is choked off from the train pipe proper as above indicated.

In the accompanying drawing, Figure 1 is a sectional view of a brake controlling valve mechanism, with our improvement applied thereto, the parts being shown in normal release position and Fig. 2 a similar view, showing the parts in emergency application position.

The triple valve device shown in the drawing is of the usual well known quick action type having a piston 1 contained in piston chamber 2 which communicates with passage 3 leading to the train pipe. The piston 1 operates the usual main valve 4 and auxiliary valve 5 contained in valve chamber 6 which is open to the auxiliary reservoir. The emergency piston 7 of the triple valve device is adapted to operate the usual emergency valve 8 for opening communication from the train pipe to the brake cylinder. The portion of the train pipe space indicated by the reference numeral 3 communicates with pipe and passage 9 or the train pipe proper only through a restricted passage 10 shown diagrammatically in the drawing as located in a wall 11, it being understood that said passage may in practice be arranged in a suitable plug inserted in the train pipe passage or otherwise. Any desired form of train pipe vent valve device may be provided at a point adjacent to the choke in the train pipe.

As shown in the drawing, the vent valve device may comprise a casing 12 having a piston chamber containing a piston 13 which divides the piston chamber into the chambers 14 and 15. The piston 13 is provided with a stem 19 carrying a vent valve 16 adapted to control communication from the train pipe proper to an atmospheric exhaust port 17. A passage 18 leads from the train pipe passage 9 to the piston chamber 14 and when the vent valve 16 is seated, a groove 20 establishes communication around the piston 13 from the chamber 14 to chamber 15. A spring 26 may be provided to assist the closing movement of the emergency piston 13.

Instead of the usual emergency tail port, according to our invention, a restricted port 21 is provided in the main valve 4 which is adapted in emergency position to register with passage 22 leading to the emergency piston 7.

In operation, when the train pipe is charged with fluid under pressure, the chamber 15 on one side of the piston 13 is also charged through the groove 20 and fluid passing through the restricted port 10 flows through the usual feed groove 23 around the triple valve piston 1 charging the auxiliary reservoir. The restricted port 10 is of sufficient size to permit of effecting the usual service reductions in train pipe pressure and the groove 20 around piston 13 is of sufficient capacity to permit fluid to equalize back into the train pipe from chamber 15 under service reductions in train pipe pressure so that the opposing pressures on the piston 13 are maintained substantially equal and the piston is not actuated.

Upon a sudden reduction in train pipe pressure produced at the brake valve or otherwise, the groove 20 around piston 13 not being of sufficient capacity to take care of the necessary back flow from chamber 15, the pressure therein shifts the piston 13 and the vent valve 16 is thereupon opened, thereby locally venting fluid from the train pipe and causing quick serial action throughout the train by similar action of the succeeding vent valves. This sudden reduction in train pipe pressure is communicated to the train pipe passage 3 through the restricted passage 10 and while this passage is restricted, a sufficient flow from the passage 2 to the atmospheric exhaust port 17 is produced to effect the movement of the triple valve piston to emergency position. In the emergency position of the triple valve, port 21 in the main valve 4 registers with port 22, as shown in Fig. 2, and fluid under pressure thereupon flows from the auxiliary reservoir to the emergency piston 7, actuating the same so as to open the emergency valve 8. Fluid is then suddenly vented from the train pipe space 3 to the brake cylinder. The volume of the train pipe space 3 and piston chamber 2 is preferably such as to enable sufficient fluid to be vented from the train pipe space to the brake cylinder to move out the brake cylinder piston and apply the brakes with a few pounds pressure. Fluid under pressure also flows from the auxiliary reservoir through a port 25 in the emergency piston 7 to the brake cylinder until the auxiliary reservoir pressure equalizes into the brake cylinder, but owing to the restriction of the communication from the auxiliary reservoir to the brake cylinder in emergency position, the rise in brake cylinder pressure is more gradual than heretofore, thus preventing the too rapid increase in brake cylinder pressure at one part of the train as compared with the increase in brake cylinder pressure at another point in the train. The venting of a predetermined limited volume of the train pipe into the brake cylinder serves to quickly shift the brake cylinder piston to application position at a few pounds pressure, so that the braking effect starts as promptly as with the prior equipment but owing to the restricted communication from the auxiliary reservoir to the brake cylinder the rate of increase in brake cylinder pressure is thereafter more gradual than heretofore. Upon equalization of the auxiliary reservoir into the brake cylinder, the emergency piston and the emergency valve move back to normal position in the usual way, closing com-

munication from the train pipe to the brake cylinder. The train pipe vent valve 16 remains open until substantially all of the fluid in the train pipe is vented to the atmosphere, when leakage around the piston 13 permits the pressure on opposite sides of the piston to equalize so that the piston and the emergency valve are shifted to normal closed position.

If any triple valve piston in a train should accidentally move to emergency position in making a service reduction in train pipe pressure or by reason of leakage from the train pipe, while that particular triple will of course open the emergency valve 8 so as to vent fluid from the train pipe passage 3, the restricted port 10 prevents the pressure in the train pipe proper from being reduced at a rate required to propagate quick action through the train.

The restricted communication from the triple valve to the train pipe proper permits the use of a train pipe vent valve which operates to produce quick action in the same time or even quicker than heretofore without having the disadvantages hereinbefore enumerated.

It will now be evident that with our improvement, undesired quick action is prevented and also such an increase in brake cylinder pressure at one point in the train as would be liable to cause buckling of the train and the danger of shocks and derailment.

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

1. In a fluid pressure brake, the combination with a train pipe, an automatic valve device operated by a reduction in train pipe pressure for effecting an application of the brakes, and means operated upon movement of the automatic valve device to emergency position for venting fluid from the train pipe to the brake cylinder, of a restricted port of fixed capacity controlling communication from the train pipe to said valve device.

2. In a fluid pressure brake, the combination with a train pipe, an automatic valve device operated by a reduction in train pipe pressure for effecting an application of the brakes, and means operated upon movement of the automatic valve device to emergency position for venting fluid from the train pipe to the brake cylinder, of a restricted port of fixed capacity for controlling the sole communication from the train pipe to said valve device and a valve mechanism operating upon a sudden reduction in train pipe pressure for venting fluid from the train pipe.

3. In a fluid pressure brake, the combination with a train pipe and an automatic valve device operating upon a gradual reduction in train pipe pressure for effecting a service application of the brakes and upon a sudden reduction in train pipe pressure for venting fluid from the train pipe to the brake cylinder, of a restricted port having a constantly fixed capacity and forming the only means of communication from the train pipe to said automatic valve device.

4. In a fluid pressure brake, the combination with a train pipe and an automatic valve device operating upon a gradual reduction in train pipe pressure for effecting a service application of the brakes and upon a sudden reduction in train pipe pressure for venting fluid from the train pipe to the brake cylinder, of a vent valve mechanism located adjacent to the automatic valve device and operating upon a sudden reduction in train pipe pressure for locally venting fluid from the train pipe and a restricted port in the train pipe between the vent valve mechanism and the automatic valve device and constituting the only means of communication from the train pipe to said automatic valve device.

5. In a fluid pressure brake, the combination with a train pipe and a triple valve device operating upon a gradual reduction in train pipe pressure for effecting a service application of the brakes and upon a sudden reduction in train pipe pressure for effecting an emergency application of the brakes and having means for venting fluid from the train pipe to the brake cylinder in an emergency application, of a vent valve mechanism for locally venting fluid from the train pipe upon a sudden reduction in train pipe pressure and a restricted port controlling communication from the train pipe to the triple valve device.

6. In a fluid pressure brake, the combination with a train pipe and a triple valve device operating upon a gradual reduction in train pipe pressure for effecting a service application of the brakes and upon a sudden reduction in train pipe pressure for effecting an emergency application of the brakes and having means for venting fluid from the train pipe to the brake cylinder in an emergency application, of a vent valve mechanism for locally venting fluid from the train pipe upon a sudden reduction in train pipe pressure and a restricted port in the train pipe between the vent valve mechanism and the triple valve device.

7. In a fluid pressure brake, the combination with a train pipe and an automatic valve device operating upon a gradual reduction in train pipe pressure for effecting a service application of the brakes and upon a sudden reduction in train pipe pressure for effecting an emergency application of the brakes and having means operating in an emergency application for venting fluid from the train pipe, of a vent valve mech-

anism located adjacent to the automatic valve device and operating upon a sudden reduction in train pipe pressure for venting fluid from the train pipe and a restricted port in the train pipe between the vent valve mechanism and the automatic valve device.

8. In a fluid pressure brake, the combination with a train pipe and an automatic valve device operated by variations in train pipe pressure for controlling the brakes and having means for venting fluid from the train pipe in an emergency application of the brakes, of a restricted port in the train pipe adjacent to the automatic valve device forming the only means of communication from the automatic valve device to the train pipe for limiting the rate of reduction in train pipe pressure upon movement of the automatic valve device to emergency position to thereby prevent undesired quick action.

In testimony whereof we have hereunto set our hands.

WALTER V. TURNER.
PATRICK H. DONOVAN.

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

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