No. 869,837. PATENTED OCT. 29, 1907.

A. L. GOODKNIGHT.

AIR BRAKE SYSTEM.

APPLICATION FILED FEB. 16, 1907.

Fig. 1.

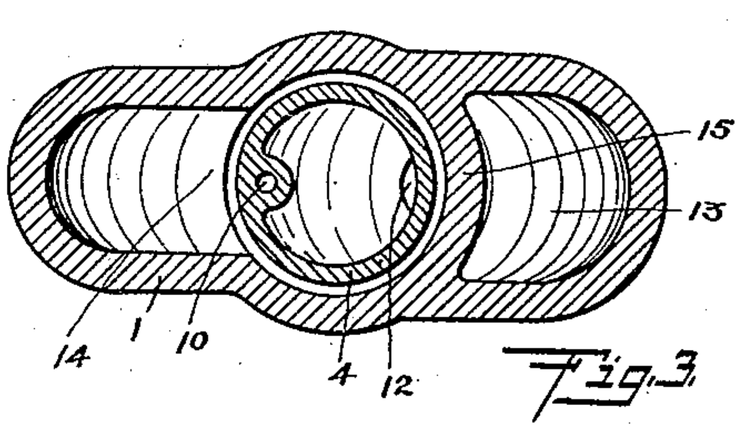

Fig. 3.

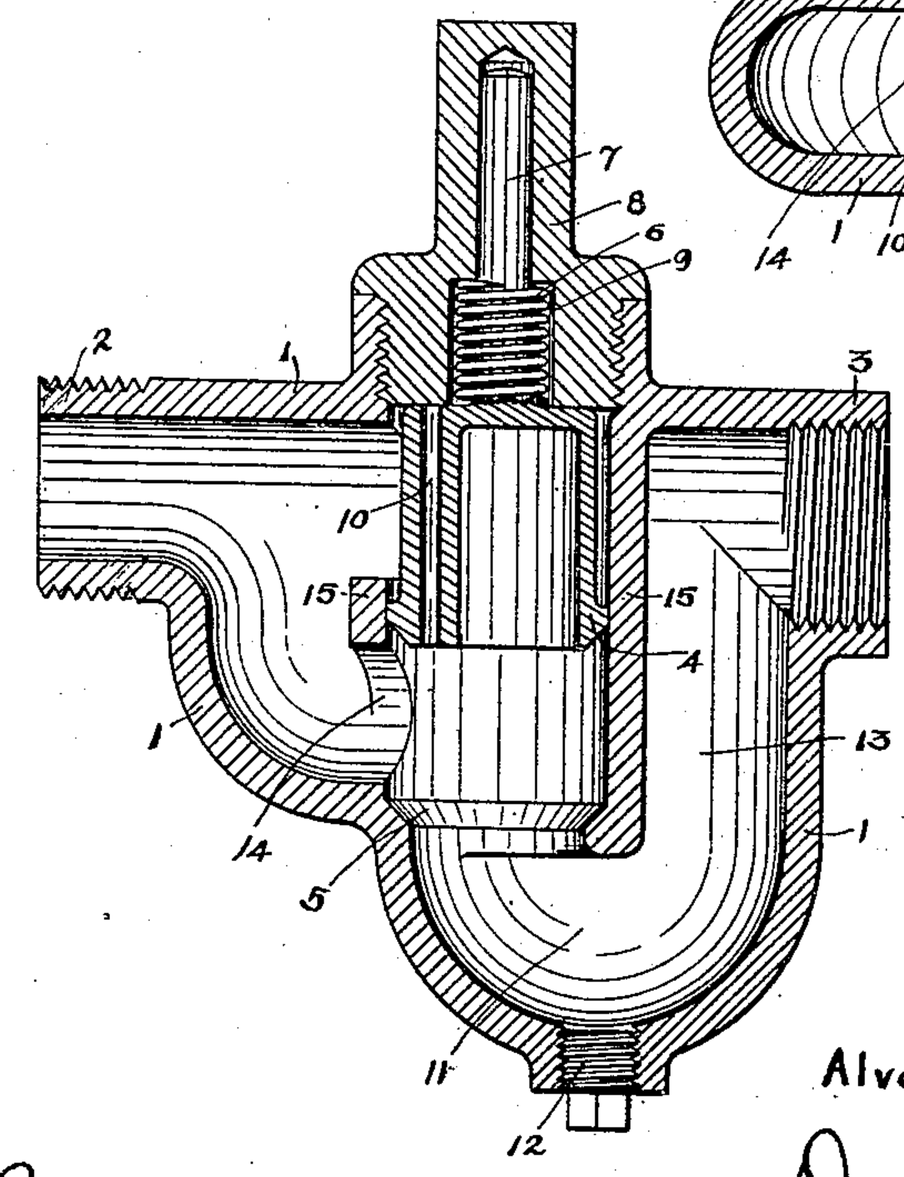

Fig. 2.

Witnesses:
Edmund F. Bradley
B. B. Roberts.

Inventor,
Alva L. Goodknight.
By David O. Barnell,
Attorney.

UNITED STATES PATENT OFFICE.

ALVA L. GOODKNIGHT, OF COUNCIL BLUFFS, IOWA.

AIR-BRAKE SYSTEM.

No. 869,837. Specification of Letters Patent. Patented Oct. 29, 1907.

Application filed February 16, 1907. Serial No. 357,765.

To all whom it may concern:

Be it known that I, ALVA L. GOODKNIGHT, a citizen of the United States, and a resident of Council Bluffs, in the county of Pottawattamie and State of Iowa, have invented certain new and useful Improvements in Valves for Air-Brake Systems, of which the following is a specification.

My invention relates to valves for fluid-pressure-controlled railway-brakes and it is the object thereof to provide a means for preventing emergency applications of the brakes of an entire train through defective operation of a triple-valve on a single car of the train. To set forth more clearly this object of my invention and convey a clear understanding of the operation of the means employed in attaining the same it is necessary to note in detail the nature of the defective operation above referred to and its results on the brake mechanism of the train. In ordinary or service applications of the brakes a gradual reduction of train-pipe-pressure is made at the engineer's valve, the total reduction usually being made in two or more operations thereof or, as it is said, the brakes are "graduated on". In the ordinary triple-valves now in general use the valve will sometimes fail to move and apply the brakes at the first or second reduction of train-pipe-pressure, this failure to operate being caused by excessive pressure of the valve spring, or gumming or sticking of the valve, a broken graduating-spring or graduating-pin, or burs wearing in the piston bushing. Such defective valves frequently, at the second or third reduction of train-pipe-pressure, will suddenly overcome the obstruction which has been causing them to fail to operate and, as a result of such sudden movement, will pass to the emergency position, in so doing causing the opening of the emergency-valve venting train-pipe-air to the brake-cylinder or atmosphere, the resulting sudden reduction of train-pipe-pressure throwing all other triple-valves of the train into emergency position. Thus a single defective triple-valve in a train may cause an emergency application of the brakes of the entire train, which, being undesired and unexpected by the engineer and being beyond his control, usually results in harmful strain of the draft rigging and couplings of the train, and frequently causes serious breakage thereof.

My invention provides a simple and economical means, applicable to any air-brake system now in general use, by which such defective action may be confined to the defective valve itself and not transmitted to the brakes of the entire train, at the same time permitting all proper functions of the triple-valve to be performed in the usual manner.

A construction embodying my invention is shown in the accompanying drawings in which

Figure 1 is a longitudinal section of the valve showing the normal position thereof, which position is maintained at all times except momentarily during a regular emergency application of the brakes, Fig. 2 is a similar view showing the position assumed by the valve momentarily during an emergency application of the brakes, and Fig. 3 is a detail transverse section of the valve on the plane indicated by the line x—x of Fig. 1.

In the construction shown I provide a suitable casing 1, having at opposite sides thereof the nipples 2 and 3 which are shown as exteriorly and interiorly threaded, respectively, adapting the same for connection by ordinary pipe fittings with the proper portions of the brake-system piping. Within the casing adjacent the nipple 2 is disposed the vertically-movable cup-shaped check valve 4 which normally rests on the inclined seat 5 formed in the casing, being held thereon by its own weight and the tension of the coil spring 6. Said spring 6 is placed around the guide stem 7 which extends upwardly from the valve body into the plug 8 which is screwed into the casing above the valve, as shown. The lower end of the plug 8 is counterbored at 9 to form a recess for containing the spring 6 when compressed and the valve in the raised position shown in Fig. 2. A small port 10 passes through the valve body 4 from top to bottom thereof, as shown. Below the seat 5 is a drip chamber 11 having a plug 12 at the lowest point thereof. From the chamber 11 a passage 13 extends upwardly to the nipple 3. When the valve is in the raised position shown in Fig. 2 a free passage is opened through the casing between the nipples 2 and 3, through the passage 13, chamber 11, valve seat 5, and the port 14 through the side of the cylindrical valve guide 15.

In the use of the valve for the purpose described the same is placed in the branch-pipe leading from the train-pipe to the triple-valve mechanism, the connection from the nipple 2 leading to the train pipe and the connection from the nipple 3 leading to the triple-valve mechanism, the latter connection preferably being as short as possible under the conditions met with in practice.

In making service applications of the brakes in systems equipped as described, the gradual reductions of train-pipe-pressure are communicated to the triple-valve mechanism through the small port 10 in the valve body 4, any moderate or gradual reduction of train-pipe-pressure thus operating the brakes in the usual manner. In making a regular emergency application of the brakes the sudden reduction of train-pipe pressure above the valve 4 cannot draw enough air through the port 10 to reduce the pressure below the valve with sufficient rapidity to prevent said valve from being forced upwardly by the pressure of the air below the same, to a position such as shown in Fig. 2. The sudden reduction of train-pipe-pressure being thus communicated to the triple-valve mechanism the same is

thrown to emergency position, the emergency-valve of the triple-valve mechanism is opened and train-pipe-air vented to the brake-cylinder or atmosphere in the usual manner. All these actions take place with extreme rapidity and, immediately following the initial sudden reduction of train-pipe-pressure during which a flow of air is momentarily established through the branch-pipe and valve 4 from the triple-valve mechanism toward the train-pipe, the flow thus established is reversed in direction and passes through the branch-pipe and valve 4 from the train-pipe toward the triple-valve mechanism, this further reduction of train-pipe-pressure affecting and being repeated at each triple-valve mechanism of the entire train. At the time of the above mentioned reversal of flow in the branch-pipe the valve 4 has been raised by the first rush of air toward the train-pipe, as described, and stands in the raised position shown in Fig. 2. Thus the valve has no tendency to retard the rush of air toward the triple-valve mechanism after the reversal of flow through the branch-pipe, for the reason that the closing of the valve is retarded by such inward rush of air sufficiently to prevent its closure before the said rush of air toward the triple-valve mechanism is completed. The cup-shaped form of the valve and the arrangement of the port 14, by causing an eddying of the air currents below the valve, assists in retarding the closure of the valve until the desired action has occurred. Thus in either service or emergency applications of the brakes by the engineer the action of the triple-valves in the usual manner is not interfered with in any way by my valve mechanism.

Coming now to a consideration of the action of my valve in connection with a defective triple-valve it will be seen that, should the defective triple-valve during a service application of the brakes pass into emergency position and vent train-pipe-air to the brake-cylinder or atmosphere, the inward rush of air from the train-pipe to the triple-valve mechanism can only take place through the small port 10, the valve 4 being closed and being openable only by sudden reduction of train-pipe-pressure, and such reduction not being made during service applications of the brakes. Thus the only possible effect which the defective triple-valve could produce on the other brake mechanism of the train is a slightly heavier service application of the brakes caused by the gradual reduction of train-pipe-pressure through the port 4, said port being too small to permit a sudden reduction of train-pipe-pressure through the same, such as would be necessary to throw the other triple-valves of the train into emergency position.

Now, having described my invention, what I claim and desire to secure by Letters Patent is:

1. The combination in and with a fluid-pressure-controlled railway-brake system, of means responsive to sudden reductions of train-pipe-pressure in the emergency operation of the brakes for opening a large passage from the train-pipe to the triple-valve mechanism, and means for restricting the flow of train-pipe-air into the triple-valve mechanism during service operations of the brakes.

2. The combination in and with a fluid-pressure-controlled railway-brake system, of a valve arranged between the train-pipe and triple-valve mechanism, said valve normally restricting the passage between the train-pipe and triple-valve mechanism but being openable by sudden reduction of train-pipe-pressure.

3. In a fluid-pressure-controlled railway-brake system, means for preventing emergency reductions of train-pipe-pressure through defective operation of a triple-valve, said means comprising a valve arranged to normally restrict the connection between the train-pipe and triple-valve mechanism, said valve being openable only by emergency reductions of train-pipe-pressure.

4. In an automatic air-brake system, a valve arranged between the train-pipe and triple-valve mechanism, said valve being openable toward the train-pipe, and there being a relatively small port affording communication between the train-pipe and triple-valve mechanism when said valve is in closed position.

5. In an automatic air-brake system, a valve arranged between the train-pipe and triple-valve mechanism, said valve being openable toward the train-pipe by sudden reduction of pressure therein, there being a relatively small port affording communication between the train-pipe and triple-valve mechanism when the valve is in closed position, and means whereby when the valve is opened a rush of air from the train-pipe toward the triple-valve mechanism will retard closure of the valve.

6. In an automatic air-brake system, a valve controlling communication between the train-pipe and triple-valve mechanism, said valve when open affording a relatively large passage between the train pipe and triple-valve mechanism and when closed restricting said passage, and means preventing opening of said valve except by sudden reduction of train-pipe-pressure.

7. In an automatic-air-brake system, a valve casing connected in the branch-pipe between the train-pipe and triple-valve mechanism, a spring-impressed cup-shaped check valve arranged within said casing and adapted when closed to restrict the passage of air through the same, said valve being openable by air pressure toward the train-pipe, and there being a port arranged adjacent the valve whereby when the valve is open a rush of air from the train-pipe will retard closure thereof.

In testimony whereof I have hereunto subscribed my name in the presence of two witnesses.

ALVA L. GOODKNIGHT.

Witnesses:
D. O. Barnell,
John H. Sherry.