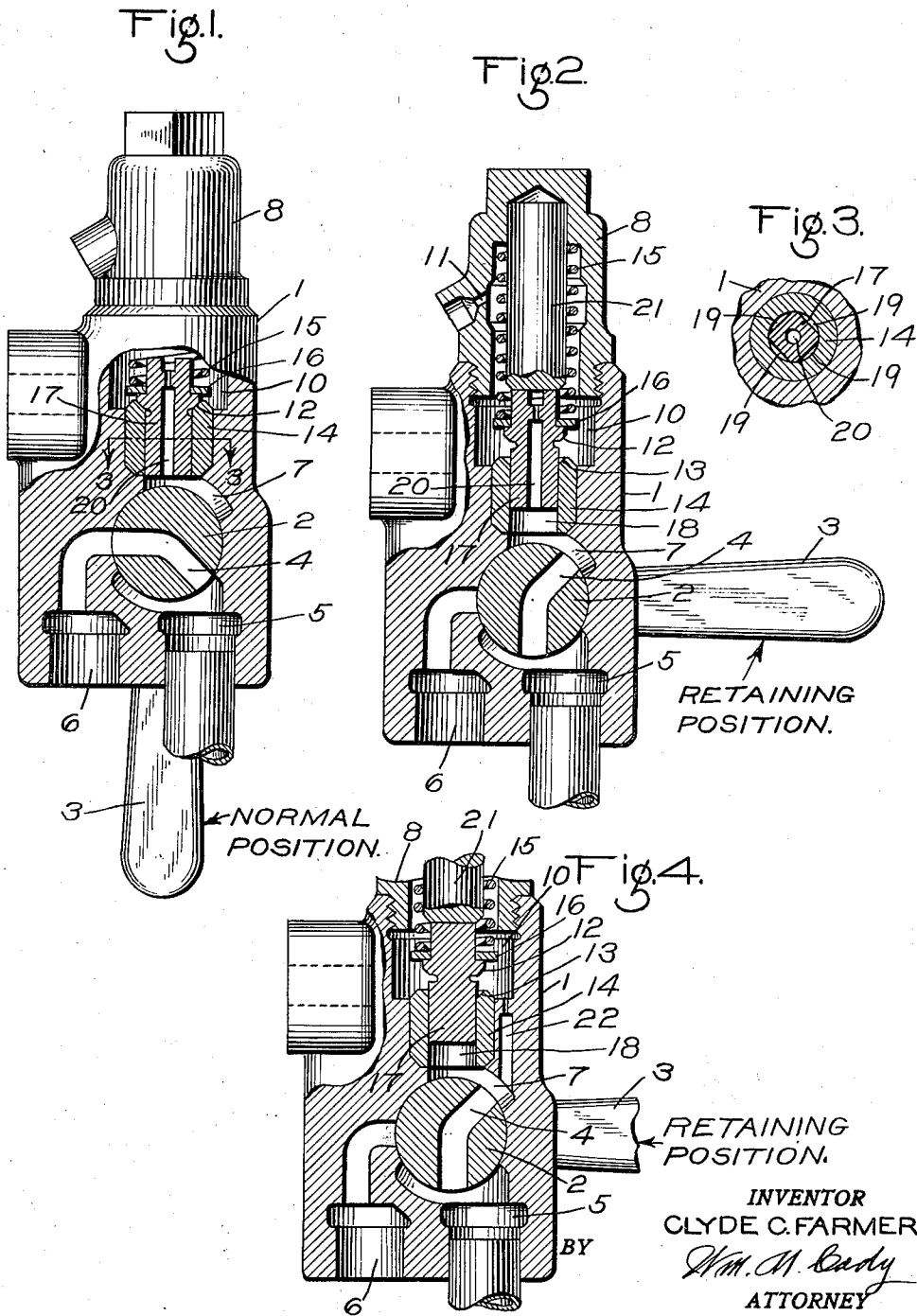


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RETAINING VALVE DEVICE

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RETAINING VALVE DEVICE

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This invention relates to retaining valve devices of the type employed on railway cars for retaining fluid under pressure in the brake cylinders when, in grade service, the brake equipment on a train is being recharged with fluid under pressure.

The retaining valve devices now in common use on cars employed in either freight or passenger service are adapted, when turned up to their pressure retaining position, to retain a predetermined fluid pressure in the brake cylinders for maintaining the brakes applied while the brake equipment is being recharged with fluid under pressure.

Preparatory to descending a grade, it is the usual practice to bring the train to a stop and to then turn the retaining valve devices to their pressure retaining position. At the bottom of the grade the train is again brought to a stop and the retaining valves turned to their normal position, in which the brake cylinders are open to the atmosphere as is well known.

In passenger, mail, express and like service, it may not be desirable to bring the train to a stop preparatory to descending a grade, and when such is the case, the retaining valve devices must be turned to their pressure retaining position while the train is in motion. Since, in these classes of service, it is objectionable to have the trainmen pass through some of the cars of the train, only those retaining valve devices which are accessible to the trainmen will be turned to their pressure retaining position and may result in only a few of the retaining valve devices being turned to their pressure retaining position. This is, of course, objectionable in that it causes excessive wear of the brake shoes and wheels of the cars on which the retaining valve devices are in their pressure retaining position, and is further objectionable in that it results in excessive air consumption due to the brake cylinders, on the cars where the retaining valve devices have not been turned to their pressure retaining position, being completely vented each time the brake equipment is recharged on the grade.

A further objectionable feature is, that when the train is brought to a stop between or at stations with the retaining valve devices turned to pressure retaining position, either the trainman must turn the retaining valve devices to their normal position or the train set in motion with the brake maintained applied by fluid pressure retained in the brake cylinders.

The principal object of my invention is to provide a brake cylinder pressure retaining valve

device for fluid pressure brakes which may be turned up, i. e., turned to pressure retaining position, preparatory to a train entering a grade territory and which may be left turned up until after the train is out of the territory, even though the territory may have level stretches and ascending grades which the train must traverse, and even though the train should be stopped at or between stations, thus eliminating the before mentioned difficulties which are experienced with the ordinary retaining valve device.

To attain this object I provide a retaining valve device which, when turned to pressure retaining position, will function in substantially the same manner as the ordinary retaining valve device to vent fluid under pressure from the brake cylinder until the brake cylinder pressure has been reduced to a predetermined degree, and will then function to continue the venting of fluid from the brake cylinder to insure the complete release of the brakes. This final venting of fluid from the brake cylinder is at a slow rate through a restricted passage formed in either the retaining valve or in the valve casing and is for the purpose of insuring the brakes remaining applied for a predetermined period of time after the retaining valve has been moved to its pressure retaining position.

Other objects and advantages will appear in the following more detailed description of the invention.

In the accompanying drawing; Fig. 1 is a central sectional view of a pressure retaining valve device embodying my invention, the device being shown in its normal or turned down position; Fig. 2 is a similar sectional view showing the device turned up, i. e., turned to its pressure retaining position; Fig. 3 is a fragmentary sectional view of the device taken on the line 3-3 of Fig. 1; and Fig. 4 is a fragmentary sectional view of a pressure retaining valve device embodying another form of my invention, the device being shown in its pressure retaining position.

As shown in the drawing, the pressure retaining valve device may comprise the usual casing 1 having mounted therein a plug valve 2 which is adapted to be rotated through the medium of the usual handle 3. With the handle 3 in its normal position as shown in Fig. 1, a port 4 in the plug valve 2 connects a brake cylinder exhaust passage 5 to a passage 6, which is open to the atmosphere and with the handle turned up as shown in Fig. 2, the port 4 connects the brake cylinder passage 5 to an exhaust passage 7 in the casing.

A hollow cap 8 is provided which has screw-threaded connection with the casing 1, said cap and casing defining a chamber 10 which is open to the atmosphere through the usual small exhaust port 11. Contained in this chamber is a retaining valve 12 which is operative to control a communication from the passage 7 to the chamber 10. This valve is normally maintained seated on the seat 13, provided on a seat member 14 securely mounted in the casing, by a spring 15 contained in the valve chamber 10 and interposed between and engaging the cap 8 and a spring seat 16 carried by the valve.

The valve 12 is provided with a stem 17 which, as shown in Fig. 3, is substantially square in cross section. The corners of the stem slidably engage the circular wall of a central opening 18 in the seat member 14, the spaces 19 between the flat sides of the stem and the circular wall permitting the flow of fluid from the passage 7 to the chamber 10 when the valve 12 is unseated.

A restricted passage 20 extends centrally through the valve 12 and stem 17, and at all times establishes communication from the passage 7 to the chamber 10. The restriction is located at the outlet end of the passage and is of considerably less length than the remaining portion of the passage. By thus making the main portion of the passage of greater diameter than the restricted portion, the possibility of the restricted portion becoming clogged with dirt or other matter is reduced to a minimum.

In operation, when the handle 3 of the retaining valve device is in pressure retaining position, as shown in Fig. 2, fluid under pressure released from the brake cylinder flows to the under side of the valve 12 by way of passage 5, port 4 in the plug valve 2, passage 7 and spaces 19 between the valve stem and interior circular wall of the valve seat member 14. Fluid under pressure thus vented from the brake cylinder causes the valve to be unseated against the opposing pressure of the spring 15, the opening movement of the valve being limited by the valve engaging the inner end of a stop member 21 which is securely mounted in the cap 8. The stop member 21 also serves as a guide for the coils of the spring 15.

Fluid from the brake cylinder flows past the open valve 12 and through the passage 20 to the chamber 10 and from thence flows to the atmosphere by way of the port 11.

It will be understood that this flow of fluid from the brake cylinder may be at substantially the same rate as that provided for in the usual retaining valve device.

Now when the brake cylinder pressure has been reduced to such a degree that it can no longer hold the valve 12 unseated, the spring 15 acts to seat the valve. With the valve seated, the flow of exhaust fluid from the brake cylinder to the chamber 10 is by way of the restricted passage 20 in the valve. If a subsequent application of the brakes is not effected within a predetermined period of time the brake cylinder will be completely depleted of fluid under pressure. The flow of fluid from the brake cylinder to the atmosphere by way of the restricted passage 20 and port 11 is preferably at such a slow rate as to prevent the complete release of the brakes during the period of time normally required to recharge the brake equipment.

In Fig. 4 a modified form of my invention is illustrated, in which a restricted passage 22 is provided in the casing 1 through which the passage 7 is constantly open to the valve chamber 10.

This passage restricts the flow of fluid from the brake cylinder when the retaining valve 12 is seated and is the equivalent of the passage 20 in the retaining valve of the device shown in Figs. 1 and 2.

It will be seen from the foregoing description that my improved retaining valve device, when turned to pressure retaining position, will retain pressure in the brake cylinder for a predetermined period of time after the retaining valve 12 seats and will also insure the complete release of the brakes when said predetermined period of time has elapsed.

My improved retaining valve device is particularly adapted for use on cars to be employed in passenger and like service, but it is to be understood that I contemplate its use on cars to be employed in freight service.

While two illustrative embodiments of the invention have been described in detail, it is not my intention to limit its scope to these embodiments or otherwise than by the terms of the appended claims.

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

1. A brake cylinder pressure retaining valve device comprising a casing having an exhaust port and an exhaust passage through which fluid is adapted to be vented from the brake cylinder when the device is in brake cylinder pressure retaining position, said exhaust port being restricted to provide for a retarded flow of fluid from the brake cylinder while the brake cylinder pressure is being reduced to that which it is usual to retain, a valve in said casing controlling communication from the exhaust passage to the exhaust port, said valve being operative by the exhaust flow of fluid from the brake cylinder to open said communication and operative when the brake cylinder pressure has been reduced to the usual retained pressure to close said communication, and a restricted passage by-passing said valve and having a smaller flow area than that of the restricted exhaust port to further reduce the rate of flow of fluid from the brake cylinder when the valve is closed and to insure the complete venting of fluid from the brake cylinder.

2. A brake cylinder pressure retaining valve device comprising a casing having an exhaust port and an exhaust passage through which fluid is adapted to be vented from the brake cylinder when the device is in brake cylinder pressure retaining position, said exhaust port being restricted to provide for a retarded flow of fluid from the brake cylinder while the brake cylinder pressure is being reduced to that which it is usual to retain, a valve in said casing controlling communication from the exhaust passage to the exhaust port, said valve being operative by the exhaust flow of fluid from the brake cylinder to open said communication and operative when the brake cylinder pressure has been reduced to the usual retained pressure to close said communication, and a by-pass port extending through said valve connecting said exhaust passage with said exhaust port and having a smaller flow area than that of the restricted exhaust port to further reduce the rate of flow of fluid from the brake cylinder when the valve is closed and to insure the complete venting of fluid from the brake cylinder.

3. A brake cylinder pressure retaining valve device comprising a casing having an exhaust port and an exhaust passage through which fluid

is adapted to be vented from the brake cylinder when the device is in brake cylinder pressure retaining position, said exhaust port being restricted to provide for a retarded flow of fluid from the brake cylinder while the brake cylinder pressure is being reduced to that which it is usual to retain, a valve in said casing controlling communication from the exhaust passage to the exhaust port, said valve being operative by the exhaust flow of fluid from the brake cylinder to open said communication and operative when the brake cylinder pressure has been reduced to the usual retained pressure to close said communication, and a by-pass port extending through said valve connecting said exhaust passage with said exhaust port, the by-pass port, for the greater portion of its length, having a relatively large flow area and, for the remainder of its length, having a flow area less than the flow area of the restricted exhaust port for further reducing the rate of flow of fluid from the brake cylinder when the valve is closed and to insure the complete venting of fluid from the brake cylinder.

4. In combination with the brake cylinder exhaust pipe of a fluid pressure brake equipment, a pressure retaining valve device having a valve normally establishing a communication through

which fluid under pressure is adapted to be completely vented from the brake cylinder at the usual release rate and manually operative to a position for closing said communication and for establishing another communication through which fluid under pressure is adapted to be completely vented from the brake cylinder, and means for varying the rate of flow of fluid through the last mentioned communication, said means comprising a choked exhaust port to provide for a retarded flow of fluid from the brake cylinder, a valve interposed in the last mentioned communication and operative by fluid under pressure vented from the brake cylinder to permit the free flow of fluid under pressure from the brake cylinder exhaust pipe to the choked exhaust port and operative when the brake cylinder pressure has reduced to the usual retained brake cylinder pressure for closing off the free flow of fluid under pressure from the exhaust pipe to the choked exhaust port, and a choked port in said valve establishing a communication through which fluid is adapted to flow from the exhaust pipe to the exhaust port, the flow area of the port in the valve being less than that of the choked exhaust port.

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