

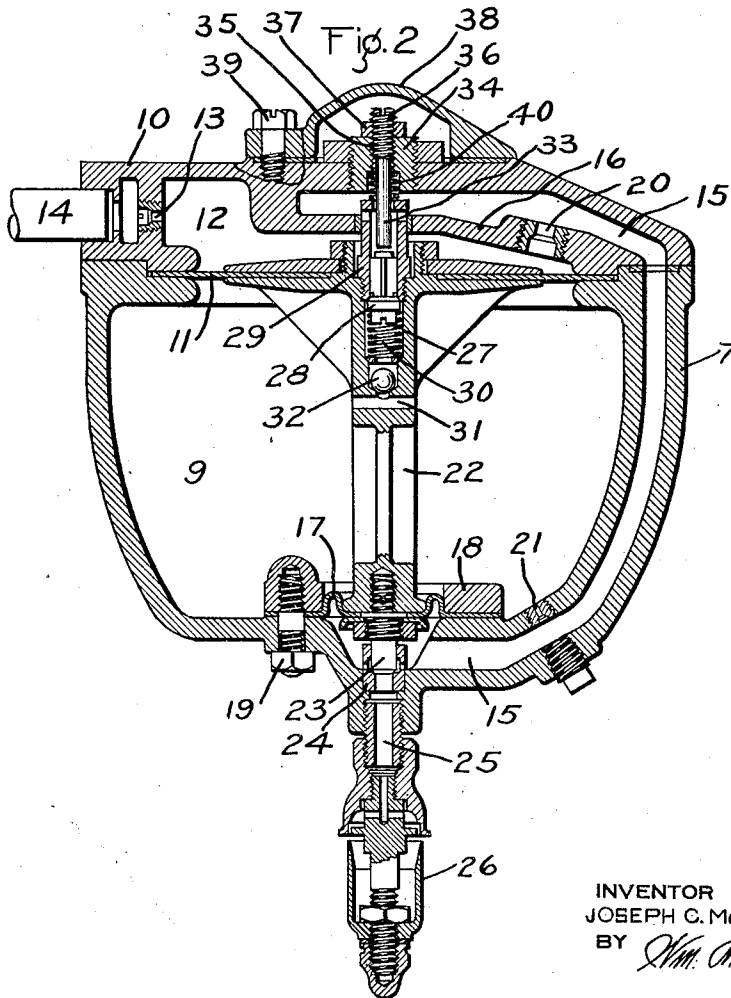
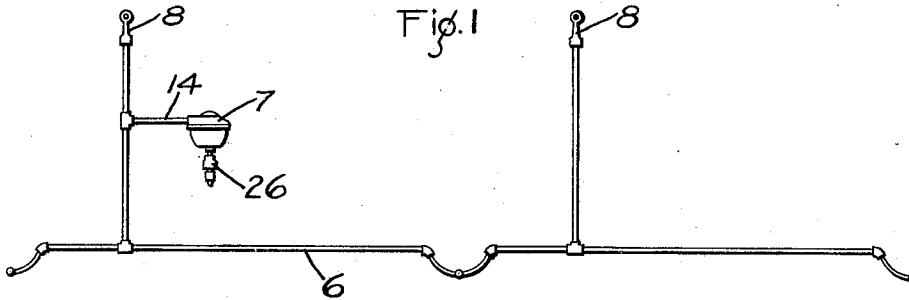
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SIGNAL VALVE DEVICE

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SIGNAL VALVE DEVICE

Application filed May 16, 1930. Serial No. 452,885.

This invention relates to signal systems, and more particularly to a fluid pressure railway train signal system.

An object of the invention is to provide an improved fluid pressure operated signal valve device.

Another object of the invention is to provide a fluid pressure operated signal valve device which is more sensitive in operation than the signal valve devices heretofore in use.

Another object of the invention is to provide a signal valve device of the above type which is adapted to operate upon a smaller reduction in fluid pressure than that heretofore required.

Another object of the invention is to provide an improved signal valve device of the character mentioned which is simple in construction, and reliable and exact in function under all conditions of service.

The invention also comprises certain new and useful improvements in the construction, arrangement and combination of the several parts of which it is composed, as will be hereinafter more fully described and claimed.

In the accompanying drawings; Figure 1 is a diagrammatic view of a fluid pressure train signal system as applied to a locomotive and a car of a train, and embodying the invention; and Fig. 2 is a vertical section of the signal valve device.

Referring to the drawings, in the fluid pressure train signal system as now employed, a train signal pipe 6 extends through the train, the train pipe being connected between cars by means of the usual flexible hose and couplings.

On the locomotive, a signal valve device 7 is provided which is subject to the pressure of fluid which is normally carried in the train signal pipe 6. A suitable discharge valve 8 may be connected to the train signal pipe on the locomotive and each car of the train, for the purpose of effecting a reduction in signal pipe pressure. When the pressure in the signal pipe is reduced at any point in the train, the signal valve device on the locomotive is operated to blow a whistle or other signal indicating device.

As shown in Fig. 2, the signal valve device 7 may comprise a suitable casing having a chamber 9. A cover plate 10 is secured to the upper face of the casing and clamped between the cover plate and the casing is a flexible diaphragm 11.

Cavity 12, formed in the cover plate 10, above the diaphragm 11, is connected, through a restricted port 13 with a pipe 14, which in turn is connected to the signal pipe 6, as shown in Fig. 1.

A second chamber 15 is also formed in the casing. This chamber extends from the cover plate 10 to the base of the casing. The portion of the chamber 15 disposed in the cover plate 10 is separated from the cavity 12 by a web 16. The portion of the chamber 15 at the base of the casing is sealed from chamber 9 by a flexible diaphragm 17, which is clamped to the casing at its periphery by a ring 18 and studs 19.

Chamber 15 is connected with the cavity 12 in the cover plate 10, through a restricted port 20, and said chamber is also connected with the chamber 9, near the base of the casing, through a restricted port 21. As shown, the area of the port 21 is less than the area of the port 20, for a purpose to be hereinafter more fully described.

Secured at the upper end to the diaphragm 11 and at the lower end to the diaphragm 17 is a stem or rod 22 and carried by and below the diaphragm 17 is a poppet valve 23 adapted to engage a seat provided in a bushing 24, for controlling the venting of fluid from the chamber 15 to a pipe 25, which leads to the usual signal whistle 26.

The upper portion of the stem 22 is formed with a longitudinal opening or bore 27 in which is mounted a valve 28 adapted to engage a seat provided in a bushing 29 mounted in the stem and projecting through the cavity 12 and terminating in the upper portion of the chamber 15. The valve 28 is normally maintained seated by a spring 30 also mounted in the bore 27. The bore 27 is connected to the chamber 9, by a passage 31 which contains a ball check valve 32 to prevent back flow.

The valve 28 is provided with a fluted stem

which is adapted to be engaged by a rod 33 fixed to the casing. In order that the relative positions of the valve stem and the rod 33 can be adjusted, a screw-threaded plug 34 is mounted in the cover plate 10, and this plug is provided with a threaded opening 35 adapted to receive the enlarged threaded portion 36 of the rod 33. The rod 33 projects downwardly through the plug 34 and also through the upper open end of the bushing 29. The top of the rod 33 is provided with a slot to receive a screw driver or other tool for rotating the rod so that the lower end of the rod can be properly spaced from the upper end of the stem of the valve 28 when the parts of the device are being assembled. The rod 33 may be secured in its adjusted position by a suitable lock nut 37.

Since the upper end of the rod 33 projects above the top of the cover plate 10, in order to prevent tampering with the adjustment of said rod after the same has been properly positioned, a cap 38 is provided. The cap 38 is secured in place by means of cap screws 39.

When the signal pipe 6 is charged with fluid under pressure, fluid flows from pipe 14 to cavity 12 of the signal valve device and thence through the restricted port 20 to chamber 15, and from thence through the restricted port 21 to chamber 9. Since the flow area of the port 21 is less than the flow area of the port 20, chamber 9 will be charged at a slower rate than the chamber 15 is charged from the signal pipe.

In order to signal the engineer, a car discharge valve 8 on a car of the train is operated in the usual manner to vent fluid from the signal pipe 6. A reduction in fluid pressure is thus effected in the cavity 12 of the signal valve device 7 on the locomotive, and since the pressure in cavity 12 is reduced at a greater rate than fluid can flow from the chamber 9 through the restricted port 21, the higher fluid pressure in chamber 9 will act to deflect the diaphragm 11 upwardly.

The upward movement of the diaphragm 11 carries the valve 28 upwardly, so that the stem of said valve engages the end of the rod 33 and the valve is unseated.

Since the valve 23 is also carried by the diaphragm stem 22, the valve 23 is also unseated. Fluid under pressure is then supplied from the chamber 15 to pipe 25 and thus the whistle 26 is blown to signal the engineer.

As soon as the valve 28 is unseated, fluid under pressure flows from the chamber 9, through passage 31 in the stem 22, and past the ball check valve 32 and the valve 28, to chamber 15.

The pressure drops more quickly in chamber 9 under the diaphragm 11 than in the cavity 12, due to the port 20 restricting the flow from cavity 12. Therefore, as soon as an amount of pressure slightly in excess of the reduction in cavity 12 has been vented

from the chamber 9, the pressure under the diaphragm 11 will be less than that above the diaphragm, and therefore the diaphragm will move downwardly and close the valves 23 and 28. The flow of fluid under pressure to the whistle will thus cease and the chamber 9 will be recharged to the same pressure in chamber 15 and cavity 12 in the manner heretofore described.

In order to stabilize the diaphragm 11 against improper action, due to slight variations of train pipe pressure caused by leakage, and the like, a spring 40 is interposed between the plug 34 and the bushing 29. This spring should be very light so as to prevent slight deflections of the diaphragm 11 which may be caused by slight or unintentional variations in fluid pressures on the opposite sides of said diaphragm.

The flow area of the restricted port 20 should be less than the flow rate through the bushing 29, so that the diaphragm 11 will move down promptly and close the valves 23 and 28, when the pressure in the cavity 12 slightly exceeds the pressure in the chamber 9, it being understood that the restricted port 20 retards the build up in pressure in the chamber 15 from the signal pipe, so that the chamber 9 will not be recharged until the valves 23 and 28 are again firmly seated.

While one illustrative embodiment of the invention has been described in detail, it is not my intention to limit its scope to that embodiment 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. In a fluid pressure signal system, the combination with a train signal pipe, of a signal valve device comprising a diaphragm subject to the opposing pressures of the signal pipe and a chamber, a second chamber, a restricted port through which the second chamber is charged with fluid under pressure from the signal pipe, a restricted port through which the first chamber is charged with fluid under pressure from said second chamber, a valve, operated by said diaphragm for controlling a communication from the first chamber to the second chamber, and a signal controlling valve operated by said diaphragm for venting fluid from said second chamber.

2. In a fluid pressure signal system, the combination with a train signal pipe, of a signal valve device comprising a diaphragm subject to the opposing pressures of the signal pipe and a chamber, a second chamber, a restricted port through which the second chamber is charged with fluid under pressure from the signal pipe, a restricted port through which the first chamber is charged with fluid under pressure from said second chamber, a valve operated by said diaphragm

for venting fluid from said first chamber to said second chamber, and a signal controlling valve for venting fluid from said second chamber.

5 3. In a fluid pressure signal system, the combination with a train signal pipe, of a signal valve device comprising a diaphragm subject to the opposing pressures of the signal pipe and a chamber, a second chamber, a restricted port through which the second chamber is charged with fluid under pressure from the signal pipe, a restricted port through which the first chamber is charged with fluid under pressure from said second chamber, a valve for venting fluid from said first chamber to said second chamber, and a valve for venting fluid from said second chamber to operate a signal device.

4. In a fluid pressure signal system, the combination with a train signal pipe, of a signal valve device comprising a diaphragm subject to the opposing pressures of the signal pipe and a chamber, a second chamber, a restricted port through which the second chamber is charged with fluid under pressure from the signal pipe, a restricted port through which the first chamber is charged with fluid under pressure from said second chamber, a valve for venting fluid from said first chamber to said second chamber, and a valve for venting fluid from said second chamber to operate a signal device, both valves being operated simultaneously by said diaphragm.

5. In a fluid pressure signal system, the combination with a train signal pipe, of a signal valve device comprising a diaphragm subject to the opposing pressures of the signal pipe and a chamber, a second chamber, a restricted port through which the second chamber is charged with fluid under pressure from the signal pipe, a restricted port through which the first chamber is charged with fluid under pressure from said second chamber, a stem carried by said diaphragm and extending through said chambers, a valve for venting fluid from said first chamber to said second chamber, and a valve for venting fluid from said second chamber to operate a signal device, both valves being carried by said stem.

6. In a fluid pressure signal system, the combination with a train signal pipe, of a signal valve device comprising a diaphragm subject to the opposing pressures of the signal pipe and a chamber, a second chamber adapted to be charged with fluid under pressure from the signal pipe, a restricted port through which the first chamber is charged with fluid under pressure from said second chamber, a stem carried by said diaphragm, an opening in said stem providing a communication from the first chamber to the second chamber, a valve mounted in the stem for controlling the communication from the first

chamber to the second chamber, a ball check valve also mounted in the stem to prevent back flow through the communication from the second chamber to the first chamber, and a second valve carried by the stem for venting fluid from the second chamber to operate a signal device.

7. In a fluid pressure signal system, the combination with a train signal pipe, of a signal valve device comprising a diaphragm subject to the opposing pressures of the signal pipe and a chamber, a second chamber adapted to be charged with fluid under pressure from the signal pipe, said first chamber being adapted to be charged with fluid under pressure from said second chamber, a stem carried by said diaphragm, an opening through said stem, providing a communication from the first chamber to the second chamber, a valve for controlling the communication through said opening, a ball check valve for preventing back flow from the second chamber to the first chamber when said valve is open, and a second valve for controlling a communication from the second chamber to a signal indication device.

8. In a fluid pressure signal system, the combination with a train signal pipe, of a signal valve device comprising a diaphragm subject to the opposing pressures of a signal pipe and a chamber, a second chamber adapted to be charged with fluid under pressure from the signal pipe, said first chamber being adapted to be charged with fluid under pressure from said second chamber, a stem carried by said diaphragm and extending through said chambers, an opening in said stem, providing a communication from the first chamber to the second chamber, a valve for controlling the communication from the first chamber to the second chamber, and a second valve for controlling a communication through which fluid is supplied from the second chamber to operate a signal device, both of said valves being carried by said diaphragm stem.

9. In a fluid pressure signal system, the combination with a train signal pipe, of a signal valve device comprising a diaphragm subject to the opposing pressures of a signal pipe and a chamber, a second chamber adapted to be charged with fluid under pressure from the signal pipe, means for charging said first chamber with fluid under pressure from the second chamber, a stem carried by said diaphragm, an opening in said stem, providing a communication from the first chamber to the second chamber, a valve for controlling the communication through said opening, a ball check valve for preventing back flow through said opening, and a valve for controlling a communication through which fluid is supplied from the second chamber to operate a signal device, all of said valves being carried by said diaphragm stem.

10. In a fluid pressure signal system, the combination with a train signal pipe, of a signal valve device comprising a diaphragm subject to the opposing pressures of the signal pipe and a chamber, a second diaphragm separating said chamber from a second chamber, a restricted port through which said second chamber is charged with fluid under pressure from the signal pipe, a restricted port through which said first chamber is charged with fluid under pressure from said second chamber, a stem connecting said diaphragms, a signal controlling valve carried by said stem, and another valve carried by said stem for controlling a communication from said first chamber to said second chamber. 70
11. In a fluid pressure signal system, the combination with a train signal pipe, of a signal valve device comprising a diaphragm subject to the opposing pressures of the signal pipe and a chamber, a second diaphragm separating said chamber from a second chamber, means for charging the second chamber with fluid under pressure from said signal pipe at a restricted rate, means for charging the first chamber with fluid under pressure from said second chamber at a rate restricted more than that which said second chamber is charged, a stem connecting said diaphragms, a valve mounted in said stem for controlling a communication from said first chamber to said second chamber, and a signal controlling valve also carried by said stem. 75
12. In a fluid pressure signal system, the combination with a train signal pipe, of a signal valve device comprising a diaphragm subject to the opposing pressures of the signal pipe and a chamber, a second diaphragm separating said chamber from a second chamber, means for charging said second chamber with fluid under pressure from the signal pipe, means for charging said first chamber with fluid under pressure from said second chamber, a stem connecting said diaphragms, a valve mounted in said stem for controlling a communication from said first chamber to said second chamber, a ball check valve for preventing back flow through the stem from the second chamber, and a signal controlling valve also carried by said stem. 80
13. In a fluid pressure signal system, the combination with a train signal pipe, of a signal valve device comprising a signal controlling valve, a diaphragm, subject to the opposing pressures of the signal pipe and a chamber, for operating said valve, a valve operated upon movement of said diaphragm to open said signal valve for venting fluid from said chamber, a projection carried by said diaphragm, and a spring engaging said projection for resisting the movement of said diaphragm in the direction in which the valves are operated. 85
14. In a fluid pressure signal system, the combination with a train signal pipe, of a signal valve device comprising a diaphragm subject to the opposing pressures of the signal pipe and a chamber, a valve for venting fluid from said chamber, said valve being carried by the diaphragm, and an adjustable stop for limiting the movement of the diaphragm. 90
15. In a fluid pressure signal system, the combination with a train signal pipe, of a signal valve device comprising a plurality of valves, a flexible diaphragm, subject to the opposing pressures of the signal pipe and a chamber, for operating said valves, and a spring for opposing the deflection of said diaphragm in the direction in which said valves are opened. 95
- In testimony whereof I have hereunto set my hand, this 13th day of May, 1930.
JOSEPH C. McCUNE. 100
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