W. V. TURNER.

PRESSURE CONTROL APPARATUS FOR FLUID PRESSURE BRAKES.

APPLICATION FILED FEB. 15, 1908.

1,004,110.

Patented Sept. 26, 1911.

2 SHEETS—SHEET 1.

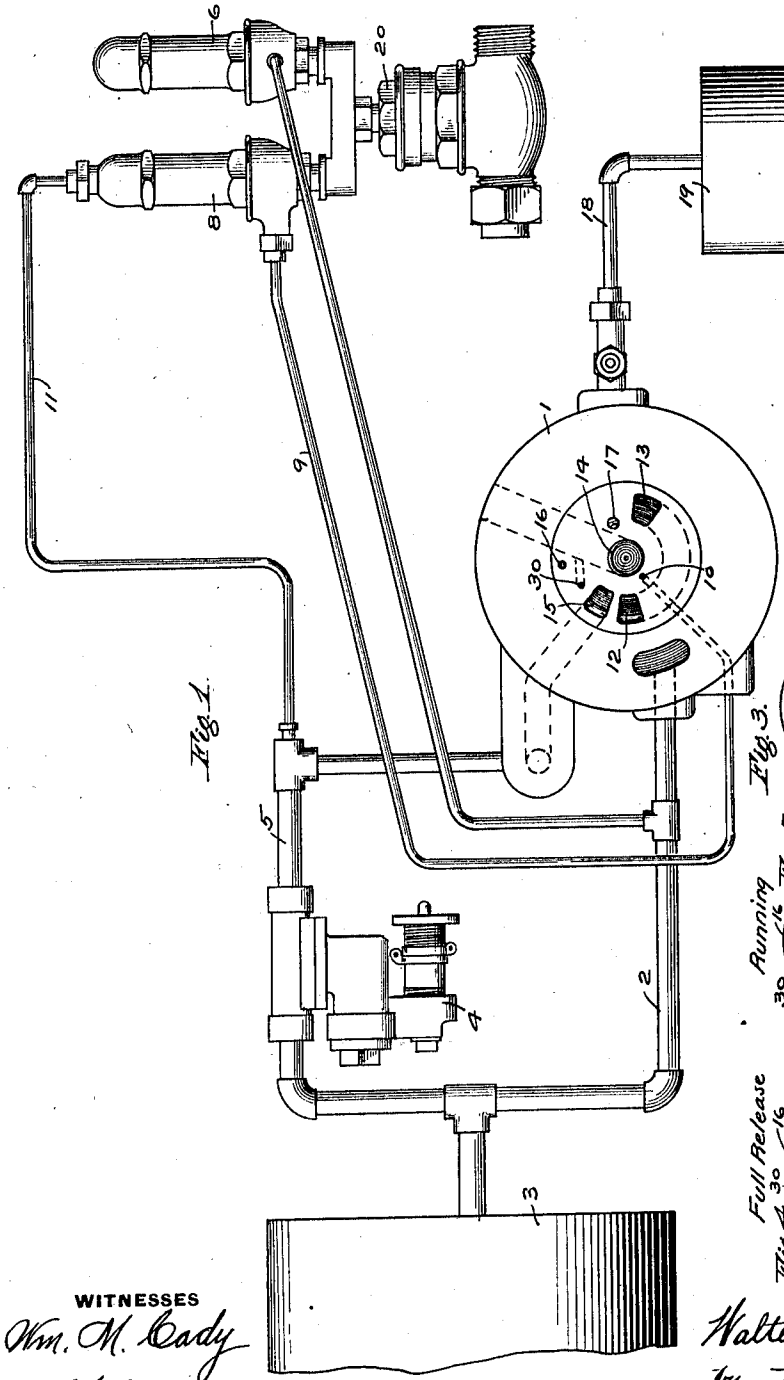

Fig. 1.

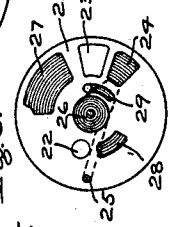

Fig. 3.

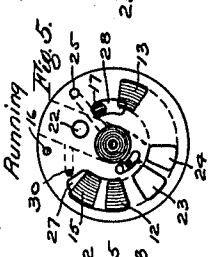

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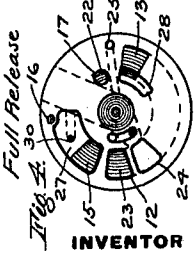
Fig. 5.



Full Release

Fig. 4.

WITNESSES

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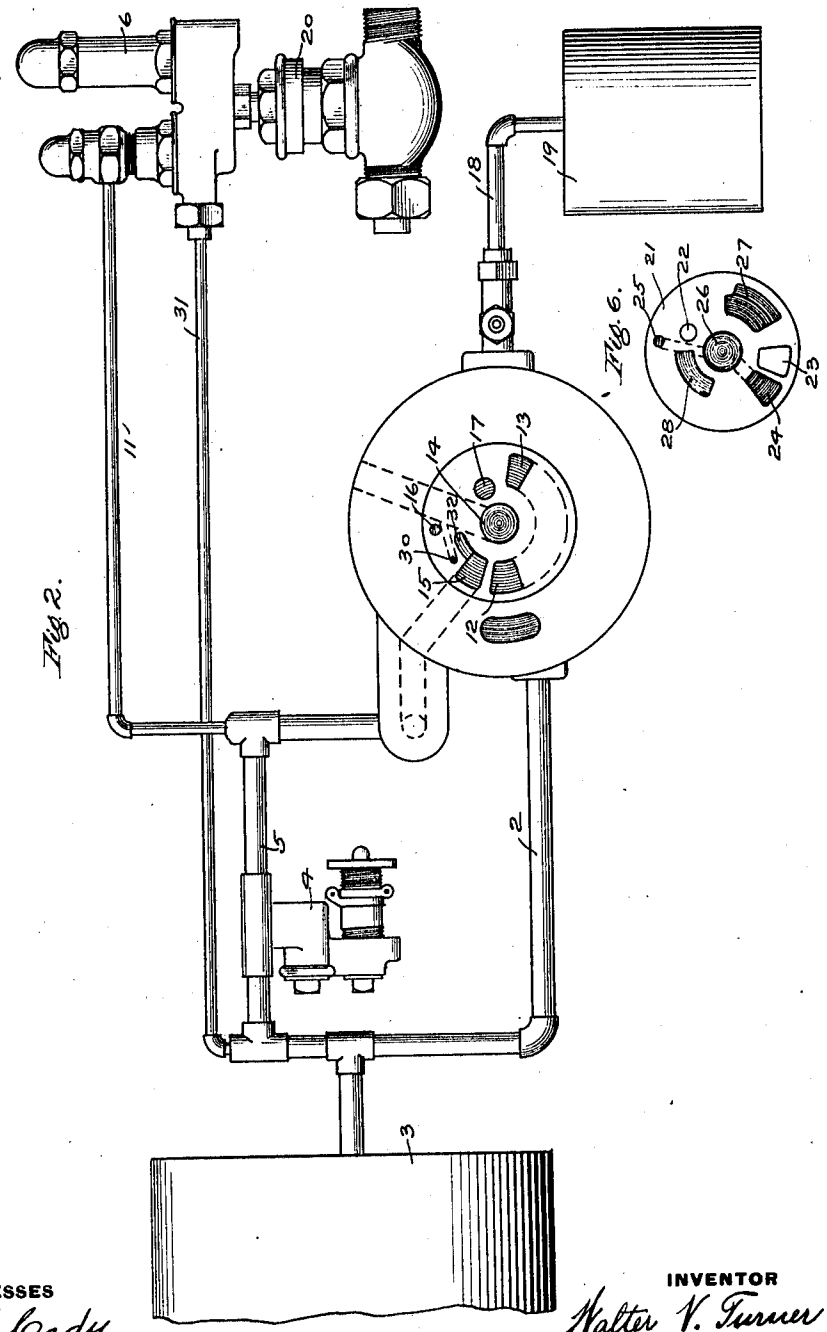

Fig. 2.

Fig. 6.

WITNESSES

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UNITED STATES PATENT OFFICE.

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

PRESSURE-CONTROL APPARATUS FOR FLUID-PRESSURE BRAKES.

1,004,110. Specification of Letters Patent. Patented Sept. 26, 1911.

Application filed February 15, 1908. Serial No. 416,090.

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 Pressure-Control Apparatus for Fluid-Pressure Brakes, of which the following is a specification.

My invention relates to fluid pressure brakes, and more particularly to apparatus adapted to obtain either one of two different degrees of working pressure for the brake system. For this purpose, it has heretofore been proposed to provide a duplex pressure governor for the air pump and main reservoir, having two diaphragms each subject on one side to fluid at main reservoir pressure, and one of the diaphragms being subject to train pipe pressure on its opposite side. A duplex feed valve mechanism is further provided, whereby the train pipe pressure may be adjusted to different degrees of pressure and thus, as the load on one diaphragm of the pressure governor varies with the train pipe pressure, the maximum main reservoir pressure is regulated to a corresponding degree automatically. If the fluid pressure load on the diaphragm of the pressure governor is increased above the train pipe pressure from any cause, such as by leakage of fluid from the main reservoir thereto, for example, the governor head controlled thereby correspondingly increases the maximum degree of main reservoir pressure, and should the brake valve be in full release position, at which fluid at main reservoir pressure is admitted to the train pipe, there is some liability that the train pipe will be charged to an excessive degree of pressure.

It is therefore one object of my invention to provide means in an apparatus of the above character, for relieving excess pressure on the side of the governor diaphragm subject to train pipe pressure.

Another object of my invention is to provide improved means for warning the engineer when the brake valve is in full release position.

In the accompanying drawings; Figure 1 is a diagrammatic view showing in elevation one form of engine apparatus for obtaining two degrees of working pressure, with my improvement applied thereto; Fig. 2 a similar view of another type of engine brake equipment, also showing my improvement applied thereto; Fig. 3 a face view of the rotary valve for the brake valve employed in the construction illustrated in Fig. 1, showing the arrangement of ports and cavities therein; Figs. 4 and 5 diagrammatic views, showing the relative position of ports when the above brake valve is respectively in full release and in running positions; and Fig. 6 a face view of the rotary valve for the brake valve employed with the apparatus illustrated in Fig. 2, showing the location of ports and cavities therein.

According to the construction illustrated in Fig. 1, the engine equipment may comprise an engineer's brake valve 1, connected by a pipe 2 with a main reservoir 3, a duplex feed valve 4 of any desired construction adapted to be adjusted for either one of two different degrees of pressure and interposed in a pipe 5, leading from the main reservoir to the brake valve 1, and a duplex pressure governor 20 for the pump, comprising the usual high pressure head 6, connected by a pipe 7 to the main reservoir pipe 2, and the low pressure head 8, having one side of its pressure diaphragm connected by a pipe 9 to a port 10 in the brake valve, and the opposite or spring side thereof connected by a pipe 11 to the brake valve side of the feed valve pipe 5. The rotary valve seat of the brake valve is provided with train pipe ports 12 and 13, a central exhaust port 14, feed valve port 15 connected with pipe 5, and ports 16 and 17 connected to a pipe 18 and equalizing reservoir 19, as in the usual standard construction. The rotary valve 21 may be provided with through ports 22 and 23, cavities 24 and 25 leading to a central exhaust cavity 26, and cavities 27 and 28 for controlling the train pipe pressure in operating the brakes in the usual manner. The rotary valve 21 is also provided with a cavity 29, having a through port opening to the rotary valve chamber and adapted to register with the port 10, leading to the pipe 9 which opens into the chamber at the under side of the low pressure governor diaphragm. The upper face of the low pressure governor diaphragm being subject to fluid under pressure admitted to the train pipe according to the adjustment of the duplex feed valve, and the

diaphragm spring being adjusted to a degree equal to the desired difference between normal train pipe and maximum main reservoir pressure, it will be seen that the low pressure governor is automatically adjusted according to the degree of train pipe pressure, so as to provide the correspondingly higher main reservoir pressure. In order that the high pressure governor head may control the main reservoir pressure while the brakes are applied, port 10 is closed in service and lap positions but in running and release positions the cavity 29 is arranged to register with the port 10, so that the low pressure diaphragm is open to main reservoir pressure and consequently the low pressure governor then controls the action of the pump.

The above described construction is similar to that covered in my prior Patent No. 874,260, dated December 17, 1907. According to my present invention, I provide an additional port 30 in the rotary valve seat, which communicates with the atmosphere and is so located that when the rotary valve 21 is in full release position, the cavity 27 in said valve establishes communication between the feed valve port 15 and the port 30. By this means, fluid under pressure in excess of the train pipe pressure is released from pipes 5 and 11 through the port 30, but as soon as the pressure is reduced to a degree which is slightly less than that at which the feed valve 4 may be adjusted, the further flow of air through the port 30 is compensated for by the opening of the feed valve 4 in the usual manner.

In Fig. 2 of the drawings is illustrated another construction, the general arrangement of parts being similar to that shown in Fig. 1. In this construction, however, both the high and low pressure diaphragms are in constant open communication on one side to fluid at main reservoir pressure, being connected by a single pipe 31 to the main reservoir pipe 2. The low pressure diaphragm is subject to, and is therefore governed by train pipe pressure as in the first described construction, but in order to cause the governor to act at a high degree of pressure when the brakes are applied a cavity extension 32 to the feed valve port 15 is provided, and in service application and lap positions the through port 22 in the rotary valve 21 registers with the port 32, so that fluid at main reservoir pressure is then admitted to the pipe 11 and to the spring side of the low pressure diaphragm. Said diaphragm being subject to main reservoir pressure on opposite sides is cut out of action for the time, and the pump and main reservoir pressure is governed by the high pressure governor. If, after the brakes are applied, the brake valve handle should be moved to full release position, fluid at main reservoir pressure is supplied to the train pipe by means of the through port 23 in the rotary valve, in the usual manner. The main reservoir pressure which was admitted to the low pressure governor top in the brake application position may remain in the pipe 11 and on the low pressure diaphragm, so that, as in the first described construction, the governor acts at a higher degree of pressure than the train pipe pressure, whereby a higher main reservoir pressure is obtained, which may be supplied to the train pipe to overcharge the same should the brake valve handle remain in full release position long enough.

By means of my invention, when the brake valve handle is moved to full release position, the cavity 27 in the rotary valve connects the feed valve port 15 with the exhaust port 30, so that the excess pressure in the pipe 11 and on the low pressure diaphragm is vented to the atmosphere, the ordinary operation of the feed valve 4 serving to prevent reduction of pressure below the train pipe pressure at which the feed valve may be adjusted.

Another feature of my invention resides in providing a warning port for notifying the engineer that the brake valve is in full release position. For this purpose I employ the port 30, which in full release position is in communication with the feed valve 4. The port 30 being small, when the feed valve 4 operates by the reduction in pressure in the feed valve pipe to slightly less than the train pipe pressure for which it is adjusted, said feed valve pipe is quickly recharged and the feed valve closes, then the pressure again reduces by leakage through the port 30, until the feed valve again operates to supply the deficiency. It will thus be seen that continual gradual rise and fall of pressure takes place, thereby causing the flow from the port 30 to the atmosphere to vary in intensity so that the sound varies accordingly, and is thus readily noticed and distinguished by the engineer from the sounds of other escaping fluids.

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

1. In a fluid pressure brake, the combination with a main reservoir and train pipe, of a pressure governor having a diaphragm subject to main reservoir pressure and on the opposite side to fluid at train pipe pressure and means for relieving excess pressure on the train pipe side of the diaphragm.

2. In a fluid pressure brake, the combination with a main reservoir and train pipe, of a pressure governor having a diaphragm subject to main reservoir pressure and on the opposite side to fluid at train pipe pressure and means for relieving fluid pressure on the train pipe side of the diaphragm in excess of train pipe pressure.

3. In a fluid pressure brake, the combination with a main reservoir and train pipe, of a pressure governor having a diaphragm subject on one side to main reservoir pressure and on the opposite side to train pipe pressure and an engineer's brake valve having means for releasing fluid from the train pipe side of said diaphragm in excess of train pipe pressure.

4. In a fluid pressure brake, the combination with a main reservoir and train pipe, of a pressure governor having a diaphragm subject on one side to main reservoir pressure and on the opposite side to train pipe pressure and an engineer's brake valve having ports adapted in full release position to release fluid from the train pipe side of said diaphragm in excess of train pipe pressure.

5. In a fluid pressure brake, the combination with a main reservoir and train pipe, of a duplex pressure governor having two diaphragms subject on one side to main reservoir pressure, and one of said diaphragms being subject on its opposite side to train pipe pressure, and means for releasing fluid under pressure from the train pipe side of said diaphragm in excess of train pipe pressure.

6. In a fluid pressure brake, the combination with a main reservoir and train pipe, of a duplex pressure governor having two diaphragms subject on one side to main reservoir pressure, and one of said diaphragms being subject on its opposite side to train pipe pressure, and an engineer's brake valve having ports adapted in full release position of the valve to release fluid under pressure from the train pipe side of said diaphragm in excess of train pipe pressure.

7. In a fluid pressure brake, the combination with a main reservoir, train pipe and feed valve device, of an engineer's brake valve adapted in one position to admit air from the feed valve device to the train pipe, and in another position from the main reservoir, and having a warning port for permitting the escape of air from the feed valve port in the latter position thereof.

8. In a fluid pressure brake, the combination with a main reservoir, train pipe and feed valve device, of an engineer's brake valve having a port for admitting fluid under pressure from the feed valve device to the train pipe in the running position, a port for admitting fluid from the main reservoir and a warning port for permitting the escape of air from the feed valve port, in full release position.

9. In a fluid pressure brake, the combination with a main reservoir and train pipe, of a pressure governor having a diaphragm subject on one side to main reservoir pressure and on the opposite side to train pipe pressure, and an engineer's brake valve for supplying fluid at main reservoir pressure to said opposite side in one position and for relieving pressure therefrom in another position.

10. In a fluid pressure brake, the combination with a main reservoir and train pipe, of a pressure governor having a diaphragm subject on one side to main reservoir pressure and on the opposite side to train pipe pressure, and an engineer's brake valve for supplying fluid at main reservoir pressure to said train pipe side of the diaphragm in a brake applied position and for releasing fluid under pressure therefrom in excess of the train pipe pressure in a position for releasing the brakes.

11. In a fluid pressure brake, the combination with a main reservoir and train pipe, of a pressure governor having a diaphragm subject on one side to main reservoir pressure and on the opposite side to train pipe pressure and an engineer's brake valve for admitting fluid at main reservoir pressure to said train pipe side of the diaphragm in service and service lap positions and having a port for releasing fluid under pressure therefrom in excess of the train pipe pressure in full release position.

12. In a fluid pressure brake, the combination with a train pipe, main reservoir, a pump for compressing air into the main reservoir, and a feed valve device having a train pipe feed passage, of a brake valve adapted to open said train pipe feed passage to the train pipe in one position and to the atmosphere in another position and a pressure governor subject on one side to the pressure in said train pipe feed passage for controlling the pump.

In testimony whereof I have hereunto set my hand.

WALTER V. TURNER.

Witnesses:
WM. M. CADY,
EDITH B. MACDONALD.