No. 888,207. PATENTED MAY 19, 1908.

W. V. TURNER.

FLUID PRESSURE BRAKE.

APPLICATION FILED OCT. 1, 1906.

Fig. 3.

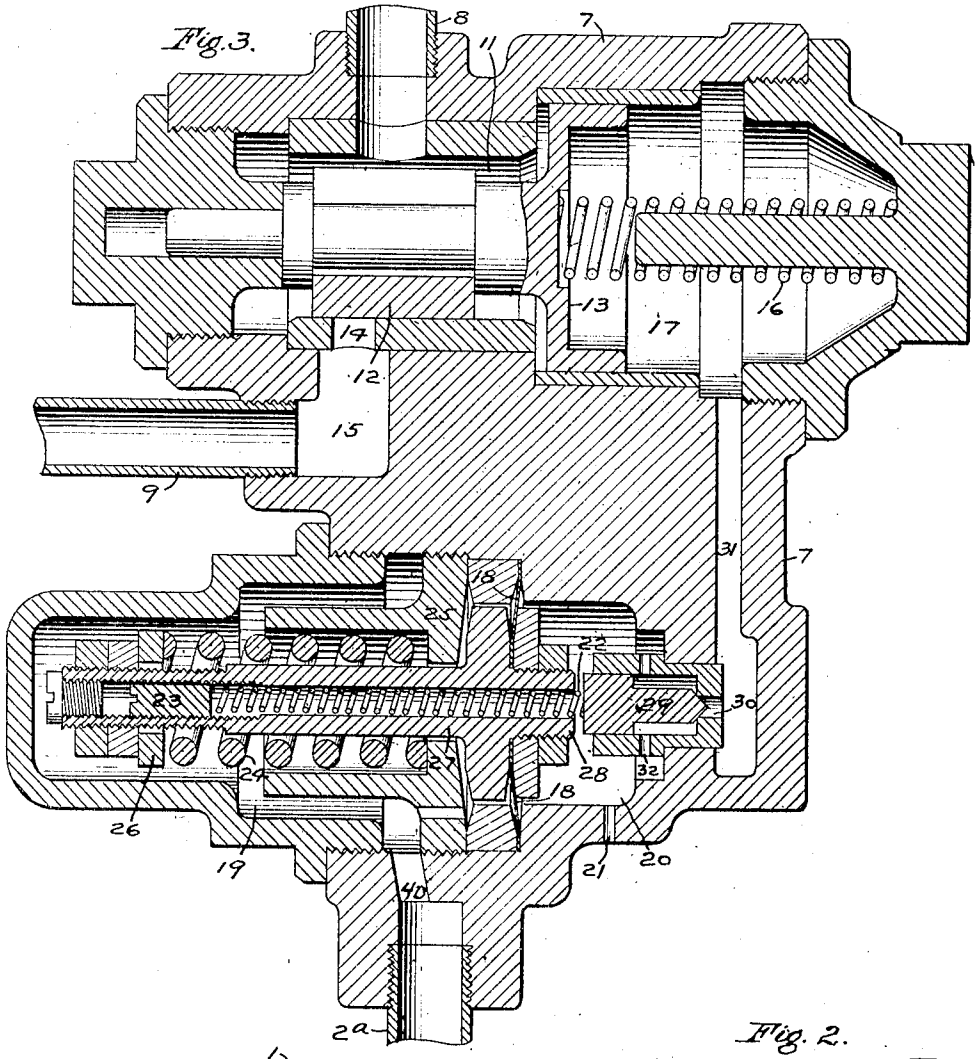


Fig. 2.

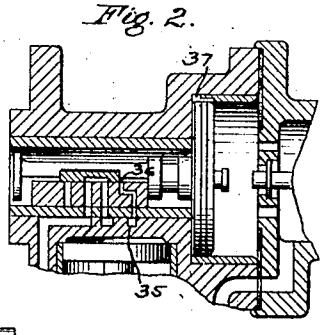
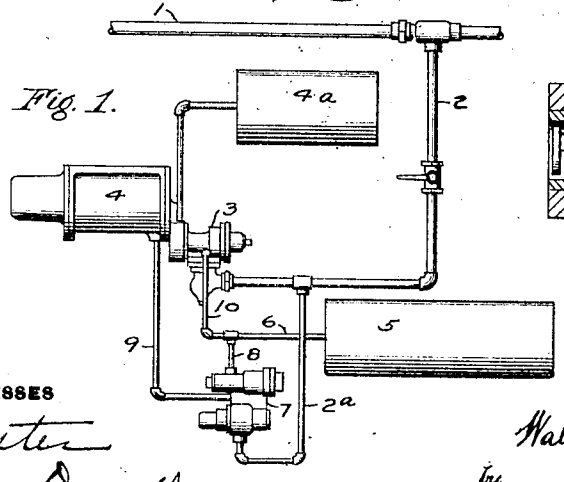


Fig. 1.



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.

FLUID-PRESSURE BRAKE.

No. 888,207. Specification of Letters Patent. Patented May 19, 1908.

Application filed October 1, 1906. Serial No. 336,916.

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

My invention relates to automatic fluid pressure brakes for railway cars, and its object is to provide new and improved means for augmenting brake cylinder pressure.

My invention provides means for charging fluid under pressure from a supplementary source of pressure into the brake cylinder, for augmenting the pressure therein, when the train pipe pressure has been reduced to, or below, a certain degree, gradually or otherwise; such degree, and the operation effected by a reduction of train pipe pressure to, or below, such degree, being independent of the degree or rapidity of reduction required to effect a quick action or emergency application of the brakes.

My invention further comprises certain new and improved features of construction and operation, as hereinafter set forth.

In the accompanying drawings, which illustrate an application of my invention, Figure 1 is a diagrammatic view of an ordinary form of brake apparatus with my improvement applied thereto; Fig. 2 a sectional view of a part of a triple valve device showing the graduating valve and the main valve through which the supplemental reservoir is charged; and Fig. 3 a central section, on a larger scale, through the valvular apparatus of my invention.

In Fig. 1 of the drawing, my invention is shown in combination with a Westinghouse quick action, or emergency, brake apparatus, comprising the train pipe, 1, branch pipe, 2, emergency or quick action triple valve, 3, auxiliary reservoir 4^a, and brake cylinder 4. My improvement provides, in addition to this usual form of apparatus, an additional source of air under pressure, such as a supplementary reservoir, 5, and a valve device, 7, having connection with the supplementary reservoir through pipes 8 and 6; with the brake cylinder through pipe 9; and with the train pipe through pipes 2^a and 2. The supplemental reservoir may be charged in any desirable manner, but as shown in Figs. 1 and 2 of the drawing, it is connected with the triple valve device, 3, by means of the pipes 6 and 10, and is charged from the train pipe through the feed groove 37 of the triple valve device, the passage 36 in the main valve, and through the passage 35 which connects with the pipe 10. The supplemental reservoir, 5, communicates, through the pipes 6 and 8, with the chamber 11 within the casing of the valve device 7, as shown in Fig. 3; and a main valve 12, in the chamber 11, controls communication between that chamber and the brake cylinder, through port 14, passage 15, and pipe 9. The valve 12 is held in the normal or closed position by the pressure of the spring 16 and the pressure of the fluid in the chamber 17 on the right of the piston 13; the chamber 17 being charged with fluid under pressure, which passes around the piston from chamber 11 and is normally retained in the chamber by the closure of the valve 29.

A diaphragm 18, within the casing 7, is exposed on one side to the pressure in chamber 20 which is open to the atmosphere through the port 21; and on the other side the diaphragm is exposed to the pressure in chamber 19, which is in open communication with the train pipe through the passage 40 and pipes 2^a and 2. A spring 24 which bears at one end on a fixed abutment 25, and at the other end against a bearing 26, on the diaphragm stem 27, tends to move the diaphragm 18 to the left; but the train pipe pressure in the chamber 19, acting in opposition to the pressure of the spring, tends to move the diaphragm to the right; and the degree of train pipe pressure necessary to hold the diaphragm in its position to the right depends on the strength and adjustment of the spring 24. When the diaphragm is in its normal position to the right, that is, when the train pipe is charged to its normal or maximum pressure, with the brakes off, the extension, 28, of the diaphragm stem bears against the valve 29 and holds it closed, thereby preventing escape of fluid under pressure from the chamber 17 through the passages 31, 30, 32, chamber 20, and passage 21. As shown in Fig. 3 of the drawing, the diaphragm 18 is in its position to the left, and the extension, or projection, 28, is out of contact with the valve 29. When the diaphragm is in this position the valve 29 may be held closed, as shown, against a reduced pressure in the pas-

sages 30, 31, and chamber 17, by means of the spring 22 which bears at one end against the valve 29 and at the other end against an adjusting plug 23.

Since the spring 24 may be of sufficient strength and so adjusted as to move the diaphragm to the left against any degree of train pipe pressure acting on the diaphragm, it will be seen that this operation need not be limited to emergency applications or to a great or sudden reduction of pressure, but may be effected when the train pipe pressure is at or below any desired degree for which the spring pressure has been adjusted. This may be but a few pounds below the normal train pipe pressure.

In applying the brakes, when the train pipe pressure is reduced to the desired degree, the diaphragm 18 will be moved to the left, so that the extension 28 will be out of contact with the valve 29; the pressure in the passages 30, 31, and chamber 17 will unseat the valve 29, and fluid under pressure will be released from chamber 17, through passages 31, 30, 32, chamber 20, and passage 21, to the atmosphere. The supplementary reservoir pressure in chamber 11, on the left of the piston 13, will move the piston and valve 12 to the right, and open the port 14; fluid under pressure will then flow from chamber 11 and the supplemental reservoir through passages 14 and 15 and pipe 9 to the brake cylinder, thus augmenting the pressure therein which has been supplied through the triple valve device. The release valve 29 will remain so long as the pressure in chamber 17 and passages 31 and 30 is high enough to overcome the pressure of the spring 22, and any lower pressure will permit the closing of the release valve.

In the employment of my improvement for high speed braking, the opening movement of the main valve 12 permits an equalization of the supplemental reservoir and brake cylinder pressures, thereby producing a maximum pressure in the brake cylinder, which pressure is gradually blown down by the high speed reducing valve attached to the brake cylinder. The spring 22 may be adjusted so as to close the valve 29 against a pressure equal to the maximum or equalized brake cylinder pressure, or against any definite lower degree of pressure due to a partial reduction of pressure in the brake cylinder; and on the closing of the valve 29, and the consequent closing of the valve 12, due to the action of the spring 16 and the accumulation of pressure in the chamber 17, communication will be cut off between the supplemental reservoir and brake cylinder, and any further reduction of supplemental reservoir pressure by the high speed reducing valve will be prevented.

The spring 16 may be so adjusted as to close the valve 12 when the supplemental reservoir and brake cylinder pressures have equalized, or when a somewhat higher or lower degree of pressure exists in the chamber 11 and in the supplemental reservoir; and this action, if the spring be properly adjusted, may be independent of the closing of the release valve 29 and the consequent accumulation of pressure in the chamber 17. The closure of the release valve 29 will be necessary, however, to prevent escape of fluid from the chamber 17 and reduction of pressure in the supplemental reservoir; and the pressure retained in the supplemental reservoir will be determined by the strength and adjustment of the spring 22.

In high speed braking, with a normal train pipe pressure of 110 pounds, the spring 22 may be adjusted to close the valve 29 against a brake cylinder pressure of from 85 to 90 pounds, so that after the high speed reducing valve has blown down the equalized pressure of both brake cylinder and supplemental reservoir to this amount, the slide valve 12 will be closed, and the further blowing down of pressure by the high speed reducing valve will reduce the pressure in the brake cylinder but not in the supplemental reservoir.

My improvement is particularly designed for use in that class of train service where it is desirable to produce the usual fine graduations in brake cylinder pressure in ordinary service applications, and also be able to produce a very high brake cylinder pressure in emergency applications. It it not, however, desirable to produce this extra high braking pressure when a gradual reduction in train pipe pressure is being made for a service application, even though the train pipe pressure should be reduced to and slightly below the equalizing point, as it often is in making a full service or full equalization of auxiliary reservoir and brake cylinder pressure, and it is therefore preferred to adjust the main spring 24 of my improved valve mechanism to a degree of pressure somewhat below the normal equalized pressure. When operating the system at a standard normal train pipe pressure of 70 pounds per square inch, at which the pressures of the auxiliary reservoir and brake cylinder equalize at 50 pounds, the spring 24 may be adjusted to permit the valve device to operate at or below a train pipe pressure of about 40 to 45 pounds per square inch. In this way the extra pressure from the supplemental source will not be supplied to the brake cylinder in any ordinary full service application, even if the train pipe pressure should inadvertently be reduced a few pounds below the equalizing point, but the extra braking pressure will always be produced in an emergency application, in the making of which the rule is to always entirely vent the train pipe to the atmosphere. By this means excessive braking pressure is prevented and fine graduations are obtainable

in service applications, while the extra braking pressure from the additional source of fluid pressure supply will always be secured in emergency applications.

While I have indicated a supplemental reservoir charged from the train pipe, for furnishing the additional pressure, it will be evident that any other suitable additional source of fluid under pressure may be employed for this purpose.

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

1. In an automatic fluid pressure brake apparatus, the combination with a train pipe, a triple valve, an auxiliary reservoir, and a brake cylinder, of means for augmenting pressure in the brake cylinder by a reduction of train pipe pressure to or below a certain degree of pressure which is independent of the degree, or rapidity, of reduction of pressure necessary to effect a quick action or emergency application of the brakes.

2. In an automatic fluid pressure brake apparatus, the combination, with a train pipe, a triple valve, an auxiliary reservoir, and a brake cylinder, of a supplemental source of fluid pressure, and a valve device for discharging fluid under pressure from the supplemental source to the brake cylinder and which is operative by a reduction of train pipe pressure to or below a certain degree which is independent of the reduction required to effect a service or emergency application of the brakes.

3. In an automatic fluid pressure brake apparatus, the combination, with a train pipe, a triple valve, an auxiliary reservoir, and a brake cylinder, of a supplemental source of fluid pressure, and a valve device for releasing fluid under pressure from the supplemental source to the brake cylinder and which is independent of the triple or emergency valve devices.

4. In an automatic fluid pressure brake apparatus, the combination, with a train pipe, an auxiliary reservoir, a triple valve, and a brake cylinder, of a supplemental source of fluid pressure, a main valve controlling communication between the supplemental source and the brake cylinder, and a valve operative by variations of train pipe pressure for controlling the operation of the main valve.

5. In an automatic fluid pressure brake apparatus, the combination, with a train pipe, an auxiliary reservoir, a triple valve, and a brake cylinder, of a supplemental source of fluid pressure, a main valve controlling communication between the supplemental source and the brake cylinder, a piston for operating the main valve, a release valve normally held closed by pressure in the train pipe and which operates to release pressure from one side of the piston and to effect opening movement of the main valve when the train pipe pressure is reduced to or below a certain degree.

6. In an automatic fluid pressure brake apparatus, the combination, with a train pipe, an auxiliary reservoir, a triple valve, and a brake cylinder, of a supplemental reservoir, and a valve device operative, by a reduction of train pipe pressure to a certain degree, to discharge fluid under pressure from the supplemental reservoir to the brake cylinder; and on a reduction of supplemental reservoir pressure to a certain degree, to cut off the discharge from the supplemental reservoir and to retain pressure therein.

7. In an automatic fluid pressure brake apparatus, the combination, with a train pipe, an auxiliary reservoir, a triple valve, and a brake cylinder, of a supplemental reservoir, a main valve for opening and closing communication between the supplemental reservoir and the brake cylinder, a diaphragm, a valve for controlling the movement of the main valve, and which is normally closed by train pipe pressure on the diaphragm, a spring for moving the diaphragm to permit opening movement of the valve on reduction of train pipe pressure, and a spring for closing the valve independently of the train pipe pressure.

8. In a fluid pressure brake, the combination with a train pipe, auxiliary reservoir, triple valve, and brake cylinder, of a supplemental source of fluid pressure, and a valve device operated by a reduction in train pipe pressure to a point less than the equalized pressure of the auxiliary reservoir and brake cylinder for supplying fluid from said supplemental source to the brake cylinder.

9. In a fluid pressure brake, the combination with a train pipe, triple valve, brake cylinder and auxiliary reservoir, of a supplemental source of fluid pressure, a valve device for controlling a communication from said source to the brake cylinder, and means, subject to the opposing pressures of the train pipe and an adjustable spring, for governing the operation of said valve device.

10. In a fluid pressure brake, the combination with a train pipe, triple valve, brake cylinder and auxiliary reservoir, of a supplemental source of fluid pressure, a valve for controlling the supply of air from said supplemental source to the brake cylinder, an actuating abutment for said valve, subject to fluid under pressure, and means, subject to the opposing pressures of the train pipe and an adjustable spring, for releasing air from one side of said abutment.

In testimony whereof I have hereunto set my hand.

WALTER V. TURNER

Witnesses:
R. F. EMERY,
J. B. MACDONALD.