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W. V. TURNER & E. A. WRIGHT.

FLUID PRESSURE BRAKE.

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NO MODEL.

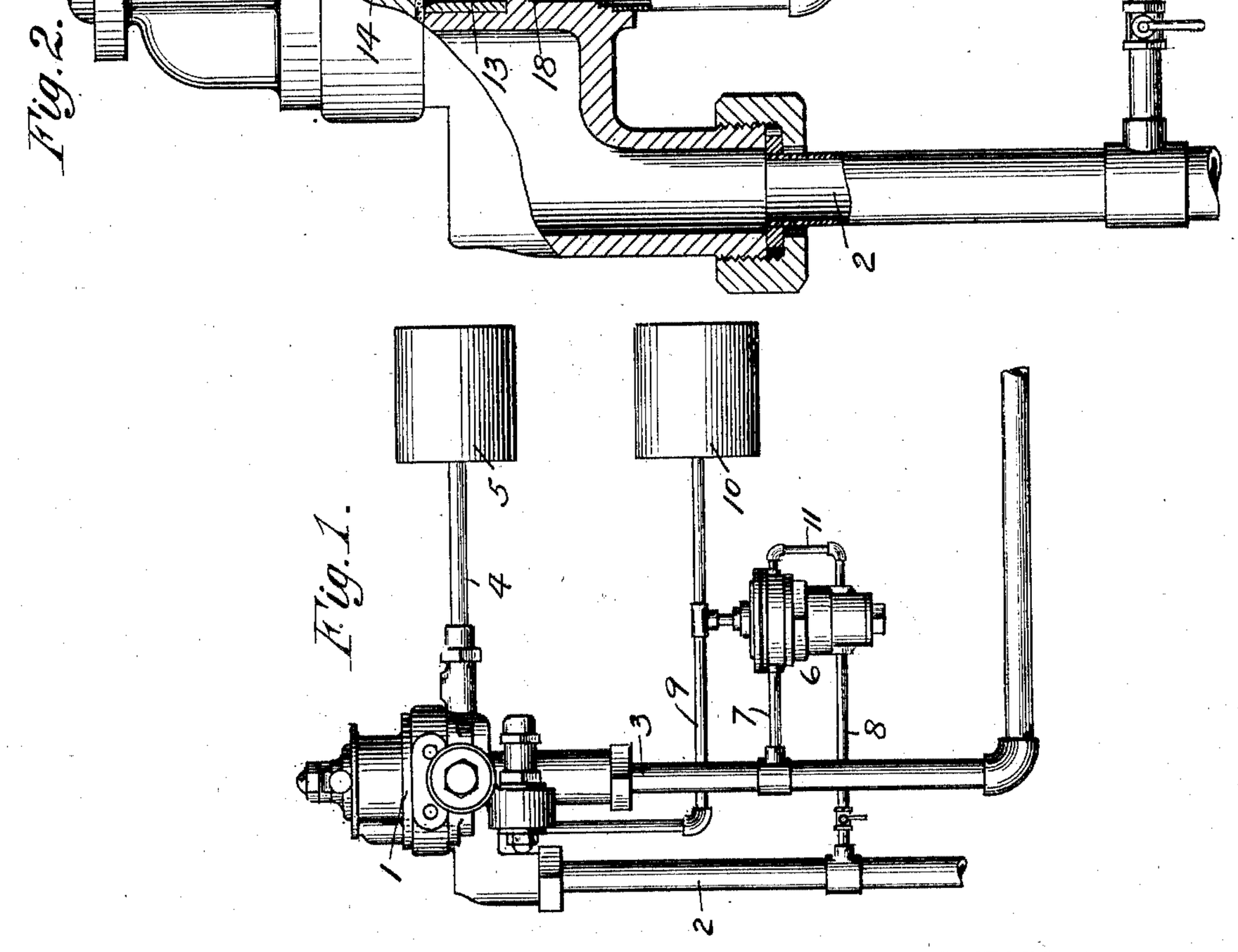

Fig. 2.

Fig. 1.

WITNESSES

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UNITED STATES PATENT OFFICE.

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FLUID-PRESSURE BRAKE.

SPECIFICATION forming part of Letters Patent No. 760,282, dated May 17, 1904.

Application filed September 26, 1903. Serial No. 174,732. (No model.)

To all whom it may concern:

Be it known that we, WALTER V. TURNER, residing at Wilkinsburg, and EDWARD A. WRIGHT, residing at Edgewood Park, in the county of Allegheny and State of Pennsylvania, citizens of the United States, have invented a certain new and useful Improvement in Fluid-Pressure Brakes, of which the following is a specification.

This invention relates to fluid-pressure brakes, and more particularly to means for maintaining a supply of fluid under pressure to the train-line while the brakes remain applied and the brake-valve in lap position.

With the present standard automatic air-brake system when the brakes are applied by making a reduction in train-pipe pressure in the usual way and the engineer's brake-valve is then placed in lap position there is no means for supplying the train-line with air under pressure to compensate for the usual leakage. Consequently when the brakes are held applied for any length of time, as when descending long grades, such train-pipe leakage causes further action of the triple valves and a correspondingly-greater braking pressure, which may become greater than desired and necessitate a release and reapplication perhaps several times in descending the grade, thereby wasting a large amount of compressed air.

The object of this invention is to overcome this difficulty by providing improved means for supplying fluid under pressure to the train-pipe while the brakes are applied and the brake-valve in lap position, whereby all leakage from the train-pipe is compensated for and the pressure therein is maintained constant at the desired degree of reduction for any length of time desired.

In the accompanying drawings, Figure 1 is a view in elevation showing our improvement applied to a standard engineer's brake-valve device of an automatic air-brake system; Fig. 2, a similar view on a larger scale, a portion of the engineer's brake-valve device and our improved regulating-valve being shown in section; and Fig. 3, a sectional view of the engineer's brake-valve device, showing a slight modification.

According to the construction as shown in the drawings the engineer's brake-valve device 1 comprises the usual casing, having connections to the main-reservoir pipe 2 and the train-pipe 3, the equalizing-reservoir 5 being connected, through pipe 4 and port 14, with the chamber 12 above the movable abutment or equalizing-piston 13, the stem 15 of which carries the train-pipe discharge-valve 16, controlling outlet-port 17. The pressure in the train-pipe and equalizing-reservoir is controlled by means of the rotary valve (not shown) for applying and releasing the brakes in the usual way, all of which comprises the standard Westinghouse brake-valve construction, the operation of which is well understood by all familiar with this art and requires no further description.

According to our improvement a regulating-valve device 6, connected by pipes 7 and 8 with the train-pipe and main reservoir, respectively, is provided for controlling the supply of fluid to the train-pipe while the brakes are applied. This regulating-valve device may be of any desired construction, but according to the preferred design shown in Fig. 2 contains a regulating-chamber 20, which is in open communication with the reservoir 10, forming an enlargement of said chamber, and is connected by a pipe 9 with an additional port 18, formed in the casing of the engineer's brake-valve and communicating with the train-pipe space beneath the equalizing-piston 13. This port is preferably controlled by a small slide-valve 19, operated by the stem 15 of the equalizing-piston, so that said port will be opened and closed simultaneously with the train-pipe discharge-valve 16.

Within the regulating-valve casing is formed a chamber 21, which is separated from the regulating-chamber 20 by the movable diaphragm 22 and communicates with the train-

pipe through pipe 7. A piston-chamber 24 and communicating valve-chamber 28 are also formed in the casing and contain the piston 26, having stem 27 for operating the slide-valve 30, which controls the port 29, which communicates through pipe 11 with the train-pipe chamber 21 and through pipe 7 with the train-pipe. By connecting the port or passage 29 to the train-pipe chamber 21 or to the train-pipe in close proximity to said chamber the device is rendered more sensitive, and the diaphragm responds quickly to a rise in train-pipe pressure. The stem of the diaphragm is arranged to open the small spring-seated valve 23 for establishing communication from the piston-chamber 24 in the rear of the piston with the train-pipe chamber 21. Fluid under pressure from the main reservoir is supplied through pipe 8 to the valve-chamber 28 and on the face of piston 26, which latter, not being of a perfectly-tight fit, will allow the compressed fluid to readily leak around the same into the chamber 24, a light spring 25 being employed to return the piston to its normal position with the port 29 closed by the slide-valve 30 when the pressure is equalized on opposite sides of the piston.

According to the modification shown in Fig. 3 the stem 15 of the equalizing-piston 13 operates a slide-valve 31, having a port 32 and arranged to control both the port 18, leading to pipe 9 and the regulating-chamber, and the train-pipe discharge-port 17.

The operation of our improvement is as follows: When the system is being charged with air or other fluid under pressure from the main reservoir, the small valve 23 being closed, the fluid will readily equalize around the piston 26, and the spring 25 will hold the valve 30 closed while the train-pipe and auxiliary reservoirs of the train are being charged up in the usual manner. When the first reduction is made for the purpose of applying and testing the brakes, the pressure in the chamber 12 is reduced the desired amount by the usual means, and the movement of the equalizing-piston in opening the train-pipe discharge-valve 16 also opens the port 18, thereby establishing communication between the train-pipe and the regulating-chamber 20. This communication remains open as long as the train-pipe is discharging through port 17 and is closed by valve 19 at the same instant that the valve 16 is closed, so that the pressure in the regulating-chamber 20 equalizes with that of the train-pipe at the desired degree of reduction and is then sealed up by the closure of valve 19. This sealed pressure in the regulating-chamber has no chance for leakage and is therefore maintained constant on the regulating-diaphragm 22 as long as the train-pipe discharge-valve remains closed. Further reductions for increasing the braking pressure may of course be made as desired. The pressures being equal on opposite sides of the regulating-diaphragm 22, it is clear that any leakage of fluid from the train-pipe will produce a reduction of pressure in chamber 21, and consequently cause a movement of said diaphragm to open the small valve 23, thereby releasing a portion of the main-reservoir pressure in chamber 24 to the train-pipe and causing the movement of the piston 26 to open the port 29, thereby supplying fluid from the main reservoir to the train-pipe at a sufficient rate to compensate for all leakage and maintain the train-pipe pressure substantially equal to that sealed up in the regulating-chamber. When the pressures are equal on opposite sides of the regulating-diaphragm 22, the small valve 23 closes by means of its spring and the main-reservoir pressure equalizing around the piston 26 immediately moves the valve 30 to close the port 29. By this means the brakes may be held applied for any length of time and the train-pipe pressure maintained constant at the desired amount of reduction. The brakes may then be released at any time by raising the train-pipe pressure in the usual way, which operation in no way affects the pressure in the regulating-chamber, the increased train-pipe pressure merely acting in chamber 21 on the diaphragm 22 to hold the stem of the same away from the valve 23. At the next application of the brakes the pressure in the regulating-chamber equalizes with that of the train-pipe at the desired degree of reduction, as before described.

While we have described in detail one preferred form of regulating-valve device, it will be evident that any such device operated by the opposing pressure of the train-pipe and a regulating-chamber may be used in place thereof without departing from the scope of this invention.

Having now described our invention, what we claim as new, and desire to secure by Letters Patent, is—

1. In a fluid-pressure brake, the combination with a train-pipe and a movable abutment operated by opposing fluid-pressures for controlling the discharge from the train-pipe, of means operated by the opposing pressures of the train-pipe and a regulating-chamber for controlling the supply of fluid to the train-pipe, and means actuated by said movable abutment for closing communication between the train-pipe and regulating-chamber.

2. In a fluid-pressure brake, the combination with a train-pipe and a movable abutment subject to the opposing pressures of the train-pipe and a reservoir for closing the discharge from the train-pipe, of means operated by the opposing pressures of the train-pipe and a regulating-reservoir for controlling the supply of fluid to the train-pipe, and means actuated by said movable abutment for closing communication between the train-pipe and said regulating-chamber.

3. In a fluid-pressure brake, the combination with a train-pipe and means operated by the opposing pressures of the train-pipe and a regulating-chamber for controlling the supply of fluid to the train-pipe, of a movable abutment subject to the opposing pressures of the train-pipe and a reservoir for closing the discharge from the train-pipe and simultaneously closing communication between the train-pipe and the regulating-chamber.

4. In a fluid-pressure brake, the combination with a train-pipe and a movable abutment subject to the opposing pressures of the train-pipe and a reservoir for controlling the discharge from the train-pipe, of means operated by the opposing pressures of the train-pipe and a regulating-chamber for controlling the supply of fluid to the train-pipe, and means operated by the movement of said movable abutment for opening and closing communication between the train-pipe and said regulating-chamber.

5. In a fluid-pressure brake, the combination with a train-pipe and means operated by the opposing pressures of the train-pipe and a regulating-chamber for controlling the supply of fluid to the train-pipe, of a movable abutment subject to the opposing pressures of the train-pipe and a reservoir for opening and closing the discharge from the train-pipe and simultaneously opening and closing communication between the train-pipe and said regulating-chamber.

6. In a fluid-pressure brake, the combination with a train-pipe, an equalizing-reservoir with means for varying the pressure therein, and a movable abutment subject to the opposing pressures of the train-pipe and equalizing-reservoir for controlling the discharge from the train-pipe, of a regulating-chamber and means operated by the pressure therein for controlling the supply of fluid to the train-pipe, and a valve actuated by said movable abutment for closing communication between the train-pipe and said regulating-chamber.

7. In a fluid-pressure brake, the combination with a train-pipe and a movable abutment subject to opposing fluid-pressures for controlling the discharge from the train-pipe, of a valve device having a diaphragm subject to the opposing pressures of the train-pipe and a regulating-chamber for controlling the supply of fluid to the train-pipe, and a valve actuated by said movable abutment for controlling communication between the train-pipe and said regulating-chamber.

8. A regulating-valve device for fluid-pressure brakes comprising a valve for controlling the supply of fluid to the train-pipe, a movable abutment or piston for operating said valve, a diaphragm subject to opposing fluid-pressures, and means operated by said diaphragm for varying the pressure on one side of said piston.

9. A regulating-valve device for fluid-pressure brakes comprising a valve for controlling the supply of fluid from the main reservoir to the train-pipe, a piston for actuating said valve, a diaphragm subject to the opposing pressures of the train-pipe and a regulating-chamber, and a valve operated by said diaphragm for releasing the pressure from one side of said piston.

10. A regulating-valve device for fluid-pressure brakes comprising a valve for controlling the supply of fluid from the main reservoir to the train-pipe, a piston for actuating said valve, a diaphragm subject to the opposing pressures of the train-pipe and a regulating-chamber, and a valve operated by said diaphragm for opening communication from the space on one side of said piston to the train-pipe.

11. A regulating-valve device for fluid-pressure brakes comprising a valve for controlling the supply of fluid from the main reservoir to the train-pipe, a piston exposed on one side to main-reservoir pressure for actuating said valve, means for equalizing the pressure around the piston, a diaphragm subject to the opposing pressures of the train-pipe and a regulating-chamber, and a valve operated by said diaphragm for releasing the pressure from one side of said piston.

12. A regulating-valve device for fluid-pressure brakes comprising a valve for controlling the supply of fluid from the main reservoir to the train-pipe, a piston exposed on one side to main-reservoir pressure for actuating said valve, means for equalizing the pressure around the piston, a spring normally tending to move said piston to close the valve, a diaphragm subject to the opposing pressures of the train-pipe and a regulating-chamber, and a valve operated by said diaphragm for releasing the pressure from one side of said piston.

13. A regulating-valve device for fluid-pressure brakes comprising a chamber having communication with the train-pipe, a diaphragm exposed on one side to the pressure in said chamber, a valve for controlling the supply of fluid from the main reservoir to the said chamber, a movable abutment or piston for operating said valve and means operated by said diaphragm for varying the pressure on one side of said piston.

In testimony whereof we have hereunto set our hands.

WALTER V. TURNER.
EDWARD A. WRIGHT.

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