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H. H. WESTINGHOUSE.

FLUID PRESSURE BRAKE.

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Fig. 1.

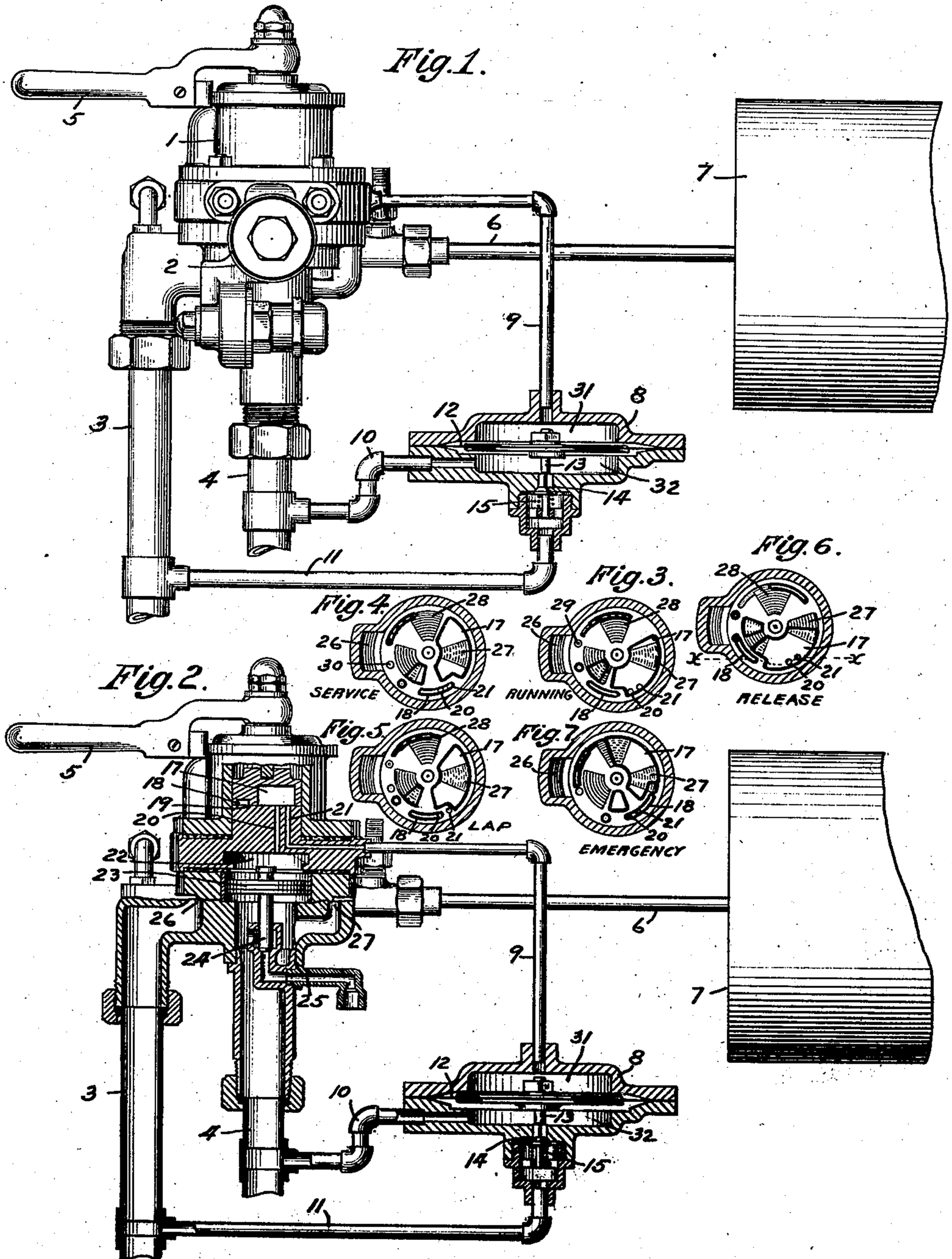

Fig. 2.

Fig. 3.

Fig. 4.

Fig. 5.

Fig. 6.

Fig. 7.

WITNESSES

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FLUID-PRESSURE BRAKE.

No. 847,711. Specification of Letters Patent. Patented March 19, 1907.

Application filed April 1, 1903. Serial No. 150,591.

To all whom it may concern:

Be it known that I, HENRY H. WESTINGHOUSE, a citizen of the United States, residing in Pittsburg, county of Allegheny, and State of Pennsylvania, have invented a certain new and useful Improvement in Fluid-Pressure Brakes, of which improvement the following is a specification.

This invention relates to automatic fluid-pressure brakes, and has for its principal object to provide means for maintaining the train-pipe pressure substantially constant at whatever point it may be intentionally reduced at the engineer's brake-valve for applying the brakes.

As is well known, in the operation of an automatic fluid-pressure brake apparatus, such as the Westinghouse, certain reductions in train-pipe pressure are made at the engineer's brake-valve for applying the brakes with corresponding pressures, the force of the application in ordinary service depending upon the extent or amount of reduction made from the normal train-pipe pressure.

It sometimes happens that after a certain reduction has been made for securing the application of the brakes at a certain pressure the force of the application will gradually increase, while the engineer's brake-valve still remains on lap, owing to leaks in the train-pipe, which cause a further reduction in the train-pipe pressure and a corresponding opening of the graduating-valves of the triple valves, thus increasing the brake-cylinder pressure above what was intended.

My invention comprises means whereby any such leaks may be supplied and the train-pipe pressure maintained constant at the desired degree of reduction, while the brakes remain applied.

In the accompanying drawing, Figure 1 is a view showing an engineer's brake-valve with the usual pipe connections and equalizing-reservoir in elevation and having embodied therewith one form of my invention, a portion of which is shown in section. Fig. 2 is a similar view showing the upper portion of the engineer's brake-valve in vertical section taken on the line *x x* of Fig. 6 and the lower portion in central vertical section. Figs. 3, 4, 5, 6, and 7 are diagrammatic views showing the relative positions of the ports in the rotary valve and in its seat for the different operative positions of the brake-valve handle, the ports in the valve-seat being shown in light lines, while the ports in the face of the rotary valve are indicated in heavy lines.

The engineer's brake-valve, as shown in the drawing, is connected to the pipes 3 and 4 leading to the main reservoir and to the train-pipe, respectively, and is provided with the feed-valve device 2 and the operating-handle 5. The passage 26 leads from the main reservoir-pipe 3 to the space above the rotary valve 16, which operates upon the valve-seat 19, in which the following ports are located: train-pipe port 27, leading to the train-pipe 4; exhaust-port 28, leading to the atmosphere; preliminary-discharge port 29, leading to the equalizing-chamber 22, which is in open communication through pipe 6 with the equalizing-reservoir 7; equalizing-port 20, also leading to the equalizing-chamber 22, and feed-port 30, leading to the feed-valve device 2. Below the chamber 22 is located the equalizing-piston 23 and the attached valve 24 for controlling the train-pipe discharge-port 25. The rotary valve is also provided with the usual ports and cavities.

As thus far described the construction is substantially the same as the present standard engineer's brake-valve structure of the Westinghouse air-brake system.

According to the form of my improvement shown in the drawing, a casing 8 is provided containing a diaphragm 12, thus forming two chambers 31 and 32, the latter being connected by a pipe 10 with the train-pipe 4 and by a pipe 11 with the main reservoir-pipe 3, while the former chamber 31 above the diaphragm is connected by a pipe 9 with an additional port 21 located in the rotary valve-seat 19 close to the regular equalizing-port 20, and an additional cavity 18 is provided in the face of the rotary valve 16 in such a location as to connect the two ports 20 and 21 when the brake-valve is in either the "service" position, as shown in Fig. 4, or in "emergency" position, as shown in Fig. 7, and to close said port 21 when in "lap" position, as shown in Fig. 5. The ports 20 and 21 are also in communication with each other through the ordinary large cavity 17 of the rotary valve when the brake-valve handle is

in "running" position, as shown in Fig. 3, or in "release" position, as shown in Fig. 6. A regulating-valve 15 is located between the pipe 11 and the lower diaphragm-chamber 32, and the diaphragm is provided with a stem 13, adapted to force the valve open against the pressure of a light spring 15 when the diaphragm or movable abutment is depressed below mid-position by a preponderance of pressure in the regulating-chamber above that of the train-pipe.

When the brakes are applied in the usual way by moving the brake-valve handle to "service-stop" position, Fig. 4, a certain amount of fluid under pressure is vented from the equalizing-reservoir to the atmosphere, thereby reducing the pressure in said reservoir to the point that it is desired to reduce the train-pipe pressure. In this position the regulating-chamber 31 is in communication with the equalizing-reservoir through ports 20, 21, and 18, so that the pressure in the regulating-chamber above the diaphragm 12 is reduced to the same point as that in the equalizing-reservoir. Then when the brake-valve is moved to lap position, Fig. 5, for closing the preliminary discharge from the equalizing-reservoir the port 21 is also closed and this pressure is sealed within the regulating-chamber above the diaphragm. The equalizing-piston 23 raises the valve 24 to open the train-pipe discharge-port 25 and reduce the train-pipe pressure to substantially the same degree as that of the equalizing-reservoir above the piston 23, whereupon the valve 24 closes the train-pipe discharge in the usual manner. This reduction of train-pipe pressure causes the triple valves of the brake system to operate in the usual way to permit a certain amount of fluid under pressure from the auxiliary reservoirs to be charged into the brake-cylinders, thus applying the brakes with the desired force, all of which comprises the ordinary and well-known operation of the standard automatic air-brake apparatus in service applications.

Heretofore it has often happened that while the brakes are thus held applied with the engineer's brake-valve in lap position, a further leakage of air from the train-pipe has caused a sufficient movement of the triple valve pistons to again open the graduating-ports, and thus increase the brake-cylinder pressure to a point greater than desired. With my improvement, however, this action is prevented, since as soon as the train-pipe pressure, which is in the chamber 32 beneath the diaphragm 12, diminishes below that in the regulating-chamber above the diaphragm the said diaphragm will be forced downward and open the regulating-valve 14, whereupon fluid under pressure from the main reservoir and pipe 11 will feed through the valve and pipe 10 to the train-pipe, thus compensating for all train-pipe leakage. As soon as the train-pipe pressure rises to a degree equal to that in the regulating-chamber 31 the diaphragm again moves upward to mid-position and allows the regulating-valve 14 to close, thus maintaining the train-pipe pressure constant. The pressure thus sealed in the regulating-chamber will not be affected by any leakage which may occur from the equalizing-reservoir around the equalizing-piston 23 to the train-pipe while the engineer's brake-valve remains in lap position.

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 an engineer's brake-valve having an equalizing-reservoir, train-pipe and main-reservoir pipe connection, and a train-pipe discharge-valve operated by the opposing pressures of the equalizing-reservoir and train-pipe, of a regulating-chamber, a regulating-valve operated by the opposing pressures of the train pipe and said regulating-chamber for controlling the supply of fluid to the train-pipe, and means controlled by the brake-valve for opening communication from the regulating-chamber to the equalizing-reservoir in running position and in service position, and for closing such communication in lap position.

2. In a fluid-pressure brake, the combination with a main reservoir, engineer's brake-valve, train-pipe, equalizing-reservoir, and train-pipe discharge-valve operated by the opposing pressures of the equalizing-reservoir and train-pipe, of a regulating-chamber, and a valve controlled by the pressure of the regulating-chamber for supplying fluid to the train-pipe, said brake-valve having ports for releasing fluid from the equalizing-reservoir and for opening communication from the regulating-chamber to the equalizing-reservoir in service position and in running position, and for closing such communication in lap position.

3 In a fluid-pressure brake, the combination with an engineer's brake-valve having an equalizing-reservoir, and train-pipe and main-reservoir connections, of a regulating-chamber, means governed by the pressure in the regulating-chamber for controlling the supply of fluid to the train-pipe when the brakes are applied, and means controlled by the brake-valve for opening communication between the equalizing-reservoir and the regulating-chamber in running position and in service position, and for closing such communication in lap position.

4. In a fluid-pressure brake, the combination with an engineer's brake-valve having main-reservoir and train-pipe connections, and an equalizing-reservoir for controlling the train-pipe discharge in service applica-

tions, of a regulating-chamber, and a valve device governed by the pressure in said chamber for controlling the supply of fluid to the train-pipe, said brake-valve having means for opening communication between the equalizing-reservoir and the regulating-chamber in "running" and "service" positions.

5. In a fluid-pressure brake, the combination with an engineer's brake-valve having an equalizing-reservoir and train-pipe and main-reservoir connections, of a regulating-valve for controlling communication from the main reservoir to the train-pipe, a movable abutment exposed on one side to train-pipe pressure and on the other side to pressure from a regulating-chamber for operating said valve, and a valve operated by the movement of the engineer's brake-valve handle for opening communication between the equalizing-reservoir and the regulating-chamber when the brake-valve handle is moved to "service-stop" position and running position, and for closing such communication when in "lap" position.

6. In a fluid-pressure brake, the combination with an engineer's brake-valve having an equalizing-reservoir and train-pipe and main-reservoir connections, of a regulating-valve for controlling communication from the main reservoir to the train-pipe, a movable abutment exposed on one side to train-pipe pressure and on the other side to pressure from a regulating-chamber for operating said valve, ports located in the seat of the engineer's brake-valve and connected to the equalizing-reservoir and regulating-chamber respectively and a cavity located in the movable part of the brake-valve for connecting said ports when the brake-valve is placed in "service-stop" position and disconnecting said ports when placed in "lap" position.

In testimony whereof I have hereunto set my hand.

HENRY H. WESTINGHOUSE.

Witnesses:
R. F. EMERY,
E. A. WRIGHT.