No. 827,274. PATENTED JULY 31, 1906.

W. V. TURNER.

GRADUATED RELEASE VALVE.

APPLICATION FILED SEPT. 7, 1904.

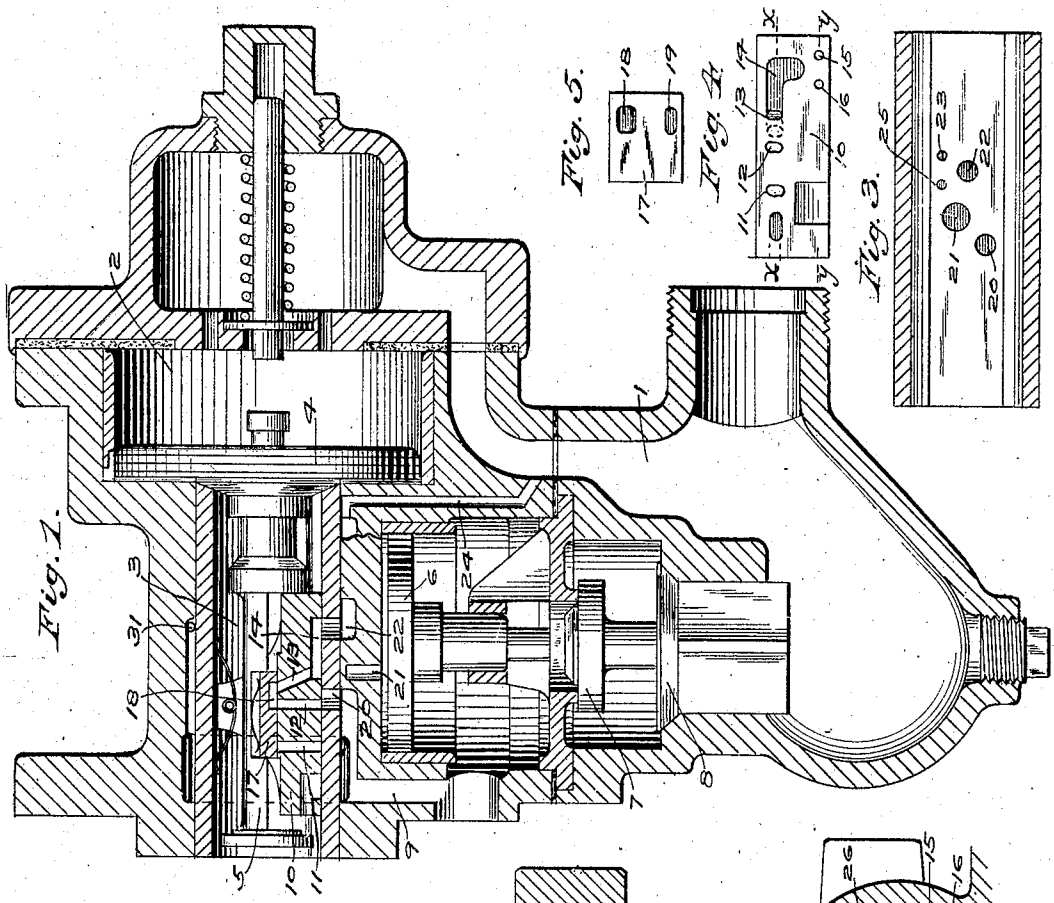

Fig. 1.

Fig. 5.

Fig. 4.

Fig. 3.

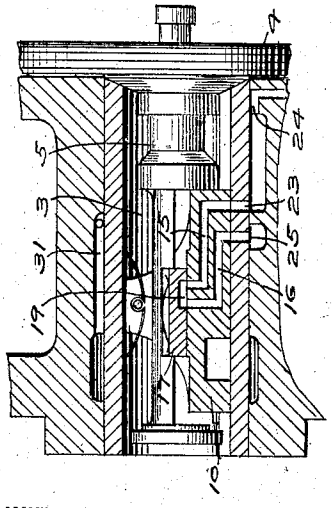

Fig. 2.

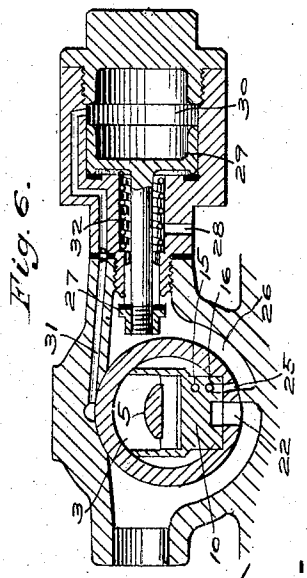

Fig. 6.

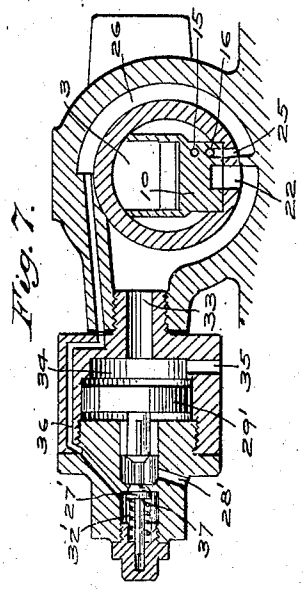

Fig. 7.

WITNESSES

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GRADUATED RELEASE-VALVE.

No. 827,274. Specification of Letters Patent. Patented July 31, 1906.

Application filed September 7, 1904. Serial No. 223,610.

To all whom it may concern:

Be it known that I, WALTER V. TURNER, a citizen of the United States, residing in Wilkinsburg, county of Allegheny, and State of Pennsylvania, have invented a certain new and useful Improvement in Graduated Release-Valves, of which the following is a specification.

This invention relates in general to automatic air-brakes, and more particularly to a triple-valve device adapted to grade the brake-cylinder pressure up or down at will by certain variations in the train-pipe pressure.

The principal object of the invention is to provide improved mechanism for grading down the brake-cylinder pressure, or, in other words, for securing a graduated release of the brakes; and it comprises means operated by the movement of the triple valve to release position for momentarily discharging air from the train-pipe when desired, and thereby cause the movement of the triple-valve piston to close the brake-cylinder exhaust.

In the accompanying drawings, which illustrate a triple-valve device embodying my improvements, Figure 1 is a vertical section, the slide-valve being shown in section, taken on the line X X of Fig. 4; Fig. 2, a corresponding section of the slide-valve, taken on the line Y Y of Fig. 4; Fig. 3, a plan view of the slide-valve seat; Fig. 4, a face view of the main slide-valve; Fig. 5, a face view of the graduating slide-valve; Fig. 6, a transverse section of the upper portion of the triple-valve device, taken through the slide-valve chamber and attached valve mechanism; and Fig. 7 a similar transverse section showing a slight modification.

As shown in the drawings, the triple-valve device comprises the usual casing containing train-pipe passage 1, piston-chamber 2, valve-chamber 3, piston 4, stem 5, emergency-piston 6, emergency-valve 7, check-valve 8, and brake-cylinder passage 9, all of which corresponds with the ordinary construction, which is well known to those familiar with the art.

According to my improvements the main slide-valve 10 is provided, in addition to the usual service-port 11, with release-ports 12 and 13, exhaust-cavity 14, and ports 15 and 16 for controlling the discharge of air from the train-pipe. The graduating slide-valve 17 contains cavity 18 for controlling communication between ports 12 and 13 and cavity 19 for connecting ports 15 and 16.

The main slide-valve seat contains the usual brake-cylinder port 20, quick-action port 21, leading to the emergency-piston, and exhaust-port 22. In addition to these the port 23 communicates by passage 24 with the train-pipe, and port 25 communicates with passage 26, leading to valve 27, which controls the outlet from discharge-passage 26 to the atmosphere through port 28. The valve 27 is operated by piston 29 in chamber 30, which is connected by passage 31 with brake-cylinder passage 9. A spring 32 is employed to act in opposition to the brake-cylinder pressure upon the piston 29 and tends to close the valve 27. This spring may of course be made of any desired strength and normally holds the outlet-valve 27 closed when the brakes are released or when the brake-cylinder pressure has been reduced to a certain amount.

The operation of my improvement is as follows: The system is charged with air under pressure in the usual way, the triple-valve moving to release position and the air passing around the piston through the feed-groove to the valve-chamber and auxiliary reservoir. There being no air under pressure in the brake-cylinder at this time, the spring holds the valve 27 closed, so that the air from the train-pipe which passes through ports 24, 23, 15, 16, and 25 to passage 26 cannot escape to the atmosphere. A service application of the brakes is made by reducing the train-pipe pressure in the usual way, causing the triple valve to move to service position, in which air is supplied from the auxiliary reservoir through ports 11, 20, and 9 to the brake-cylinder. When the auxiliary-reservoir pressure has reduced to a point slightly below that of the train-pipe, the piston with the graduating-valve moves to lap position, in which the port 11 is covered by the valve 17, and the ports 12 and 13 are connected by cavity 18, and ports 15 and 16 are connected by cavity 19. If then it be desired to grade down the brake-cylinder pressure or to graduate the release of the brakes, the train-pipe pressure is increased a certain amount by throwing the engineer's brake-valve to full-release or to running position and then back to lap. This wave of in-

creased pressure passing through the train-pipe is sufficient to move the triple valves to release position, in which the brake-cylinder is open to the exhaust through ports 20, 12, 18, 13, 14, and 22. At the same time communication from the train-pipe passage 24 is opened through ports 23, 15, 19, 16, and 25 to discharge-passage 26, and since at this time the valve 27 is held open by the pressure from the brake-cylinder acting on the piston 29 the train-pipe may vent to the atmosphere through outlet-port 28. This momentary discharge of air from the train-pipe causes the triple piston and graduating-valve to move back sufficiently to cut off communication between the brake-cylinder release-ports 12 and 13 and the train-pipe-vent ports 15 and 16 in the main slide-valve, but does not move the main slide-valve. Another slight increase in train-pipe pressure will cause the piston and graduating-valve to move to full-release position again, thereby exhausting a little more air from the brake-cylinder and making another momentary vent from the train-pipe, which causes the immediate movement of the graduating-valve to again cut off communication between said ports. Further graded reductions of the brake-cylinder pressure may be made, as desired, by repeating the operation as above described, and it will be noticed that this action of the device is very sensitive and accurate, for the reason that it is not necessary to move the large main slide-valve, but merely to cause sufficient variations of pressure upon the opposite sides of the piston to move the graduating slide-valve relative to the main valve. Whenever a complete and rapid release of the brakes is required, this is done in the usual manner by holding the engineer's brake-valve in full-release or running position, thereby making a continuous increase in train-pipe pressure, which holds the triple piston and valve in full-release position, while all of the air under pressure in the brake-cylinder is released to the atmosphere. The slight vent from the train-pipe which occurs at this time through ports 25 and 28 is not sufficient to affect the triple piston, and this vent is closed by valve 27 as soon as the pressure in the brake-cylinder and on piston 29 is released or reduced to a certain amount.

Various devices may be used for normally closing the outlet from the train-pipe discharge-passage and for opening the same when it is desired to release the brakes. A modified form of device for this purpose is shown in Fig. 7, in which the spring 32′ normally holds the valve 27′ closed, thereby preventing escape of air from discharge-passage 26 through port 36 and chamber 37 to the outlet-port 28′. The valve 27′ is opened by piston 29′ when air under pressure is exhausted from the brake-cylinder through ports 22 and 33 into chamber 34 and outlet-port 35, this outlet-port being somewhat smaller than the exhaust-port 22 to allow an accumulation of pressure upon the piston 29′ in chamber 34 sufficient to open the valve 27′. In this way each time air is exhausted from the brake-cylinder the outlet-valve 27′ will be opened, thereby permitting a venting of the train-pipe, which causes the graduating-valve to move back and cut off the brake-cylinder release-ports, as above described.

Other modifications may be designed, if desired, and it will also be apparent that various forms of mechanism within the scope of my invention may be employed, operating under an increase in train-pipe pressure or the movement of the triple valve to release position for momentarily venting air from the train-pipe, and thereby secure a graduated release of the brakes.

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

1. In an automatic air-brake, the combination with means for supplying air to the brake-cylinder, of means operated by an increase in train-pipe pressure for opening the brake-cylinder exhaust and venting air from the train-pipe.

2. In an automatic air-brake, the combination with means for supplying air to the brake-cylinder, of valve mechanism operated by an increase in train-pipe pressure when the brakes are applied for venting air from the train-pipe.

3. In an automatic air-brake, the combination with a triple valve, of means operated by the movement of the triple valve to release position for venting air from the train-pipe.

4. In an automatic air-brake, the combination with a triple valve, of means operated by the movement of the triple valve to release position for opening the brake-cylinder exhaust and momentarily venting air from the train-pipe.

5. In an automatic air-brake, the combination of a valve mechanism operated by an increase in train-pipe pressure when the brakes are applied for opening communication from the train-pipe to a train-pipe discharge-passage, and means for normally closing said passage when the brakes are released.

6. In an automatic air-brake, the combination with a triple valve, of means operated by the movement of the triple valve to release position for opening communication from the train-pipe to a discharge-passage, and means for normally closing said passage when the brakes are released.

7. In an automatic air-brake, the combination of valve mechanism operated by an increase in train-pipe pressure when the brakes are applied for opening communication from the train-pipe to a train-pipe discharge-passage, and a valve device operated

by pressure from the brake-cylinder for opening said discharge-passage.

8. In an automatic air-brake, the combination with a triple valve, of means operated by the movement of the triple valve to release position for opening communication from the train-pipe to a discharge-passage, and a valve device operated by pressure from the brake-cylinder for opening said discharge-passage.

9. A triple-valve device having ports adapted to be open for releasing air from the brake-cylinder and for venting air from the train-pipe when the valve is in one position, said ports being closed in other positions of the valve.

10. A triple-valve device having ports for opening communication from the brake-cylinder to the exhaust and from the train-pipe to a discharge-passage when in release position, and means for controlling the outlet from said discharge-passage.

11. A triple-valve device comprising a main slide-valve having ports for releasing air from the brake-cylinder and for venting air from the train-pipe when in one position, and a graduating-valve movable upon said main valve for controlling said ports.

12. A triple-valve device comprising a main slide-valve having ports for releasing air from the brake-cylinder and for venting air from the train-pipe to a discharge-passage when the valve is in release position, a graduating-valve movable upon the main valve for controlling said ports, and means for controlling the outlet from said discharge-passage.

13. In a triple valve, the combination with a casing, of a triple piston therein open on one side to train-pipe and on the other side to auxiliary-reservoir pressure, and a graduating-valve controlled by movements of said piston, said casing having a relief-passage leading from the train-pipe side of said triple piston arranged when open to allow pressure on the train-pipe side of the piston to fall below that on the reservoir side thereof, said relief-passage controlled by said graduating-valve.

14. A triple valve, including a triple piston and a graduating-valve, and having means for connection with a train-pipe, an auxiliary reservoir, and a brake-cylinder, said triple valve provided with means controlled by its said graduating-valve for lowering the train-pipe pressure, below that of the auxiliary reservoir.

15. In a triple valve, the combination with a casing provided with a train-pipe connection, an auxiliary-reservoir connection and a brake-cylinder connection, of a triple piston exposed on one side to the train-pipe pressure and on the other side to the auxiliary-reservoir pressure, and a graduating-valve controlled by movements of the said piston and itself controlling fluid-passage to and from the brake-cylinder, said casing provided with a relief-passage leading from the train-pipe side of the triple piston only to exhaust, and controlled by the said graduating-valve.

16. In a triple valve, the combination with a casing, of a triple piston therein open on one side to train-pipe pressure, and on the other side to pressure from another source, and a graduating-valve controlled by movements of the said piston, said casing having an exhaust-port, and a relief-passage leading from the said train-pipe side of said triple piston, said graduating-valve having a passage therein, arranged in certain positions of said valve to register with said relief-passage and said exhaust-port and place same in communication with each other, thereby to permit pressure on the train-pipe side of said piston to fall below that on the opposite side thereof.

In testimony whereof I have hereunto set my hand.

WALTER V. TURNER.

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