No. 759,947. PATENTED MAY 17, 1904.

H. H. WESTINGHOUSE.

TRIPLE VALVE.

APPLICATION FILED JULY 26, 1902.

NO MODEL.

Fig. 1

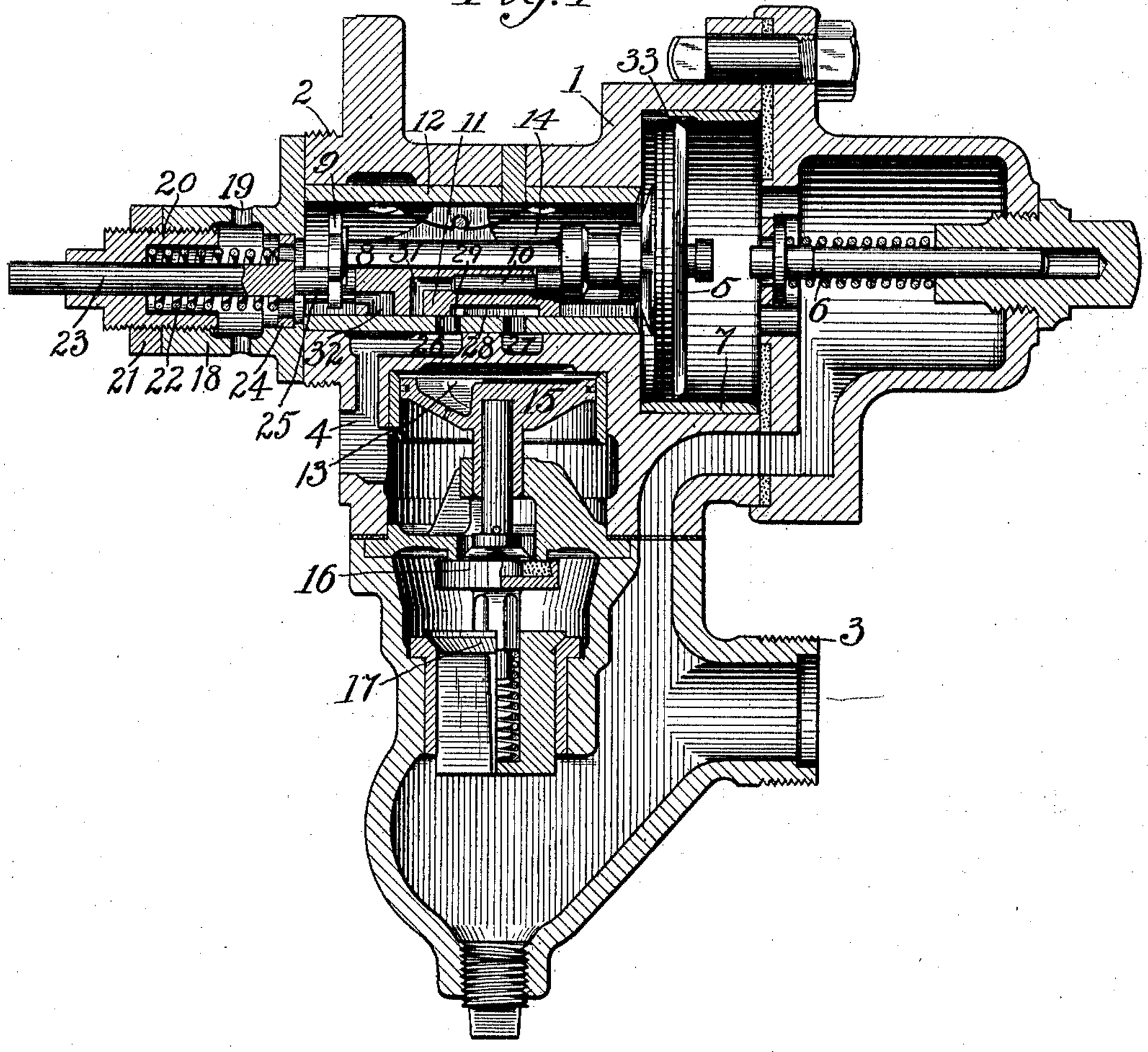
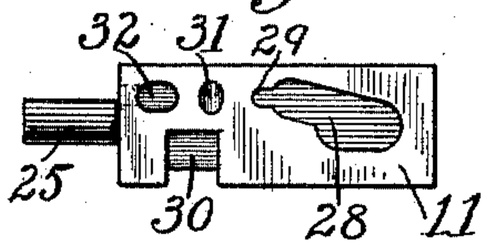


Fig. 2



WITNESSES:

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No. 759,947. Patented May 17, 1904.

UNITED STATES PATENT OFFICE.

HENRY H. WESTINGHOUSE, OF NEW YORK, N. Y., ASSIGNOR TO THE WESTINGHOUSE AIR BRAKE COMPANY, OF PITTSBURG, PENNSYLVANIA, A CORPORATION OF PENNSYLVANIA.

TRIPLE VALVE.

SPECIFICATION forming part of Letters Patent No. 759,947, dated May 17, 1904.

Application filed July 26, 1902. Serial No. 117,138. (No model.)

To all whom it may concern:

Be it known that I, HENRY H. WESTINGHOUSE, a citizen of the United States, residing in New York city, county and State of New York, have invented a certain new and useful Improvement in Triple Valves, of which improvement the following is a specification.

My invention relates to fluid-pressure brakes, and has for one of its objects to provide a new and improved form of triple-valve device by which after the brakes are applied the pressure in the brake-cylinder may be reduced to any desired extent by graduated amounts, thus giving the engineer perfect control of braking pressure at all times.

Another object of my invention is to provide a construction by which the auxiliary reservoirs may be recharged, while the pressure in the brake-cylinder is slightly reduced by escaping through a small restricted outlet, the brakes being only partially released during the time necessary to recharge the auxiliary reservoirs, and still another object is to be able to secure a quick and full release of the brakes whenever desired.

With these objects in view my invention comprises a new and improved form of triple valve having a normal release position intermediate of its service position and full-release position and adapted when in its normal release position to open a feed groove or passage from the train-pipe to the auxiliary reservoir and to open a small restricted passage from the brake-cylinder to the atmosphere.

My invention also comprises means normally acting on the valve for returning the same from its full-release position to its normal release position when the increased pressure in the train-pipe is equalized into the auxiliary reservoir, the valve being adapted to open a larger passage from the brake-cylinder to the atmosphere when in its full-release position.

My invention further comprises certain novel combinations and improved construction of parts, as hereinafter fully set forth.

In the accompanying drawings, Figure 1 is a longitudinal section of a triple-valve device embodying my improvement, and Fig. 2 is a detail view showing the face of the slide-valve.

As heretofore constructed and used in connection with the Westinghouse air-brake system the triple-valve device comprises a body portion or casing 1, having threaded connection 2 for connection with the auxiliary reservoir, a threaded nozzle 3 for attaching the train-pipe, and a port or passage 4 leading to the brake-cylinder. The piston 5 is located in the cylindrical bushing 7 and has a stem 8, with head 9 and graduating-valve 10 coöperating with the main slide-valve 11, which is located on its seat in the bushing 12, forming the valve-chamber 14. The emergency-piston chamber 13 communicates with the triple-valve chamber through a port 30 in the main slide-valve when the same moves to emergency position, and the emergency-piston 15 is connected to the emergency-valve 16 for opening communication from the train-pipe to the brake-cylinder, the check-valve 17 being adapted to close when the train-pipe pressure equalizes with that of the brake-cylinder.

As thus far described this device does not differ materially from the quick-action triple-valve device in common use, the operation of which is fully understood by those familiar with the art.

In coming to a stop after an application of the brakes has been made it is often desirable to make gradual reductions in the brake-cylinder pressure without wholly releasing the same to the atmosphere, and in order to obtain this result I provide a casing 18, which may be secured against the end of the triple valve and containing the stem 23, spring 22, and adjusting and lock nuts 20 and 21. The stem 23 is provided with a perforated head 24, which bears against a shoulder in the casing 18, and communication with the auxiliary reservoir is established through side openings 19 in the casing. In addition to the usual ports 30, 31, 32, and exhaust-cavity 28 of the main slide-valve 11 I provide the exhaust-cavity with a small extension 29, which is adapted to com-

municate with the brake-cylinder port 26 when the valve is in its normal release position, as shown in Fig. 1 of the drawings, and thus open a small restricted outlet-passage from the brake-cylinder to the atmosphere when in this position. A stem 25 extends between the slide-valve 11 and the head 24 of the spring-actuated stem 23 and normally holds the valve, with its piston, in normal release position. While I have shown the stem 25 as secured to and carried by the slide-valve, it is evident that it might be formed by an extension of the spring-actuated stem 23, if desired. The feed-groove 33 around the triple-valve piston is made longer than usual, so as to extend beyond the piston when in its normal position, as shown in Fig. 1, and allow for the recharging of the auxiliary reservoir.

The operation of my improved device is as follows: When a reduction in train-pipe pressure is made in the usual manner for a service application of the brakes, the triple-valve piston 5 moves back to service position, closing the feed-groove 33 and engaging the graduating-stem 6. In this position the graduating-valve 10 is withdrawn from its seat, and the port 31 in the slide-valve registers with the brake-cylinder port 26, thus supplying air from the auxiliary reservoir to the brake-cylinder until the reservoir-pressure decreases to a point slightly below that of the train-pipe, when the triple-valve piston moves under the slight preponderance of train-pipe pressure to close the graduating-valve, but does not move far enough to open the feed-groove 33. Further reductions of train-pipe pressure serve to increase the pressure in the brake-cylinder in the usual way. After the brakes are applied if it is desired to secure a quck and full release the engineer's brake-valve is thrown to release position for a sufficient length of time to cause the triple-valve piston to move to its extreme inner or full-release position and to retain the same in this position long enough to allow the brake-cylinder to exhaust, through ports 4 26, large exhaust-cavity 28, and port 27, to the atmosphere. During this movement the stem 25 engages the spring-actuated stem 23 and compresses spring 22, the preponderance of the train-pipe pressure on the triple-valve piston being maintained so as to hold this spring compressed a sufficient length of time to allow the pressure to be released from the brake-cylinder. The engineer's valve is then turned to lap or running position, and as the reservoir-pressure is equalized with that of the train-pipe the spring 22 moves the slide-valve and its piston back to normal position, as shown in Fig. 1. If after the brakes are set it is desired to make gradual reductions in the brake-cylinder pressure, the engineer's brake-valve may be moved to release position for a short period and then back to lap position, thus causing a wave of increased pressure in the train-pipe, which will be sufficient to move the triple-valve and piston to full-release position for an instant until the increased train-pipe pressure is nearly equalized with the reservoir through the feed-groove. Then the spring, together with the reservoir-pressure, overcomes the train-pipe pressure and moves the valve back to normal position. During the short period of time that the valve remains in the full-release position a portion of the fluid in the brake-cylinder is released to the atmosphere through the large exhaust-cavity 28; but as the valve moves back to normal position only the small cavity 29 communicates with the brake-cylinder port, and as the size of this cavity is such as to permit only a very slow gradual leakage of the fluid from the brake-cylinder the brakes are held on at a reduced pressure. Further reductions may be made in a similar manner, and thus the engineer is enabled to grade his braking pressure up and down at will. If it is desired to recharge the auxiliary reservoirs without wholly releasing the brakes, the train-pipe pressure may be gradually increased, as by turning the engineer's brake-valve to running position or slightly opening the direct supply-port, so as to cause the triple valve to move only as far as normal position. The spring-actuated stem prevents further movement, and the auxiliary reservoir is recharged through the feed-groove, while a portion of the fluid in the brake-cylinder is leaking out through the small restricted cavity 29 in the slide-valve, the relative sizes of these passages being such as to secure a material recharging of the auxiliary reservoir before the brake-cylinder has been too far reduced. A slight reduction of train-pipe pressure then holds the brakes applied with the desired pressure and recharged reservoirs.

An important feature of my invention consists in the provision of the small restricted outlet from the brake-cylinder when the valve is in its normal position. It has heretofore been proposed to construct a triple valve having an intermediate normal position, but with the exhaust from the brake-cylinder entirely closed, and it has been found that such an arrangement is objectionable, for the reason that if there is any leakage through the emergency-valve or around the slide-valve to the brake-cylinder port the pressure is liable to accumulate in the brake-cylinder and set the brakes, since it cannot escape to the atmosphere. This causes great inconvenience and delay in operating trains, and it is often difficult to release such brakes except by creating an abnormal pressure in the train-pipe or bleeding the brake-cylinder. By the use of my improved construction these objections are overcome, since there is always a small restricted passage open from the brake-cylinder to the atmosphere when the valve is in its normal position.

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

1. A triple-valve device comprising a piston and a valve having a normal position between the service position and the full-release position and means for opening communication from the train-pipe to the auxiliary reservoir and from the brake-cylinder to the atmosphere through a restricted passage when the valve is in its normal position.

2. A triple-valve device comprising a piston operated by variations in train-pipe pressure, a valve actuated thereby and having a normal release position and a full-release position, means for opening a restricted outlet from the brake-cylinder to the atmosphere when the valve is in its normal release position and means for opening a larger outlet from the brake-cylinder when the valve is in its full-release position.

3. A triple-valve device comprising a piston and valve operated by variations in train-pipe pressure and having a service position, a full-release position and an intermediate normal position, the valve also having a small restricted port for establishing communication from the brake-cylinder to the exhaust when in its normal position and a larger port communicating with the brake-cylinder when in full-release position, and means normally tending to return the valve from full-release position to its intermediate position.

4. In a triple-valve device, the combination with a valve and piston operated by variations in train-pipe pressure of a spring constantly acting to move the valve from its full-release position to its intermediate normal position, the valve being provided with a small port or passage for connecting the brake-cylinder to the exhaust when in normal position and with a larger port or passage for connecting the brake-cylinder to the exhaust when in full-release position.

5. In a triple-valve device, the combination of a main slide-valve and a piston for operating the valve according to variations in train-pipe pressure, the slide-valve having a large cavity for connecting the brake-cylinder and exhaust ports when in full-release position, and a small extension of said cavity adapted to register with the brake-cylinder port when the valve is in its normal position.

6. In a triple-valve device, the combination with a valve and piston operated by variations in train-pipe pressure of a spring tending to move the valve from full-release position to normal position, said valve having a small port or passage for connecting the brake-cylinder to the exhaust when in normal position and a larger port or passage when in full-release position, and a passage for connecting the train-pipe to the auxiliary reservoir when the valve is in its normal position.

7. In a triple-valve device, the combination of a main slide-valve and a piston operated by variations in the train-pipe for actuating the same, said valve having a large passage for connecting the brake-cylinder with the exhaust when in its full-release position and a small restricted passage for connecting the brake-cylinder with the exhaust when in its normal release position, and a spring constantly acting on the valve when in its full-release position to move the same to normal release position.

8. A triple-valve device comprising a casing having connections for train-pipe, auxiliary reservoir and brake-cylinder, a piston and valve therein operated by variations in train-pipe pressure, the piston having a certain lost motion with respect to the valve, and a spring acting against said valve and tending to move the same from full-release position to normal position.

9. A triple-valve device comprising a casing having connections for train-pipe, auxiliary reservoir and brake-cylinder, a piston and valve therein operated by variations in train-pipe pressure, a spring-casing attached to the valve-casing and containing a spring-actuated stem adapted to bear against the valve and move the same from its full-release position to its normal release position.

In testimony whereof I have hereunto set my hand.

HENRY H. WESTINGHOUSE.

Witnesses:

R. F. EMERY,

JAS. B. MACDONALD.