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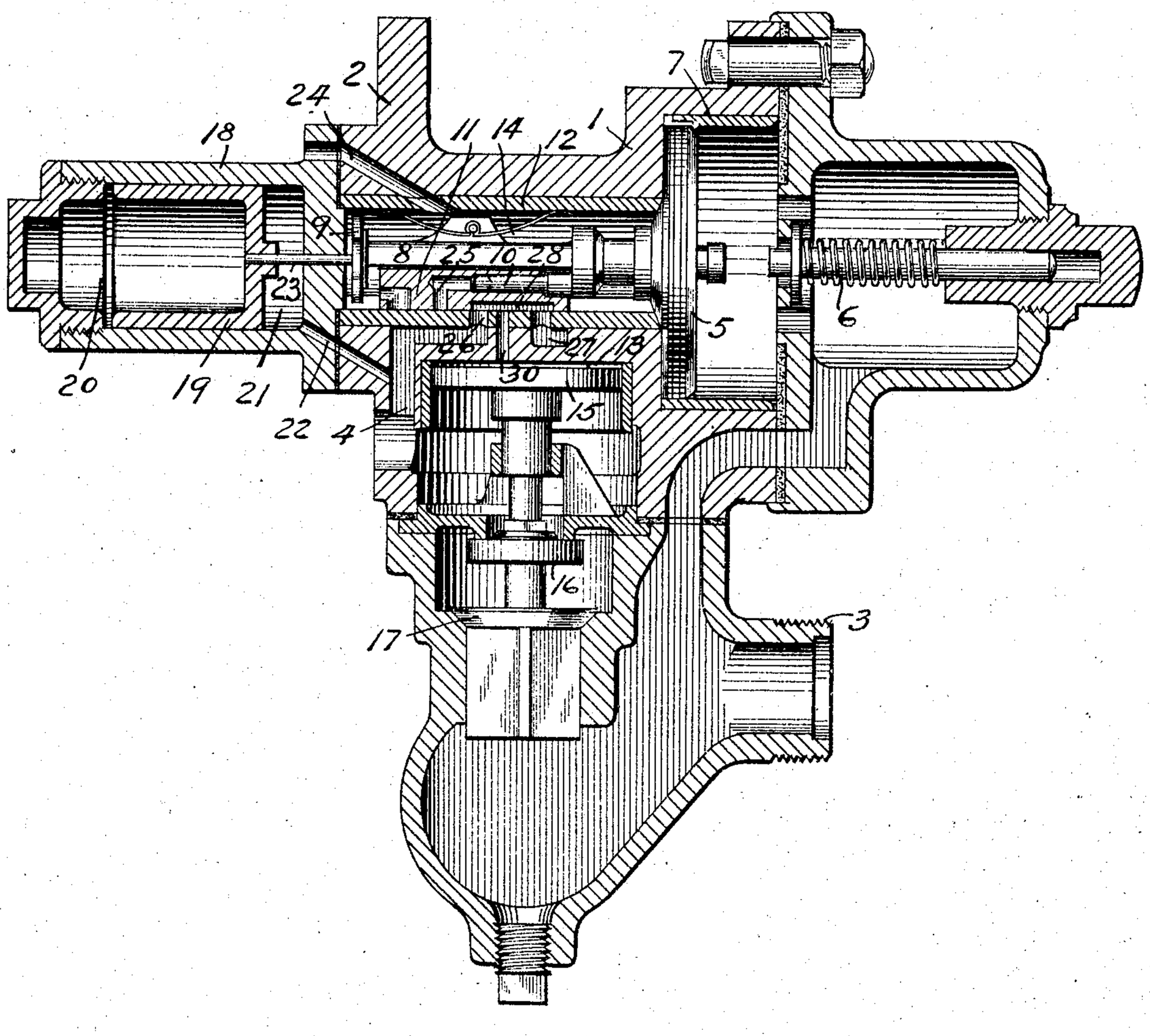
G. WESTINGHOUSE.

FLUID PRESSURE BRAKE.

APPLICATION FILED DEC. 3, 1902.

NO MODEL.



WITNESSES:

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UNITED STATES PATENT OFFICE.

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FLUID-PRESSURE BRAKE.

SPECIFICATION forming part of Letters Patent No. 772,852, dated October 18, 1904.

Application filed December 3, 1902. Serial No. 133,680½. (No model.)

To all whom it may concern:

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

My invention relates to fluid-pressure brakes, and has for its object to provide an improvement in valve devices by means of which a graduated release of the brakes may be secured. As one means for accomplishing this result I have devised an improved form of valve device having a movable abutment operated by variations in pressure in the brake-cylinder or a passage connected therewith for closing the exhaust-port, and thus retaining a certain pressure in the brake-cylinder.

My invention will be more clearly understood from the accompanying drawing, which shows a longitudinal section of a triple-valve device with my improvement applied thereto.

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 flange 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 when the main slide-valve 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.

After an application of the brake 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 for this purpose I provide a casing 18, which may be secured against the end of the valve-chamber, as shown, and containing a movable abutment or piston 19, thus forming on its opposite sides the chambers 20 and 21. The chamber 21 communicates, by means of a port 22, with the passage 4, leading from the service-port of the triple valve to the brake-cylinder, and the piston 19 is provided with a stem 23, adapted to engage the head 9 of the stem 8 of the triple-valve piston. A passage 24 establishes communication between the valve-chamber and auxiliary reservoir.

Various means may be provided for allowing fluid under pressure to feed slowly from chamber 21 of the brake-cylinder passage to the reservoir-chamber 20 on the other side of movable abutment or piston 19, and as preferred in the present instance this may be accomplished by making the fit between the piston and cylinder sufficiently loose to permit the charging of chamber 20 around the periphery of the piston, thus forming a restricted passage between the opposite chambers. This reservoir-chamber 20 may of course be made of any desired shape or size.

The operation of this form of my improvement 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 and engaging the graduating-stem 6. In this position the graduating-valve 10 is withdrawn from its seat and the port 25 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. Further reductions of train-pipe pressure serve to increase the pressure in the brake-cylinder in the usual way. As the air passes through passage 4 to the brake-cylinder it also flows through passage 22 into chamber 21 and in a very short space of time equalizes around the piston 19 into chamber 20, so that both chambers are charged to a degree substantially equal to the pressure in the brake-cylinder. If now it is desired to make gradual reductions in the pressure in the brake-cylinder, 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. This immediately releases the air from passage 4 and chamber 21 to the atmosphere through exhaust-cavity 28 and exhaust-port 27, and the brake-cylinder pressure is reduced a certain amount; but at the same time a preponderance of pressure remains in reservoir-chamber 20 on the opposite side of piston 19, which greater pressure will cause the piston to move to the opposite end of its traverse before said pressures have time to equalize around the piston. The stem 23 thus engages the stem of the triple-valve piston and moves the slide-valve back a sufficient distance to close the exhaust-port, but not far enough to open the graduating-port. By this means a certain amount of air is allowed to escape from the brake-cylinder, the exhaust-port then being closed.

It will be observed that at the time the triple valve is moved to release position there is very little difference in the pressures on the opposite sides of the triple-valve piston, and especially since the train-pipe air at the same time begins to flow to the reservoir through the feed-groove, so that it requires but a very little preponderance of pressure on the piston 19 to move the triple valve back to lap position and close the exhaust-port.

Further reductions in the brake-cylinder pressure may be secured by repetition of the same operation, and a complete release of the brakes may be obtained at any time by merely causing a continuous rise in train-pipe pressure, which will hold the triple valve in release position a sufficient length of time to allow the pressure in chamber 20 to equalize around the piston 19 and the brake-cylinder to discharge to the atmosphere.

By means of my improved construction the braking pressure may be graded up or down at will, thus giving perfect control of the brakes.

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

1. In a fluid-pressure brake, a movable abutment exposed on opposite sides to fluid under pressure and operated by a reduction of brake-cylinder pressure to close the exhaust from the brake-cylinder, and means for equalizing the pressure from either side of said abutment to the other.

2. In a fluid-pressure brake, the combination with a valve controlling the exhaust from the brake-cylinder, of a movable abutment exposed on opposite sides to fluid under pressure and operated by variations of pressure in the brake-cylinder for actuating said valve, and means for equalizing the pressure from either side of said abutment to the other.

3. In a fluid-pressure brake, the combination with a valve for controlling the supply of fluid under pressure to and from the brake-cylinder, and a piston for operating said valve according to variations in train-pipe pressure, of an independently-movable abutment also acting on said valve and exposed to brake-cylinder pressure on one side and to a stored pressure on the other side.

4. In a fluid-pressure brake, the combination of a valve for controlling the exhaust from the brake-cylinder, a movable abutment for closing said valve, said abutment being exposed to the pressure of a reservoir-chamber on one side and to the brake-cylinder pressure on its opposite side, and means for permitting a restricted flow of fluid under pressure from one side of said abutment to the other side.

5. In a fluid-pressure brake, the combination with a valve for controlling the exhaust from the brake-cylinder and a movable abutment for closing the same, of a reservoir-chamber on one side of the abutment, a chamber on the other side of the abutment in communication with the brake-cylinder, and a restricted passage for permitting a slow equalization of pressures between the chambers on opposite sides of the abutment.

6. In a fluid-pressure brake, the combination with a valve for controlling the exhaust from the brake-cylinder and a movable abutment for closing said valve, of a reservoir-chamber on one side of said abutment, a chamber on the opposite side of the abutment in communication with the passage leading from the brake-cylinder to the exhaust-valve, and a restricted passage for establishing communication between said chambers.

7. In a fluid-pressure brake, the combination with a valve for controlling the exhaust from the brake-cylinder, and a piston operated by an increase of train-pipe pressure for opening said valve, of an independently-movable abutment actuated by a decrease of brake-cylinder pressure to close said valve.

8. In a fluid-pressure brake, a triple-valve device comprising a valve for supplying fluid under pressure from the auxiliary reservoir to the brake-cylinder and from the brake-cylinder to the exhaust, a piston operated by

variations in train-pipe pressure for controlling said valve, and an independently-movable abutment actuated by a reduction in brake-cylinder pressure for moving said valve to close the exhaust.

9. In a fluid-pressure brake, a triple-valve device comprising a piston and valve operated according to variations of pressure in the train-pipe for controlling the supply of fluid under pressure from the auxiliary reservoir to the brake-cylinder and from the brake-cylinder to the exhaust, in combination with an independently-movable abutment exposed on one side to the pressure of a reservoir-chamber and on the opposite side to pressure from the brake-cylinder, said abutment being actuated by a reduction of brake-cylinder pressure to move said valve to close the exhaust.

In testimony whereof I have hereunto set my hand.

GEO. WESTINGHOUSE.

Witnesses:
WM. H. CAPEL,
H. C. TENER.