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DISTRIBUTOR FOR FLUID PRESSURE BRAKES

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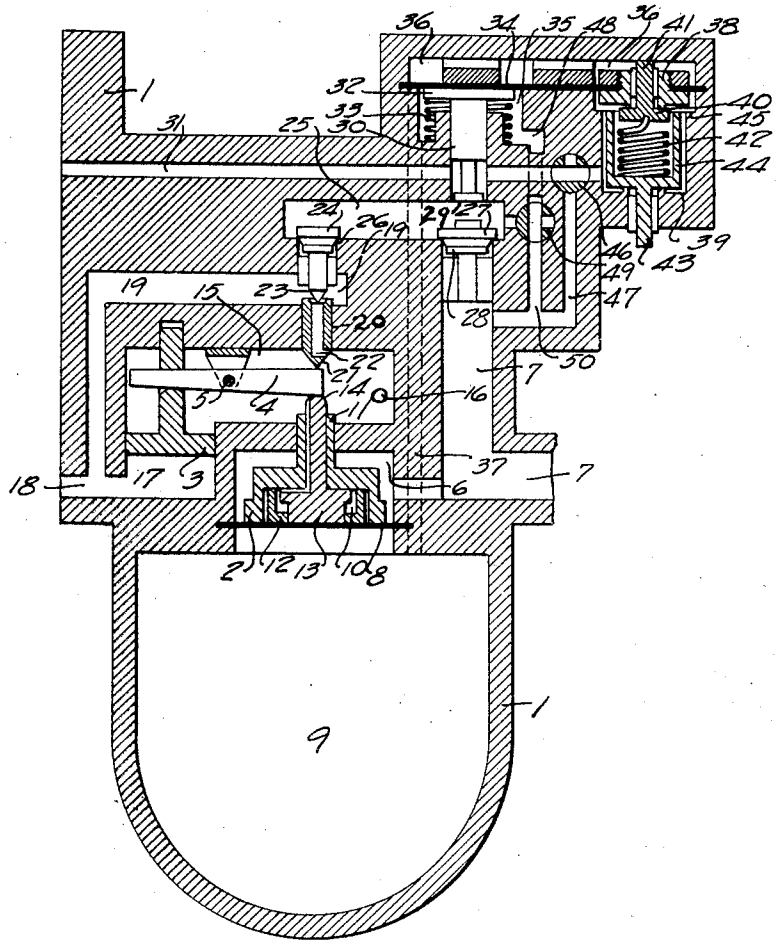

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DISTRIBUTOR FOR FLUID-PRESSURE BRAKES.

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In order to ensure continuous and automatic braking by means of compressed air of long goods trains it is necessary to propagate the wave of negative pressure in the train pipe as rapidly as possible and to allow the pressure in the brake cylinder to develop rapidly only at the commencement of the braking operation. These two different objects have been attained by means of two devices.

The subject of the present invention is a distributor which during the braking operation permits first the compressed air in the pipe to escape at the commencement of each braking operation into the brake cylinders so as to utilize the air in the pipe and to produce a definite and sudden negative pressure in the train pipe no matter what its length and no matter how many wagons are braked. Once this negative pressure is obtained the connection between the pipe and brake cylinder is interrupted and that between the auxiliary reservoir and the cylinder is established.

A construction in accordance with the invention is illustrated by way of example in the accompanying drawing which is a vertical section of a distributor.

Referring to the drawing, within the body 1 are located the operating piston 2 and the balancing piston 3 each acting respectively on one of the arms of a lever 4 pivoting about a movable pivot 5. The operating piston 2 is located in the chamber 6 which is in constant communication with the main pipe by the passage 7 and rests on the diaphragm 8 which separates the chamber 6 from the chamber 9 in an air-tight manner. Within the operating piston 2 and its rod 11 which fits air-tight in the wall of the chamber 6 and extends into the atmosphere are disposed the interrupting piston 12 and the moderating piston 13, the piston rod 14 of which extends through the rod 11 and acts in the chamber 15 against the right hand arm of the lever 4. These two pistons 12 and 13 are always subject to atmospheric pressure. They are kept air-tight with respect to one another and with respect to the chamber 6 by the excess pressure which exists in the chamber 9 on the diaphragm 8. The chamber 15 is in continuous communication with the atmosphere by way of the opening 16.

The balancing piston 3 separates the chamber 15 from the chamber 17 which is in constant communication by way of the passage 18 with the brake cylinder. This passage 18 also connects the cylinder with the chamber 19 which is separated from the chamber 15 by the tubular rod 20 the end 21 of which bears also against the right hand arm of the lever 4 to the right of the rod 14. The passage 22 leading to the atmosphere through the tubular rod 20 may be closed by the outlet valve 23 which is in one with the inlet valve 24. This valve separates the chamber 19 from the intermediate chamber 25 and has a throttling cylinder 26 beneath its seating.

The intermediate chamber 25 is connected with the pipe when the discharge valve 27 is open. This valve is also formed with a throttling cylinder 28. On the other hand the intermediate chamber is in constant communication by way of the narrow passage around the shoulder 29 of the rod 30 with the passage 31 leading to the auxiliary reservoir. The rod 30 is in one with the commutator piston 32 which is pressed upwards by the spring 33 against the diaphragm 34. This diaphragm separates the chamber 35 in which the disc is located from the chamber 36 which is in constant communication with the chamber 9 by the passage 37. The diaphragm 34 and the differential piston 38 also separate the chamber 36 from the chamber 39. Within the body of this piston is located a feed valve 40 the stem 41 of which is pressed against the wall of the chamber 36 by the spring 42 which also presses on the outlet valve 43 closing the passage connecting the chamber 39 with the atmosphere.

The valve 43 has projections 44 which in rising raise the piston 38 of the feed valve 40 allowing it to open. The piston 38 in moving downward and in compressing the spring 42 may bear against the shoulder 45 of the body 1.

Connection between the chamber 39 and the auxiliary reservoir may be established by means of the cock 46 and the passage 31 as shown in the drawing or with the pipe 7 by the passage 47 if the cock is turned through 90° to the right.

Connection between the chamber 35 and the pipe 7 may be established by the passage 48 by means of the cock 49 and by the pas-

sage 50 as shown in the drawing, or with the intermediate chamber 25 if the cock 49 is turned to the left through 90°.

The operation of the distributor is as follows:—

The compressed air in the main pipe passes by way of the passage 7 into the chamber 6; after raising the valve 27 it enters the chamber 25 and passes also by way of the passages 50 and 48 and the cock 49 into the chamber 35. From the chamber 25 the compressed air passes by way of the passage 31 into the auxiliary reservoir and by way of the cock 46 into the chamber 39. At this moment the compressed air raises the piston 38 and passes through the open valve into the chamber 36 and through the passage 37 into the chamber 9.

When the pressure in all these chambers becomes approximately equal to that existing in the pipe the valves close.

If the cocks are turned the chamber 35 receives the compressed air from the chamber 25 and the chamber 39 directly from the pipe.

If a slight negative pressure is produced in the pipe and consequently in the chamber 6, the unit consisting of the pistons 2, 12 and 13 is pushed upwards by the excess pressure in the chamber 9. The rod 13 through the medium of the arm of the lever 4 raises the hollow rod 20, closes the outlet valve 23, and opens the inlet valve 24 so that the throttling cylinder 26 moves out of the passage. The compressed air in the chamber 25 as also the air in the pipe after raising the valve 27 escapes rapidly into the brake cylinder by the inlet valve and the passage 18. The escape of the air produces an increased negative pressure in the pipe which is propagated from one distributor to another in the train to the end.

At the same time this negative pressure makes itself felt in the chamber 35. At the moment when the force from the difference of pressures on the piston 32 becomes greater than the tension of the spring 33 the latter is compressed and the disc is pushed downwards until it reaches the wall of the body 1 on which it abuts. This rod 30 and its shoulder 29 push the valve 27 downwards so as to bring the throttling cylinder 28 within the passage in the pipe while the shoulder 29 moves out of the passage leading from the auxiliary reservoir into the intermediate chamber. The compressed air from the reservoir escapes in turn into the brake cylinder.

The depression in the pipe caused by the escape of air into the cylinder only depends on the tension of the spring 33 and is independent of the length of the pipe and of the volume of the cylinder. It is sufficient to cause the brake pistons to move outwards and to press the shoes against the wheels with a slight force and rapidly throughout the braked vehicles of a train.

The depression is also felt in the chamber 39. The force of the excess pressure on the piston 38 presses the latter against the valve 40 interrupting communication between the chambers 36 and 39 and increasing the tightness of the valve 40.

If the depression in the pipe is not prolonged the force of the increased pressure in the brake cylinder and consequently against the balancing piston 3 acting against the left hand arm of the lever 4 becomes after a time according to the position of the point 5, greater than the force resulting from the difference of the pressures on the operating piston 2 acting against the right hand arm of the lever 4. At this moment the whole of the pistons 2 and 3 with the lever 4 move in clockwise direction until the inlet valve is closed and cuts off the passage of air from the intermediate chamber into the brake cylinder without however opening the outlet valve 23.

In this construction the sensitiveness of the distributor for the commencement of the braking remains always the same in all positions of the point 5 of the lever 4. The development of the pressure in the brake cylinder is only effected rapidly at the commencement. As soon as the force of the increased pressure in the cylinder against the balancing piston 3 becomes greater than the excess pressure on the moderating piston 13, this piston is pressed back until it bears against the interrupting piston 12. For this position the inlet valve descends more or less according to the thickness of the right hand arm of the lever. For the different positions of the lever this thickness changes so as to allow more or less or not at all the introduction of the throttling cylinder 26 into the passage.

At the moment when the development of the pressure in the cylinder reaches a definite value greater than the excess pressure on the moderating and interrupting pistons both are pushed back and the inlet valve closes completely.

The release is effected by increase of the pressure in the main pipe by the passage 22 and the opening 16.

Release by hand is effected by pushing the valve 43 upwards from the outside. The shoulders 44 of this valve cause the piston 38 of the valve 40 to rise and the air in the chamber 9 may escape by the passage 37, the chambers 36 and 39 and the valves 40 and 43 to the atmosphere. Similarly air from the auxiliary reservoir may escape by the passage 31, and the cock 46 (if the latter is in the position shown in the drawing) and by the chamber 39 and the valve 43.

I claim:—

1. A compressed air brake distributor per-

mitting at the commencement of braking of utilizing first in the brake cylinder the air from the pipe and consequently of propagating rapidly the wave of negative pressure in the pipe, comprising an operating piston between the main pipe and the isolated chamber which acts on one arm of a movable lever the other arm of which is controlled by the balancing piston located between the brake cylinder and the atmosphere characterized by a hollow rod opening the admission valve between the intermediate chamber and the brake cylinder as soon as a depression makes itself felt in the pipe above the operating piston.

2. A compressed air brake distributor comprising an intermediate chamber between the main pipe, the auxiliary reservoir and the brake cylinder characterized by an outlet valve which allows air from the pipe to pass into the brake cylinder as soon as the admission valve is open and which is closed by the piston rod of the commutator piston located between the isolated chamber and the pipe as soon as the difference of pressures on it becomes greater than the tension of the spring.

3. A compressed air brake distributor as claimed in claim 2 wherein on the closing of the outlet valve the rod of the commutator piston opens the passage between the auxiliary reservoir and the intermediate chamber.

4. In a compressed air brake as claimed in claim 1 an interrupting piston and a moderating piston, the piston rod of which acts through the medium of a lever of variable thickness on the one hand, on the hollow rod having the outlet passage and in order to open the admission valve, and on the other hand acts on the balancing piston so as to regulate the quantity and speed of the passage of the air from the intermediate chamber into the brake cylinder and from the latter to the atmosphere.

5. In a compressed air brake distributor as claimed in claim 1 a supply valve for the isolated chamber sustained by a spring characterized by this that its seating is provided in the differential piston, the total difference of the pressures acting to close this valve.

In testimony whereof I have signed my name to this specification.

DOBRIVOJE BOŽIĆ.