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E. A. WRIGHT & W. V. TURNER.

ELECTROPNEUMATIC BRAKE.

APPLICATION FILED MAR. 20, 1905.

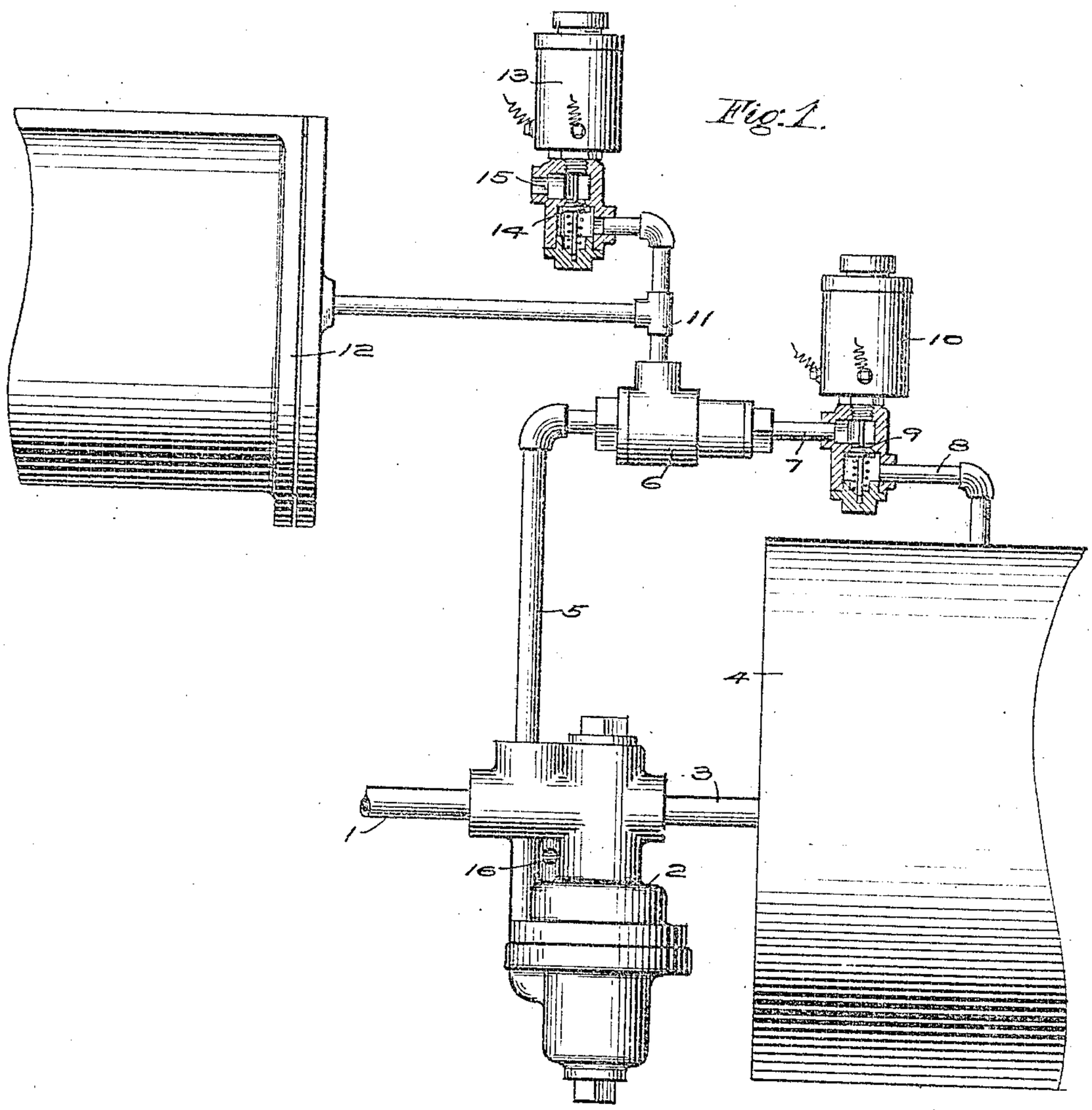

Fig. 1.

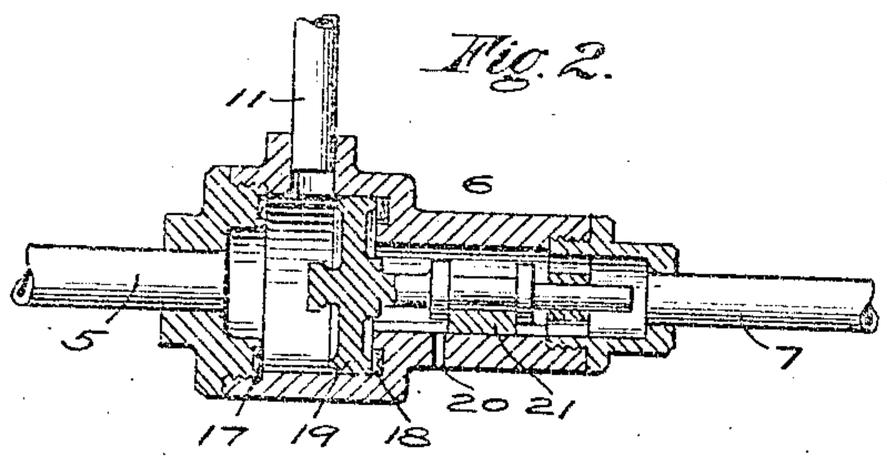

Fig. 2.

WITNESSES

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UNITED STATES PATENT OFFICE.

EDWARD A. WRIGHT, OF EDGEWOOD PARK, AND WALTER V. TURNER, OF WILKINSBURG, PENNSYLVANIA, ASSIGNORS TO THE WESTINGHOUSE AIR BRAKE COMPANY, OF PITTSBURG, PENNSYLVANIA, A CORPORATION OF PENNSYLVANIA.

ELECTROPNEUMATIC BRAKE.

No. 837,369. Specification of Letters Patent. Patented Dec. 4, 1906.

Application filed March 20, 1905. Serial No. 250,988.

To all whom it may concern:

Be it known that we, EDWARD A. WRIGHT, residing at Edgewood Park, and WALTER V. TURNER, residing at Wilkinsburg, in the county of Allegheny, State of Pennsylvania, citizens of the United States, have invented certain new and useful Improvements in Electropneumatic Brakes, of which the following is a specification.

This invention relates to automatic fluid-pressure brakes, and more particularly to electropneumatic brakes, and has for its principal object to provide an improved construction whereby the brakes may be controlled either by the manipulation of electrically-operated valves or by variations in the train-pipe pressure in the usual way.

Another object is to provide an improved form of double-check-valve device for use in controlling the flow from two separate inlet-ports to a common outlet.

Our invention comprises, in addition to the usual standard automatic air-brake equipment of a train-pipe, auxiliary reservoir, triple-valve device, and brake cylinder, an electrically-operated valve for also controlling the supply of air to the brake-cylinder and a double check-valve located between the electrically-operated valve and the triple valve and the brake-cylinder. By this means when air is supplied to the brake-cylinder by the electrically-operated valve the check-valve acts to close communication from the brake-cylinder to the triple valve, and thereby prevents the escape of air through the triple-valve exhaust-port; but when the brakes are operated pneumatically and air flows from the triple valve to the brake-cylinder the check-valve operates to close communication from the brake-cylinder to the electric application-valve.

In order to prevent the accumulation of pressure from leakage on the opposite side of the check-valve when operating the brakes pneumatically, which might cause an undesirable shifting of the valve and prevent the pneumatic release of the brakes, a vent-port is provided on the electric-application-valve side of the check-valve, and this vent-port is controlled by the movement of the check-valve, so as to be open when operating the brakes pneumatically and closed when operating electrically.

The electrically-operated release-valve is connected on the brake-cylinder side of the double check-valve, whereby the brake-cylinder pressure may be graded down or released at any time, as desired.

In the accompanying drawings, Figure 1 is a diagrammatic elevation of a car-brake equipment embodying our invention and Fig 2 a sectional view of the improved double-check-valve device.

According to this construction our improvements are illustrated as applied to the standard automatic air-brake apparatus, including the train-pipe 1, triple valve 2, connected by pipe 3 with the auxiliary reservoir 4, and pipe 5 for supplying air to the brake-cylinder 12. In addition to this structure we provide an electromagnet 10, operating the valve 9 for controlling communication from the pipe 8 and the auxiliary reservoir or other source to the pipe 7, and one inlet-port of the double-check-valve device 6, the other inlet-port of which communicates with the service-pipe 5 from the triple valve. The outlet-pipe 11 communicates with the brake-cylinder, and to this is connected the electric release-valve 14, operated by magnet 13, for controlling the outlet-port 15 to the atmosphere. The electrically-operated valves are preferably normally closed when their magnets are not energized.

As shown in Fig. 2, the improved double-check-valve device comprises a casing having a piston 19 and seats 17 and 18 for the same at opposite ends of its stroke. The outlet-port leads from the space between said seats, while the inlet-ports from pipes 5 and 7 communicate with the chambers or space on the opposite sides of the piston. On the side of the piston-seat toward the inlet-pipe 7 is provided a small vent or leak port 20, which is controlled by the valve 21, operated by the movement of the check-valve or piston. By this means when the piston is seated against gasket 18 any leakage of air under pressure around the check-valve piston or leakage from the admission-valve to pipe 7 will escape to the atmosphere through vent-port 20, and no pressure can accumulate to cause

an objectionable shifting of the check to its opposite seat at the time of releasing the brakes pneumatically.

The operation is as follows: Suitable circuit connections being provided for controlling the magnets 10 and 13, to apply the brakes electrically the magnet 10 is energized to open the valve 9 and supply air from the auxiliary reservoir or other source through pipe 7 to the double check-valve. This air under pressure acting on piston 18 accumulates much faster than it can escape through the small leak-port 20, if this should happen to be open, and instantly moves the piston over against its seat 17, thereby closing the vent-port 20 and communication from the brake-cylinder to the pipe 5 and the triple valve and opening free communication to the brake-cylinder through pipe 11. In this manner the escape of air through the exhaust-port 16 of the triple valve is prevented and the brake-cylinder pressure may be graded up to any desired degree by the electric application-valve. In a similar manner the brake-cylinder pressure may be graded down or released, as desired, by energizing and deënergizing the magnet 13 for controlling the valve 14 and the exhaust-port 15.

To operate the brakes pneumatically, the train-pipe pressure is reduced to operate the triple valve in the ordinary way to supply air from the auxiliary reservoir to the pipe 5, leading through the double check-valve and pipe 11 to the brake-cylinder. This air under pressure seats the piston 19 against the gasket 18, thereby closing communication from the brake-cylinder to the pipe 7 and the electric application-valve and opening the vent-port 20.

Should there be any leakage around the check-valve or past the electric application-valve, the same would readily escape through the vent-port to the atmosphere. The brakes may then be released in the usual way by increasing the train-pipe pressure, and there will be no tendency for the check-valve to shift to its opposite seat and stop the exhaust through pipe 5 and port 16 of the triple valve, and this is considered an important feature in actual practice, since otherwise the pressure accumulating by leakage to the opposite side of the check-valve would probably cause the same to shift to its opposite seat at the time of pneumatic release and prevent the complete release of the brake.

It will now be apparent that by the mere addition of the electrically-operated application and release valves and the double check-valve to the standard automatic air-brake apparatus we have provided a simple and efficient electropneumatic brake equipment by which the brakes may be applied and controlled either electrically or pneumatically.

It will also be obvious that the improved double check-valve device may be employed in any connection for controlling the flow from two separate inlet-ports to a common outlet—as, for instance, in the ordinary combined automatic and straight air-brake apparatus.

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

1. In a fluid-pressure brake, the combination with a train-pipe, auxiliary reservoir, triple valve and brake-cylinder, of an electrically-operated valve for controlling the supply of air to the brake-cylinder, and a double check-valve between the triple valve and the electric supply-valve and the brake-cylinder.

2. In a fluid-pressure brake, the combination with a train-pipe, auxiliary reservoir, triple valve and brake-cylinder, of an electrically-operated valve for controlling the supply of air to the brake-cylinder, and a check-valve device operated by the flow of air from the triple valve to the brake-cylinder to close communication from the brake-cylinder to the electric supply-valve.

3. In a fluid-pressure brake, the combination with a train-pipe, auxiliary reservoir, triple valve and brake-cylinder, of an electrically-operated valve for controlling the supply of air from the auxiliary reservoir to the brake-cylinder, and a double check-valve between the triple valve and the electric supply-valve and the brake-cylinder.

4. In a fluid-pressure brake, the combination with a train-pipe, auxiliary reservoir, triple valve and brake-cylinder, of an electrically-operated valve mechanism for controlling the supply of air to the brake-cylinder and its release therefrom, and a double check-valve between the supply from the electric valve, the triple valve, and the brake-cylinder.

5. In a fluid-pressure brake, the combination with a train-pipe, auxiliary reservoir, triple valve and brake-cylinder, of an electric application-valve for controlling the supply of air to the brake-cylinder, a check-valve device between the electric application-valve and the triple valve and the brake-cylinder, and an electric release-valve on the brake-cylinder side of the check-valve.

6. In a fluid-pressure brake, the combination with a train-pipe, auxiliary reservoir, triple valve and brake-cylinder, of an electric application-valve for controlling communication from the auxiliary reservoir to the brake-cylinder, a check-valve device operated by the flow of air from the electric application-valve for closing communication from the brake-cylinder to the triple valve, and an electric release-valve on the brake-cylinder side of the check-valve device.

7. In a fluid-pressure brake, the combina-

tion with a train-pipe, auxiliary reservoir, triple valve and brake-cylinder, an additional valve for controlling a supply of air to the brake-cylinder, a double check-valve between said additional valve supply and the triple valve and the brake-cylinder, and a vent on the side toward the additional supply-valve and controlled by the movement of said double check-valve.

8. In a fluid-pressure brake, the combination with a train-pipe, auxiliary reservoir, triple valve and brake-cylinder, an additional valve for controlling a supply of air to the brake-cylinder, and a check-valve device operated by the flow of air from the triple valve to the brake-cylinder to close communication from the brake-cylinder to the additional supply-valve and to open a vent-port from the space on said supply-valve side of the check-valve.

9. In a fluid-pressure brake, the combination with a train-pipe, auxiliary reservoir, triple valve, and brake-cylinder, of an additional application-valve for controlling the supply of air from said reservoir to the brake-cylinder, and a double check-valve between the triple valve and the application-valve and the brake-cylinder.

10. In a fluid-pressure brake, the combination with a train-pipe, auxiliary reservoir, triple valve and brake-cylinder, of an electric application-valve for controlling the supply of air to the brake-cylinder, a check-valve device operated by the flow of air from the triple valve to the brake-cylinder to close communication from the brake-cylinder to the electric application-valve, a vent-port on the application-valve side of the check-valve, and means for controlling said vent-port.

11. In a fluid-pressure brake, the combination with a train-pipe, auxiliary reservoir, triple valve and brake-cylinder, of an electric application-valve for controlling the supply of air to the brake-cylinder, a double check-valve between the electric application-valve and the triple valve and the brake-cylinder, a vent-port on the application-valve side of the double check-valve and controlled by its movement, and an electric release-valve on the brake-cylinder side of said double check-valve.

In testimony whereof we have hereunto set our hands.

EDWARD A. WRIGHT.
WALTER V. TURNER.

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