C. E. DUFFIE.

AIR BRAKE APPARATUS.

APPLICATION FILED JULY 25, 1907.

907,686. **Patented Dec. 22, 1908.**

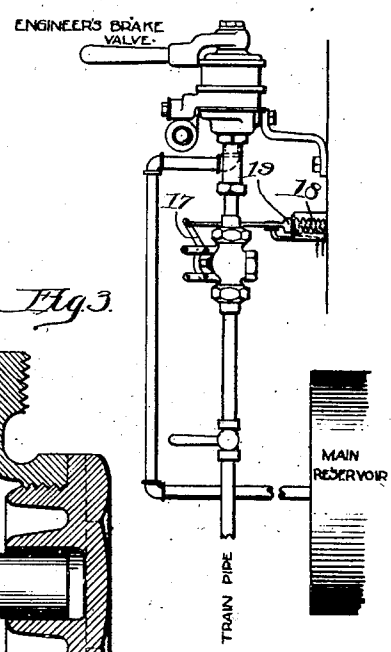


Fig. 3.

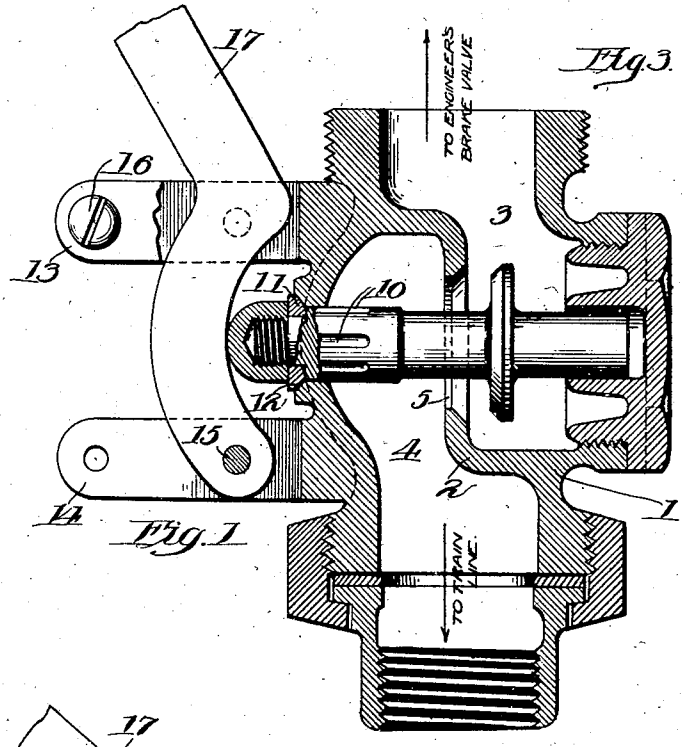


Fig. 1

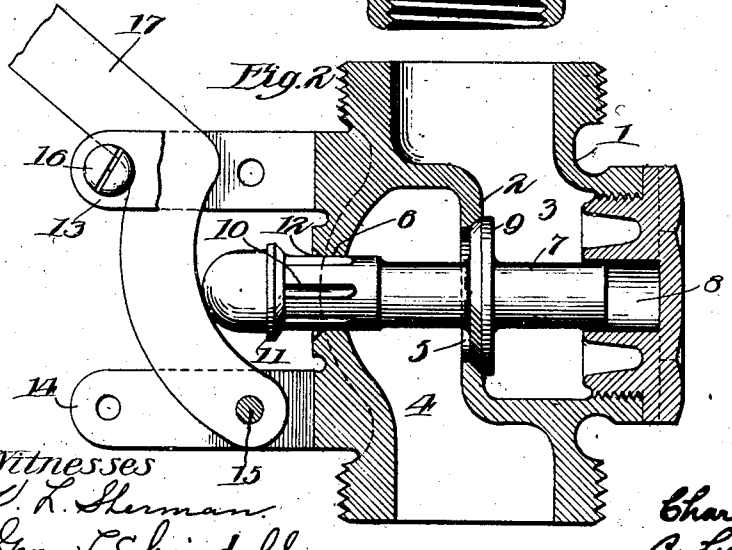


Fig. 2.

Witnesses
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UNITED STATES PATENT OFFICE.

CHARLES E. DUFFIE, OF OMAHA, NEBRASKA.

AIR-BRAKE APPARATUS.

No. 907,686. Specification of Letters Patent. Patented Dec. 22, 1908.

Original application filed April 27, 1907, Serial No. 370,590. Divided and this application filed July 25, 1907. Serial No. 385,500.

To all whom it may concern:

Be it known that I, CHARLES E. DUFFIE, a citizen of the United States, residing at Omaha, in the county of Douglas and State of Nebraska, have invented certain new and useful Improvements in Air-Brake Apparatus, of which the following is a specification.

This application is a division of my co-pending application Serial No. 370,590, filed April 27, 1907.

The present invention relates especially to air-brake apparatus adapted to operate in connection with a railway signal system for providing a service application of the brakes whenever the train enters upon an obstructed section of the road.

One of the objects of my invention is to provide a valve which shall operate automatically to reduce the train-pipe pressure.

Another object of my invention is the provision in such a valve of an automatic cut-off between the main reservoir and the train pipe in order to prevent loss of pressure air.

In the accompanying drawings Figure 1 is a vertical central section of a valve embodying my invention showing the valve in the normal position. Fig. 2 also represents a vertical central sectional view of the valve in the operative position. Fig. 3 is a somewhat diagrammatic view showing the valve in operative relation to an air brake apparatus.

The valve herein shown comprises a casing 1 preferably of the globe valve type, adapted to be included in the train pipe below the engineer's brake valve. Said casing is divided by a partition 2 forming the chambers 3 and 4, the former being connected with the engineer's brake valve and the latter with the portion of the train pipe running to the brakes, as shown in Fig. 3. In the partition 2 is a port 5 which is the only means of communication between the train pipe and the engineer's brake valve. An opening 6 in one wall of the casing 1 leads from the chamber 4 to the atmosphere and acts as a bearing for one end of the valve stem 7. A recess 8 in the opposite wall of the casing provides a bearing for the opposite end of said valve stem. The space in the recess 8 to the rear of the valve stem 7 is preferably open to the pressure within the valve casing. Said recess is herein shown as slightly larger in diameter than the stem 7 so as to permit of the flow of pressure air into said recess.

The valve stem 7 carries the valve disk 9 adapted to close the port 5 and has one or more channels 10 formed therein adapted to connect the chamber 4 with the atmosphere. On one end of said valve stem is a valve disk 11 adapted to seat upon a valve seat 12 formed about the outer end of the opening. Two forks 13 and 14 containing the bolts 15 and 16 are fixed to the casing 1, said bolts acting respectively as fulcrum and stop for a lever 17. In the present embodiment the valve disk 9 is arranged normally to be held unseated and the valve disk 11 seated by means adapted to be acted upon by a suitable block signal apparatus (not shown). Said means comprises an electro-magnet 18, the coil of which is included in a cab circuit arranged to be interrupted when a danger condition exists. The armature 19 of the electro-magnet 18 is connected with the lever 17 in any suitable way.

Assuming the road to be clear and the electro-magnet 18 therefore energized, the armature 19 will remain in contact with said magnet and the lever will hold the valve disk 11 seated and valve disk 9 unseated. The train pipe is thus open, allowing ordinary operation of the brakes. Should the current be cut off from the electro-magnet 18, as in case of a "blocked" section, the lever will be free to move. The pressure of the air within the valve casing on the combined areas of the end of the valve stem 7, within the recess 8, and the corresponding side of the valve disk 9 overcomes the pressure upon the opposite side of the valve disk 9 and the atmospheric pressure from without upon the valve stem, and seats said valve disk 9 and unseats the valve disk 11. The channels 10 now afford direct communication between the train pipe and the atmosphere, and the drop in the train pipe pressure causes a service application of the brakes. The simultaneous seating of the disk 9 prevents loss of main reservoir pressure. The brakes will be applied with more or less force according to the size of the openings leading to the atmosphere.

As the engine passes out of operative connection with the signal circuit, as de-

scribed in the copending application hereinbefore referred to, the circuit through the magnet 18 is reëstablished. The engineer may then shift the lever 17, thereby reseating the armature 19, and reopening normal train pipe connections. Being inserted in the train line below the engineer's brake valve, the valve herein described, when automatically operated as just set forth, deprives the engineer of all control of the brakes through the engineer's brake valve.

As the particular construction herein shown is only one of numerous possible designs, I do not wish to be limited to the precise construction set forth.

I claim as my invention:

1. In air brake apparatus, in combination, a train line; an engineer's brake valve; means for opening the train line to the atmosphere; and means operating simultaneously therewith and moving in the direction of the air current flowing through the engineer's brake valve for cutting off the engineer's brake valve from the train line.

2. In air brake apparatus, in combination, a train line; a main reservoir; means for opening the train line to the atmosphere; means for cutting off the main reservoir from the train line; and electrical means for holding both of said means in the inoperative position.

3. In air brake apparatus, in combination, a train line; a main reservoir; means for opening the train line to the atmosphere; means for cutting off the main reservoir from the train line; a lever operatively connected with both of said means; and electrical means for acting upon said lever to hold both of said means in the inoperative position.

4. In air brake apparatus, in combination, a valve casing comprising two communicating chambers adapted to be connected in the train line, one of said chambers having an opening communicating with the atmosphere; a valve member in the other chamber for closing communication between said chambers; and a valve member for closing said opening to the atmosphere, said valve members being arranged to move together.

5. In air brake apparatus, in combination, a valve casing comprising two communicating chambers adapted to be connected in the train line; means for opening one of said chambers to the atmosphere; and separate means for closing communication between said chambers.

6. In air brake apparatus, in combination, a valve casing comprising two communicating chambers adapted to be connected in the train line, one of said chambers having an opening communicating with the atmosphere; and a valve stem having thereon a valve member in the other chamber adapted to close communication between said chambers and a valve member adapted to close the said opening, one of said valve members being arranged to be seated when the other is unseated.

7. In air brake apparatus, in combination, a valve casing comprising two communicating chambers adapted to be connected in the train line, one of said chambers having an opening communicating with the atmosphere; a valve stem having thereon a valve member in the other chamber adapted to close communication between said chambers and a valve member adapted to close the said opening, one of said valve members being arranged to be seated when the other is unseated; and means for holding said valve stem in position to close said opening.

8. In air brake apparatus, in combination, a valve casing comprising two communicating chambers, one of said chambers being adapted to be connected with a portion of the train line extending to the engineer's brake valve, and the other chamber being adapted to communicate with the portion of the train line running to the brakes; a valve stem slidably mounted in said valve casing; a valve member on said stem for closing communication between said chambers, said valve stem extending through an opening arranged to connect the second mentioned chamber with the atmosphere; a valve member on said valve stem adapted to close said opening, said valve stem being formed to permit the passage of air to said opening when said last mentioned valve member is unseated; and means for moving said valve stem in one direction.

9. In an air brake apparatus, in combination, a valve casing adapted to communicate with the portion of the train line extending to the engineer's brake valve and the portion of the train line running to the brakes; a valve device adapted to open communication between the atmosphere and the portion of the train line running to the brakes; a lever for operating said valve device; and an electro-magnet normally holding said lever in position to close communication between the atmosphere and the portion of train line running to the brakes.

10. In an air brake apparatus, in combination, a valve casing comprising two communicating chambers, one of said chambers being adapted to be connected with the portion of the train line extending to the engineer's brake valve, and the other chamber being adapted to communicate with the portion to the train line running to the brakes, said last mentioned chamber having an opening communicating with the atmosphere; a valve stem slidably mounted in said valve casing; a valve member on said stem for closing communication between said chambers; a valve member on said stem for closing the said opening, one of said members

being arranged to be seated when the other is unseated, said stem being adapted to permit the passage of pressure air past it when the valve member for said opening is unseated; a lever for operating said valve stem; and an electro-magnet normally holding said lever in position to close communication between the atmosphere and the portion of the train line running to the brakes.

CHARLES E. DUFFIE.

Witnesses:
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JOHN F. STOUT.