C. E. DUFFIE.

RAILWAY BRAKE.

APPLICATION FILED JULY 15, 1908.

943,737. Patented Dec. 21, 1909.

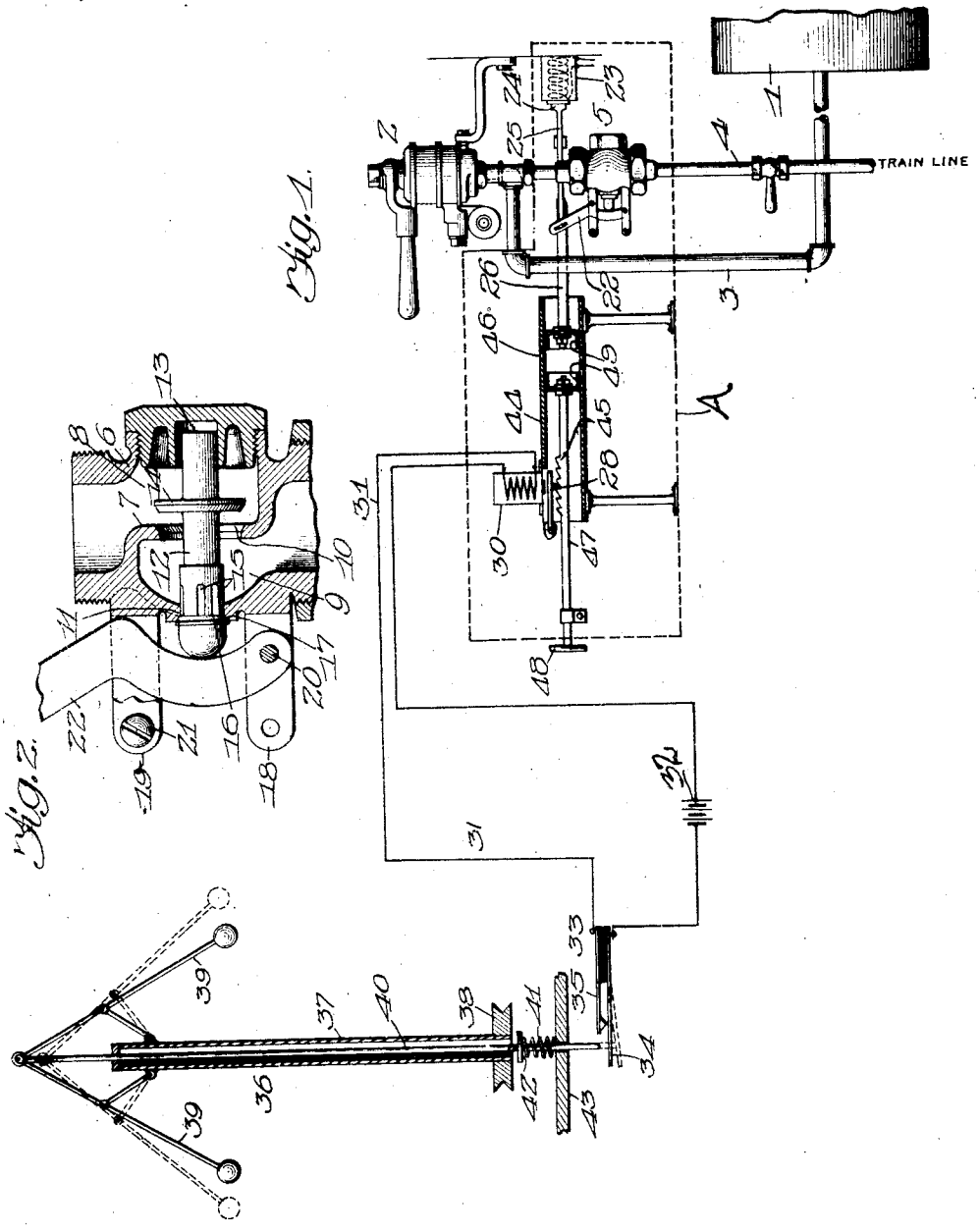

Fig. 1.

Fig. 2.

Witnesses:
B. F. Funk
G. V. Donaru Jr.

Inventor:
Charles E. Duffie
By Luther L. Miller
Atty.

UNITED STATES PATENT OFFICE.

CHARLES E. DUFFEE, OF OMAHA, NEBRASKA.

RAILWAY-BRAKE.

943,737. Specification of Letters Patent. Patented Dec. 21, 1909.

Application filed July 15, 1908. Serial No. 443,843.

To all whom it may concern:

Be it known that I, CHARLES E. DUFFEE, 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 Railway-Brakes, of which the following is a specification.

This invention relates to railway brakes, and especially to a system in which the brakes are arranged to be automatically applied when the train enters a danger zone or a portion of the system becomes deranged.

The object of the invention is to prevent the engineer from releasing the brakes after an automatic application thereof, until the train has slowed down to a predetermined speed.

In the accompanying drawings, Figure 1 is a diagrammatic representation of a brake apparatus embodying the features of my invention. Fig. 2 is a fragmental sectional view of a valve comprised in said apparatus.

In the illustrative embodiment herein shown of the invention, 1 is the main reservoir, 2 the engineer's valve, 3 a pipe extending from the main reservoir to the engineer's brake valve, 4 a pipe extending from the engineer's brake valve to the train line, and 5 an automatic valve inserted in the pipe 4.

The valve 5, in the construction herein shown, comprises a casing 6 (Fig. 2) which is divided by a partition 7 into the chambers 8 and 9, 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. 1. In the partition 7 is a port 10 which is the only means of communication between the train pipe and the engineer's brake valve. An opening 11 in one wall of the casing 6 leads from the chamber 9 to the atmosphere and serves as a bearing for one end of the valve stem 12. A recess 13 in the opposite wall of the casing provides a bearing for the opposite end of said valve stem. The space in the recess 13 to the rear of the valve stem 12 is preferably open to the pressure within the valve casing. Said recess is herein shown as slightly larger in diameter than the stem 12 so as to permit of the flow of pressure air into said recess.

The valve stem 12 carries a valve disk 14 adapted to close the port 10, and has one or more channels 15 formed therein adapted to connect the chamber 9 with the atmosphere. On one end of said valve stem is a valve disk 16 adapted to seat upon a valve seat 17 formed about the outer end of the opening 11.

Two forks 18 and 19 containing the bolts 20 and 21 are fixed to the casing 6, said bolts acting respectively as a fulcrum and a stop for a lever 22.

In the present embodiment, the valve disk 14 is arranged to be normally held unseated and the valve disk 16 seated by means adapted to be acted upon by a suitable block signal apparatus, such, for example, as that shown in Patent No. 910,184 issued to me on January 19, 1909. Said means comprises an electro-magnet 23 which is included in a cab circuit arranged to be interrupted when a danger condition exists. The armature 24 of the electro-magnet 23 is connected with the lever 22 by means of a rod 25 or in any other suitable way.

Assuming the road to be clear and the electro-magnet 23 therefore energized, the armature 24 will remain in contact with said magnet, and the lever 22 will hold the valve disk 16 seated and valve disk 10 unseated. The train pipe is thus open, allowing ordinary operation of the brakes. Should current be cut off from the electro-magnet 23, as in case of a "blocked" section, or derangement of the apparatus, the lever 22 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 12, within the recess 13, and the corresponding side of the valve disk 14 overcomes the pressure upon the opposite side of the valve disk 14 and the atmospheric pressure from without upon the valve stem, and seats said valve disk 14 and unseats the valve disk 16. The channels 15 now afford direct communication between the train pipe and the atmosphere, and the resulting drop in the train-pipe pressure causes an application of the brakes. The simultaneous seating of the disk 14 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. Being inserted in the train line below the engineer's brake valve, the valve 5, when automatically operated as just set forth, deprives the engineer of all control of the brakes through the engineer's brake valve. When the engine passes out of operative connection with the signal circuit, as described in the patent hereinbefore referred to, the circuit

through the magnet 28 is closed. The engineer may then manually shift the lever 22 to reseat the armature 24, thereby releasing the air brakes and reëstablishing normal train-pipe connections. To prevent the engineer from thus releasing the brakes until the speed of the train has been reduced to a predetermined point, I provide the mechanism to be now described.

The mechanism just referred to, in the present embodiment, comprises a rod 26 attached to the lever 22 so as to be reciprocated thereby, for example, it may be rigid with or otherwise attached to the rod 25 carrying the armature 24. On the end of the rod 26 is a piston 49, having a peripheral flange fitting in a cylinder 44 and adapted to reciprocate therein by mechanism to be described hereinafter. The cylinder 44 is provided with an opening 46. A rod 47, having a piston 49, similar to the one on the rod 26, is provided with teeth 45 to be engaged by a pawl 28, pivotally connected to the cylinder 44 and actuated by a magnet 30.

48 is a wheel or handle on the end of the rod 47, whereby said rod 47 may be moved away from the rod 26 under all conditions, but can only be moved toward the rod when the armature is attracted to the magnet.

The electro-magnet 30 is included in the circuit 31 containing a source of electrical energy 32 and a circuit-breaker 33, which circuit-breaker may consist of two contacts 34 and 35. For separating said contacts to open the circuit and thereby deënergize the device 30, I provide suitable means such, for example, as a governor 36. The governor 36 may be of any preferred type, but is herein shown as comprising a tubular shaft 37 adapted to be rotated by means of a grooved pulley 38, said shaft having a link connection with the arms 39; the latter are pivotally attached to a rod 40 extending through the tubular shaft 37 to a point adjacent to the contact 34. A spring 41, interposed between a collar 42 on the rod 40 and a stationary abutment 43, tends to prevent the governor from operating the circuit breaker 33. The collar 42 is adjustable in position upon the rod 40 in order that the tension of the spring 41 may be varied as desired. The pulley 38 is driven from an axle or other moving part of the vehicle. The governor drive and the tension of the spring 41 may be arranged so that the governor shall operate the circuit breaker 33 to deënergize the device 30 at any desired speed of the train, for example, twelve miles per hour.

The cylinder 44 serves as a casing within which is the operating end of the magnet 30 and pawl 28, so that it will be impossible for the rod 47 to be moved inwardly unless the pawl is raised through the medium of the magnet 30. It will be apparent then that the engineer may move the rod 47 in one direction only unless the magnet 30 is excited. In order to explain the operation of the device by the engineer, it will be supposed that the engineer's rod 47 is shoved clear in, but that the magnet 30 is not excited. If the engine crosses a point of indication and there is danger at that point, the magnet 28 will release its armature together with the rod 26. This rod will now fly out, pressing the cup 49 on the rod 26 to the left. As soon as the opening 46 is covered, air will begin to be compressed in the tube 44, which pressure will drive the rod 47 outward; the locking dog 28 will prevent the engineer from shoving it in until the magnet 30 is again excited to raise the locking dog 28. The engineer may, however, pull the rod 47 outward so as to fill the space between the two cups 49, on the rods 26 and 47, with air at atmospheric pressure. He cannot shove the rod in, however, until the dog is raised. When the dog is raised, he may shove the rod 47 into the tube with a sudden motion. The leather piston on the rod 47 prevents escape of the air from one end of the tube and the one on the rod 26 prevents escape of air from the other end of the tube. The air is thus compressed, driving the rod 26 to the right. There will be a sufficient volume of air in the tube 44 to permit of such compression that the rod 26 will be forced back until the magnet 28 attracts its armature and holds the automatic valve closed. This move will be effective in causing the piston 49, on the rod 26, to uncover the opening 46 in the cylinder 44 and restore the space between the pistons 49 to atmospheric pressure. It will be obvious then that the engineer is powerless to manipulate the rod 26 unless the speed of the train is decreased sufficiently to permit the circuit 31 to be closed. The electro-magnetic device 30, the locking rod 26, the lever 22, the valve 5 and the electro-magnet 28 may all be incased in a box or casing A, shown by dotted line in Fig. 1, so that the engineer will only have access to his valve and to the operating end of the rod 47.

It will be seen that the apparatus herein described automatically takes control of the brakes from the engineer when said brakes have been automatically applied, provided the train is moving at a greater speed than the predetermined number of miles per hour; and that the control of the brakes is automatically restored to the engineer when the speed of the train is reduced below the predetermined point. It will also be understood that the apparatus described does not prevent the engineer from applying the brakes whenever he so desires, nor from applying or releasing the brakes at any time except when the safety apparatus including the magnet 28 has been operated or has become deranged.

I have used the term "train" to indicate a locomotive, car or train.

The mechanism illustrated in Fig. 2 is described and claimed in Patent No. 907686 issued to me on December 22, 1908.

I claim as my invention:

1. The combination, with brake-applying and releasing means, of speed-controlled means for preventing a releasing operation of said means.

2. In air-brake apparatus, in combination, a train line; means for opening the train line to the atmosphere; means for holding said first mentioned means in the inoperative position; and means for locking said first mentioned means in the operative position.

3. In air-brake apparatus, in combination, a train line; means for opening the train line to the atmosphere; means for holding said first mentioned means in the inoperative position; and speed-controlled means for locking said first mentioned means in the operative position.

4. In air-brake apparatus, in combination, a valve arranged to be automatically operated to apply the brakes; and means for locking said valve to prevent a brake-releasing operation.

5. In air-brake apparatus, in combination, a valve arranged to be automatically operated to apply the brakes; and speed-controlled means for locking said valve to prevent a brake-releasing operation.

6. In brake apparatus, in combination, a brake device, and speed-controlled electrical means for locking said device against operation.

7. In brake apparatus, in combination, a brake device; a locking member connected with said device; a circuit including an electro-magnetic device and a circuit-breaker; a locking member controlled by said electro-magnetic device and arranged to coöperate with the first mentioned locking member; and speed-controlled means for operating said circuit-breaker to open and close said circuit.

8. In brake apparatus, in combination, automatic brake-applying means; manually-operable means for restoring said brake-applying means after a brake-applying operation; and means for locking said restoring means against operation until the speed of the vehicle has fallen to a predetermined point.

9. In brake apparatus, in combination, brake-applying and releasing means; a cylinder; a piston in said cylinder; a rod connected to said piston and said brake-applying and releasing means; a second piston in said cylinder; a manually operable rod attached to the second piston; and speed-controlled means for locking the second mentioned rod against operation.

10. In brake apparatus, in combination, brake-applying and releasing means; means for restoring the first mentioned means after a brake-applying operation; and speed-controlled means for locking said restoring means against operation, said restoring means being connected to said brake-applying and releasing means so as to permit said brake-applying and releasing means to go to brake-applying position without hindrance by said restoring means.

CHARLES E. DUFFIE.

Witnesses:
EDITH OLSEN,
E. R. DUFFIE.