No. 646,447. Patented Apr. 3, 1900.

C. E. MORGAN.

AIR BRAKE.

(Application filed Sept. 22, 1897.)

(No Model.)

Fig. 1.

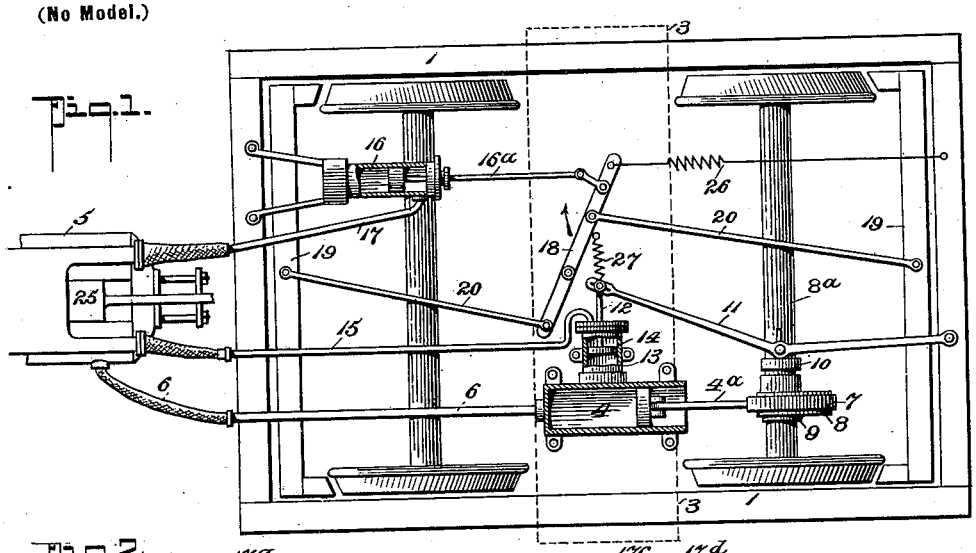


Fig. 2.

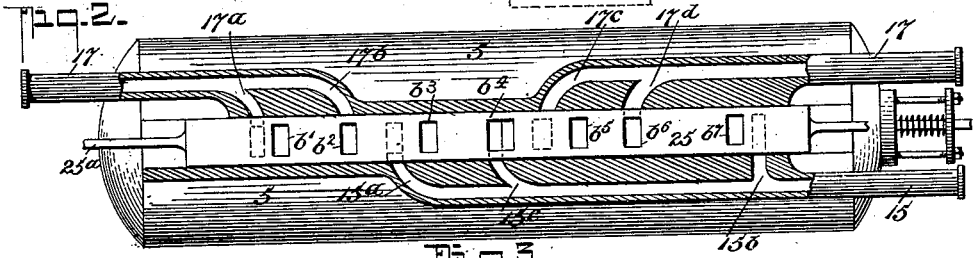


Fig. 3.

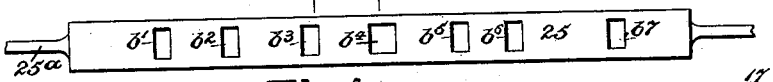


Fig. 4.

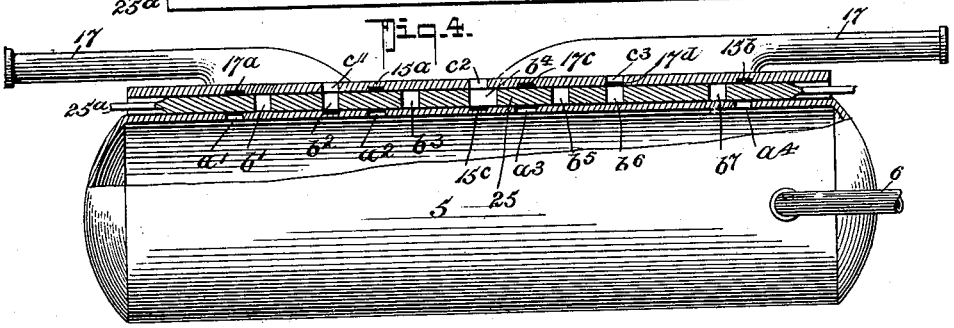


Fig. 5.

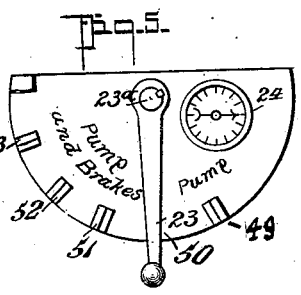
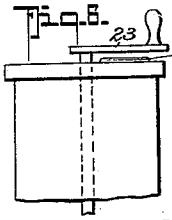


Fig. 6.



WITNESSES

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UNITED STATES PATENT OFFICE.

CHARLES EASTMAN MORGAN, OF PORTLAND, OREGON, ASSIGNOR, BY DIRECT AND MESNE ASSIGNMENTS, OF TWO-THIRDS TO DE WITT C. SOUTHWORTH AND ALBERT W. LAMBERT, OF SAME PLACE.

AIR-BRAKE.

SPECIFICATION forming part of Letters Patent No. 646,447, dated April 3, 1900.

Application filed September 22, 1897. Serial No. 652,587. (No model.)

To all whom it may concern:

Be it known that I, CHARLES EASTMAN MORGAN, a citizen of the United States, residing at Portland, in the county of Multnomah and State of Oregon, have invented certain new and useful Improvements in Air-Brakes; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to an improved air-brake mechanism more especially adapted for use on street-cars, and in its general construction embodies a novel pumping means having regulating devices operated by the motorman adapted to be set in operation from one of the truck-axles to charge up a reservoir carried on the car-body, from which at the will of the motorman air is fed into the brake-cylinder.

In its subordinate features this invention comprehends the peculiar combination and novel arrangement of parts, such as will be first described in detail and then be specifically pointed out in the appended claims, reference being had to the accompanying drawings, in which—

Figure 1 is a plan view of a car-truck frame having my improved air-brake mechanism applied, parts being in section. Fig. 2 is a top plan view, partly in section, of the air-holding reservoir and the top of the valve-chamber. Fig. 3 is a plan view of the slide-valve. Fig. 4 is a longitudinal section of the valve devices for regulating the connection of the pump and the brake-piston with the reservoir. Fig. 5 is a plan view of the motorman's shifting lever devices. Fig. 6 is a detail view illustrating the connection between the valve-stem and the motorman's shifting device.

Referring to the accompanying drawings, 1 indicates the car-truck of the ordinary construction, and 3 indicates a cross bar or beam to which the swinging brake-lever and the pump-cylinder are secured.

The pump-cylinder 4, connected to the beam 3 in any suitable manner, has its compression end connected by means of the pipe 6 with the air-holder 5, suitably mounted on the car and preferably centrally thereof, as it in practice is intended to supply air to the brake devices for the truck at each end of the car.

One end of the cylinder 4 is open to allow for the free play of the piston-rod, which is pivotally joined to a cup-shaped piston in the usual manner.

The outer end of the rod 4^a is provided with a band 7, adapted to encircle an eccentric 8, loosely mounted on the car-axle 8^a and held to abut a stationary collar 9 and a sliding clutch-collar 10 on such axle 8^a. The collar 10, which is held to rotate with the axle, is adapted to be moved into a tight frictional engagement with the eccentric 8, to make it turn with it, by means of the lever 11, fulcrumed at one end on the truck-frame and having its other end secured to the rod 12 of a piston 4, operating in a subcylinder 13, formed integral with the pump-cylinder 4, into which air is let, back of the piston 4, from the holder 5 through the feed-pipe 15.

So far as described the operation is as follows: When it is desired to charge the holder 5, communication is opened up between such holder and the cylinder 13 by suitable valve-shifting mechanism under the control of the motorman, (which will hereinafter be fully explained.) The air-pressure forces the piston 14 inward and in consequence moves the lever 11 to an apply position, which locks the clutch member 10 and the eccentric by frictional contact, causing them to rotate together, thereby setting the pump storing up air to the holder 5. As soon as the air in the cylinder is exhausted the piston 14 and the lever 11 are returned to their normal position by the spring 27, the end of which is connected to the beam 3, as shown. The swinging brake-lever 18 is secured to the beam 3 and has attached thereto at points opposite its fulcrum the brake-beam rods 20 20, which extend in opposite directions and connect with the brake-beams 19 19, as shown. The lever 18 is held to its released or normal position by the rod and spring devices 26 and is moved to its forward or braking position by the air-operated piston and rod 16^a, operating in the cylinder 16, which is charged when it is desired to apply the brakes from the main reservoir or holder 5 by the pipe 17, which opens into the cylinder 16 at the front of the

piston and connects with the valve-chamber of the said holder, as clearly shown in Figs. 3, 4, and 5. By arranging the brake-applying devices as shown and described it is obvious that so soon as a charge of air is opened into the cylinder the lever 18 will be swung in the direction indicated by the arrow and the brakes applied, the force of such application being at the will of the motorman, as will presently appear.

In the practical application of my invention any suitable shifting valve mechanism under control of the motorman may be employed which will serve to feed and exhaust the brake-cylinder, and as it so does cut out the pump-cylinder, and for cutting in the pump-cylinder as the brake-cylinder is cut out.

The holder is provided in its valve-seat with four feed-ports a', a^2, a^3, and a^4, one of which, a^4, is located at the extreme right end. On this valve-seat is arranged a reciprocating slide-valve 25, provided with seven ports b', b^2, and b^3, b^4, b^5, b^6, and b^7. The ports b', b^3, and b^5 are adapted to register with the feed-ports a', a^2, and a^3 to supply compressed air to the brake-cylinders and to the clutch-cylinder in applying the brakes, and the port b^7 is adapted to register with the feed-port a^4 to supply air to the clutch-cylinder for charging the holder when not applying the brake. The cap or top of the valve-chamber has three exhaust-ports c', c^2, and c^3 opening to the atmosphere. The pipe 17 at the left-hand end of the holder is provided with leads 17^a and 17^b for the admission and exhaust of air, respectively, and the right-hand pipe 17 is provided with reversely-arranged leads 17^c and 17^d. The pipe 15 has leads 15^a and 15^b for the admission of air designed to be used, respectively, when the brakes are being applied and when charging the holder simply, and it is also provided with an exhaust-lead 15^c, which is located at a point between the leads 15^a and 15^b. When the port b^7 of the slide-valve registers with the feed for simply charging the cylinder, all the other ports of the holder are closed and air passes through the said ports a^4 and b^7 and enters the pipe 15 through the lead 15^b and operates the clutch. Should the holder be entirely empty, it is then charged by temporarily locking the clutch-lever in its engaging position by any suitable means, and after the holder is charged the clutch-lever is released and can then be operated by compressed air. The slide-valve is in the said position when the motorman's lever is at the notch 49. The pipe 17 at the right-hand end of the holder in Fig. 1 communicates with the brake-cylinder 16, as shown, and the pipe 17 at the left-hand end of the holder communicates with the brake-cylinder at the opposite end of the car. By shifting the lever 23 to the position shown at 50 in Fig. 5 of the drawings the valve is moved to the left and the ports a^4 and b^7 are closed, and the port b^4 establishes communication between the exhaust-lead 15^c of the pipe 15 and the exhaust-port c^2 of the top of the holder, thereby permitting the air to exhaust from the pipe 15 and disengage the clutch. When the valve is in this position, the ports b^2 and b^6 are also in register with the ports c' and c^3 to permit air to exhaust from the pipes 17 through the leads 17^b and 17^d, and the valve is brought to this position after an application of the brakes. A movement of the valve to the notch 52 gradually closes the exhaust-ports c' and c^3 and partly opens the ports a', a^2, and a^3 by reason of the ports b', b^3, and b^5 in the slide-valve communicating therewith. By moving the lever 23 still farther to the left to notches 53 54 the inlet-ports a', a^2, and a^3 will be gradually opened to the fullest extent. When the ports a', a^2, and a^3 are opened, air is admitted to the pipes 17 and 15 through the leads 17^a, 17^c, and 15^a to apply the brakes and operate the clutch to keep up the pressure in the holder. After the brakes have been set as tight as desired to hold them the lever 23 is moved to the right to the notch 51, which adjustment moves the valve 25 to close off the ports a', a^2, and a^3 and again partially opens the exhaust-ports c^2, which adjustment of the valve and the several ports noted releases the clutch, but does not permit the air held within the pipe 17 to escape, as the said movement of the valve 23 to the right at this time also cuts off the leads 17^b and 17^d to the said pipes 17, and thereby keeps the brakes applied, which is advantageous, particularly in descending a grade. Another movement of the lever 23 to the right to the notch 50 will carry the valve 25 back and bring its ports b^2, b^4, and b^6 again into register with ports c', c^2, and c^3, (see Fig. 4,) which permits the air to again exhaust from the pipes 17 and 15, as before explained.

The shank or shaft 23^a of the motorman's lever is provided with an arm 23^b, which is connected with the valve-stem 25^a, and a pressure-gage 24 is mounted upon the table to keep the motorman posted as to the pressure in the air-holder.

While the arrangement of the several parts as illustrated in the drawings discloses the general idea of my invention, it is manifest the details of construction may be modified, and changes, such as arranging the feed-ports of the holder and the corresponding ports of the slide-valve longitudinally of the holder to effect a more gradual opening of the same, may be made without departing from the spirit of my invention.

I claim—

1. An air-brake, comprising a pump provided with a piston and piston-rod, an eccentric loosely mounted on the car-axle, a collar surrounding said eccentric and connected with the piston-rod, an air-reservoir connected with the said pump and provided with openings, a slide-valve mounted upon said air-reservoir and having openings adapted to register with the openings of the reservoir,

means for controlling the movements of the slide-valve, a cap for the slide-valve connected at each end with a brake-cylinder, a piston and piston-rod working in such cylinder, a brake-lever attached to such piston-rod, brakes connected to said lever, an air-cylinder 14 in communication with the valve-cap, a lever 11 connected with the piston of the cylinder 14, and a collar mounted on the car-axle and provided with a roughened face and adapted to be brought into engagement with the eccentric, substantially as described.

2. An air-brake, comprising a pump, a reservoir connected therewith and provided with ports, brake-cylinders, pipes 17, connected with the latter, a clutch-cylinder, having a feed-pipe 15, a slide-valve having ports to register with those of the reservoir, and a valve-cap having exhaust-ports and provided with feed and exhaust leads communicating with the pipes 17 and arranged in pairs, said cap having a pair of feed-leads and an intermediate exhaust-lead communicating with the pipe 15, substantially as described.

3. In an air-brake, the combination of a reservoir having ports a', a^2, a^3 and a^4, a cap provided with central exhaust-ports c', c^2 and c^3, and having at one side feed and exhaust leads arranged in pairs, said cap being provided at the opposite side with feed-leads 15^a, and 15^b, and an intermediate exhaust-lead 15^c, and the slide-valve provided with ports b', b^2, b^3, b^4, b^5, b^6 and b^7, substantially as described.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

CHARLES EASTMAN MORGAN.

Witnesses:

A. T. LEWIS,

W. A. LAIDLAW.