(No Model.)

J. M. MAXWELL.

AIR BRAKE.

No. 405,968. Patented June 25, 1889.

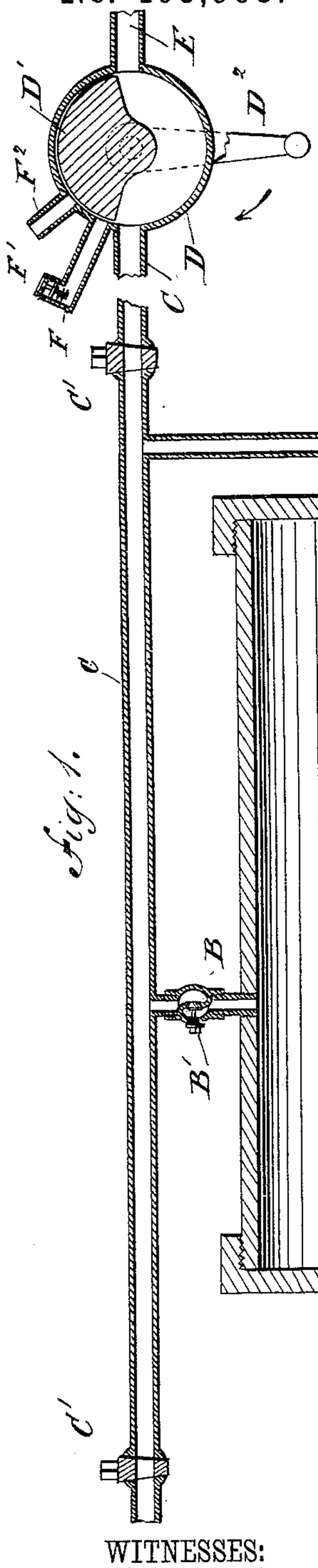

Fig. 1.

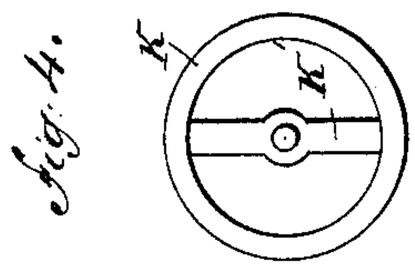

Fig. 4.

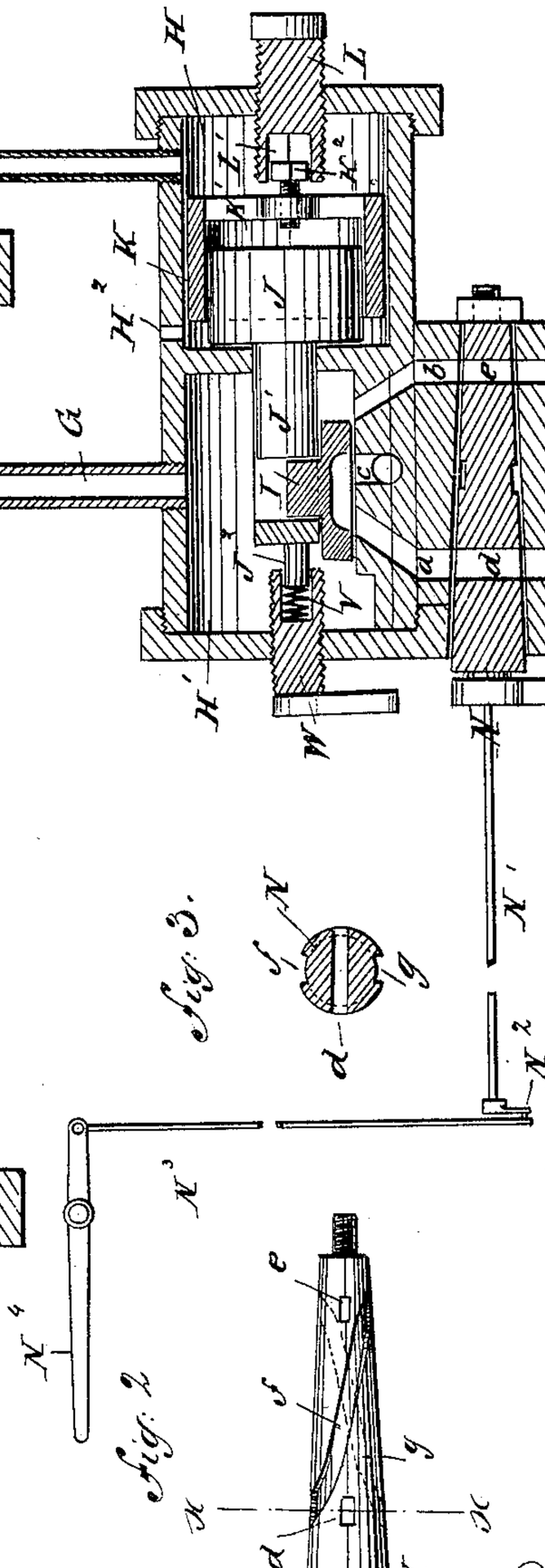

Fig. 3.

Fig. 2.

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AIR-BRAKE.

SPECIFICATION forming part of Letters Patent No. 405,968, dated June 25, 1889.

Application filed April 25, 1888. Serial No. 271,777. (No model.)

To all whom it may concern:

Be it known that I, JAMES M. MAXWELL, of Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented a new and Improved Air-Brake, of which the following is a full, clear, and exact description.

The invention relates to air-brakes such as described in Patent No. 207,126, granted to me August 20, 1878.

The object of the invention is to provide a new and improved air-brake which is simple and durable in construction and very effective in operation.

The invention consists of certain parts and details and combinations of the same, as will be fully described hereinafter, and then pointed out in the claims.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar letters of reference indicate corresponding parts in all the figures.

Figure 1 is a sectional side elevation of the improvement. Fig. 2 is a side elevation of a reversing-valve. Fig. 3 is a cross-section of the same on the line $x\ x$ of Fig. 2, and Fig. 4 is an end elevation of the sleeve.

The auxiliary reservoir A is located under the cars, and is provided with a pipe B, containing a check-valve B′ and connected with the air-supply pipe C, running under the several cars, and having valves C′, for establishing connection between the several cars and shutting off the connection whenever desired. The forward end of the pipe C leads to the engineer's valve D, from which leads the pipe E, connecting with the main reservoir. The plug D′ in the engineer's valve D is operated by the usual handle D^2, and serves to establish a connection between the pipes C and E, or to disconnect the same, so as to admit air to or cut it off from the main supply-pipe C from the main reservoir. The plug D′ is also adapted to establish a connection between the pipes C and F, in the outer end of which pipe F is held a valve F′, and the said plug D′ can also be turned to establish a connection between the pipe C and the pipe F^2, leading to the outside air.

From the auxiliary reservoir A leads a pipe G, which connects with the air-chest H′, formed on one end of the cylinder H. In the chest H′ is held to slide a slide-valve I, connected with the piston-rod J′ of the piston J, mounted to slide in and with a sleeve K, held in the said cylinder H. At the rear end of the sleeve K is secured a transverse bar K′, in which screws a bolt K^2, its head fitting into a correspondingly-shaped aperture L′, formed in the screw L, screwing in the head of the cylinder H. At the inner end of the cylinder H is formed an outlet-opening H^2, so as to permit waste air leaking through the chest H′, the piston J, and sleeve K to escape.

The slide-valve I is adapted to operate over the supply-port a for applying the brakes, over the supply-port b for releasing the brakes, and over the port c for exhausting the air alternately from the ports a and b. The ports a and b lead to the straight ports d and e, formed in a valve N, mounted to turn in an offset directly below the chest H′. The ports a and b can also connect with the spiral grooves f and g, formed in the periphery of the said valve N and serving to reverse the action of the brake, as hereinafter more fully described.

The ports d and e and the channels f and g are adapted to connect at their lower ends with the pipes O and P, having the branch pipes O′ O^2 and P′ P^2, respectively, leading into the auxiliary brake-cylinders Q and Q′, respectively. In the pipes O^2 and P^2 are held the inwardly-opening valves O^3 and P^3, respectively. The cylinder Q is somewhat larger in diameter than the cylinder Q′, and the said cylinders contain the pistons R and R′, respectively, connected with each other by a piston-rod R^2, which carries an arm S, connected with the brake-rod T, and the said piston-rod R^2 also operates on the lever S′, connected with the brake-rod T′, extending in an opposite direction from the brake-rod T to the other end of the car. The cylinder Q and its piston R serve to apply the brakes, and the cylinder Q′ and its piston R′ are used for releasing the brakes.

From the cylinder H leads a pipe U, which connects with the main supply-pipe C.

On the outer end of the piston-rod J′ is formed a pin J^2, against which presses a spring V, held in a recess in a screw W, screwing in the head of the chest H′.

The operation is as follows: The brake, as shown in the drawings, is in a released position, and when the operator now desires to apply the brakes he turns the handle D^2 of the plug D′ until the latter disconnects the pipes C and E and establishes a connection between the pipes C and F, so that air from the cylinder H can pass through the pipe U into the pipe C, and from the latter to the pipe F and out through the pop-valve F′. The air-pressure in the cylinder H is thus somewhat reduced, so that the air in the auxiliary reservoir A forces the piston-rod J′ and its piston J outward until it strikes against the screw K^2 of the sleeve K, when it will be arrested, owing to the fact that the pressure against the sleeve K is now greater than the pressure against the piston. When the piston has moved to the position just described, the valve I has been moved so that the port *b* connects with the port *c*, and the port *a* is partially uncovered and in communication with the chest H′. The air from the auxiliary reservoir A and the chest H′ can now pass through the ports *a* and *b* into the pipe O, and from the latter through the branch pipe O^2 and the valve O^3 in the end of the cylinder Q. The pressure of the air thus admitted into the cylinder causes the piston-rod R to move outward, whereby the brake-rods T and T′ are moved inward toward each other and the brakes are applied slightly. When the engineer desires to apply the brakes more fully, he turns the handle D^2 until the plug D′ establishes a connection between the pipes C and F^2, so that still more air can escape from the cylinder H through the pipe U and the said pipes C and F^2. The pressure in the cylinder H is thus so reduced that the pressure in the auxiliary reservoir A forces the piston-rod J′, the piston J, and the sleeve K until the screw in the sleeve strikes against the screw in the end of the said cylinder, when the valve I will be moved sufficiently to wholly uncover the port *a*. The air then passing through the ports *a* and *d* and into the pipe O passes from the latter through the pipe O′ and the pipe O^2 into the cylinder Q and forces the piston R to the end of its stroke, whereby the other piston R′ forces the air from the cylinder Q′ to exhaust through the pipe P′ into the pipe P, and from the latter through the ports *e* and *b* into the exhaust-port *c*. The valve P^3 closes at the inward motion of the piston R′, whereby an air-cushion is formed at the end of the cylinder Q. It will thus be seen that the sleeve K serves as a means for arresting the piston J, and thereby preventing the valve I from being moved so as to wholly uncover the port *a* when it is desired to apply the brake lightly.

It is understood that when the engineer changes the position of the plug D′, so as to establish connection between the pipes F and F^2, the check-valve B′ in the short pipe B seats itself and prevents an escape of air from the auxiliary cylinder A to the pipe C. When the engineer desires to release the brakes, he throws the arm D^2 into the position shown in Fig. 1, so as to establish a connection between a pipe C and the pipe E leading to the main reservoir. The air can then pass through the pipe U into the cylinder H and force the piston J and sleeve K inward, so that the slide-valve I again assumes the position shown in Fig. 1, whereby the air under full pressure from the main reservoir passes through the auxiliary reservoir A and the pipe G into the chest H′, and from the latter through the ports *b* and *e* to the pipe P, and through the pipe P^2 and the valve P^3 to the end of the cylinder Q′. The pressure of the air acting against the piston R′ forces the same outward, whereby the brakes are released. As soon as the piston R′ has moved a short distance in the cylinder Q′ the other pipe P′ also opens into the said cylinder Q′. The air in the cylinder Q is expelled through the pipe O′, the pipe O, and the ports *d* and *a* into the exhaust-port *c*. The valve O^3 closes at this inward movement of the piston R, so that an air-cushion is formed as soon as the piston R has closed the opening of the pipe O′.

The spring V is for the purpose of applying the rear brakes in a train first. This is done by increasing the tension of the said spring V on the rear cars of the train by screwing the screw W inward, so that the piston J and its piston-rod J′ move sooner than the same devices on the other cars. In order to use direct air, it is necessary to give the valve N a quarter-turn, so as to disconnect the ports *d* and *e* from the ports *a* and *b* and connect the spiral grooves *f* and *g* with the ports *a* and *b* and with the pipes O and P. It will be seen that the port *b* is connected by the groove *g* with the pipe O, and the port *a* is connected by the groove *f* with the pipe P. As the auxiliary reservoir A is charged with air and the pipes C and U and the cylinder H are without air, the piston-rod J′ of the piston J will be driven outward, so that the slide-valve I uncovers the port *a* and the air can pass to the cylinder Q′ in order to release the brakes. In order to apply the brakes, the pipe C is charged so that the piston J is moved inward, whereby the slide-valve I uncovers the port *b* and the air can now pass through the groove *g* to the pipe G, and from the latter to the cylinder Q, as above described, thus applying the brakes. Thus it will be understood that by changing the position of the valve N direct air can be utilized for applying and releasing the brakes.

The valve N may be operated, as above described, from the top of the car by any suitable device, preferably, however, by the means shown in Fig. 1, in which the valve N is connected with the rod N′, leading to one end of the car, and provided at its outer end with a crank-arm N^2, pivotally connected by the link N^3 with the lever N^4, mounted on top of the car. With this arrangement the operator can

apply the brakes independently of the engineer's valve.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In an air-brake, the combination, with a cylinder connected with the main supply-pipe, of a sleeve held in the said cylinder, a screw for regulating the throw of the said sleeve, and a piston connected with a slide-valve for operating the brakes, the said piston being held to slide in the said sleeve, substantially as shown and described.

2. In an air-brake, a cylinder connected with the main air-pipe, an air-chest held on the said cylinder, and an auxiliary reservoir connected by a pipe having a check-valve with the main air-pipe, and also with the said air-chest, in combination with a piston held to slide in the said cylinder, a slide-valve operating over ports in the said chest and actuated by the piston-rod of the said piston, two cylinders connected with the inlet-ports, and pistons held in the said cylinders and connected with each other and operating the brakes, and a reversing-valve for changing the connection between the air-chest and the said two cylinders, substantially as shown and described.

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Witnesses:
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