

R. E. MARSHALL.  
AIR BRAKE APPARATUS.

No. 560,730.

Patented May 26, 1896.

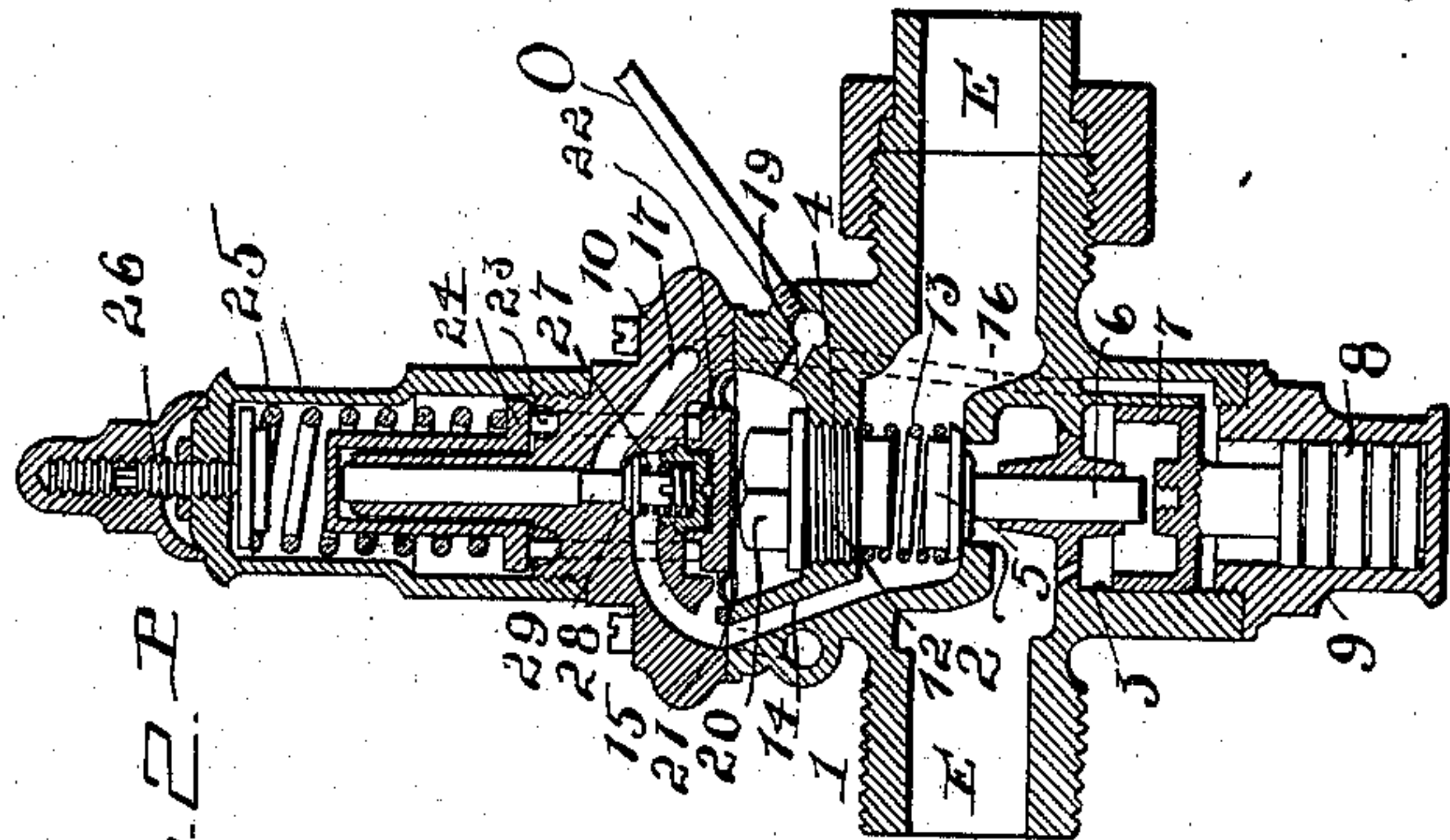


Fig. 2. P.

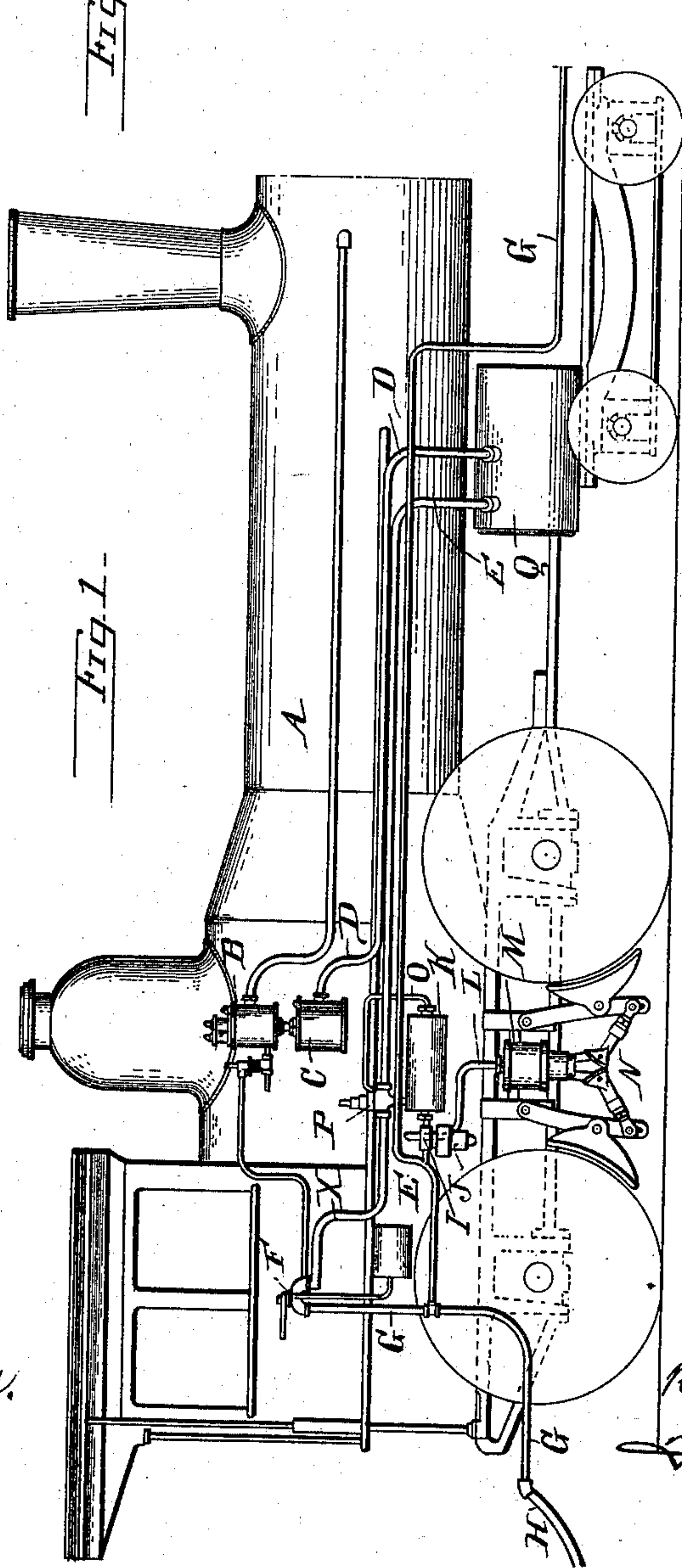


Fig. 1.

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# UNITED STATES PATENT OFFICE.

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## AIR-BRAKE APPARATUS.

SPECIFICATION forming part of Letters Patent No. 560,730, dated May 26, 1896.

Application filed September 2, 1893. Serial No. 484,655. (No model.)

*To all whom it may concern:*

Be it known that I, ROBERT E. MARSHALL, of Wilmington, New Castle county, Delaware, have invented a certain new and useful Improvement in Air-Brake Apparatus, of which the following is a true and exact description, reference being had to the accompanying drawings, which form a part hereof.

My invention relates to an automatic-pressure air-brake system of railway-trains, and has for its object to automatically cut off the supply of air to the train-pipe when the pressure in the system fed by said train-pipe has reached a proper amount, and to do this without interfering with the action of the air-pump or the accumulation of pressure in the main reservoir. In my former patent, No. 456,199, dated July 21, 1891, I have described a device for so cutting off the supply of air to the train-pipe in which the pressure in said pipe is utilized to operate the cut-off valve; but I have found, in long trains especially, that the pressure in the train-pipe is not a safe and reliable instrumentality for this purpose, as it will frequently act to cut off and check the flow of air before the auxiliary cylinders have received their full charge.

My present invention, broadly speaking, consists in so combining a pressure-regulating valve with the train-pipe and with an auxiliary cylinder that the pressure in said cylinder (preferably that on the engine) will operate the valve to close or open the train-pipe, and by this device I insure at the same time the free passage of air to the train-pipe until the auxiliary cylinders are properly charged and the immediate closing of the train-pipe when the said cylinders are so charged.

Reference being now had to the drawings, Figure 1 is a side elevation of a locomotive equipped with my device; and Fig. 2, a sectional elevation of a pressure-regulating valve suitable for use in my appliance, but not in itself my invention.

A is the locomotive; B, the steam-cylinder, and C the air-cylinder of the air-pump; D, the conduit leading from the air-pump to the main reservoir Q; E, the train-pipe, or that part of it leading from reservoir Q to the brake-valve F, G being the continuation of said train-pipe, which is coupled with sections on the tender or cars by a hose H.

I is a branch of the train-pipe leading to the auxiliary cylinder K on the engine. L is a pipe leading to the brake-cylinder M, N indicating the brake mechanism. As shown, the cylinder K is coupled with pipe I and with cylinder M by a triple valve, (indicated at J.)

O is a pipe leading from the auxiliary cylinder K to the pressure-regulating valve P, which is situated in train-pipe E, as shown, and which may be of any construction, that shown in Fig. 2 being only one of many suitable forms.

Referring now to Fig. 1, the valve P is made up of a valve-casing 1, in which is formed a seat 2 and below it a cylinder 3, while above said seat is a chamber 20, separated from the air-passage by means of a plug 12, which screws into a threaded ring 4 in casing 1 and serves to adjust the tension of a spring 13, which presses against a valve 5 and serves to hold it to its seat 2. The valve 5 has a downwardly-extending stem 6, which extends into cylinder 3, and in said cylinder is a piston 7, having a weighted stem 8 extending into a cap-piece 9, screwing onto the bottom of casing 1, as shown.

10 is a cap secured to the top of the casing and serving, among other purposes, to clamp a diaphragm 21 in place at the top of chamber 20.

22 is a plate resting on the diaphragm and supporting a valve 28 by means of a spring 27. The plate 22 and the diaphragm are normally pressed down by a spring 25, having an adjusting device 26 and pressing against a casting 24, which in turn presses against rods 23, which rest against plate 22.

14 is a passage formed in casing 1 and leading from the side of valve 5, from which the air in pipe E moves.

15 is a continuation of said passage formed in cap 10 and connecting through valve-seat 29 with a passage 17, which in turn has a continuation in a passage 16, formed in casing 1 and leading to cylinder 3 below piston 7.

19 is a passage leading to chamber 20 and connected, as shown, with the pipe O, which leads to it from the auxiliary reservoir. Obviously in this arrangement the valve 28 will be depressed by the action of spring 25, and the passage from the train-pipe E through ports 14 and 15, valve-seat 29, and ports 17



and 16 to cylinder 3 will remain open until the pressure in the auxiliary reservoir, acting through conduit O, port 19, and chamber 20 on diaphragm 21, exceeds the pressure of the spring, when valve 28 will move up and close the passage. Obviously, also, as long the passage remains open the air admitted to the underside of piston 7 will push it upward and cause it to press against valve-stem 6 of valve 5 and thus to open and hold open said valve, which will at once seat itself and close the conduit E when the piston 7 falls, as it will when the supply of air is cut off from it. The tensions of springs and weights of parts are of course to be nicely adjusted, but by this device no difficulty is met with in closing the train-pipe just when the auxiliary reservoirs have been properly charged.

Of course the auxiliary reservoir K, instead of being that which connects with the driver-brakes, may be any other or may be one having no other function than to operate on valve P.

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

1. In a railway automatic-pressure air-brake system having main and auxiliary reservoirs, the combination with the train-pipe

or conduit leading from the main to the auxiliary reservoirs of a pressure-regulating valve situated in the train-pipe and a conduit separate and apart from the train-pipe connecting an auxiliary reservoir with said valve as described and so as to close said valve when the pressure in the auxiliary reservoir is in excess of a predetermined limit, and to open it when the pressure is below said limit.

2. In a railway automatic-pressure air-brake system having main and auxiliary reservoirs, the combination with the train-pipe or conduit leading from the main to the auxiliary reservoirs, of an engineer's brake-valve situated in the train-pipe between said reservoirs, a pressure-regulating valve situated in the train-pipe between the engineer's brake-valve and the main reservoir and a conduit separate and apart from the train-pipe connecting the auxiliary reservoir with said valve, as described, and so as to close said valve when the pressure in the auxiliary reservoir is in excess of a predetermined limit and to open it when the pressure is below said limit.

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