(No Model.)

R. E. MARSHALL.

AIR BRAKE.

No. 456,199. Patented July 21, 1891.

FIG. 1.

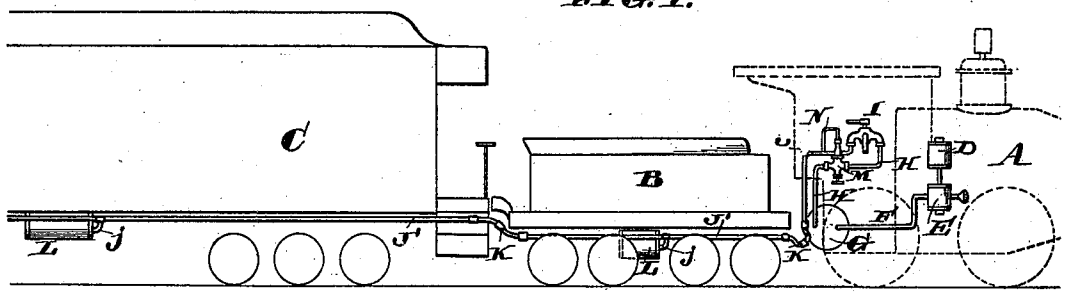


FIG. 2.

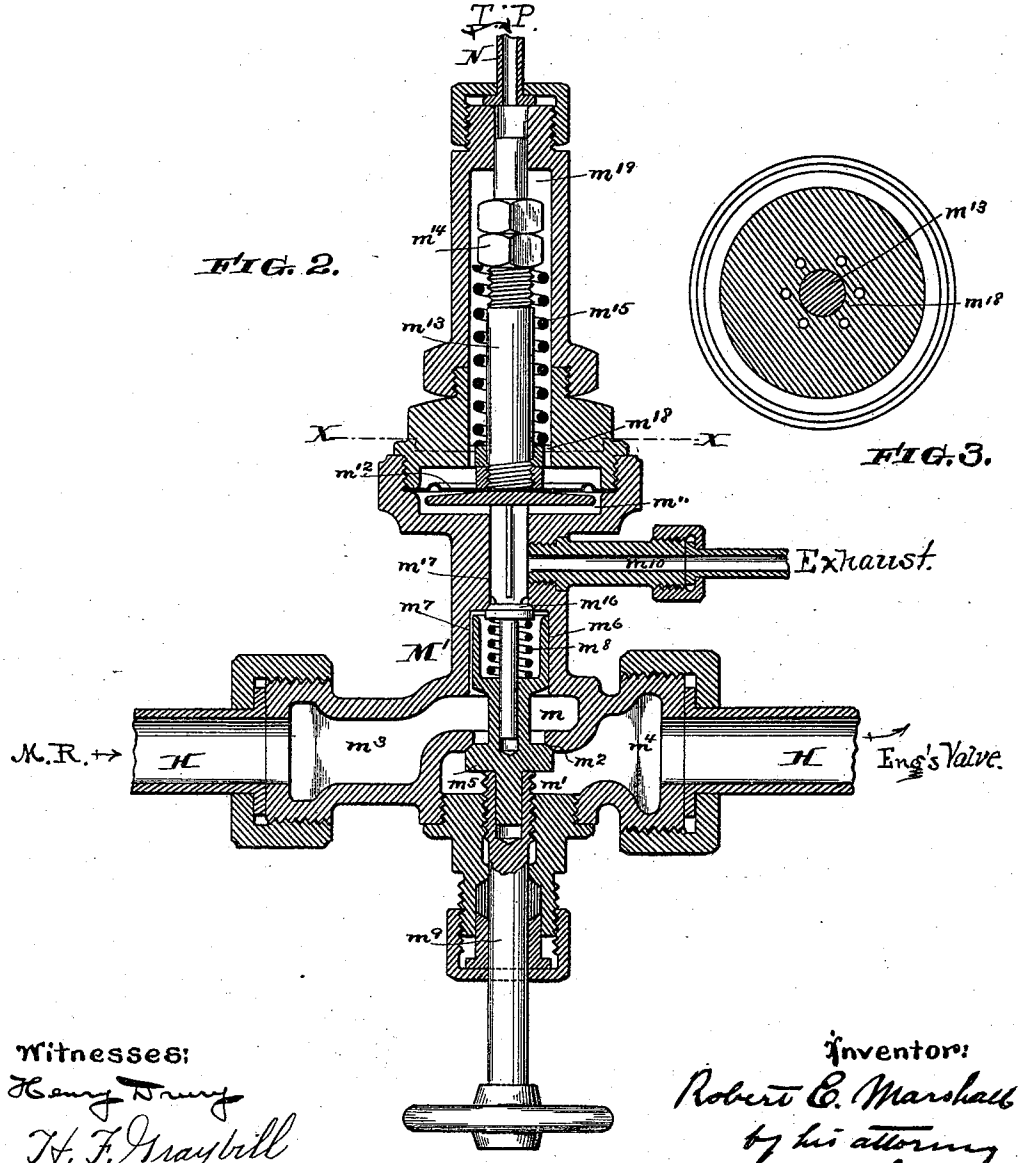


FIG. 3.

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ROBERT E. MARSHALL, OF WILMINGTON, DELAWARE.

AIR-BRAKE.

SPECIFICATION forming part of Letters Patent No. 456,199, dated July 21, 1891.

Application filed May 1, 1890. Serial No. 350,133. (No model.)

To all whom it may concern:

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

My invention relates to the automatic pressure air-brake system or apparatus of railway-trains, and has for its object to so construct the said apparatus that the supply of air from the main reservoir to the train-pipe will be automatically cut off when the pressure in the train-pipe has reached a determined height without interfering with the air-pump or with the accumulation of a higher pressure in the main reservoir. This I accomplish by placing an automatically-acting pressure-regulator in some part of the conduit or pipe system leading from the main reservoir to the auxiliary cylinder or cylinders of the train.

Reference is now had to the drawings, which illustrate my invention, and in which—

Figure 1 is a side elevation of part of a railway-train equipped with my improved device; Fig. 2, a central sectional elevation of a pressure-regulator well adapted for use in my improved apparatus, and Fig. 3 a cross-section through the regulator on the line X X of Fig. 2.

A is the locomotive; B, the tender; C, a railway-car. D is the steam-pump; E, the air-pump; F, a conduit leading from the air-pump to the main reservoir G; H, a pipe leading from the main reservoir to the engineer's brake-valve I; J, a pipe leading from the brake-valve and constituting part of the train-pipe.

J′ J′ are sections of the train-pipe attached, respectively, to the tender and the car.

K K are the couplings of the train-pipe.

j j are branches leading from the train-pipe J′ to the auxiliary reservoir L L.

In all of the above-noted features my apparatus is of the usual kind and is used with the well-known supplementary devices, brake-cylinders, &c., which, as they may be of any usual construction, I have not thought it necessary to show in the drawings.

M is an automatic pressure-regulator, which I place in some part of the conduit leading from the main reservoir to the auxiliary reservoir, preferably, as shown, in the pipe connecting the engineer's brake-valve with the main reservoir.

N is a pipe connecting the pressure-regulator with some part of the pipe on the delivery side of the pressure-regulator.

Referring now to the construction of the pressure-regulator shown in Fig. 2, it consists of a casing M′, having formed in it the chambers m and m', connected by a passage in which is formed a valve-seat m^2. A port or passage m^3 connects the chamber m with the pipe leading from the main reservoir, and a port or passage m^4 connects the chamber m' with the pipe leading to the train-pipe, or, preferably, to the engineer's brake-valve. m^5 is a valve arranged to close the passage m^2. This valve, as shown, is a balanced valve, its upper part moving in a bearing m^6, formed above the chamber m. A small port m^7 should be left to permit air to escape from the chamber m to the top of the balanced valve. m^8 is a spring situated between the top of the balanced valve and a valve m^{16}, which is arranged to close a passage m^{17}, which leads to an escape-pipe m^{10}, and also, as shown, to the lower part of a chamber m^{11}, formed above it. In this chamber is a diaphragm m^{12}, and secured to this diaphragm is a rod m^{13}, which moves in a chamber m^{19} and upon which is an adjusting-nut m^{14}. A spring m^{15} is arranged, as shown, to press the rod m^{13} up and normally keep the diaphragm in its uppermost position. The lower part of the spring rests on a shoulder m^{18}, formed at the bottom of the chamber m^{19}. m^9 is a screw-rod, by which the valve m^5 can be held to its seat or allowed a certain amount of movement from its seat.

The operation of the device is as follows: The rod m^9 is screwed down, so as to permit the valve m^5 to leave its seat and open the passage between the chambers m and m'. The spring m^8 pressing it down as far as it can go, the air from the main reservoir then passes through the regulator unchecked until the air in the auxiliary reservoir and train-pipe has reached the determined pressure, at which, passing through the pipe N into the chamber m^{19} and thence to the top of the dia-

phragm m^{12}, it will overcome the power of the spring m^{15} and press the diaphragm down. The downward movement of the diaphragm, which rests upon a plate connected with the valve m^{16}, presses this valve also down, opening the connection between the upper side of the balanced valve m^5 and the escape-pipe m^{10}. The pressure on the upper side of the balanced valve is thus removed, and it of course immediately rises, closing the passage m^2 and cutting off any further supply of air from the main reservoir to the train-pipe. The steam-pump, however, continues to operate and pump additional air into the main reservoir, in which, of course, the pressure soon greatly exceeds that in the train-pipe. As soon as the pressure in the train-pipe is released by the act of setting the brake the pressure on the upper side of the diaphragm m^{12} will fall below that necessary to compress the spring m^{15}, which spring will therefore draw up the diaphragm. The spring m^8 then moves the valve m^{16} up, closing the passage m^{17} and permitting the air passing around through the small port m^7 to accumulate above the top of the balanced valve, which will of course move downward and open the passage m^2. This passage being opened, the high-pressure air accumulated in the main reservoir will rush with great quickness to refill the train-pipe and the auxiliary reservoir.

Any of the many well-known forms of pressure-regulators can be used in connection with my improved apparatus. The one illustrated in the drawings is well adapted for the purpose, and is now in quite general use to regulate the operation of the steam-pump used in connection with the air-pump of air-brake apparatus. The said pressure-regulator in itself forms no part of my invention.

It must be understood that by the "automatic pressure air-brake system" I refer to the system of which the Westinghouse automatic pressure air-brake is the best-known example, and my invention has no relation to the systems known as the "vacuum system" and the "direct-pressure system."

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

1. In a railway automatic pressure air-brake system having main and auxiliary reservoirs, as described, the combination, with the pipe or conduit leading from the main reservoir on the engine to the auxiliary reservoir or reservoirs, of a pressure-regulator arranged to automatically cut off the supply of air to the train-pipe when it has reached a certain pressure therein, substantially as and for the purpose specified.

2. In a railway automatic pressure air-brake system having main and auxiliary reservoirs, as described, the combination, with the pipe leading from the main reservoir to the engineer's brake-valve, of a pressure-regulator arranged to automatically cut off the supply of air to the train-pipe when it has reached a certain pressure therein, substantially as and for the purpose specified.

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