(No Model.) 2 Sheets—Sheet 1.

H. M. LOFTON.

AUTOMATIC AIR BRAKE VALVE.

No. 514,153. Patented Feb. 6, 1894.

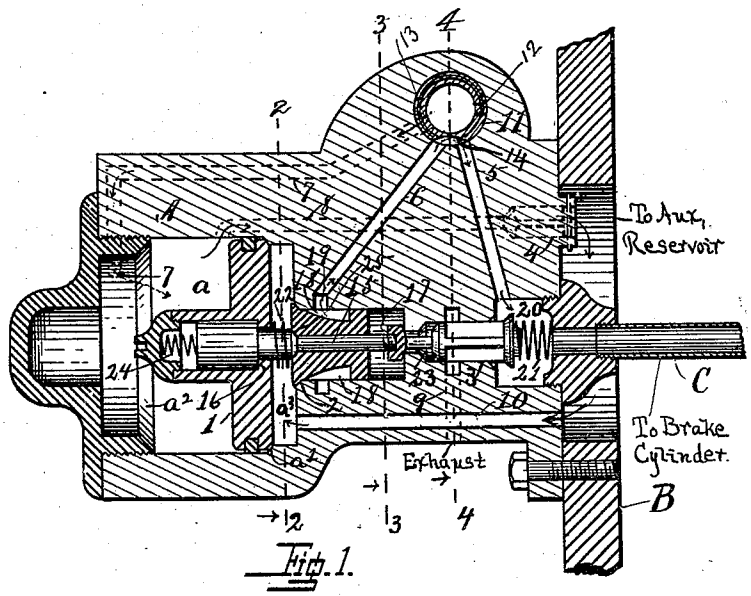

Fig. 1.

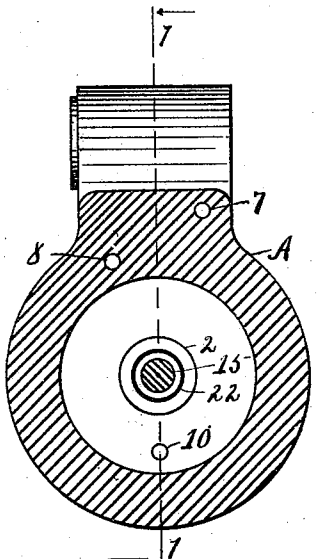

Fig. 2.

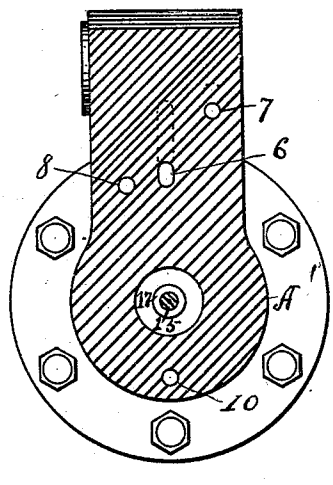

Fig. 3.

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(No Model.) 2 Sheets—Sheet 2.

H. M. LOFTON.

AUTOMATIC AIR BRAKE VALVE.

No. 514,153. Patented Feb. 6, 1894.

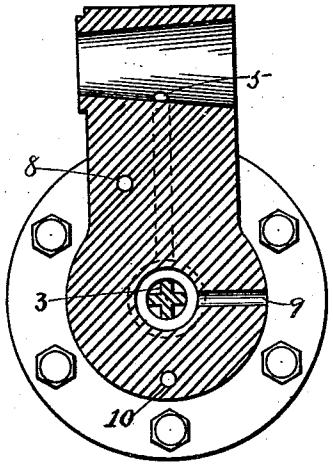

Fig. 4.

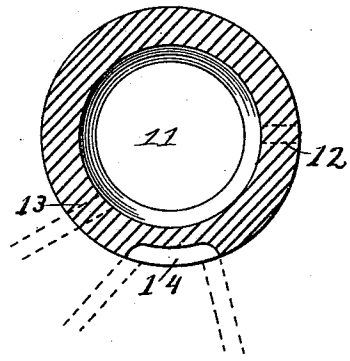

Fig. 7.

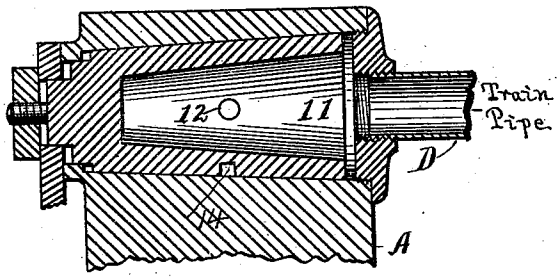

Fig. 5.

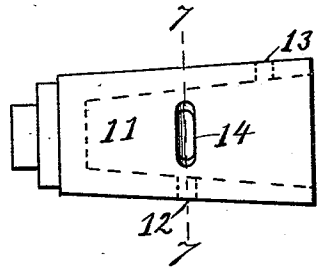

Fig. 6.

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UNITED STATES PATENT OFFICE.

HERBERT M. LOFTON, OF SAVANNAH, GEORGIA.

AUTOMATIC AIR-BRAKE VALVE.

SPECIFICATION forming part of Letters Patent No. 514,153, dated February 6, 1894.

Application filed August 29, 1891. Serial No. 404,120. (No model.)

To all whom it may concern:

Be it known that I, HERBERT M. LOFTON, of Savannah, in the county of Chatham and State of Georgia, have invented certain new and useful Improvements in Automatic Air-Brake Valves; 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, reference being had to the accompanying drawings, and to letters and figures of reference marked thereon, which form a part of this specification.

Figure 1 is a central longitudinal section on line 1—1 Fig. 2, showing in full and dotted lines the relative positions of the various parts and the interior arrangement of the parts. Fig. 2 is a vertical cross-section on line 2—2 of Fig. 1. Fig. 3 is a vertical cross section of Fig. 1 on the line 3—3 therein. Fig. 4 is a vertical cross section on the line 4—4 Fig. 1. Fig. 5 is an enlarged section through the valve seat on the same plane as Fig. 4, but showing a plug-valve and its pipe connection. Fig. 6 is a bottom view of the plug valve shown in Fig. 5. Fig. 7 is a section on line 7, Fig. 6.

In these several figures the parts are uniformly marked by reference characters.

The principal part of the device is the casing A, which is shown as being fastened to an auxiliary air-reservoir B, a portion of which is shown, and having a pipe C connected with an air brake cylinder.

Seats for the valves 1, 2, 3, and 4 are formed in the casing A as are also the passages 5, 6, 7, 8, 9, and 10. The relative positions of these several passages are shown in the sections, Figs. 1, 2, 3, and 4.

In an upward projection of the casing is a seat for the plug valve 11. The plug valve 11 is hollow as shown in Fig. 5, and has through its shell the port 13, adapted to be brought into coincidence with the passage 7 by a proper turning of the said plug-valve, the port 12 adapted to coincide with the passage 5 when the said plug-valve 11 is properly turned, and the pocket port 14 adapted to join the passages 5 and 6 when the port 13 and the passage 7 coincide. The air enters the plug-valve 11 through the train-pipe D and is distributed by that valve to the several connected ports and passages which will now be described in detail as well as the functions of the several valves.

The piston valve 1 moves within a cylinder *a*, annular projections thereinto forming seats *a'* and a^2. The passage 7 connects the cylinder with the plug-valve seat, as seen in Fig. 1, a second passage 8 connecting said cylinder with the auxiliary reservoir, said passage being governed to prevent air flowing through it toward the cylinder by a check-valve 4 and having its embouchure into said chamber about midway between the seats *a'* and a^2. A passage 10 connects the auxiliary reservoir B with the end of the cylinder 1 opposite the opening thereinto of the passage 7. Also connected with this end of the cylinder is a smaller cylindrical opening and an automatic valve 2 operates to close same against communication with said cylinder 1, grooves 18 being cut into the circumference of said automatic valve 2 to admit air when said valve is withdrawn and being made tapering wider and deeper so that the admission opening will increase in proportion to the withdrawal of the said valve. A passage 6 connects this cylinder with the seat of the plug-valve as seen in Fig. 1. The automatic valve 2, is perforated longitudinally. The plunger 15 is set and moves in the piston valve 1 being by the spring 24, pressed outwardly therein, the shoulder 16 limiting its motion obedient to said spring, and said plunger 15 projects through the perforation just mentioned in the automatic valve 2 a sufficient distance to contact, when the said piston valve is in the position shown in Fig. 1, with the pilot 23 of the exhaust valve 3, the outer end of the head 17 on said plunger 15 coming into contact with the said pilot. The exhaust valve 3 is interposed in the passage 9 leading to the open air from the chamber 20 which in turn is connected with the brake cylinder by a pipe C, and with the plug-valve by the passage 5.

To work the brake automatically, the plug-valve 11 is so turned that the port 13 in the same will coincide with the passage 7 in the casing, which will cause the air from the train pipe to enter the chamber *a* and force the piston valve 1 against the seat *a'*, as shown in Fig. 1. Piston valve 1 is also a piston, filling the chamber or cylinder *a* and being provided with a piston ring or other approved

packing for the purpose of preventing the passage of any air between its periphery and the interior cylindrical surface in which it works. After the piston valve 1 shall have passed the opening into the cylinder of the passage 8, the air passes through that passage and by check-valve 4 into the reservoir B and out of the reservoir through the passage 10 into the chamber a^3 to the side of the piston-valve 1 opposite the chamber a, thus causing the tension to be equal on both sides of the said piston-valve 1.

The operation just above described is the operation of filling the auxiliary reservoir that is in the immediate vicinity of and supplies air to the brake-cylinder. The tension of air being nearly the same on both sides of the piston-valve 1 the valve will remain seated on account of the greater effective area of the side toward the chamber a. When, however, the brakes are to be applied the pressure in the train-pipe is reduced by means of the engineer's valve. On the reduction of said pressure in the train-pipe the valve 4 will be closed by the excess of pressure in the auxiliary reservoir B and said excess of pressure will also force back the piston valve 1 and seat it on the seat a^2. The plunger 15, having shoulder 16 and head 17 pulls back the automatic valve 2 by contact therewith of said head and allows the air coming into the chamber of the piston valve 1, on the side of the valve toward the seat a' to pass through grooves 18 in automatic valve 2, into the annular groove 19 whence it passes through the passage 6, pocket port 14 in the plug valve 11, which was so turned in bringing the port 13 and passage 7 into coincidence, as to also bring into coincidence the pocket port 14 and the passages 5 and 6, and the passage 5 into the chamber 20, which has connection by the pipe C to the braking cylinder. The cylindrical part of the automatic valve 2 is made to fit the opening in which it slides, by reason of which there is no opening for the air except through the tapering grooves 18; therefore as the automatic valve 2 is being pulled out the area of opening through these openings will be enlarged.

It is obvious that the transfer of air from the auxiliary reservoir to the braking cylinder will continue as above described until equilibrium of air pressure is established in said auxiliary reservoir and braking-cylinder.

In order to keep the piston valve seated on the seat a^2 the chamber a is reduced in size as shown in Fig. 1 by an annular projection on the cap closing the end of the casing, said projection being screwed into the end of the casing, which reduces the exposed area of that side of the piston valve 1 as soon as it is seated on the said seat a^2, said annular projection having formed on its inner end, said seat a^2.

The plunger 15 is set and moves in the piston-valve 1, being spring-pressed protrusively and the shoulder 16 limiting its motion in that direction, projecting through the automatic valve 2 a sufficient distance to contact, when the said piston valve 1 is in the position shown in Fig. 1 by the head 17 therein with the end of the pilot 23 of the valve 3.

It will be seen by reference to Fig. 1, that, when the valves are in the position there shown, the plunger 15 forces and holds the exhaust valve 3 open and that, when the piston is moved back, the exhaust valve 2 will have been raised from its seat. The opening of the exhaust valve 3 is connected by a passage 9 with the open air and it is by means of this valve and passage that the air is discharged from the brake cylinder. It is therefore essential that this valve should be closed before communication is established, as above described, between the auxiliary reservoir and the brake-cylinder. Communication is kept open between the reservoir and cylinder by the difference in pressure on the two sides of the piston-valve 1. When the brakes are to be released the pressure in the train-pipe must be increased until the piston valve 1 is forced to the position shown in Fig. 1. Before said piston valve 1 shall have reached said position however the automatic-valve 2 will have seated inasmuch as it is by the spring 22 pressed along the plunger 15 to near or against the head 17 thereon, said plunger moving in said valve 2 as soon as valve 2 is seated and contacting by its head 17 with the pilot 23 of the exhaust valve 3, thus opening the same, and allowing the air to discharge from the brake-cylinder. The spring 24 obviates the necessity for an exact or arbitrary adjustment of the seating surfaces of the valves 1 and 2 and furnishes a pressure of the shoulder 25 against the automatic valve 2, that will prevent leakage by the valve around the piston.

By turning the plug valve 10 so that the port 12 in said valve will coincide with the passage 5 a direct communication will be established between the train pipe and the air brake cylinder and the brakes can be operated by direct pressure from the main reservoir, the brakes being released by reducing the air pressure in the train-pipe by the use of the engineer's valve.

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

A casing provided with a cylindrical chamber therein, passages from the train-pipe to said chamber and to an auxiliary reservoir, from said reservoir to the brake-cylinder, and from said brake cylinder to the open air, a piston sliding in said chamber and operating valves governing the flow of air from the train-pipe to the auxiliary reservoir, from the auxiliary reservoir to the brake-cylinder, and from the brake-cylinder to the open air, a plug-valve hollow and connected interiorly with the train-pipe interposed in the passage from the train-pipe to the aforesaid chamber and hav-

ing a radial opening registering therewith, and interposed also in the passage connecting the auxiliary reservoir and the brake-cylinder, and having a pocket-port connecting the otherwise separated parts of said passage, and a radial port adapted to be brought into coincidence with the brake-cylinder half of said passage on the turning of the plug valve to a position closing the other passages, substantially as and for the purpose specified.

In testimony whereof I hereunto affix my signature in presence of two witnesses.

HERBERT M. LOFTON.

Witnesses:
A. J. DIERKS,
W. H. LOFTIN.