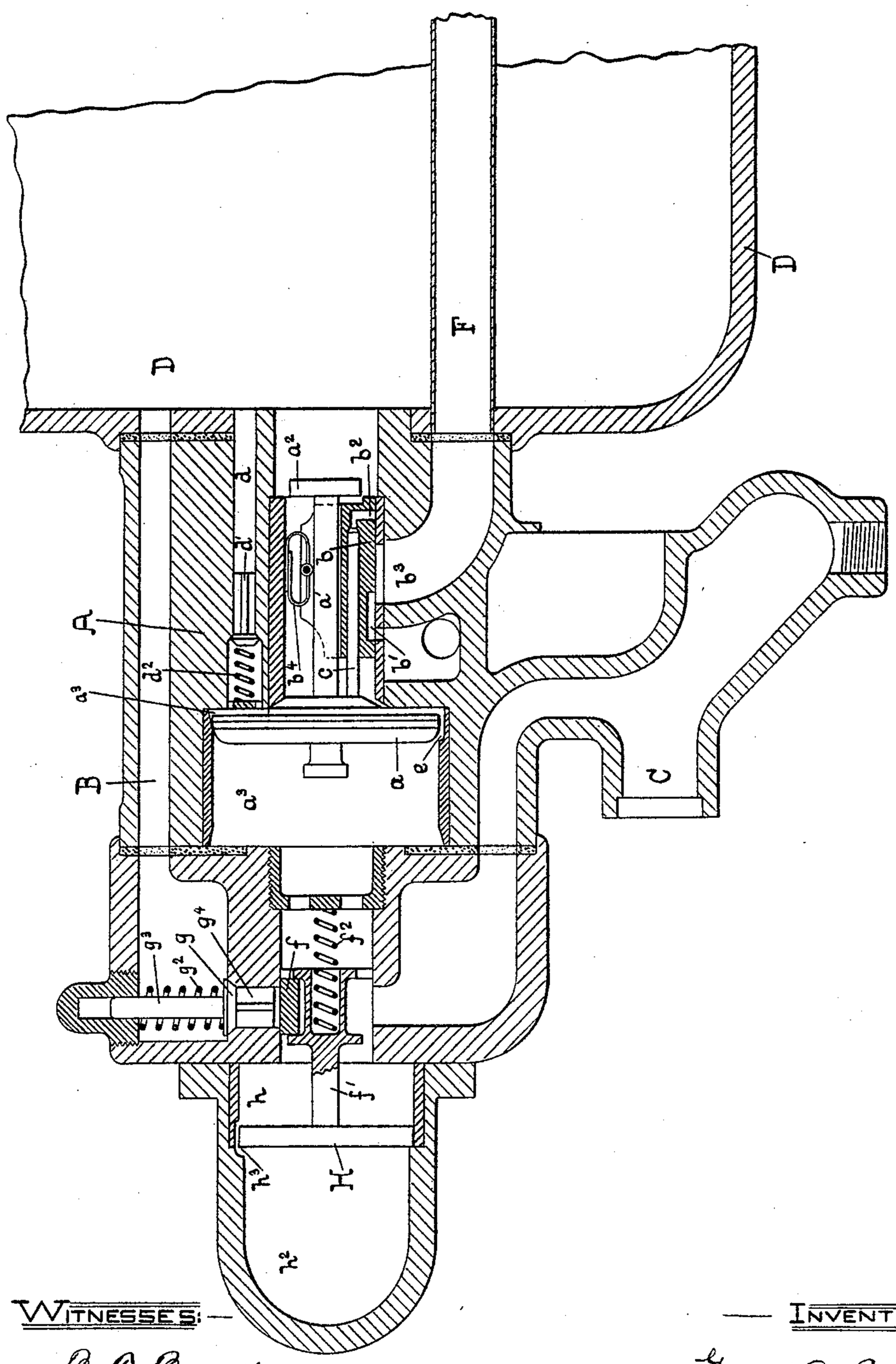
(No Model.)

G. A BOYDEN.

AUTOMATIC AIR BRAKE.

No. 583,279. Patented May 25, 1897.



WITNESSES:—

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UNITED STATES PATENT OFFICE.

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AUTOMATIC AIR-BRAKE.

SPECIFICATION forming part of Letters Patent No. 583,279, dated May 25, 1897.

Application filed April 1, 1897. Serial No. 630,269. (No model.)

To all whom it may concern:

Be it known that I, GEORGE A. BOYDEN, a citizen of the United States, residing at Mount Washington, in the county of Baltimore and State of Maryland, have invented certain new and useful Improvements in Automatic Air-Brakes, of which the following is a specification.

This invention relates to quick-action automatic air-brakes in which air is vented directly from the train-pipe to the auxiliary reservoir in making an emergency application of the brakes; and it consists in combining with the triple valve the passage leading from the train-pipe to the auxiliary reservoir and an auxiliary valve which governs said passage a supplemental piston to actuate the said auxiliary valve.

This invention employs features for which I made application for Letters Patent of the United States, dated March 20, 1897, Serial No. 628,413, and also that of March 31, 1897, Serial No. 630,060.

As the automatic brake, consisting of a train-pipe, a brake-cylinder, an auxiliary reservoir, and a triple valve, is well understood it is not necessary to describe and show the same in all its details.

The drawing shows a section of the triple valve A, provided with a passage B, leading from the train-pipe connection C directly to the auxiliary reservoir D, an auxiliary valve f, arranged to govern said passage, and a supplemental piston H to actuate the auxiliary valve. The triple valve is attached to the auxiliary reservoir D in the usual manner and communicates through the pipe F with the brake-cylinder. The latter is not shown on the drawing.

The triple valve comprises a piston a, provided with a stem a' and a head or partition a^2. The functions of the latter are to divide the valve-chamber and to engage with the main valve b, by which the motion of the piston a to the left is imparted to the valve.

The main valve b is of the slide form and governs the exhaust-passage by means of a cavity b', the graduating-passage b^2, and the main port b^3. The valve is held to its seat by the spring b^4.

The graduating-valve c is of the puppet form and secondarily governs the passage b^2 through the main valve b. The said graduating-valve is secured to the piston a in such a manner that the same reciprocating motion in each direction of the piston is communicated to it, whereby the graduating-port b^2 is opened or closed without necessarily moving the main valve in graduating the application of the brakes, which is obtained by the piston a, stem a', and the graduating-valve c, having a short range of motion independent of the movement of the main valve.

The passage d establishes communication between the auxiliary reservoir D and the piston-chamber a^3, it being provided with a check-valve d' and spring d^2, by which the air is temporarily confined in the piston-chamber and prevented from returning to the auxiliary reservoir through the said passage when making an emergency application of the brakes.

The feeding-in valve is formed by the piston a and the small groove e, through which the air passes to charge the auxiliary reservoir.

The direct passage B from the train-pipe connection C to the auxiliary reservoir D is governed by the valve f, which is auxiliary to the triple valve. The valve f is secured to the stem f' and moved to the closed position by the spring f^2, thereby preventing any train-pipe air from passing through the passage B to the auxiliary reservoir in the service application of the brakes.

The supplemental piston H is attached to the stem f', through which the movement of the piston is transmitted to the auxiliary valve f. The piston H reciprocates in the cylinder h, with one side fully exposed to the air-tight chamber h^2. Air is admitted to the chamber h^2 from the train-pipe through the feed-groove h^3 and stored therein at the maximum pressure ready to exert its force on the piston and thereby open the auxiliary valve f when the air-pressure in the train-pipe is quickly and sufficiently reduced, as in making an emergency application of the brakes.

The check-valve g is held to its seat by the spring g^2 and properly guided by the stem g^3 and the wings g^4, integral with the valve, the said valve preventing the return of air to the train-pipe.

In the operation air passes from the train-

pipe to the piston-chamber a^3, moving the piston a to the right, which opens the feeding-in groove e, through which the air passes to the valve-chamber and thence to the auxiliary reservoir D. Simultaneously with the charging of the auxiliary reservoir the air also charges the air-tight chamber h^2 by passing through the feed-groove H^3 from the train-pipe. To gradually or partially apply the brakes a gradual reduction in the train-pipe pressure is made, which causes the piston a to make a partial movement, moving the main valve b, closing the release-cavity b', and opening the graduating-port b^2. The instant this graduating-port opens the movement of piston a will be arrested, because auxiliary-reservoir air will flow to the brake-cylinder, and thereby the pressure in the reservoir will be subjected to a somewhat greater reduction than that which the engineer's valve effected in the train-pipe, and the moment the auxiliary-reservoir pressure has been reduced a little below the pressure then in the train-pipe the preponderance of pressure on the piston a will of course be on the train-pipe side, and consequently this piston will at once move forward again sufficiently to close the small port b^2 and retain the air-pressure just admitted to the brake-cylinder.

If a greater pressure is required, the above operation is repeated. To release the brakes, the maximum pressure is established in the train-pipe, which causes the piston to fully move to the right, thereby shifting the main valve, closing the graduating-port b^2, and opening the exhaust-cavity b', through which the air in the brake-cylinder is discharged to the atmosphere. When operating the brakes for service work, the gradual reduction of train-pipe pressure required therefor will not be sufficient to move the supplemental piston H, as the air in the chamber h^2 will discharge back to the train-pipe through the small groove h^3 sufficiently quick to maintain an equilibrium of pressure on both sides of the piston. In making an emergency application of the brakes a sudden and greater reduction of train-pipe pressure is made than for graduating or service applications, which causes the piston a to make its full stroke, thereby fully opening the port b^3 by the main valve, and simultaneously therewith the pressure in the chamber h^2 will exert its force and move the supplemental piston H to the right, as the small groove h^3 cannot discharge the air from the chamber h^2 sufficiently quick to maintain an equilibrium of pressure on both sides of the piston H, as when making a slight reduction of the train-pipe pressure in service applications of the brakes. This movement of the piston H opens the auxiliary valve f and thereby establishes communication directly between the train-pipe and the auxiliary reservoir. These operations cause the auxiliary-reservoir pressure to instantly and fully pass to the brake-cylinder, thereby lowering the auxiliary-reservoir pressure, and the train-pipe pressure quickly passes to the auxiliary reservoir through the passage B, resulting in quickly and fully applying each individual brake and quickening the serial application of all the brakes throughout the train.

The piston a in an emergency application is held to its full stroke by the air being momentarily confined in the piston-chamber a^3 by the check-valve d' and the partition a^2.

Having thus described my invention, what I claim is—

1. In automatic brakes, the combination of a train-pipe; a brake-cylinder; an auxiliary reservoir; a triple valve; a passage leading directly from the train-pipe to the auxiliary reservoir for discharging air from the train-pipe to the auxiliary reservoir in an emergency application of the brakes; an auxiliary valve to control the said passage; and a supplemental piston to actuate the auxiliary valve.

2. In automatic brakes, the combination of a train-pipe; a brake-cylinder; an auxiliary reservoir; a triple valve; a passage directly from the train-pipe to the auxiliary reservoir; and a valve to control said passage which valve is actuated by a supplemental piston additional to the piston of the triple valve.

3. In automatic brakes, the combination of a train-pipe; a brake-cylinder; an auxiliary reservoir; a triple valve; a passage directly from the train-pipe to the auxiliary reservoir; a valve to control the said passage; a supplemental piston to actuate the said valve; and a check-valve arranged in said passage to prevent the return of air to the train-pipe.

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

GEORGE A. BOYDEN.

Witnesses:
CHARLES B. MANN, Jr.,
CHAPIN A. FERGUSON.