(No Model.)

F. A. HOLLEMAN.

RAILWAY BRAKE.

No. 377,198. Patented Jan. 31, 1888.

Fig. 4.

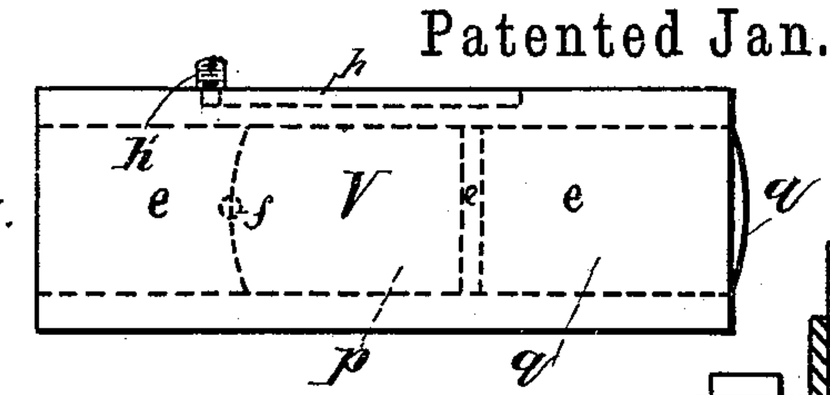


Fig. 2.

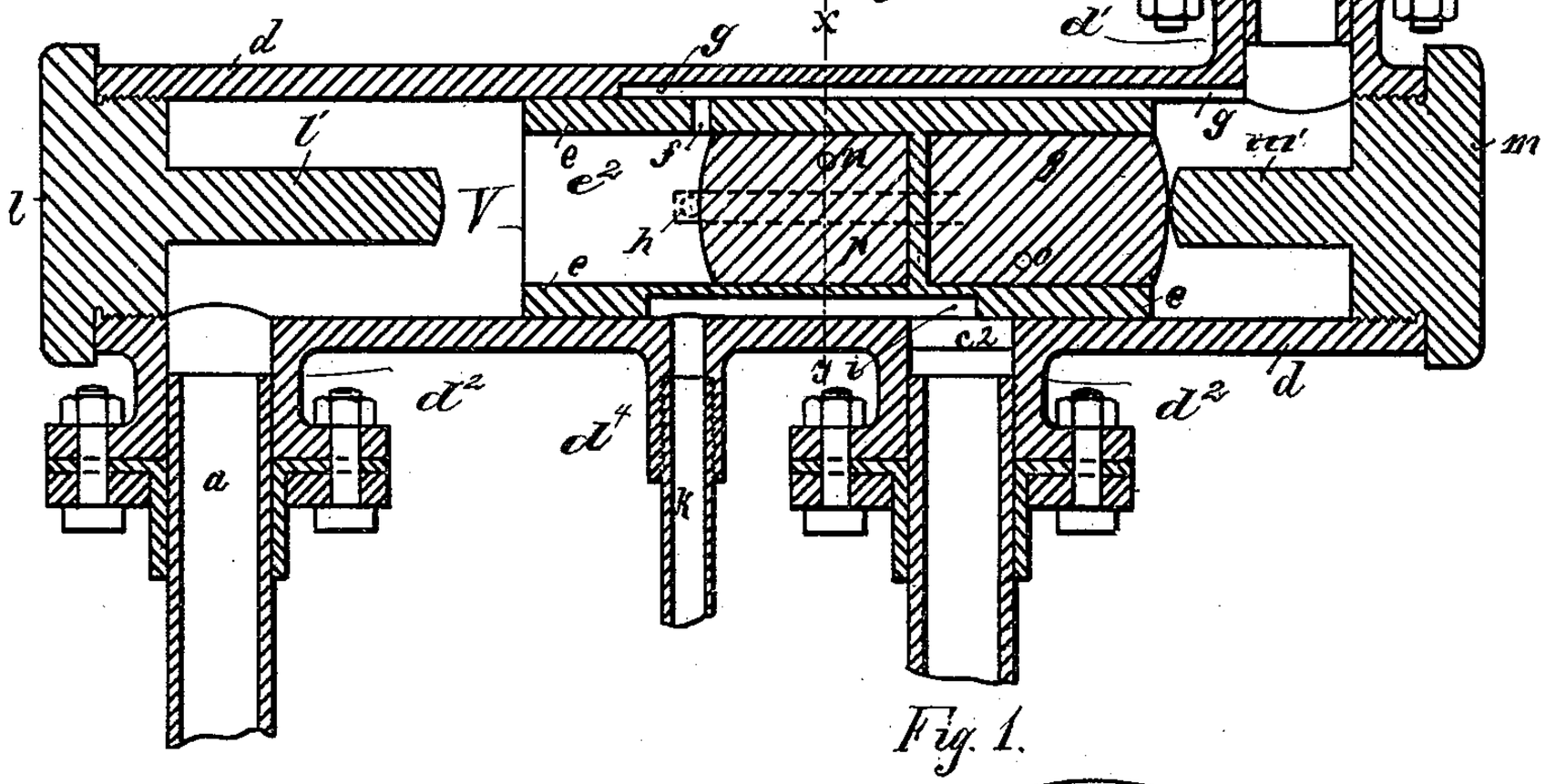
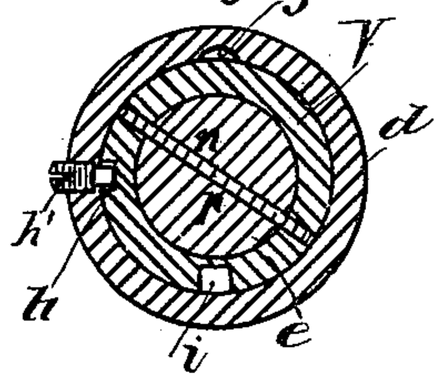


Fig. 1.

Fig. 3.



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UNITED STATES PATENT OFFICE.

FREDERIK ARNOLD HOLLEMAN, OF OISTERWYK, NETHERLANDS.

RAILWAY-BRAKE.

SPECIFICATION forming part of Letters Patent No. 377,198, dated January 31, 1888.

Application filed February 3, 1887. Serial No. 226,428. (No model.)

To all whom it may concern:

Be it known that I, FREDERIK ARNOLD HOLLEMAN, a subject of the King of the Netherlands, residing at Oisterwyk, Kingdom of the Netherlands, have invented certain new and useful Improvements in Railway-Brakes; 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 or figures of reference marked thereon, which form a part of this specification.

Referring to the drawings, Figure 1 is a sectional end view illustrating the connections between the distributing-main connected with the source of supply, an auxiliary reservoir and a brake-cylinder, and my improved controlling-valve interposed in said connections. Fig. 2 is a longitudinal axial section of the valve and valve-casing on an enlarged scale. Fig. 3 is a section of Fig. 2 on line $x\ y$, and Fig. 4 is a view of the valve itself.

This invention relates to that system of air-brakes for railway-trains in which the main reservoir for the compressed air is connected with auxiliary reservoirs that supply the brake-cylinders.

The invention consists in the combination, with the main and auxiliary reservoirs, the brake-cylinder, and their connections, of a controlling-valve interposed in said connections, and in the construction of said valve, substantially as hereinafter fully described, and as set forth in the claims.

In the drawings, a' indicates the main, through which the compressed air is conveyed to the auxiliary storage-cylinders from the source of supply. a is the valved connecting-pipe that connects the main with the auxiliary storage-cylinder b' through the valve-casing and connection b, and c is the pipe that connects the auxiliary reservoir b' with the brake-cylinder c' through said valve-casing and connection b. The controlling-valve interposed in these connections comprises a cylindrical valve-casing, d, provided with the branches d' d^2 d^3 d^4. To the branch d' is connected the pipe b, that leads to the auxiliary reservoir b', and to the branch d^2 is connected the pipe c, that leads to the brake-cylinder c'. The pipe b has a stop-cock, s', for cutting off the connection between the auxiliary reservoir b' and the valve-casing d. The branch d^3 is connected with the pipe a, that leads to the compressed-air main a', and s is the stop-cock in said pipe a, for cutting off the communication between the main a' and valve-casing d.

To the branch d^4 is connected the exhaust-pipe k, and l m are the cylinder-heads screwed into the cylinder ends and provided with inwardly-projecting abutments l' m', respectively, that serve to limit the movements of the valve.

In the inner periphery of the valve-casing and outer periphery of the valve V are formed two grooves or passages, g and i, respectively. The groove or passage g extends from the branch d' toward the length of the casing, and serves to establish communication between the auxiliary cylinder b' and the main a' through the valve-casing, and the groove or passage i serves to establish communication between the brake-cylinder c' and the exhaust-branch d^4 when the valve is in proper position.

The valve V comprises an open-ended cylinder, e, divided into two chambers by a partition, e'. The said cylinder has a longitudinal groove, h, formed in its outer periphery, into which projects the end of a screw, h', Fig. 3, screwed into the valve-casing to hold the valve V against rotation therein, yet allowing the valve the necessary reciprocation in said casing.

The chambers of the valve are provided with buffers p q, secured therein by means of pins n o, respectively, Figs. 2 and 3, which buffers I preferably make of wood.

The object of using wood for the buffers will be readily comprehended by those conversant with the operation of these valves, as it is obvious that were more elastic buffers employed the recoil of the valve would be sufficiently great to destroy its function.

It will be seen by an inspection of Fig. 2 that the buffer p does not completely fill the chamber on the left of the partition e' of the cylindrical valve, a chamber, e^2, being formed at the left end thereof, that communicates by a port or passage, f, with the groove g. The cylindrical valve is fitted within the casing d,

so as to permit it to reciprocate freely therein, and operates automatically under varying pressures of the air in the main a' and auxiliary cylinder b'.

The operation of the valve may be briefly described as follows: When compressed air is admitted to the valve-casing from the main a' through pipe a and branch d^3, the valve V, under the pressure of the incoming air, is moved toward the right to the abutment m', as shown in Fig. 2. The compressed air now passes freely through f g d' b into the auxiliary reservoir b', slight differences in the pressure in b' a' being always equalized through f and g. The valve V therefore remains in the position described and cannot be displaced by any lateral movements of the cars, the valve being held in said position by the pressure of the air. This not only insures the stability of the valve when in the position referred to, but also produces an air-tight closure of d^2 d^4 by the valve V. Inasmuch as the valve V lies in a plane at right angles to the longitudinal axis of the car, a shock in the direction of said longitudinal axis, or a sudden thrust or motion thereof in said direction, will not displace said valve. However, as soon as the pressure in the main a' is reduced or falls below the pressure in the reservoir b'—say about one-fourth of an atmosphere, for instance—the valve V, under the greater pressure of the air in the reservoir b', moves to the left of the valve-casing, first cutting off the communication between d^2 and d^4, next between f and g, then uncovering the passage c^2, leading to pipe c. Compressed air now passes freely from b', through b, the valve-casing d, and pipe c, to the brake-cylinder c' to operate the brakes. As soon as the pressure in b' has been reduced by the outflow of air to that in the main a', the motion of the valve V toward the left ceases, said valve being again held in its position by the pressure of the air on the right thereof and above it. When the pressure in b' falls below that in a', by reason of the continued outflow of air from b' to c', the valve V will again be moved from left to right under the increased pressure in a', cutting off the communication between b' and c', the brakes being held applied. If the valve were moved to the limit of its stroke toward the right by the excess in the pressure in a', the brakes would not be applied, for the reason that communication between d^2 and d^4 would be established and the air in brake-cylinder c' exhausted and lost. This cannot take place for the following reasons: First, the excess in the pressure of the air in a' is too slight to overcome the pressure of the air in b' upon the valve, and, secondly, because the excess in the pressure is annulled as soon as the valve V has moved sufficiently toward the right to establish communication between the port or passage f and the passage g. The brakes may therefore be operated under any desired pressure with my improved valve. If the pressure in the main a' is now restored to its normal pressure, the excess of such pressure will overcome the resistance to the motion of the valve exerted by the pressure in b', and said valve will return to its normal position, (shown in Fig. 2,) thereby establishing communication between the branches d^2 d^4 through the passage i, exhausting the air from the brake-cylinder c' and releasing the brakes.

Although the valve V is fitted in its casing to form a tolerably-tight joint, so as to cut off the communication between d^3 and d' when the valve is in proper position, yet it has sufficient play in said casing, so that the said joint cannot be regarded in any manner as an absolutely hermetic one. The valve only forms a tight joint with that part of the casing into which the branches d^2 d^4 open—that is to say, with the lower part of the casing—as hereinabove set forth, and for the purposes mentioned. The valve operates therefore somewhat like a float between the two strata of air in a' and b' and their connections, thereby insuring the simultaneous operation of the valve of every auxiliary cylinder of a train. Although the valve does not fit absolutely air-tight in its valve-casing, no loss of compressed air can take place along the valve, provided the engineer or the person that controls the brake-power will not allow a greater volume of compressed air to escape from the main than that which corresponds to the reduction of the pressure in the auxiliary cylinders.

In determining the diameter of the valve and its casing the coefficient of friction must be taken into consideration, and said diameter should be so chosen that the valve V will move readily and rapidly from m' to l' under a given reduction in the pressure in the main a', and that said valve will not at once move from l' back to m' under a slight increase in the pressure in a'.

The products of condensation in the described valve cannot accumulate within the casing, as they are completely exhausted therefrom; hence there is no danger of the valve becoming inoperative in cold weather, and as the valve is more or less lubricated by the petroleum no water can find a lodgment between the valve and its casing by capillary attraction.

Having now described my invention, what I claim is—

1. The herein-described valve for air-brakes, comprising a valve-casing provided with branches for connection with the compressed-air main, the auxiliary cylinder, and the brake-cylinder, respectively, also with a longitudinal groove or passage in its inner periphery in communication with the auxiliary cylinder or branch and with an exhaust-port diametrically opposite said longitudinal passage, in combination with a cylindrical valve fitting snugly but moving freely in the corresponding bore of the casing, said valve being provided with an admission-port adapted to communicate with the passage of the casing, and with an exhaust-port communicating at all times

with the exhaust-port of the casing and adapted to establish communication between said port and the brake-cylinder branch, substantially as and for the purposes specified.

2. The herein-described valve for air-brakes, comprising a valve-casing provided with branches for connection with the compressed-air main, the auxiliary cylinder, and the brake-cylinder, respectively, also with a longitudinal passage in its inner periphery in communication with the auxiliary-cylinder branch and with an exhaust-port diametrically opposite said passage, in combination with a cylindrical valve fitting snugly in the corresponding bore of the casing and having a motion at right angles to the direction of motion of the car, said valve being provided with a port adapted to communicate with the longitudinal passage in the casing, and with an exhaust-passage communicating at all times with the exhaust-port of said casing and adapted to establish communication between said exhaust-port and the brake-cylinder branch, substantially as and for the purpose specified.

3. The combination, with the main a', the reservoir b', and the brake-cylinder c', of the valve-casing d, provided with branches d' d^3 d^2, respectively connected with the main, the reservoir, and cylinder, an exhaust pipe or branch, d^4, and a groove or passage, g, and the cylindrical valve V, provided with a port or passage, f, adapted to communicate with the groove g, and a groove, i, communicating at all times with the exhaust-port and adapted to establish communication between said port and the branch d^2, substantially as and for the purpose specified.

4. The combination, with the valve-casing d, constructed as described, of the valve V, composed of a hollow cylinder divided interiorly into two chambers by a partition, and having a port, f, leading from one of said chambers, and a longitudinal groove or recess, i, in its periphery, substantially as and for the purpose specified.

5. The combination, with the valve-casing d, constructed as described, and having inwardly-projecting abutments formed on the heads thereof, of a valve composed of a hollow cylinder divided interiorly into two chambers by a partition, and buffers arranged within said chambers, substantially as and for the purposes specified.

6. The combination, with the valve-casing d, constructed as described, and having abutments of unequal length projecting inwardly from the heads thereof, of a valve composed of a hollow cylinder divided interiorly into two chambers of unequal length, a buffer-block completely filling the smaller chamber and adapted to contact with the shorter abutment, and a buffer-block partially filling the longer chamber and adapted to contact with the longer abutment, substantially as and for the purpose specified.

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

FREDERIK ARNOLD HOLLEMAN.

Witnesses:
C. KOOSH,
M. P. HENDRIK.