No. 708,092. Patented Sept. 2, 1902.

F. STRATTNER.

AIR BRAKE VALVE.

(Application filed Oct. 15, 1901.)

(No Model.)

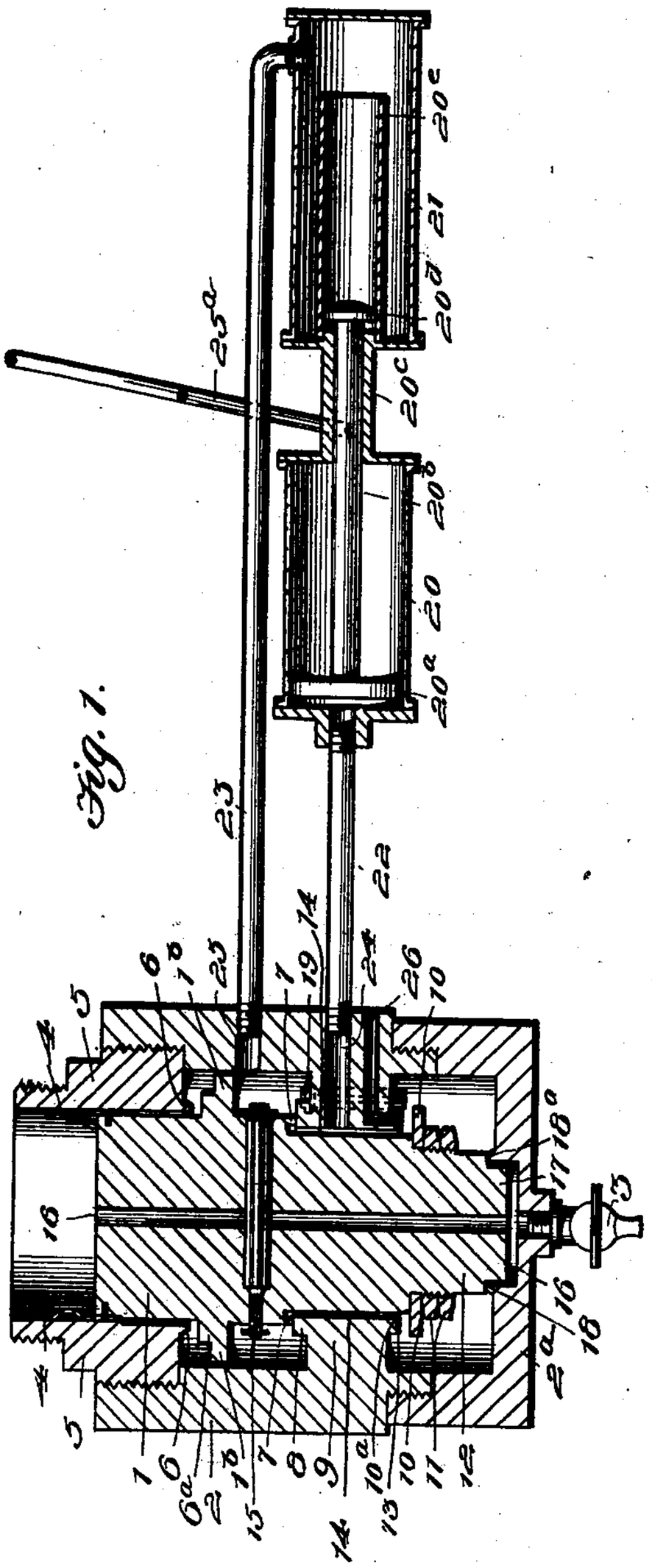

Fig. 1.

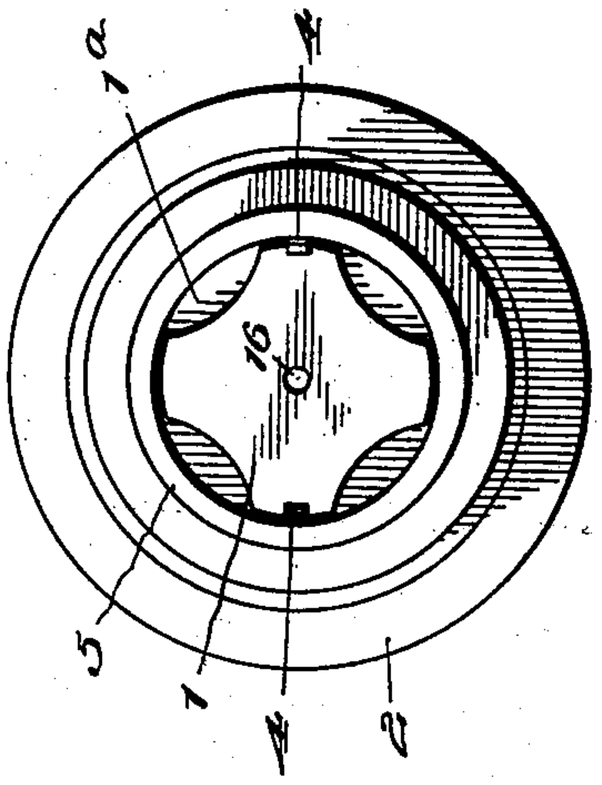

Fig. 2.

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UNITED STATES PATENT OFFICE.

FREDERICK STRATTNER, OF SALISBURY, MARYLAND.

AIR-BRAKE VALVE.

SPECIFICATION forming part of Letters Patent No. 708,092, dated September 2, 1902.

Application filed October 15, 1901. Serial No. 78,742. (No model.)

To all whom it may concern:

Be it known that I, FREDERICK STRATTNER, a citizen of the United States, residing at Salisbury, in the county of Wicomico and State of Maryland, have invented certain new and useful Improvements in 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.

My invention relates to certain improvements generally in air-brakes, more especially valve mechanism therefor. It greatly reduces friction, needs no lubrication, and requires very little cleaning or attention. It is interchangeable with valve mechanism in present use and is direct acting, as will presently be explained.

It consists of the combination, arrangement, and construction of parts, substantially as hereinafter more fully disclosed, and specifically pointed out by the claims.

In the accompanying drawings, illustrating the preferred embodiment of my invention, Figure 1 is a sectional elevation, and Fig. 2 is a plan view thereof.

It will be understood that I do not restrict myself to details, as they may be changed or varied at will without departing from the spirit of my invention and the same remain intact and yet be protected.

In carrying out my invention I provide a suitable supply or feed valve 1, having lateral vertical air passages or ports 1^a and incased or housed within a casing 2, suitably secured upon the car or engine of a train, said valve-casing having applied to its removable bottom or head 2^a a drain-cock 3. Said valve is held against axial motion or turning by means of springs 4, secured thereto and bearing against the inner side of an annulus or collar 5, screwed into the upper or greater diametered portion of the casing 2. To this annulus or collar is connected or coupled the air-supply pipe. (Not shown.) Said valve has at a suitable point below the collar or annulus 5 a lateral, preferably stepped, extension or enlargement 1^b, also having lateral vertical air passages or ports 1^c therethrough. Said lateral extension is adapted at its upper surface to engage or contact with a preferably narrowed or tapered pendent portion of the collar or annulus 5, forming a seat 6 for said valve at said point, as at 6^a, as the valve moves upwardly, as hereinafter more fully appreciated. Said valve also has an intermediate circular downward-facing offset or extension 7, adapted when the valve is in its lowered position or when air-pressure is admitted at 6 to engage or contact with an upward-facing seat 8, formed of a shoulder on the upper surface of an inward circular extension or portion 9 of the casing 2, to cut off the passage of air-pressure below that point at that time. At a point still farther down said valve is provided or equipped, preferably, with an annulus or ring 10, suitably held or clamped against a shoulder 10^a of the valve 1 by locking-nuts 11, screwed upon a reduced screw-threaded portion 12 of said valve up against said ring. This ring or annulus is adapted to engage or contact with a second downward-facing seat 13, also formed of a shoulder on the lower surface of the extension 9 of the casing 1, but which ring or annulus is out of engagement with said seat when the opposite is true of the seat 8 and extension or offset 7. Said valve has also additional lateral vertical air passages or ports 14 intermediately of the offset or extension 7 and the ring or annulus 10 to effect communication between different portions of the casing-chamber for the passage of the air-pressure to the bottom of said casing-chamber, as will be more fully disclosed later on; also, said valve has arranged within a transverse passage in itself a supplemental or compensating valve 15, suitably seated at two ends in the end of said passage and having its stem skeleton-like in cross-section to provide for the passage of the air-pressure therebetween and the wall of said passage from the upper lateral ports of the primary valve 1; also, extending about centrally clear through said primary or supply valve is an air-passage 16, intercepting or communicating with the supplemental-valve passage, as shown, and with the top and bottom portion of the casing-chamber. The bottom or removable head 2^a of the casing 2 has preferably a depression or recess 16 in its upper surface to receive the stepped lower end portion 17 of the valve 1, and said depression has around its edge an elevation or raised ledge 18, engaging the shoulder of said stepped portion of said valve, as at 18^a. Said stepped lower portion of the valve is of less diameter than said depression or recess to

provide for the passage therebetween of air-pressure from the central passage 16 and from one side of said valve to the opposite side thereof for a purpose presently made apparent.

A second supplemental or compensating valve 19 of like construction as valve 15 is also provided, but is arranged vertically or at right angles to the last named and at one side of and a short distance below the same, said second supplemental valve being disposed in a vertical passage produced in the inwardly-extending portion 9 of the valve-casing 2 and seating in the upper end of said passage. The lower end of said passage opens into the bottom chamber of said valve-casing and communicates with the central passage 16 via the passsage formed between the lower end stepped portion of the primary valve and the depression 16 in the bottom or removable head 2^a of said casing.

Two cylinders 20 21 are connected to the valve-casing 2 by pipes 22 23, respectively. Pipe 22 communicates with the primary-valve-containing chamber through a port or passage 24, and the pipe 23 communicates with said chamber by means of a passage or port 25, one, however, with said chamber intermediately of the valve-seats 8 and 13 and the other therewith intermediately of the valve-seats 6 and 8, as shown. The piston 20^a of the cylinder 20 has its rod 20^b extended through a sleeve or casing 20^c, whose ends are integral with opposite heads of the two cylinders 20 21. Said rod also has fixed thereto at its end distant from the piston 20^a a second piston 20^d, housed within a supplemental cylinder 20^e, having one end screwed to a head of and arranged within the cylinder 21, the opposite end of said supplemental cylinder opening into the last named, supplying it with air-pressure. The proportional pressure areas of the pistons of these two cylinders are in the ratio of the square of the diameter of one piston to the square of the diameter of the second piston. The effective brake-applying pressure, therefore, is equal to the excess of pressure on the pressure area of the piston 20^a over that on the pressure area of the piston 20^b. The brake-lever 25^a, suitably fulcrumed in position, is connected at one end to the piston and actuated thereby.

In operation the air-pressure, being applied through the air-supply pipe above referred to, passes through central passage 16 of the primary valve 1, thence into the passage of the supplemental or compensating valve 15, opening or unseating said last-referred-to valve. Said air-pressure then enters the valve-containing chamber and, passing through the port 25, enters and passes through the pipe 23, finally entering and filling the storage-cylinder 21, said air-pressure acting upon the piston 20^d and driving it, and consequently the piston 20^a, the last named being moved clear up to the distant head of its cylinder, the brake being in its released position. The piston 20^d is thus continually kept under air-pressure charged into its containing-cylinder 21, thus retaining or holding the brake unapplied or released. In applying the brake air-pressure is withdrawn from the train-pipe by the operator on the engine or car suitably manipulating the air-exhausting valve. The pressure on valve 1 will be instantly reduced, permitting it to rise and seat at 6 6^a and 10 13, cutting off the passage of air-pressure at those points and unseat at 7 8, consequently opening up communication with the casing-chamber via the ports 14. Air-pressure now passes from the storage or brake-releasing cylinder 21 through the pipe 23 and port 25 into the valve-containing chamber and thence through the port 24 and pipe 22, it finally entering the cylinder 20 and acting upon and driving the piston 20^a, thus setting or applying the brake, after which air-pressure is exhausted in releasing the brake from the brake-cylinder to the atmosphere, as presently seen. In order to release the brake, the operator by suitably manipulating the air-supply applies pressure to the valve 1, moving or forcing said valve downwardly, effecting the seating of said valve at 7 8 and 18 18^a and unseating it at 10 13. The air-pressure will now be exhausted from the cylinder 20 via the pipe 22, port 24, ports 14, and an outlet-passage 26, the last named being produced in the valve-casing 2 and communicating with the external air or atmosphere. The valve 1 being now unseated at 6 6^a permits the recharging of the storage-cylinder 20 and the pistons 20^a and 20^d to be forced into the position required to release the brake.

A very important feature of this invention consists in the use of two compensating valves, as above noted, whereby the air-pressure is delivered directly to the storage-cylinder via the port 25 when the brake is being applied. In this connection it is observed that as the air-pressure in the storage-chamber 21 is being drawn upon or exhausted by the demand thereon in supplying the brake-chamber 20 said drain or exhaustion is compensated by the passage through the port 16 of the valve 1 of air-pressure. Said air-pressure passes via the compensating valve 15 into the chamber containing the valve 1, as above stated, and via the opening 18 18^a, the air-pressure from the last-named passing upwardly and opening the second compensating valve 19, and the whole air-pressure finally passing through the port 25 to the storage-cylinder 21. Thus the air-pressure is delivered directly from the train-pipe to the storage-cylinder. Also direct pressure is in like manner exerted through the port 24 upon the piston 20^a in applying the brake. Also by this arrangement the storage-cylinder 21 is constantly supplied with air-pressure whether the brake be applied or released.

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

1. In air-brake apparatus, an air-cylinder and its piston for applying the brake, an air-storage cylinder and its piston arranged for simultaneous coaction with the first-referred-to piston, for releasing the brake, and air-pressure valve mechanism operatively connected to the train-pipe and to said cylinders, comprising a primary valve and an automatic supplemental valve carried by, and independently operative of, said primary valve, substantially as set forth.

2. In air-brake apparatus, an air-cylinder and its piston for applying the brake, an air-storage cylinder and its piston having a relatively-reduced area or diameter and arranged for simultaneous coaction with the aforesaid piston, for releasing the brake, and air-pressure valve mechanism operatively connected to the train-pipe and to said cylinders, comprising a primary valve and an automatic supplemental valve carried by, and independently operative of, said primary valve, substantially as set forth.

3. In air-brake apparatus, an air-cylinder and its piston for applying the brake, an air-storage cylinder and its piston arranged for simultaneous operation with the aforesaid piston for releasing the brake, and an air-pressure valve mechanism operatively connected with said cylinders comprising a primary valve and an automatic supplemental valve carried by, and independently operative of, said primary valve, said primary valve having a port or passage therethrough intersected by said supplemental valve, substantially as set forth.

4. In air-brake apparatus, an air-cylinder and its piston for applying the brake, an air-storage cylinder and its piston arranged for simultaneous operation with the first-named piston, for releasing the brake, air-pressure valve mechanism, comprising a primary valve and an automatic supplemental valve carried by, and independently operative of, said primary valve, and adapted to be seated at each end, said primary valve having a port or passage therethrough intersected by said supplemental valve, pipe connection with said cylinders, and means establishing communication between said pipe connection and the ports of said primary and supplemental valves, substantially as set forth.

5. In air-brake apparatus, an air-cylinder and its piston, for applying the brake, an air-storage cylinder and its piston for releasing the brakes, an air-pressure valve mechanism, means for effecting operative connection between said cylinders and valve mechanism, comprising a primary valve and an automatic supplemental valve carried by, and independently operative of, said primary valve, said piston having a common rod connection, substantially as set forth.

6. In air-brake apparatus, an air-cylinder and its piston, for applying the brake, an air-storage cylinder and its piston for releasing the brake, an air-pressure valve mechanism means for effecting operative connection between said cylinder and valve mechanism, comprising a primary valve and an automatic supplemental valve carried by, and independently operative of, said primary valve, said pistons being of different diameters and having a common rod connection, substantially as set forth.

7. In air-brake apparatus, an air-cylinder and its piston, for applying the brake, an air-storage cylinder and its piston, an air-pressure valve mechanism, means for effecting operative connection between said cylinders and valve mechanism, said valve mechanism having its valve proper supplied with supplemental or compensating valve acting in conjunction with a central port or passage of said valve proper and a second compensating valve also coöperating with said valve proper, said compensating valves effecting the direct supply of air-pressure to said brake-cylinder, and one effecting a passage between the bottom outlet of said central valve-port and said storage-cylinder, substantially as set forth.

8. In apparatus of the character described, a brake-applying cylinder and its piston, a brake-releasing cylinder and its piston, air-pressure valve mechanism, means effecting operative connection between said cylinders and valve mechanism, said valve mechanism comprising a centrally-ported valve, having a plurality of lateral contacting surfaces with its casing and two supplemental or compensating valves arranged for conjoint operation and in communication with ports in said casing and with said cylinders, substantially as set forth.

9. In air-brake apparatus, a brake-applying cylinder and its piston, an air-pressure-storage cylinder and its piston, a valve mechanism, and means for effecting operative connection between said cylinders and said valve mechanism, said mechanism comprising a casing having an inward circular extension, a collar provided with a circular pendent projection, and a bottom portion having, around a depression or recess therein, a shoulder, said inward extension having projections upon its upper and lower surfaces, a centrally-ported valve, having lateral vertical ports and corresponding salient portions with those of said casing, above noted, adapted to contact with, or engage the same, two supplemental or compensating valves, one adapted to be seated in the first-named valve and the other in said casing, said casing also having ports connecting with said cylinders and lateral ports of the first-referred-to valve, and an air-exhausting port, substantially as set forth.

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

FREDERICK STRATTNER.

Witnesses:
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