No. 608,095.

Patented July 26, 1898.

C. L. ANSLEY.

AIR BRAKE.

(Application filed Aug. 28, 1897.)

(No Model.)

2 Sheets—Sheet 1.

Fig. 1.

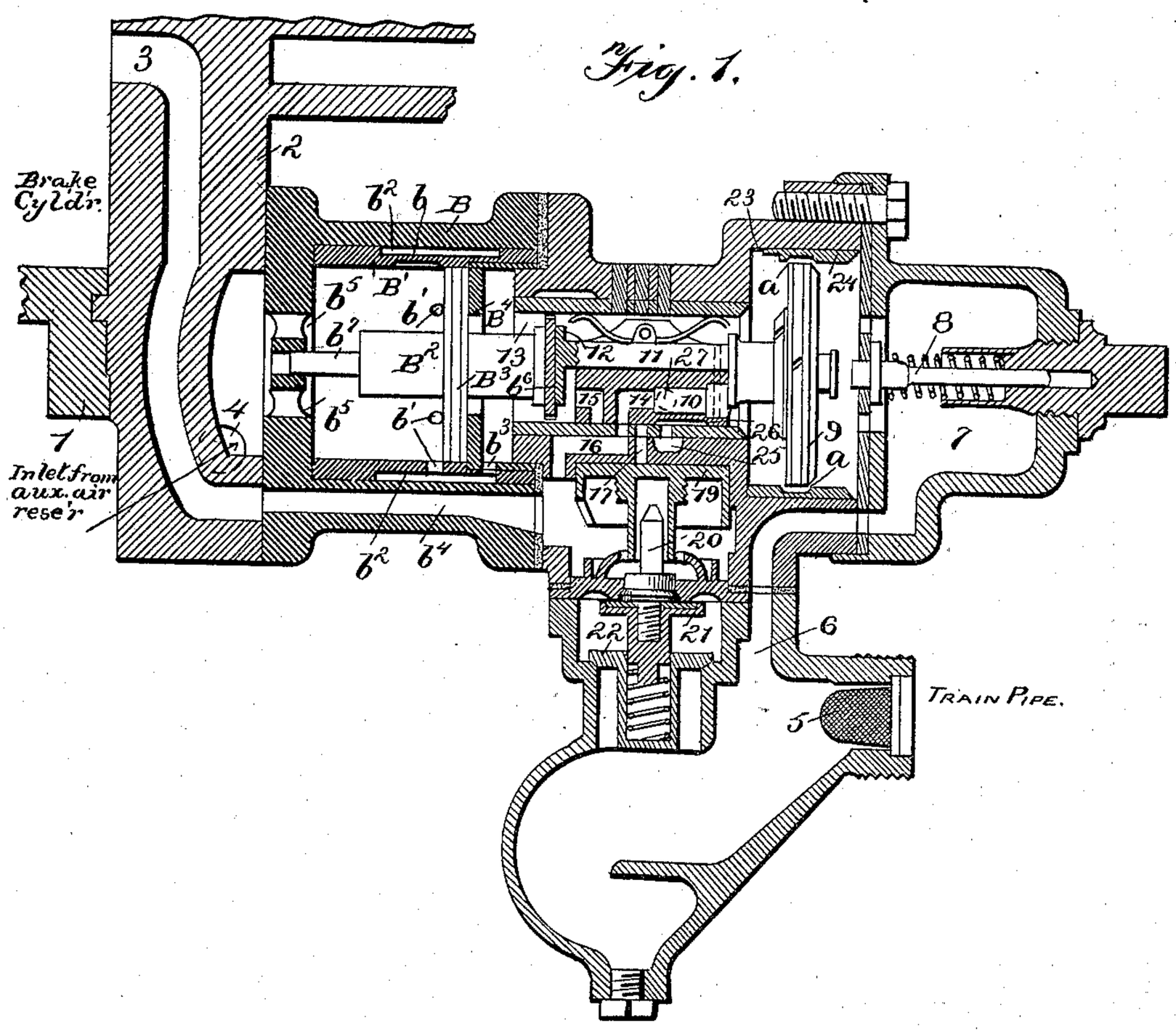

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Fig. 2.

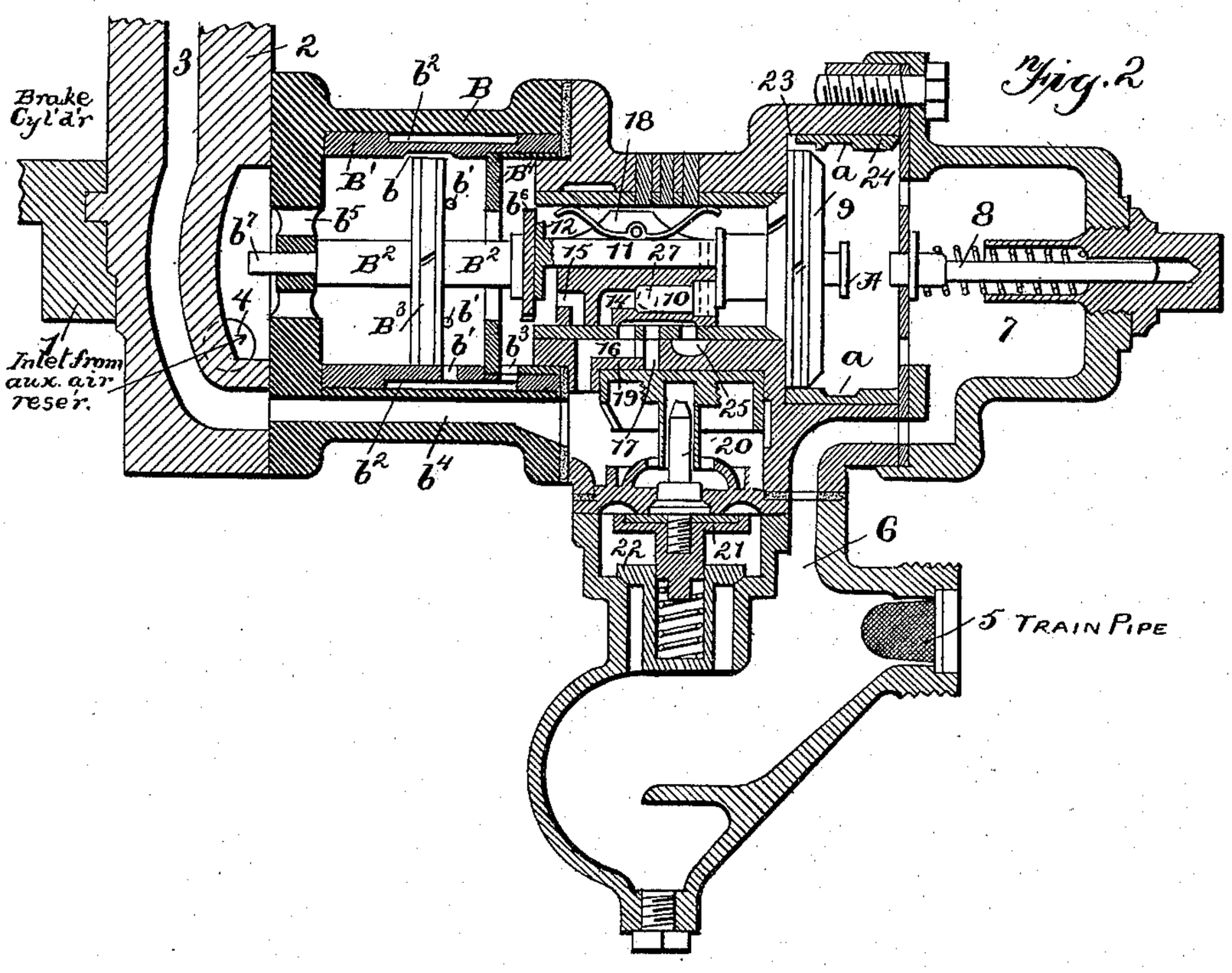
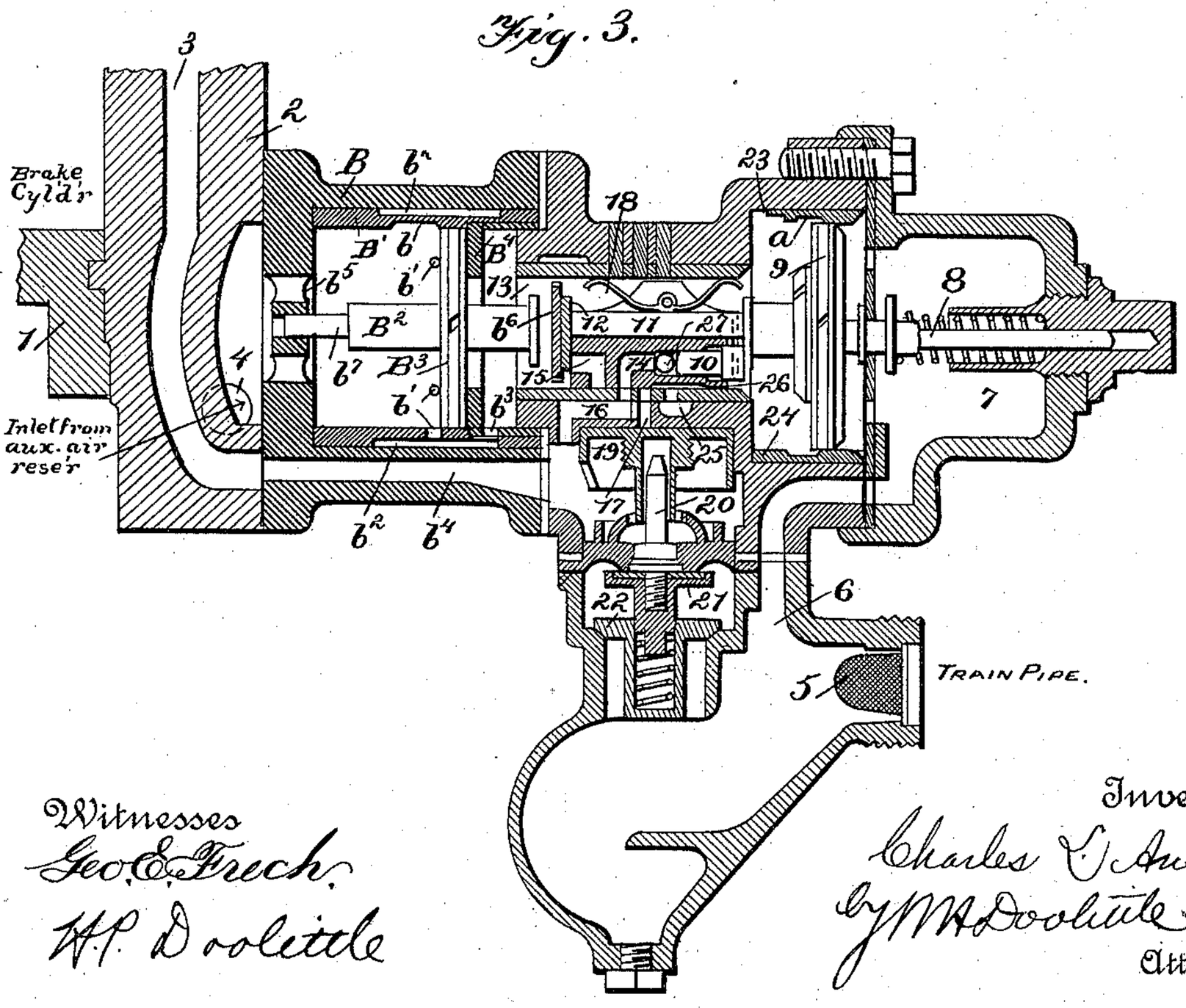


Fig. 3.



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UNITED STATES PATENT OFFICE.

CHARLES L. ANSLEY, OF ATLANTA, GEORGIA, ASSIGNOR OF ONE-FOURTH TO CHARLES G. ARTHUR, OF SAME PLACE.

AIR-BRAKE.

SPECIFICATION forming part of Letters Patent No. 608,095, dated July 26, 1898.

Application filed August 28, 1897. Serial No. 649,875. (No model.)

To all whom it may concern:

Be it known that I, CHARLES L. ANSLEY, of Atlanta, in the county of Fulton and State of Georgia, have invented a new and useful Improvement in Air-Brakes, of which the following is a specification.

My invention relates to certain improvements in that form of railway air-brakes known as the "Westinghouse" system. As is well known, this system provides a separate air-brake cylinder and an auxiliary air-reservoir for each car, which are connected with the train-pipe running to the locomotive and which are operated by a triple valve, the arrangement being such that the brakes are applied by a transfer of pressure from the auxiliary air-reservoir to the air-brake cylinder. This is effected by a reduction of pressure in the train-pipe by means of the discharge-valve on the locomotive. With this form of air-brake the application of the brakes necessarily reduces the air-pressure in the auxiliary reservoir, and when the brakes are released the air is discharged from the air-brake cylinder into the outer air before the pressure is restored in the auxiliary reservoir. This recharging proceeds slowly for the reason that the admission of air from the train-pipe to the auxiliary air-reservoir takes place through a small passage-way around the triple-valve piston. It follows, therefore, that if for any reason a second application of the brake is required immediately after the brakes are released there is a relatively low air-pressure in the auxiliary air-reservoir to rely upon, and upon several successive applications of the brakes before the auxiliary air-reservoir could be refilled to its proper pressure the supply in the auxiliary reservoir would be so depleted as to leave the train in a well-nigh helpless condition. My invention is designed to obviate this dangerous state of affairs, and it contemplates such improvements as cause the auxiliary air-reservoir to be replenished with its maximum pressure of air immediately after the brakes are applied and before the air is discharged from the brake-cylinder and the brakes are released, thus preventing any waste of air and preserving the maximum efficiency for the brakes under all conditions. To this end my invention consists in a construction and arrangement of parts that allows air to pass to the auxiliary reservoir while in the position of "brakes applied" and in a device which I term a "retainer" to hold the parts in such position as to allow this operation to take place, all as more fully hereinafter described and particularly claimed.

My invention is illustrated in the accompanying drawings, in which—

Figure 1 is a sectional view of the apparatus, taken through a portion of the brake-cylinder head, the triple valve, and my retaining devices, the parts being shown in the position of brakes applied. Fig. 2 is a sectional view of my devices shown in connection with only those parts with which they coact, the parts being in the position of "brakes released;" and Fig. 3 is a view similar to Fig. 2, showing the parts in the initial movement for applying the brakes.

In all the figures the same reference letters and numerals indicate corresponding parts, and the parts drawn in light section-lines and marked with figures indicate the old parts of the Westinghouse brake, while the parts drawn in heavy section-lines and marked with reference-letters indicate my improvements.

Referring to Fig. 1, the numeral 1 indicates a part of the brake-cylinder. 2 is its head, which is cored out to form a passage-way 3, through which compressed air is admitted to the cylinder in applying the brakes, and with which head the air-pipe from the auxiliary air-reservoir is connected at 4. 5 is the connection for the train-pipe, and the numerals 5 to 27 represent the various parts of the triple valve of the Westinghouse system. These parts I need not describe in detail, as they are all old and in common use; but it is essential for the purpose of clearly distinguishing my invention and accentuating its importance to describe the general operation of the well-known triple valve and its defects in applying and releasing the brakes. From this description the cylindrical case B and all its contained parts which constitute my retainer are omitted, as well as the construction and operation of the triple-valve piston and the passage-way *a*.

Assuming that the triple-valve piston 9 is

to the extreme left, as in Fig. 2, which is the normal position of the brakes when released, the brakes are applied as follows: The engineer reduces pressure in the train-pipe by operating the discharge-valve. Up to this time the auxiliary-air-reservoir pressure is on one side (the left) of piston 9 and the pressure in the train-pipe through chambers 6 and 7 is on the other (the right) side, and an equal pressure on both sides is maintained through the passage-way 23 around the said piston; but when the engineer reduces pressure in the train-pipe, and consequently in chambers 6 and 7, the piston 9 moves over to the right and strikes against the spring-seated stem 8, as in Fig. 3. As the piston 9 thus moves, carrying the stem 11 with it, (through a loose drag connection,) the graduating-valve 10 is also moved to the right and uncovers a port 27. This port is in open communication with the space about the piston-stem and the auxiliary air-reservoir, and as valve 10 uncovers the port 27 air from the auxiliary air-reservoir enters from pipe 4 and passes through ports 14 and 16 to passage 3 to the air-brake cylinder, it being remembered that the case B and part B^4 are not now considered. The brakes are now applied and piston 9 moves slightly back to the left from spring-stem 8 and the graduating-valve 10 closes port 27. Now to discharge the brake-cylinder and recharge the auxiliary air-reservoir the engineer throws a heavier pressure on the train-pipe than that carried normally by the auxiliary air-reservoir, and this forces the piston 9 against the auxiliary-air-reservoir pressure and to the extreme left, as in Fig. 2. This causes the passage-way 26 of the slide-valve 13 to cover the ports 16 and 25, and as 16 is in communication with the air-brake cylinder and 25 is the exhaust-port opening into the outer air it will be seen that the air from the air-brake cylinder is discharged into the outer air and the brakes released. Immediately following this the depleted pressure in the auxiliary air-reservoir is restored to its normal state from the train-pipe by a flow of air through chambers 6 and 7, around piston 9, through passage-way 23, (see Fig. 2,) thence to the space around the slide-valve 13 and to the passage-way 4, leading to the auxiliary air-reservoir. It will thus be seen that the air in the auxiliary reservoir can only be replenished by this old form of device after the air-brake cylinder is discharged and the brake released. This is very objectionable for the reasons already above set forth.

My invention provides means for recharging the auxiliary air-reservoir while the brakes are still applied or before the air is discharged from the brake-cylinder, so that the auxiliary air-reservoir is ready to do its full and effective work at its normal pressure on a second application of brakes immediately after the brakes are taken off. Passage-ways *a a* are formed in the bushing 24 of the triple-valve piston 9, so as to open communication around the piston upon opposite sides of the same when the piston is in position of brakes applied, as in Fig. 1, and then is applied my invention which I term a "retainer" to hold the said piston 9 in this position. This device is contained within a cylindrical casing B, which is bolted between the brake-cylinder head 2 on the left and the triple-valve casing on the right. Within the casing B is a metal bushing B′, having on its exterior surface a circular recess or groove b^2, forming an annular passage-way between the bushing and the casing. Fixed at one end of this bushing is a collar B^4, having a peripheral and cup-shaped flange and a central hole of much less size than the cross-sectional area of the bushing. Through this cup-shaped flange of the collar there is a port b^3, communicating with the annular passage b^2 around the bushing, and said bushing also has several holes b' on the opposite side of the collar and set a little distance from the same, which holes also communicate with the annular passage-way b^2. A longitudinal recess b is also formed within the inner periphery of the bushing, extending a greater length than the thickness of the piston B^3, which plays within this bushing. The piston B^3 is mounted upon a stem B^2, one end b^7 of which slides in and is guided within a hole in the end of the casing B and the other end of which is adapted to strike against the head b^6 of the stem of the slide-valve. The retainer-casing B has a passage-way b^4, that connects the passage-way 3 of the brake-cylinder head with the inlet-port 16 of the triple valve and has also openings b^5, which open communication between the interior of the bushing and the auxiliary-air-reservoir pipe 4.

The operation of my devices in connection with the triple valve is as follows: When brakes are applied, the reduction of air-pressure in the train-pipe acts as already described—*i. e.*, the piston 9 moves over to the right to the position shown in Fig. 3, opening graduating-valve port 27, and air flows from the auxiliary reservoir to the brake-cylinder, as follows: from 4, through b^5, down b' to the annular chamber b^2, up hole b^3 to the space around slide-valve 13, and through ports 27, 14, 16, b^4, and 3 to brake-cylinder, applying the brakes. The valve 10 then graduates and closes port 27, and the piston 9 moves slightly back from the position shown in Fig. 3 to that shown in Fig 1, and the auxiliary reservoir is replenished through the following path: from train-pipe 5, chambers 6 and 7, through passage-ways *a a*, around the piston 9, through slide-valve chamber, down hole b^3, annular chamber b^2, and thence through holes b' and b^5 to auxiliary air-reservoir through pipe 4, thus recharging the said reservoir while the brakes are applied. During this operation the piston 9 is held in this position by my retainer, consisting of the stem B^2 and piston B^3, the stem B^2 rigidly connected to B^3 and both resting against

the stem 11 of the piston 9, these parts being held in this position by differential areas of pressure—that is to say, on the left it has its entire area exposed to the pressure of the auxiliary reservoir, while on the right it rests air-tight against the collar B^4 and has only a small area exposed to the same pressure or an area equal to the opening in the center of the collar B^4. It will thus be seen that the auxiliary air-reservoir is recharged with its full normal pressure before the brakes are released. To release the brakes, a heavier air-pressure than that normally in the auxiliary air-reservoir is thrown into the train-pipe, and this, acting upon the piston 9, drives back its stem 11 and produces a kick on the stem B^2 of retaining-piston B^3, that drives it away from the collar B^4 and destroys its differential value. The piston 9 then passes to its extreme position on the left, as in Fig. 2, while the retaining-piston B^3 passes over holes b' and stops under the passage-way b, and air is then free to exert its pressure from the train-pipe to the auxiliary reservoir through the passage-way 23 around piston 9 and through passage-way b around piston B^3. The parts are all now in the normal running position with brakes released. For the purpose of avoiding prolixity I have not described the complete operation of the triple valve in the exercise of its functions for emergency applications, this being old and not necessary to an understanding of my invention. I will state briefly, however, that in an emergency application an extreme movement to the right of slide-valve 13 through ports 15 and 16 opens the auxiliary reservoir to the brake-cylinder and also through a port 17 forces piston 19 down, opening valve 21. The air-pressure in the train-pipe then lifts valve 22 and passes up around valve 21 directly to the port b^4 and the brake-cylinder, giving the full effect of the air in both the auxiliary reservoir and that in the train-pipe.

I am aware that a triple-valve device is old wherein a piston-chamber has the inner surface of its wall provided with a recharging groove or channel for the passage of fluid under pressure past the valve-operating piston from the brake-pipe to the auxiliary reservoir during the period of application of the brakes, and also that the combination is old of a train-pipe and an air-reservoir with a passage between the two always open one way only, adapted at all times to allow fluid-pressure to enter the air-reservoir; but

What I claim is—

1. In an air-brake of the kind described, the combination with the air-braking cylinder, the auxiliary air-reservoir, and the triple valve, of means for passing the air around the main piston of the triple valve when in the position of brakes applied, and an automatic pneumatic retaining device for holding the piston in this position to restore air-pressure in the auxiliary air-reservoir before discharging the brake-cylinder, said retaining device being made in the form of a casing, and a piston both sides of which are exposed to the auxiliary pressure of the air-reservoir in both of the positions of said piston, and said piston having its opposite sides exposed to unequal areas of pressure when in position of brakes applied and to equal areas when in position of brakes released, substantially as described.

2. In an air-brake of the kind described, the combination with the air-brake cylinder, the auxiliary air-reservoir, and the triple valve, of means for passing the air around the main piston of the triple valve when in the position of brakes applied, and a device for automatically retaining the triple-valve piston in its said position, said device comprising a casing and a piston, the piston having both its sides exposed to the air-reservoir pressure and to unequal areas of pressure when in position of brakes applied, and both sides exposed to the air-reservoir pressure and to an equal area of pressure when the brakes are released, substantially as and for the purpose described.

3. In an air-brake the combination with the brake-cylinder, the auxiliary reservoir, a triple valve and main piston, of means for passing the air around the main piston of the triple valve, and a retaining device between the triple valve and said reservoir, said retainer consisting of a chamber provided with a partition having a central opening and passages communicating with said triple valve and reservoir, an automatic differentially-acting piston within said chamber engaging said partition when the brakes are applied and adapted to contact directly with the main piston through said opening, whereby when the brakes are applied, said main piston is held in position to recharge said reservoir, substantially as described.

4. In an air-brake the combination with the air-brake cylinder, the auxiliary air-reservoir and the main-valve-operating piston, of retaining means for recharging the auxiliary reservoir and not the brake-cylinder, when in position of "brakes applied," said means consisting of a casing, fixed between the brake-cylinder and the triple-valve casing, a bushing within said casing provided with an annular air passage-way between the bushing and the casing, a cup-shaped collar fixed at one end of said bushing and having a central opening, a differentially-acting piston the stem of which extends through said opening and adapted to engage directly with the main piston, said bushing and collar provided with pressure-communicating passages to the auxiliary reservoir and brake-cylinder, substantially as described.

5. A retaining device for the triple-valve piston consisting of a piston, a piston-cylinder having a peripheral chamber b^2 with holes b' and b^3 and channel b, and the differentiating collar B^4 located between holes b' b^3 cov-

ering a portion of the area of the piston when adjusted against the same, substantially as and for the purpose described.

6. The combination of the casing B having openings b^5 and passage-way b^4, the bushing B′ having peripheral chamber b^2, holes b' and b^3 communicating therewith, and channel b, the fixed differentiating collar B^4, and the piston B^3, with the stem B^2, substantially as and for the purpose described.

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

CHARLES L. ANSLEY.

Witnesses:
JOS. H. BLACKWOOD,
W. H. DOOLITTLE.