

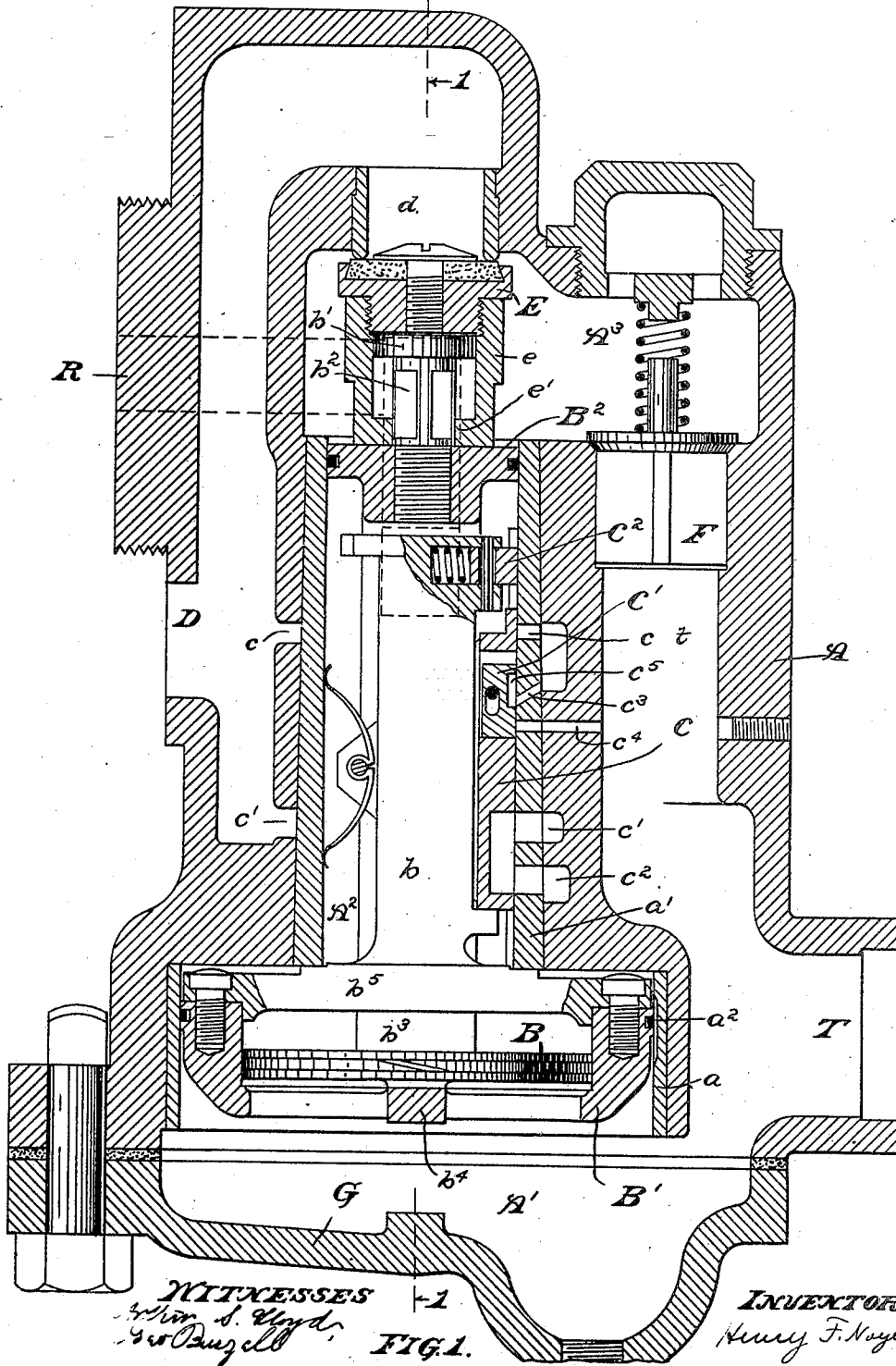
(No Model.)

4 Sheets—Sheet 1.

H. F. NOYES.
AIR BRAKE.

No. 599,349.

Patented Feb. 22, 1898.



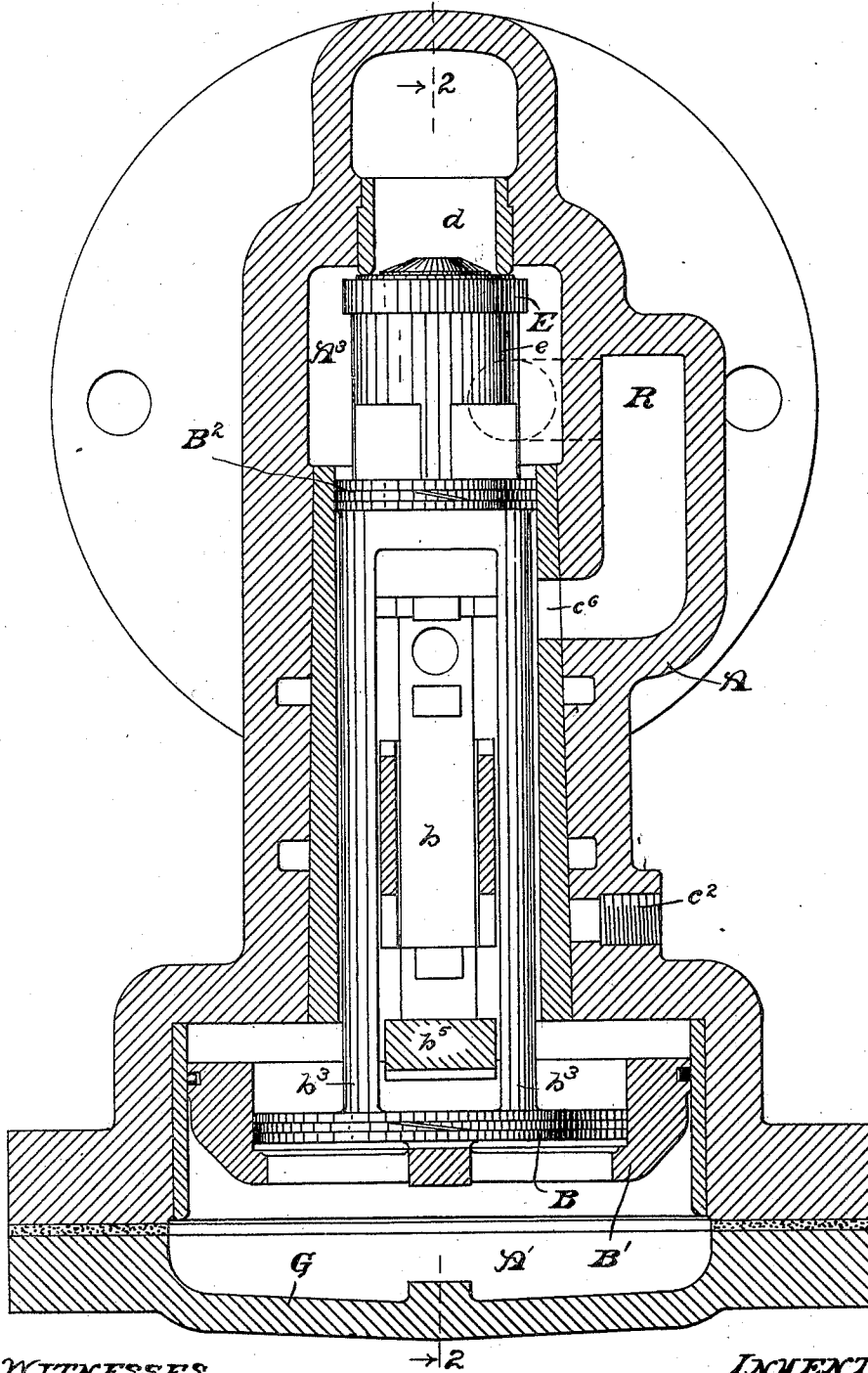
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WITNESSES
Arthur A. Lloyd,
Geo. Burgell

FIG. 2.

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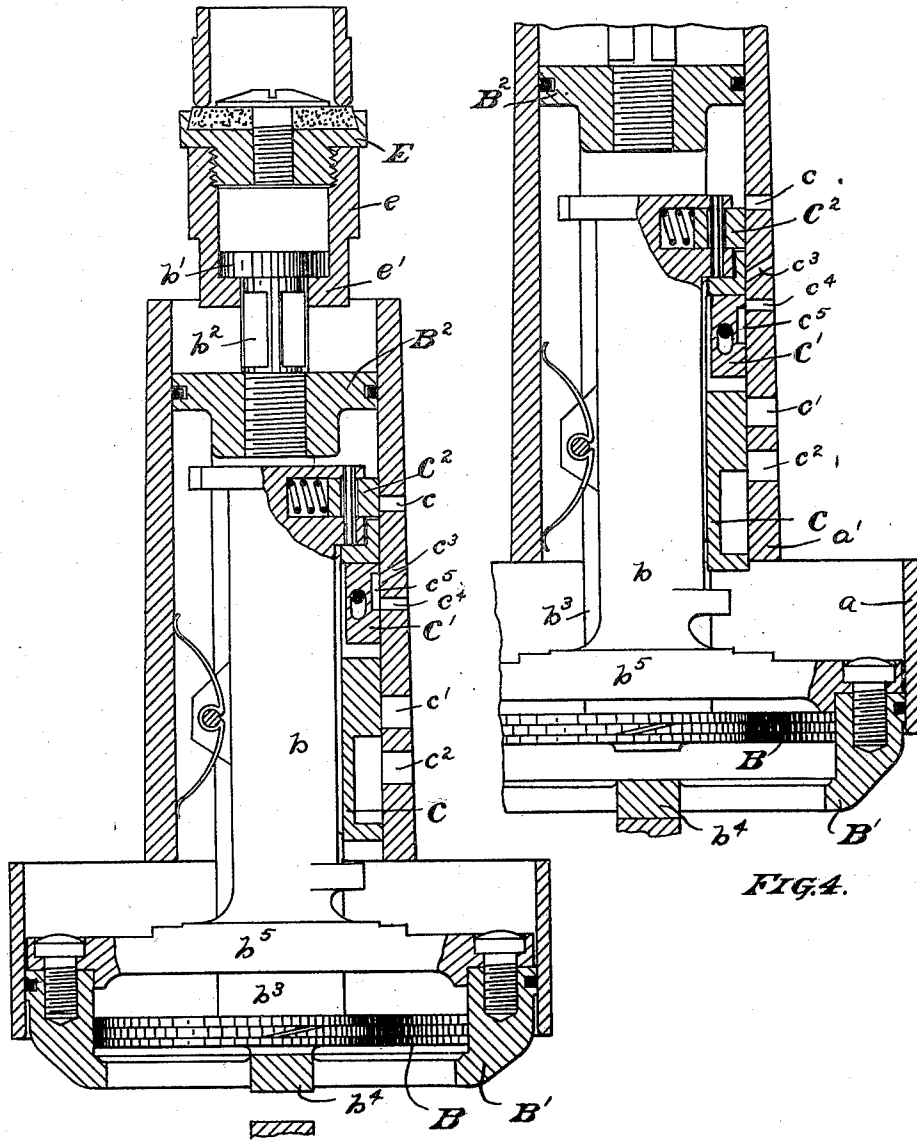


FIG. 3.

FIG. 4.

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UNITED STATES PATENT OFFICE.

HENRY F. NOYES, OF ELGIN, ILLINOIS, ASSIGNOR TO THE WESTINGHOUSE AIR BRAKE COMPANY, OF PITTSBURG, PENNSYLVANIA.

AIR-BRAKE.

SPECIFICATION forming part of Letters Patent No. 599,349, dated February 22, 1898.

Application filed June 17, 1895. Renewed July 21, 1897. Serial No. 645,448. (No model.)

To all whom it may concern:

Be it known that I, HENRY F. NOYES, of Elgin, Kane county, Illinois, have invented certain new and useful Improvements in Triple Valves for Air-Brakes, of which the following is a specification.

The object of my invention is to provide an economical and efficient triple valve, one that will accomplish the same results as those now in vogue and that will be operated in the same way and one that will overcome certain defects at present existing.

There are three points at which my invention especially aims—greater rapidity of action during service applications, a more distinct line of division between service and emergency applications, and greater convenience for inspection and repairs—and the valve I have invented to meet these needs embraces a combination of features shown in previous applications by me as follows: Serial No. 543,398, filed March 27, 1895, Serial No. 549,167, filed May 13, 1895, and Serial No. 546,750, filed April 22, 1895.

The mechanism is fully set forth in the accompanying drawings, in which—

Figure 1 is a vertical sectional elevation on lines 2 2 of Fig. 2; Fig. 2, a vertical sectional elevation on lines 1 1 of Fig. 1; and Figs. 3 and 4, a vertical sectional elevation of the pistons and valves in the positions taken during a preliminary admission from the train-pipe and during a service application, respectively. Fig. 5 is a vertical sectional elevation showing a slightly different arrangement of main valves.

I provide a main casing A, having the chambers A', A², and A³. These chambers are connected as follows: A' with the train-pipe by the passage T, A² with the auxiliary reservoir by the passage R, and A³ with the train-pipe by the passage t and with the brake-cylinder by the passage D.

Forming a partition between the chambers A' and A² are the pistons B and B', B' acting as a bushing in which piston B works. It will be evident that each piston is exposed to auxiliary-reservoir pressure in the chamber A² and to train-pipe pressure in the chamber A', and that they are operated by variations of these pressures.

Working in the chamber A² are the slide-valves C, C', and C², operated by flanges on the stem b of the piston B', this stem forming a T, fastened to the piston B' in a suitable manner. Valve C has a certain amount of lost motion between the stem-flanges that control it and is adapted to govern the exhaust from the brake-cylinder by the ports c' and c², and also normally closes port c, the admission-port for service applications.

Valve C' operates in a rectangular opening cut out of valve C and is controlled by the valve C, being allowed a little more lost motion than valve C has in order to give the latter time to fully close the exhaust-port before valve C', which is adapted to control a preliminary admission from the train-pipe to the brake-cylinder by the ports c² and c', and channel c⁵ opens them.

The graduating-valve C³ acts to control port c after a service application, these three valves being so arranged that the preliminary admission of train-pipe pressure to the brake-cylinder is shut off before the admission of auxiliary-reservoir pressure begins.

The chamber A² is separated from the chamber A³ by the partition B², which is joined to piston B by two half-round connecting-bars b², which straddle the valves C and C' and piston-stem b. In the chamber A³ is the emergency-valve E, controlling the port d, which leads directly to the brake-cylinder. This valve has a hollow stem e, in which works the stem b², which is firmly fastened to the partition B², and is provided with a head b' to operate said valve-stem and valve E by means of shoulder e', and at the same time is allowed enough lost motion to permit the piston B considerable travel without operating this valve.

Interposed in the passage leading from the chamber A³ to the train-pipe is the check-valve F.

The operation of the mechanism is as follows: In the position shown in the drawings, which is familiarly known as "running" position, train-pipe pressure feeds through groove a² to the auxiliary reservoir, keeping the pressures on each side of the pistons B and B' balanced. A slight reduction of pressure in the train-pipe, about three or four

pounds, actuates piston B to assist piston B' in moving the slide-valves to the position shown in Fig. 3 for a preliminary admission from the train-pipe through the ports c^2 and c^4 and channel c^5 and at the same time closes the exhaust-passage c' , while graduating-valve C^2 closes port c . The travel necessary to accomplish this is just sufficient to bring stem-head b' against shoulder e' and valve E, being held to its seat with considerable pressure. The slight difference on the two sides of piston B is not able to overcome this, nor is the piston B' able to move farther alone. Hence valve C' remains in the position to admit pressure from the train-pipe to the brake-cylinder until the train-pipe pressure has been lowered a further amount, or about three pounds more, which makes a difference of pressure on the two sides of piston B' sufficient to move it with valves C, C' , and C^2 to the end of its stroke, shutting off further admission of train-pipe pressure through port c^3 and admitting auxiliary pressure through port c . It will be noted that this difference of pressure is not sufficient to cause piston B to open valve E. Hence this piston remains inoperative during this operation. As soon as the auxiliary-reservoir pressure has by expansion with the brake-cylinder been reduced to an amount slightly less than that in the train-pipe piston B', assisted by piston B, returns with valve C^2 far enough to take up the lost motion allowed valve C between the stem-flanges of b , thus shutting off further admission from the auxiliary reservoir. If it is desired to apply the brakes with greater force, another slight reduction will admit further pressure from the auxiliary reservoir to the brake-cylinder, and this can be continued until the brakes have been applied as hard as desired or until the auxiliary reservoir and brake-cylinder pressure equalize. For an emergency application a reduction of about ten or twelve pounds suffices to cause piston B to move valve E from its seat, allowing train-pipe pressure to pass directly to the brake-cylinder, and at the same time piston B' uncovers port c^6 , allowing reservoir pressure in large volume to join that from the train-pipe in rushing to the brake-cylinder. To release the brakes, an increase of train-pipe pressure serves to return the pistons and valves to their respective positions for releasing the brakes, as shown in Fig. 1 of the drawings.

It will be noted that the stem b^2 has a flat place milled upon it nearly up to the head b' . This stem fits the collar e' very snugly, as also does the head b' fit the hollow stem e , and the object of this flat place is that when the head b' approaches the shoulder e' it drives out the air until the round place on the stem b^2 fully fills the collar e' , when the remaining amount of air is confined and acts as a cushion to prevent the severe blow that would otherwise occur from a sudden movement of the pistons.

In Fig. 5 is shown a slightly-different arrangement of valves for service applications. Main valve C serves to govern the exhaust and the preliminary admission to the brake-cylinder from the train-pipe, and the graduating-valve governs the admission for the auxiliary reservoir alone. The operations and different positions taken are the same as those already explained, the advantage of this construction being that it is rather more simple, but at the same time it does not offer as sensitive a graduating-valve.

Thus it will be seen that I obtain by means of these improvements a very rapid action of the brakes for service applications and at the same time save about one-half the air that has been the custom to exhaust into the atmosphere; that I provide an emergency-valve that is only to be operated by a certain reduction of pressure, doing away with the use of a spring, which is liable to become weak and permit an emergency application when only a service is intended, and that I provide a simple means of getting at the operating mechanism for inspection, as by removing the cap G all the parts can be readily taken out.

While I have described my invention with more or less completeness as regards the details thereof as being embodied in more or less precise form, I do not desire to be limited thereto unduly, as I contemplate all proper changes of form, omission of parts and substitution of equivalents, as circumstances may suggest or necessity render expedient.

I claim—

1. In a brake mechanism, the combination of a casing, a piston working within such casing and whose preliminary travel in the direction necessary to apply the brakes acts to effect a preliminary admission of pressure from a train-pipe to a brake-cylinder, and whose further travel in this direction acts to admit pressure from an auxiliary reservoir to a brake-cylinder, and a second piston working within such casing and adapted to effect a second admission of pressure from the train-pipe to the brake-cylinder, substantially as described.

2. In a brake mechanism, the combination of a casing, a piston working within such casing and whose preliminary travel in the direction necessary to apply the brakes acts to effect a preliminary admission of pressure from a train-pipe to a brake-cylinder, and whose further travel in this direction acts to admit pressure from an auxiliary reservoir to a brake-cylinder, and a second piston working within such casing and adapted to effect a second admission of pressure from the train-pipe to the brake-cylinder, independent of the admission from the train-pipe to the brake-cylinder governed by the first piston, substantially as described.

3. In a brake mechanism, the combination of a casing, a piston working within such casing and adapted to effect a preliminary ad-

mission of pressure from a train-pipe to a brake-cylinder, and a second piston not independent of the first piston working within such casing and adapted to effect an admission of pressure from the train-pipe to the brake-cylinder independent of that effected by the first piston, substantially as described.

4. In a brake mechanism, the combination of a casing, a piston working within such casing and adapted to effect a preliminary admission of pressure from a train-pipe to a brake-cylinder, from an auxiliary reservoir to a brake-cylinder and from a brake-cylinder to the atmosphere and a second piston not independent of the first piston working within such casing and adapted to effect an admission of pressure from a train-pipe to a brake-cylinder independent of that effected by the first piston, substantially as described.

5. In a brake mechanism, the combination of a casing, a piston working within such casing and adapted to effect a preliminary admission of pressure from a train-pipe to a brake-cylinder, and a second piston working within such casing and adapted to effect an admission of pressure from the train-pipe to the brake-cylinder independent of that effected by the first piston, and one of such pistons consisting of a movable cylindrical shell in which the other piston works, substantially as described.

6. In a brake mechanism, the combination of a casing, a piston working within such casing and adapted to effect a preliminary admission of pressure from a train-pipe to a brake-cylinder, from an auxiliary reservoir to a brake-cylinder and from a brake-cylinder to the atmosphere and a second piston working within such casing and adapted to effect an admission of pressure from a train-pipe to a brake-cylinder independent of that effected by the first piston, and one of such pistons consisting of a movable cylindrical shell on which the other piston works, substantially as described.

7. In a brake mechanism, the combination of a casing, a piston working within such casing and whose preliminary travel in the direction necessary to apply the brakes acts to effect a preliminary admission of pressure from a train-pipe to a brake-cylinder, and whose further travel in this direction acts to admit pressure from an auxiliary reservoir to a brake-cylinder, and a second piston working within such casing and adapted to effect a second admission of pressure from the train-pipe to the brake-cylinder, and one of such pistons consisting of a movable cylindrical shell in which the other piston works, substantially as described.

8. In a brake mechanism, the combination of a casing, a piston working within such casing and whose preliminary travel in the direction necessary to apply the brakes acts to effect a preliminary admission of pressure from a train-pipe to a brake-cylinder, and

whose further travel in this direction acts to admit pressure from an auxiliary reservoir to a brake-cylinder, and a second piston working within such casing and adapted to effect a second admission of pressure from the train-pipe to the brake-cylinder, independent of the admission from the train-pipe to the brake-cylinder governed by the first piston, and one of such pistons consisting of a movable cylindrical shell in which the other piston works, substantially as described.

9. In a brake mechanism, the combination of a casing, a main and an emergency piston working within such casing, such emergency-piston adapted to assist said main piston to effect an admission of pressure from a train-pipe to a brake-cylinder upon a reduction of train-pipe pressure, less than that necessary for the operation of such main piston unaided, substantially as described.

10. In a brake mechanism, the combination of a casing, a piston working within such casing and whose preliminary travel in the direction necessary to apply the brakes is assisted by a second piston and effects a preliminary admission of pressure from a train-pipe to a brake-cylinder, and whose further travel in this direction effects the admission of pressure from an auxiliary reservoir to a brake-cylinder, and said second piston adapted to effect a second admission of pressure from a train-pipe to a brake-cylinder, substantially as described.

11. In a brake mechanism, the combination of a casing, a piston working within such casing and whose preliminary travel in the direction necessary to apply the brakes is assisted by a second piston and effects a preliminary admission of pressure from a train-pipe to a brake-cylinder, and whose further travel in this direction effects the admission of pressure from an auxiliary reservoir to a brake-cylinder, and a second piston adapted to effect a second admission of pressure from a train-pipe to a brake-cylinder, and one of such pistons consisting of a movable cylindrical shell in which the other piston works, substantially as described.

12. In a brake mechanism, the combination of a casing, and a piston working within such casing and whose preliminary travel in the direction necessary to apply the brakes assists a second piston to effect a preliminary admission of pressure from a train-pipe to a brake-cylinder, and whose further travel in this direction effects a second and independent admission of pressure from a train-pipe to a brake-cylinder, substantially as described.

13. In a brake mechanism, the combination of a casing, and a piston working within such casing, and whose preliminary travel in the direction necessary to apply the brakes assists a second piston in effecting the escape of sufficient pressure from the train-pipe to the brake-cylinder to accomplish the further

travel of this second piston in this same direction unassisted by the further travel of the first piston, substantially as described.

14. In a brake mechanism, the combination of a casing, and a piston working within such casing, and whose preliminary travel in the direction necessary to apply the brakes assists a second piston in effecting the escape of sufficient pressure from the train-pipe to the brake-cylinder to accomplish the further travel of this second piston in this same direction unassisted by the further travel of the first piston, and a second piston which by its further travel in this direction prevents this escape of pressure from the train-pipe to the brake-cylinder and effects the admission of pressure from the auxiliary reservoir to the brake-cylinder, substantially as described.

15. In a brake mechanism, the combination of a casing, and two movable partitions adapted to divide said casing into three chambers, one of such chambers open to train-pipe pressure, a second chamber provided with valves adapted to control communication between a train-pipe and a brake-cylinder, an auxiliary reservoir and a brake-cylinder and a brake-cylinder and the atmosphere respectively, and a third chamber provided with an emergency-valve adapted to control an independent communication between a train-pipe and a brake-cylinder, substantially as described.

16. In a brake mechanism, the combination of a casing, and two movable partitions adapted to divide said casing into three chambers, one of such chambers open to train-pipe pressure, a second chamber provided with valves adapted to control communication between a train-pipe and a brake-cylinder, an auxiliary reservoir and a brake-cylinder, and a brake-cylinder and the atmosphere respectively, and a third chamber provided with an emergency-valve adapted to control an independent communication between a train-pipe and a brake-cylinder, and the partition between the first and second chambers composed of a cylindrical piston, provided with a main piston working within it, and said main piston firmly connected to the partition between the second and third chambers, substantially as described.

17. In a brake mechanism, the combination of a casing, and two movable partitions adapted to divide said casing into three chambers,

one of such chambers open to train-pipe pressure; a second chamber provided with valves adapted to control communication between a train-pipe and a brake-cylinder, an auxiliary reservoir and a brake-cylinder, and a brake-cylinder and the atmosphere respectively, and a third chamber provided with an emergency-valve adapted to control an independent communication between a train-pipe and a brake-cylinder, and the partition between the first and second chambers composed of a cylindrical piston, provided with a main piston working within it, and said main piston firmly connected to the partition between the second and third chambers, and adapted to operate said emergency-valve and said cylindrical piston adapted to operate the valves in said second chamber, substantially as described.

18. In a brake mechanism, the combination of a casing, a double piston working within such casing and composed of a cylindrical piston having a main piston working within it, a main valve adapted to control communication between ports leading to a train-pipe and a brake-cylinder and to a brake-cylinder and the atmosphere, a graduating valve adapted to control communication between ports leading to an auxiliary reservoir and a brake-cylinder, both main and graduating valves adapted to be operated by the cylindrical piston, and an emergency-valve adapted to control communication between a train-pipe and a brake-cylinder, and to be actuated by the said main piston, substantially as described.

19. In a triple-valve device, the combination of a casing, a piston working within said casing and provided with a stem adapted to operate an emergency-valve, an emergency-valve provided with a hollow stem adapted to contain said piston-stem and to allow it a short range of motion without necessarily moving the emergency-valve, and said piston-stem so constructed that when it has traveled nearly to the limit of its range of motion within the hollow valve-stem it confines enough air in the hollow valve-stem to act as a cushion when it strikes a shoulder of said valve-stem, substantially as described.

HENRY F. NOYES.

Witnesses:
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ESTELLA AKIN.