(No Model.) 2 Sheets—Sheet 1.

J. M. HURST.

AIR BRAKE.

No. 547,351. Patented Oct. 1, 1895.

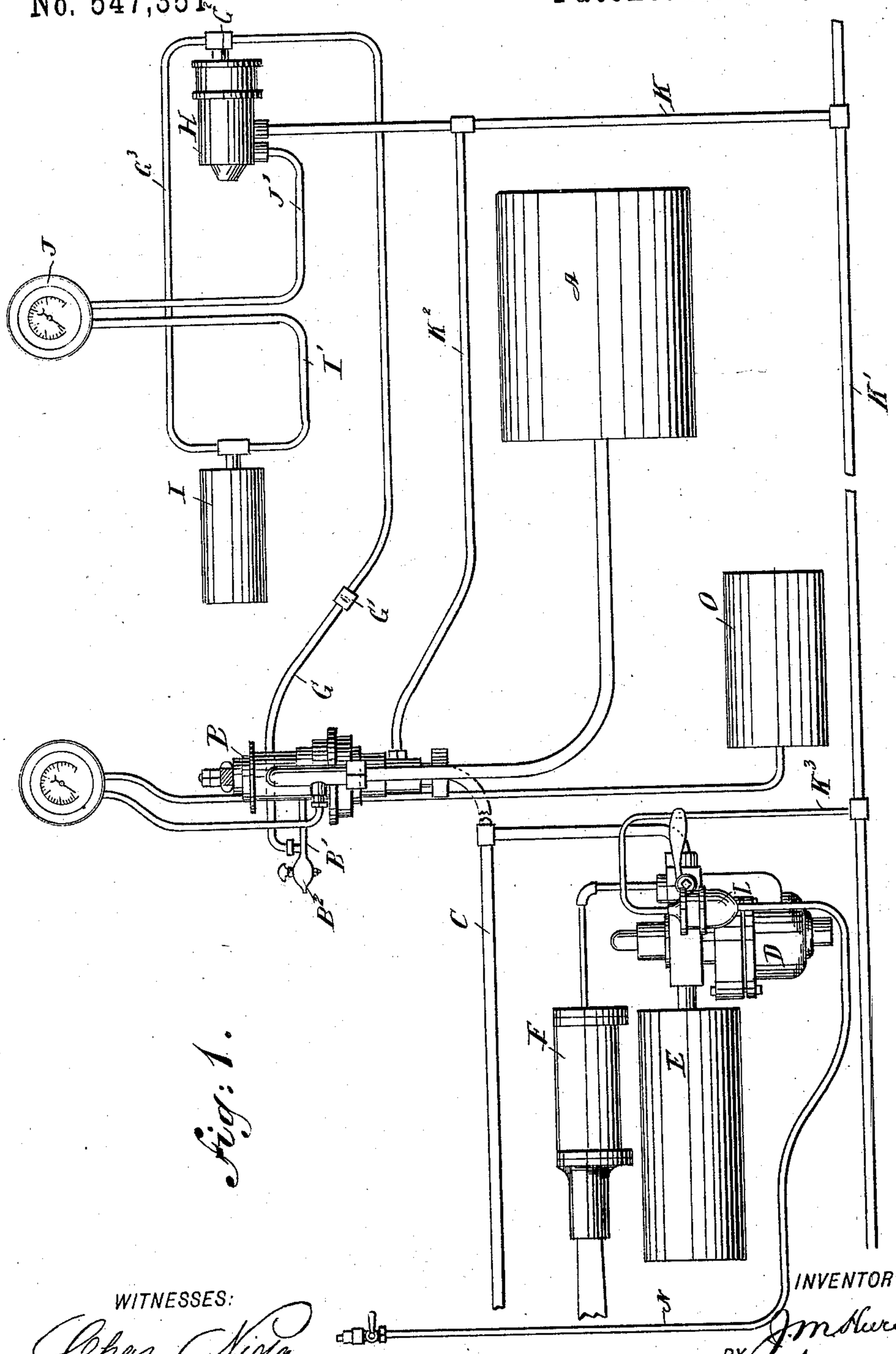

Fig. 1.

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(No Model.) 2 Sheets—Sheet 2.

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Fig: 2.

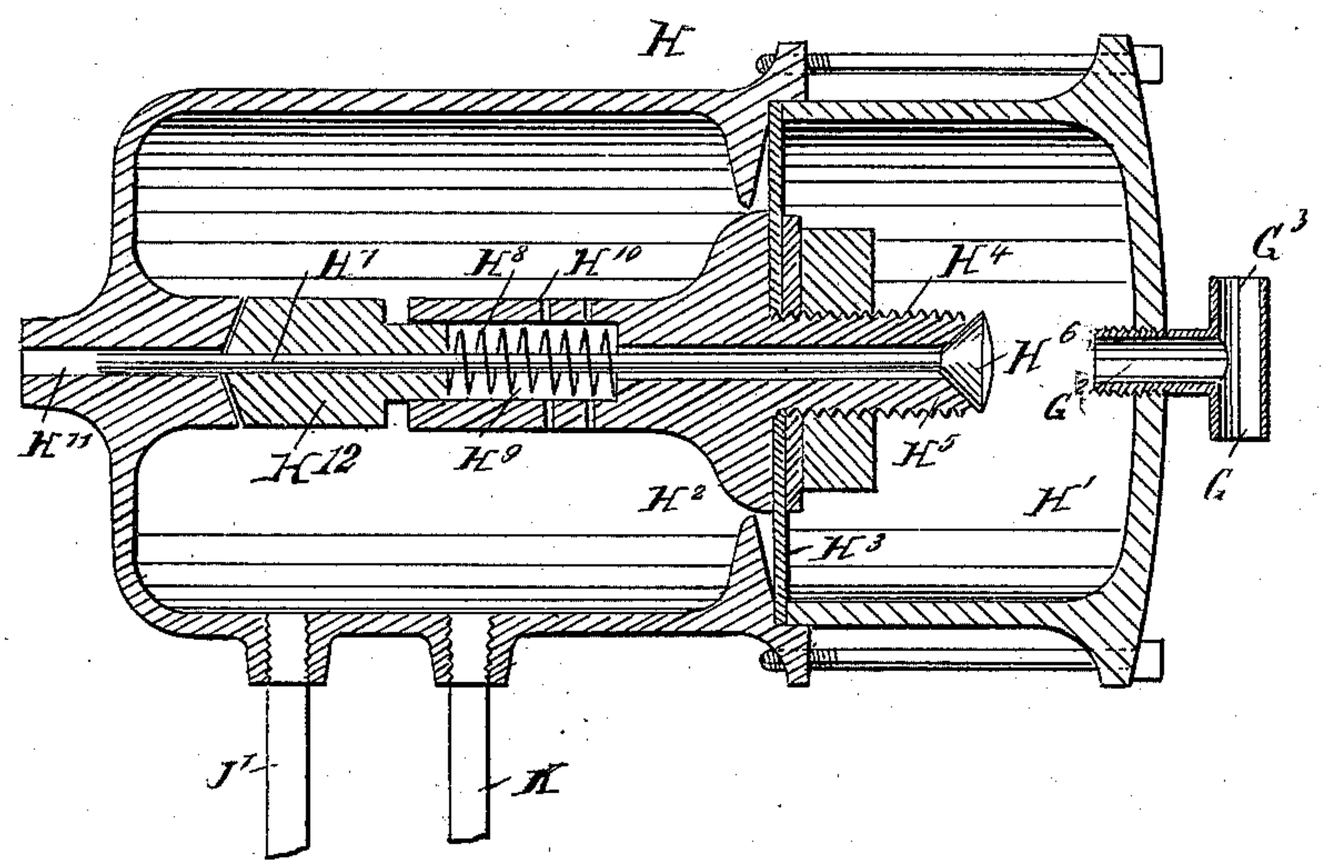
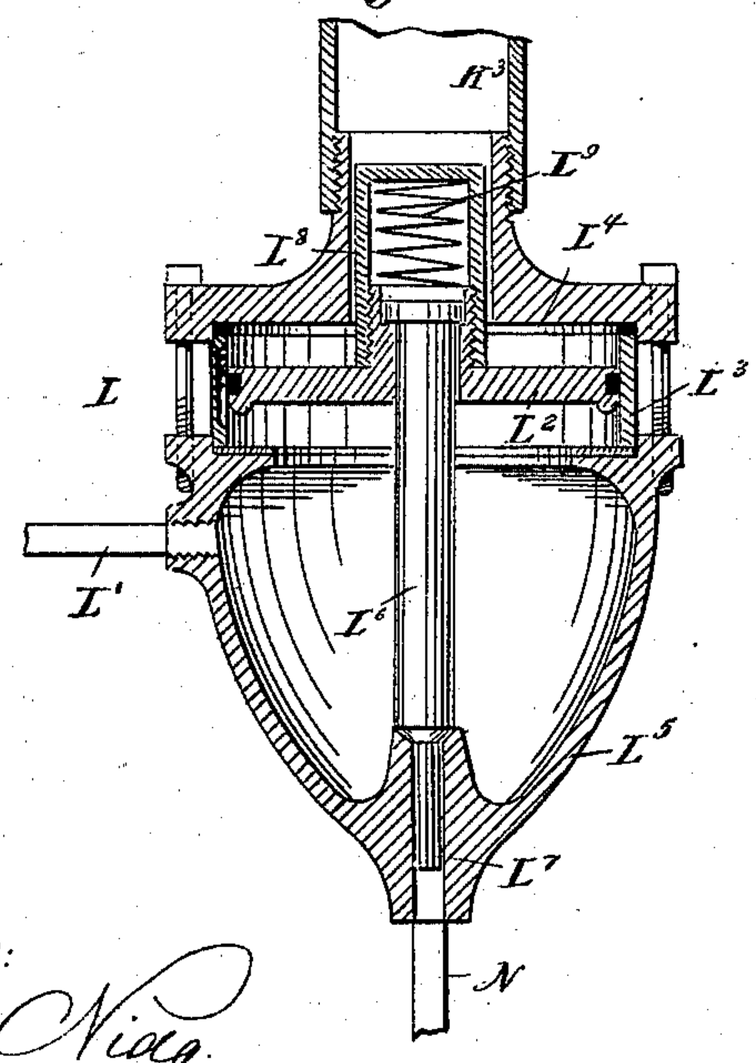


Fig: 3.



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JOHN M. HURST, OF SALT LAKE CITY, UTAH TERRITORY.

AIR-BRAKE.

SPECIFICATION forming part of Letters Patent No. 547,351, dated October 1, 1895.

Application filed September 6, 1894. Serial No. 522,291. (No model.)

To all whom it may concern:

Be it known that I, JOHN M. HURST, of Salt Lake City, in the county of Salt Lake and Territory of Utah, have invented new and useful Improvements in Air-Brakes, of which the following is a full, clear, and exact description.

The invention relates to fluid-pressure air-brakes, and its object is to provide certain new and useful improvements, whereby the air in the brake-cylinders is retained while recharging the auxiliary reservoirs.

The invention consists of a pressure-retaining valve, a pressure-retaining reservoir, a valve interposed between the triple valve and the retaining-valve, and a retaining-pipe connecting the train-pipe with the interposed valve.

The invention also consists in certain parts and details and combinations of the same, as will be hereinafter fully described, and then pointed out in the claims.

Reference is to be had to the accompanying drawings, forming part of this specification, in which similar letters of reference indicate corresponding parts in all the views.

Figure 1 is a side elevation of the improvement. Fig. 2 is an enlarged sectional side elevation of the retaining-valve, and Fig. 3 is a like view of the interposed valve on the triple valve.

On the locomotive is arranged the usual main reservoir A, connected with the engineer's valve B, from which leads the train-pipe C, connected with the triple valves D under the several cars, each triple valve being connected with the auxiliary reservoir E and the brake-cylinder F in the usual manner. From the preliminary exhaust-port of the engineer's valve B leads a pipe B′, containing at its outer end a petcock B^2, and connected by a pipe G, containing a whistle G′ for giving a signal when air is passing through said pipe, with a retaining-valve H by means of a branch pipe G^2, as plainly shown in Figs. 1 and 2. The pipe G is also connected at the branch pipe G^2 by a pipe G^3 with a small reservoir I, connected by a pipe I′ with the pressure-gage J, connected by a pipe J′ with the retaining-valve H. From the retaining-valve H leads a pipe K, connecting with a retaining-pipe K′ extending under the several cars and connected under each car by a branch pipe K^3 with an interposed valve L, connected by a pipe L′ with the exhaust-port of the triple valve D. The pipe K previously mentioned is also connected by a branch pipe K^2 with the engineer's valve B at the exhaust-port of the train-pipe C. The retaining-valve H (shown in detail in Fig. 2) is provided with two compartments H′ and H^2, separated from each other by a piston or diaphragm H^3, supporting in its middle a pipe H^4, formed at the end projecting into the compartment H′ with a valve-seat H^5, adapted to receive a valve H^6. Into the compartment H′ opens the branch pipe G^2, so that communication is established between the pipe B′ of the engineer's valve B and the said compartment. The valve H^6 is provided with a stem H^7, extending loosely through the pipe H^4, and on the said stem is coiled a spring H^8, held in an enlarged portion H^9 of the pipe H^4, the said enlarged portion being connected by ports H^{10} with the interior of the compartment H^2, connected with the pipes J′ and K, previously mentioned. The spring H^8 has a resistance of about three pounds to the square inch relative to the diaphragm H^3, so that when a pressure of more than three pounds is in the compartment H′, then the spiral spring H^8 yields to permit the diaphragm H^3 to move inward toward the compartment H^2, whereby the valve-seat H^5 is moved away from the valve H^6, which remains stationary, so that air can flow from the compartment H′ through the pipe H^4 into the enlarged part H^9, and from the latter through the ports H^{10} into the compartment H^2. Thus the compartment H′ can at no time retain more than three pounds pressure in excess of the pressure in the compartment H^2. The end of the stem H^7 opposite to the valve H^6 is guided in an exhaust-channel H^{11}, and adjacent to the said channel another valve H^{12} is secured to the stem H^7. If the engineer wishes to partially or entirely release the brakes, he opens the petcock B^2 and draws out the desired amount of air from the compartment H′ and reservoir I, so that the pressure in the compartment H^2 unseats the valve H^{12}, and a corresponding amount of air in pounds (not in quantity) escapes to the atmosphere through the port H^{11} in the end of the compartment H^2. The interposed valve L is similarly constructed to the retaining-

valve H, the said interposed valve being provided with a diaphragm or piston L^2, mounted to slide in a ring L^3, held between the cap L^4 and the body L^5 of the said valve, as plainly indicated in Fig. 3. The piston L^2 is provided with an elastic packing-ring or snap-ring having sufficient frictional engagement with the ring L^3 to prevent the piston from changing its position under the influence of gravity. Two compartments are thus formed on opposite sides of the piston L^2, the uppermost compartment—that in the cap L^4—being connected with the pipe K^3, while the compartment in the body L^5 is connected by the pipe L′ with the exhaust-port of the triple valve D.

The piston L^2 is fitted to slide on a piston-rod L^6, seated at its lower end in an opening L^7, connected with a pipe N, leading to the atmosphere, and the upper end of the said rod L^6 fits into a cap L^8, forming part of the piston L^2 and containing a spring L^9. On the inside of the ring L^3 is cut a small groove through which air can pass by the piston L^2, and this groove is for the purpose of allowing air to flow directly from the retaining-pipe to the brake-cylinder, or, on the other hand, from the brake-cylinder to the retaining-pipe when the triple valve is in the release position, thereby securing equal pressure in all the brake-cylinders throughout the entire train. The groove in the ring L^3 is very small and is only intended to overcome differences of two pounds air-pressure or less. If the difference is more than two pounds, then the piston L^2 is forced toward the weaker side to the end of its stroke, and there forms an air-tight joint against the gaskets in the cap L^4 or against the gasket in the upper part of the body L^5.

When the engineer wishes to retain the brakes before set, he closes the petcock B^2 before he makes the application of the brakes. When he applies the brakes, air passes from the preliminary exhaust-port of the engineer's valve B and passes through the pipe G into the compartment H′ of the retaining-valve H and into the reservoir I. While this is going on air also passes from the exhaust-port of the train-pipe C through the pipe K^2 into the pipe K, and from the latter air passes into the compartment H^2 of the retaining-valve H. The air also passes from the pipe K into the retaining-pipe K′, and from the latter through the branch pipe K^3 into the compartment in the cap L^4 of the interposed valve L. While the above is going on air also passes from the auxiliary reservoir E of each car to the brake-cylinder F of each car.

The relation in regard to the size of the auxiliary reservoir to the brake-cylinder is the same as the retaining-pipe has to the train-pipe, and the same relation is also maintained in regard to the usual auxiliary reservoir O on the engine, the retaining-valve H, and the reservoir I. Now when the engineer closes the cock B and applies the brakes sufficiently for the reservoir O to charge the compartment H′ of the retaining-valve H and the reservoir I, say to fifteen pounds pressure, then the train-pipe C charges the retaining-pipe K′ with the same amount and the auxiliary reservoir E charges the brake-cylinder F with the same amount. As soon as the gage shows the desired amount, then the engineer turns the brake-valve into the released position, so as to enable him to recharge his train-pipe C and the auxiliary reservoirs E on the cars. The brake-cylinder exhausts into the lower compartment of the interposed valve L, but the pressure in the upper compartment of the said interposed valve prevents the valve L^6 from unseating, and the valve and piston remain in their normal position, and the groove in the ring L^3 equalizes all. Now, if the engineer wishes to partially or entirely release the brakes, he opens the petcock B^2, to let the desired amount of air flow from the retaining-valve H and reservoir I. A corresponding amount of air in pounds flows from the retaining-pipe K′, which allows the piston L^2 in each interposed valve L to rise and unseat the valve L^6, so that a corresponding amount in pounds flows from each brake-cylinder through the port L^7 of the interposed valve to pass through the pipe N and to the atmosphere. Each car thus exhausts its own air, and the amount is shown by the gage on the engine. It will be understood that by the use of the device described the engineer is enabled to control the air-pressure in the auxiliary reservoir and brake-cylinder, so that the air now lost in replenishing the auxiliary reservoirs E is retained, and the pressure in the air-brake cylinders can be increased or diminished at will, and the pressure in all the brake-cylinders of the train is equalized and all the air now lost in applying the brakes is saved.

I do not limit myself to the special construction of the valve shown in the retaining-valve H, as it is evident that a piston or slide valve may be employed for the same purpose. I also do not limit myself to the special construction of the interposed valve L on the triple valve, as the construction may be varied and other devices substituted to accomplish the same purpose.

By providing the reservoir I and the retaining-valve H, I am enabled to employ the arrangement hereinbefore described on a train composed partly of cars equipped with my improved brake apparatus and partly of cars provided with air-brakes of other systems. In such a case when the brakes are applied and it is desired to retain the exhaust-air from the train-pipe the cock B^2 is closed, as above described, and a certain amount of air will escape from each car into the train-pipe C and pipe K; but as only a part of the cars have retaining-pipes K^3 more air will enter the pipes K K′ K^3 and the retaining-valve H than the said pipes and valve can hold at the intended pressure, and in

consequence thereof the valve H^{12} will be raised off its seat and the superfluous air from the cars not equipped according to my invention will escape through the outlet H^{11}. The provision of the reservoir I and retaining-valve H also enables the enginer to partly release the brakes by slightly opening the cock B^2.

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

1. A fluid pressure brake provided with a retaining pipe connected to the train pipe to receive the exhaust fluid therefrom, and a connection between the retaining pipe and the brake cylinders, as and for the purpose set forth.

2. A fluid pressure brake provided with a retaining pipe connected to the train pipe to receive the exhaust fluid therefrom, a pressure retaining valve connected to the said retaining pipe, and a connection between the retaining pipe and the brake cylinders, substantially as shown and described.

3. A fluid pressure brake provided with a retaining pipe connected to the train pipe to receive the exhaust fluid therefrom, a pressure-retaining valve located on the engine under the control of the engineer and connected to the said retaining pipe, and an interposed valve between the brake cylinder and the retaining pipe, substantially as described.

4. A fluid pressure brake provided with a retaining pipe connected to the train pipe to receive the exhaust fluid therefrom, and an interposed valve between the triple valve and the retaining pipe, substantially as described.

5. A fluid pressure brake provided with a retaining pipe connected to the train pipe to receive the exhaust fluid therefrom, and extending along the train, a pressure-retaining valve under the control of the engineer and connected to the said retaining pipe, and connections between the retaining pipe and the brake cylinders of the several cars, substantially as described.

6. In a fluid pressure air brake, the combination with the engineer's valve and the triple valve, of a pressure retaining valve connected with the said engineer's valve, a pressure-retaining pipe connecting the said pressure retaining valve with the exhaust ports of the triple valves, and an interposed valve between the said retaining pipe and the exhaust ports of the triple valves, substantially as shown and described.

7. A fluid pressure brake provided with a retaining pipe connected to the train pipe to receive the exhaust fluid therefrom, a pressure-retaining valve under the control of the engineer and connected to the said retaining pipe, and an interposed valve between the said pipe and the exhaust port of the triple valve, substantially as described.

8. A fluid pressure brake, provided with a pipe adapted to contain fluid under pressure, and a valve interposed between the said pipe and the exhaust port of the triple valve, said interposed valve having a port for the exhaust of the fluid from the triple valve when the brake is released, and a passage for the fluid from the pipe to travel to the triple valve and hence to the brake cylinder when the brake is applied, substantially as described.

9. In a fluid pressure air brake, a pressure retaining valve provided with two compartments, a diaphragm or piston for separating the two compartments, a pipe held on the said diaphragm, and a valve held on one end of the said pipe and adapted to establish communication between the said two compartments, substantially as shown and described.

10. In a fluid pressure air brake, a pressure retaining valve provided with two compartments, a diaphragm for separating the two compartments, a pipe held on the said diaphragm, a valve held on one end of the said pipe and adapted to establish communication between the said two compartments, and a spring pressing on the said pipe, to hold the latter and the valve in a closed position, substantially as shown and described.

11. In a fluid pressure brake, a pressure retaining valve provided with two compartments, a diaphragm or piston for separating the two compartments, a pipe held on the said diaphragm, and adapted to establish a communication between the said two compartments, a valve adapted to close one end of said pipe, and another valve connected to the first named valve and adapted to open or close an outlet port in one of the compartments, substantially as described.

12. A fluid pressure brake, provided with an interposed valve between the exhaust port of the triple valve and the pressure retaining pipe, the said interposed valve comprising a valve body, a piston or diaphragm fitted to move therein, seats for producing an air tight joint when the piston is at either end of its stroke, the valve body being provided with a groove which permits air to pass from one side of the piston to the other when the piston is not in contact with its seats, substantially as described.

13. A fluid pressure brake provided with an interposed valve between the exhaust port of the triple valve and the pressure retaining pipe, the said interposed valve comprising a valve body, a piston or diaphragm fitted to move therein, and a piston rod carried by the said piston and having a yielding connection therewith, said piston rod being adapted to open and close an outlet port leading from the said valve body, substantially as described.

14. A fluid pressure brake provided with a train pipe, a pressure retaining pipe connected to the train pipe to receive the exhaust air therefrom, and an interposed valve controlling the exhaust from the brake cylinder and connected to the pressure retaining pipe, substantially as described.

15. A fluid pressure brake provided with a

train pipe, a pressure retaining pipe connected to the train pipe to receive the exhaust air therefrom and an interposed valve controlling the exhaust from the brake cylinder and connected with the pressure retaining pipe, said valve being so constructed that when the brake is applied the air from the pressure retaining pipe can pass into the brake cylinder, substantially as described.

JOHN M. HURST.

Witnesses:
JOHN MONTGOMERY, Jr.,
T. J. ANDERSON.