

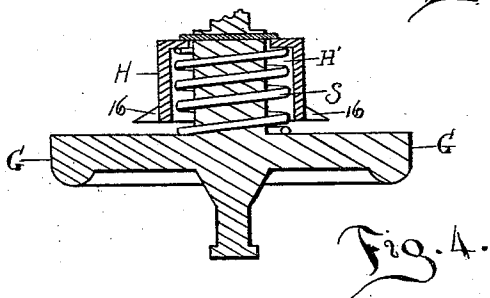
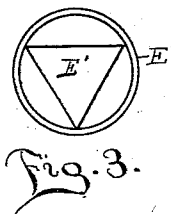
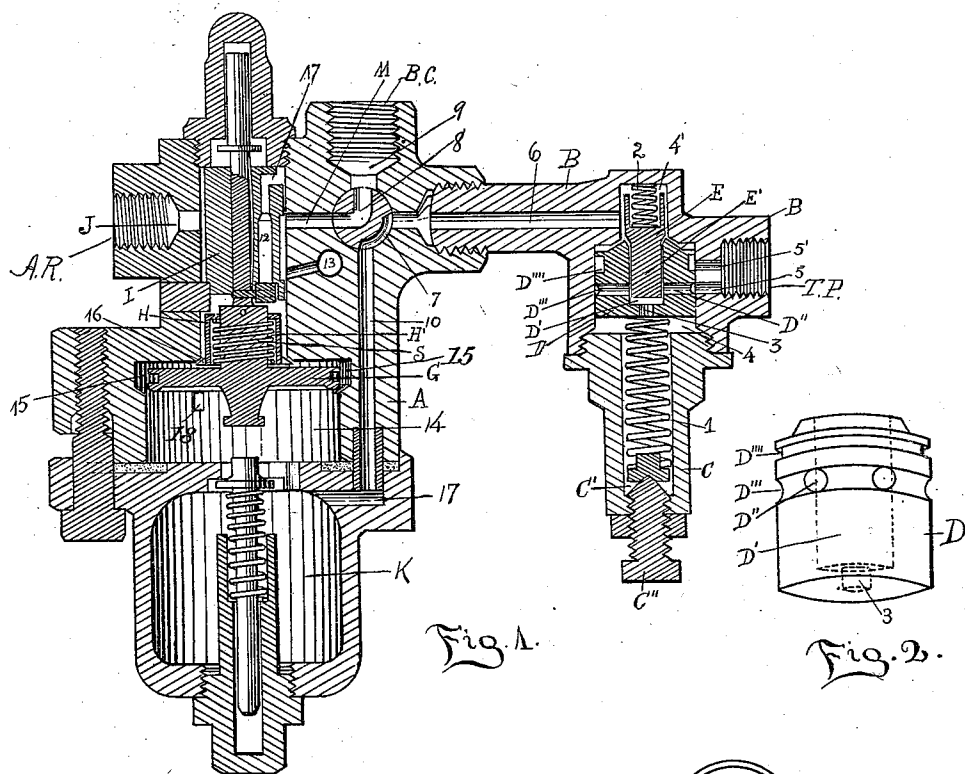
(No Model.)

2 Sheets—Sheet 1.

S. H. HEGINBOTTOM.  
VALVE FOR AIR BRAKES.

No. 546,664.

Patented Sept. 24. 1895.



WITNESSES:

*Samuel Robbins*  
*H. O'Keefe*

*Samuel Heginbottom*

INVENTOR

BY

*A. H. Heginbottom*

ATTORNEY

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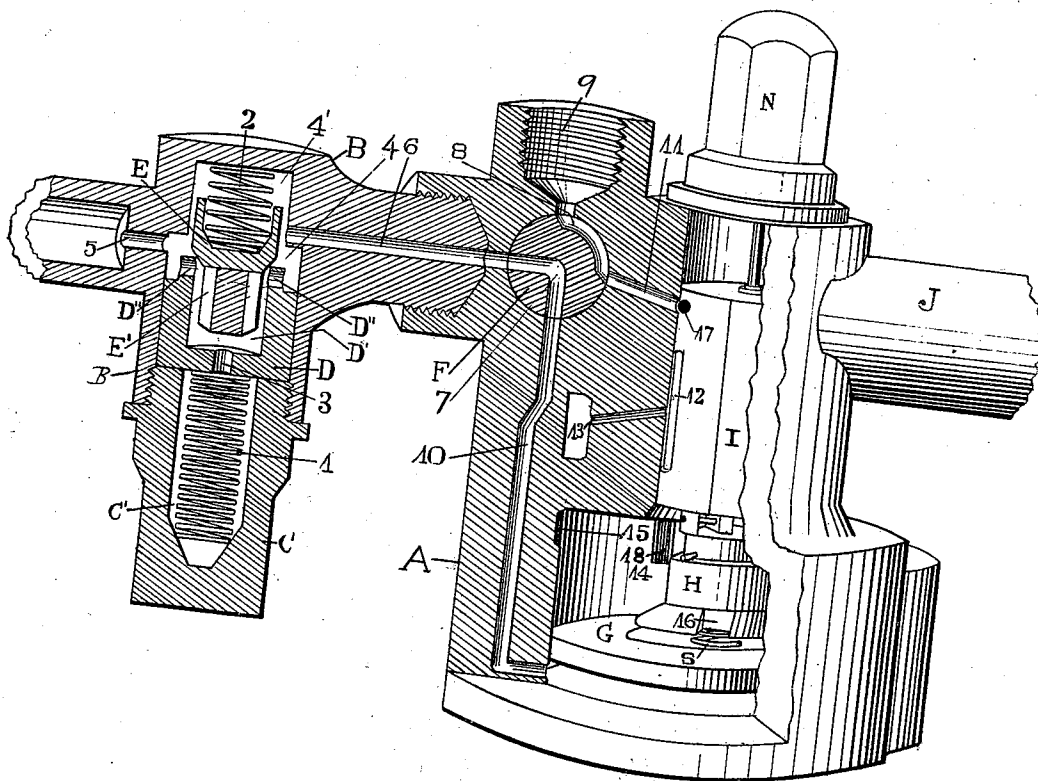


Fig. 5.

WITNESSES:

Francis Robbins  
J. O. Keefe

Samuel H. Heginbottom

INVENTOR

BY

A. H. Ward

ATTORNEY

# UNITED STATES PATENT OFFICE.

SAMUEL H. HEGINBOTTOM, OF SAGINAW, MICHIGAN, ASSIGNOR OF ONE-HALF TO STANFORD T. CRAPO, OF SAME PLACE.

## VALVE FOR AIR-BRAKES.

SPECIFICATION forming part of Letters Patent No. 546,664, dated September 24, 1895.

Application filed April 30, 1894. Serial No. 509,605. (No model.)

*To all whom it may concern:*

Be it known that I, SAMUEL H. HEGINBOTTOM, a citizen of the United States, residing at Saginaw, E. S., in the county of Saginaw and State of Michigan, have invented a certain new and useful Valve for Air-Brakes; and I do 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 the letters and figures of reference marked thereon, which form a part of this specification.

My invention is an attachment to the air-brake mechanism of a locomotive which makes possible certain modifications of the triple-valve construction and mode of operation.

The attachment or improvement herein-after described radically effects the working of the driver-brake and furnishes the following distinct advantages, viz: It is an automatic detector of the stopping of the pump or any loss of pressure which will bleed the train reservoirs, but still not be sharp enough to move the triple valves and set the brakes. It permits the reservoir of the engine-brakes to be filled almost instantly and maintains under all circumstances the maximum effectiveness of this brake. It provides for an automatic action of the driver-brakes simultaneous with the train-brakes when the engineer's valve is thrown to emergency position. This makes the emergency-stop doubly effective, because of the instantaneous response of the brake on which the engineer is not accustomed to rely. It saves wear and tear of the engine, because the driver-brake will not be set on usual service stops. It causes the train to be brought to a stop with greater smoothness and prevents the slack from running up to the engine.

This apparatus consists of what is called a "driver-brake-retaining valve," which is situated between the train-pipe and triple-valve piston and adapted to allow the free passage of air from the train-pipe through the triple-valve, but to resist the backward flow

of the train-pipe by means of springs until the pressure from the lower side of the triple-valve piston overcomes the springs. Operating in conjunction with this retaining-valve is my improved driver-brake triple-valve piston, in which, in order to permit the driver-brake piston-valve reservoir to charge more quickly, I increase the number of ports around the piston and move the piston below the ports by a spring when the reservoir is filled.

In the drawings, Figure 1 is a sectional view of the apparatus and triple valve with improved piston and ports. Fig. 2 is a perspective of the retaining-valve piston. Fig. 3 is bottom view of the valve. Fig. 4 is a sectional view of my improved triple-valve piston. Fig. 5 is a sectional perspective showing the retaining-valve in position when the brake is set, also showing another form of the retaining-valve piston.

A is the triple-valve casing. B is the casing containing the retaining-valve, which I place somewhere between the train-pipe and the triple-valve piston. The channel 5 is connected to the train-pipe and conveys the air to the driver-brake-retaining piston-valve, as shown in Figs. 1 and 5. In Fig. 1 two channels 5 and 5' are shown, the channel 5 being lower and nearer to the piston-ports. The channel 5' is above 5 and nearer to the valve-seat. There may be two or more of these channels 5' in order to afford a freer movement of the air from the triple-valve chambers.

6, 7, and 10 is a channel conducting the air to the triple-valve casing A. B contains, also, a cylinder-chamber 4, in which is a piston D and valve E. C is the lower or bottom cap of this cylinder and contains a central annular hole C', receiving a spiral spring 1, which extends beyond the inner edge of the cap and against the piston D, holding it to its extreme upper throw. The set-screw C'' in the lower end of the bottom cap, as shown in Fig. 1, extends into the annular hole C' against the spring 1, and by it the tension of the spring may be regulated.

4 is the chamber containing the piston D and 4' the valve-chamber. The piston-cham-

ber 4 is much larger than the valve-chamber 4', the head of the piston D closing the opening into the smaller chamber 4'.

The piston D has in its head a central annular orifice D', adapted to receive the wing E' of the valve E, which occupies the chamber 4'. In the piston D are ports D'', passing from the outside into the central orifice. These ports are connected with the channel 5 when the valve is closed and conduct the air into the orifice D'. In order to permit the ready flow of air to the valve E, the piston D may be provided with a circumferential groove D''' in the plane of the ports D'', permitting the air to pass around the piston along the groove to all the ports. Fig. 5 shows another form of the piston D. This piston does not contain the ring D''', and instead of a number of ports D'', as shown in Fig. 2, it has but one port D'' passing entirely through the end of the piston. It leads to the chamber D' and is directly opposite channel 5 when the brakes are not set, thus permitting the air to pass freely from train-pipe 5, through port D'', into chamber D', then around valve E into channel 6, leading to the reservoir. The backward flow from the reservoir through channel 6 will strike upon the head of the piston and valve and force it downward, when a certain number of pounds pressure is obtained, thus allowing the air to pass freely around the valve, above the top of the piston, and out through chamber 5. As many ports may be provided as desired.

E is the valve previously mentioned, resting upon the piston-head, with its wing E' in the orifice D' of the piston-head, as described. When resting upon the piston-head, no air can pass from the train-pipe through the triple valve; but under even a small pressure from the train-pipe the valve will be opened and the air pass through and into the channel 6, leading to the triple valve and reservoir. When the reservoir is filled, the pressure being equalized, the coiled spring 2 between the valve-head and the end of the chamber 4' will close the valve, which will remain closed so long as the pressure in the channel 6 equals the pressure in the channel 5. It is obvious that if the pressure in the train-pipe be increased it will again open the valve and fill the triple-valve chamber and reservoir; but when the pressure in the train-pipe is lowered the valve remains in its seat—in fact is held there by the pressure from the channel 6—and when the pressure from the train-pipe is sufficiently decreased for the pressure from the channel 6 to overcome the resistance of the spring 1 the piston D will be forced down upon the spring, thereby opening up a free passage for the air from the triple-valve chamber around the valve E, through the channels 5', to the train-pipe. In order that the backward flow from channel 6 may be immediate when the spring 1 is depressed, I provide the channels 5', leading

from the upper part of chamber 4, so that a very slight depression of the spring will force the piston by these channels and open an exit for the air. It is also seen that when the pressure underneath the piston D has been sufficiently reduced to press down the spring 1 the piston D will leave its seat, and the pressure in channel 6 will then extend into the top of chamber 4 and press on the larger surface of the piston D, which will accelerate the movement downward, opening the passages 5', which will allow the air in channel 6 to escape and move the triple valve and set the brake. It is obvious that the spring 1 can be made to resist the pressure of any number of pounds desired, and that not until the pressure in the train-pipe has been reduced below that number of pounds can the driver-brakes be set.

G is the piston of the driver-brake triple valve, having on its stem the ordinary slide-valve I, moving with it and having ports and passages governing ports and passages 17 and 8, 9, and 11 in the casing leading to the brake-cylinder and passage 13, to the atmosphere.

18 is a port like that now in triple valves and extending a like distance below the piston G when the air is equal on both sides of the piston and the spring S is extended. 15 is a port or ports much larger than 18, which when the air is equal on both sides of the piston G and spring S extended are completely covered by piston G; but when the pressure is on the under side of piston G and spring S compressed by the piston these ports are opened, allowing a large passage for the air upward.

H is an auxiliary device loose on the piston-stem and seated against the cylinder-shoulders when the piston is up and allowing the piston to move independent of it for a limited distance, as when actuated by the spring S, hereinafter described. 16 are ports on the edge of this auxiliary device II. In a recess H' in the under side of the auxiliary device II and between it and the piston and bearing against each is a spring S, which separates the auxiliary device II from the piston when not under pressure. The object of placing this spring S between the auxiliary device II and the piston G is, as previously stated, to allow the piston to rise slightly when the pressure is on the under side, and thus open the large ports 15, through which the reservoir is almost instantly filled, and when the pressure is equalized to again put the piston in such a position where the ports 15 are closed, when it will have its usual sensitiveness to a decrease in pressure in channel 6. It is after the brakes on the train and the engine have been set and the engineer throws his lever to release the brakes that the operation of this auxiliary device becomes effective. When the brakes are released, the air from the main reservoir passes at once through the retaining-valve herein described and through the large

ports around the triple-valve piston and filling the auxiliary reservoir before the air has commenced to pass into the reservoirs on the balance of the train, the engine-reservoir being so much nearer the seat of pressure. As soon as the engine auxiliary reservoir is filled, which actual test demonstrates to be in eight seconds, the piston is moved by the spring S below the large ports. The driver-brake is now effective and is the only brake on the train that can now be used by the engineer, should emergency require it. It is obvious that the pressure in the train-pipe will be gradually reduced as the reservoirs on the different cars are being filled. This reduction would ordinarily set the driver-brake again; but the retaining-valve heretofore described prevents this by holding the pressure in the auxiliary reservoir, as heretofore described. The first rush of air from the main reservoir will fill the locomotive auxiliary reservoir, and should the pump give out now, as it is most liable to, if at all, the engineer would have a brake at his command, as we have seen. As previously stated, the retaining-valve may be adjusted to resist any number of pounds backward pressure desired, and that not until that number of pounds pressure has been reduced in the train-pipe will the driver-brake be set, so that it is obvious that the engineer making service stops can hold in reserve his driver-brake; but should emergency require it he can by the sudden exhaustion of the train-pipe apply all the brakes on the train, in which event the driver-brake would operate first on account of its nearness to the exhaust-valve.

It is obvious that the retaining-valve mechanism and casing can be so adjusted that the engine-brake can be gradually set for service stops, instead of with full pressure on the first application, as described herein.

Any change in the mechanism described suggested by mechanical skill can be made without departing from the principle of my invention. Therefore I do not confine myself to the special form and arrangement of parts shown and described.

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

1. In an automatic air brake mechanism, means in the engine brake mechanism for detecting a loss of pressure in the train pipe, comprising a valve located in the brake operating mechanism on the engine and between the train pipe and the engine triple valve piston chamber, with valve ports opening into the train pipe connection and the triple valve piston chamber, the valve adapted to resist a moderate reduction of pressure in the train pipe and to discharge air into the train pipe when its resistance has been overcome by the pressure in the piston chamber.

2. In an automatic air brake system, means located in the brake mechanism for auto-

matically detecting leakage in the train pipe comprising an intermediate piston valve located in the passage way leading to the train pipe from the engine triple valve chamber and adapted to allow the passage of air to the brake operating device of the engine and to prevent the backward flow thereof until the pressure of the train pipe is reduced to a certain degree, when the valve will be operated and discharge air from the brake triple valve piston into the train pipe, substantially as described.

3. In an automatic air brake system, a piston valve located in the main passage from the engine triple valve chamber to the train pipe, adapted to allow the passage of air to the brake triple valve chamber, and to resist by means of springs the backward flow of air into such passage, substantially as described.

4. In an automatic air brake mechanism a piston held to its extreme throw by a spring and a check valve arranged in the head of the said piston, the said valve held to its seat by a spring, ports leading from the side of the piston chamber to the valve seat, all in a casing located intermediate of the train pipe and the triple valve piston chamber, and having passages leading from the train pipe to the piston chamber and from the check valve chamber to the brake mechanism.

5. In a brake mechanism, the combination with the train pipe the triple valve and reservoir, of a casing containing a valve mechanism arranged intermediate of the train pipe and the valve mechanism consisting of a piston held to its extreme throw by a spring and a check valve arranged in the head of the said piston, the valve held to its seat by a spring, ports leading from the side of the piston to the valve seat, the passage in the casing leading from the train pipe to the piston chamber and through the valve chamber to the brake operating mechanism, substantially as described.

6. In an automatic air brake mechanism the combination with the train pipe, the triple valve and reservoir of the retaining valve mechanism between the train pipe and the brake operating mechanism, a triple valve chamber having large ports and the auxiliary mechanism on the triple valve piston consisting of the loose collar H having edge ports and the spring between the collar and the piston whereby the piston will be actuated by and cover the large cylinder ports when under equal pressure, substantially as described.

7. In a brake mechanism, the combination with the triple valve chamber having the long and short ports 18 and 15 respectively, of the piston, the triple valve, and the loose collar H, having edge ports 16, the spring S between the collar and the piston, separating them when under equal pressure and thereby closing the shorter ports 15, by the piston, substantially as described.

8. In an automatic air brake system, the

combination with the mechanism described  
for filling the brake reservoir quickly, con-  
sisting of a triple valve chamber having large  
ports permitting the air to freely pass around  
5 the piston to the auxiliary reservoir, means  
for actuating the piston by and cover the  
large ports when the reservoir is filled, of a  
retaining valve between the triple valve pis-  
ton and the train pipe adapted to resist the

pressure from the triple valve chamber when the  
the pressure in the train pipe is reduced.

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

SAMUEL H. HEGINBOTTOM.

Witnesses:

A. H. SWARTHOUT,  
S. T. CRAPO.