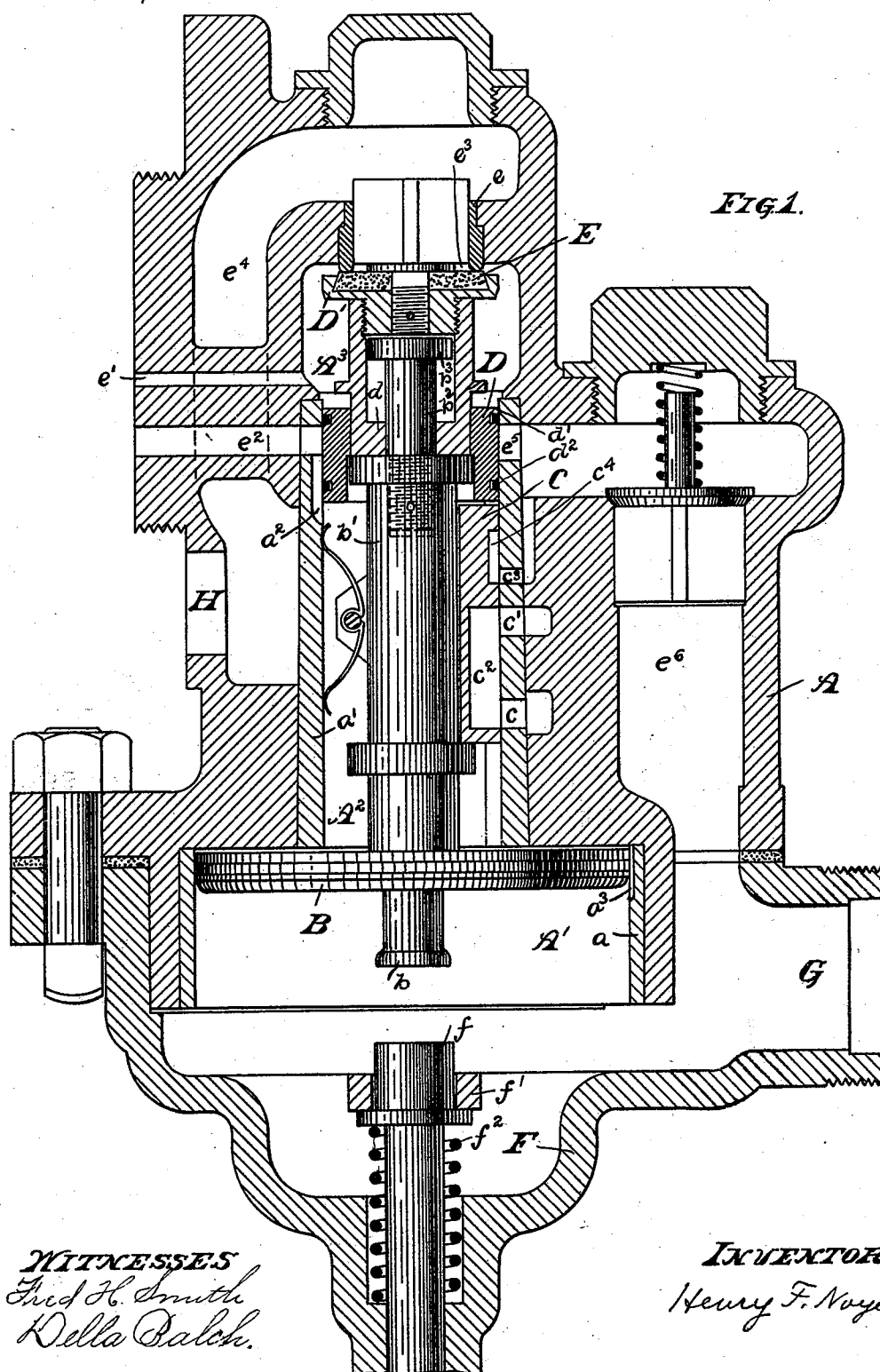


(No Model.)

H. F. NOYES.
AIR BRAKE.

No. 553,565.

Patented Jan. 28, 1896.



UNITED STATES PATENT OFFICE.

HENRY F. NOYES, OF ELGIN, ILLINOIS.

AIR-BRAKE.

SPECIFICATION forming part of Letters Patent No. 553,565, dated January 28, 1896.

Application filed April 22, 1895. Serial No. 546,750. (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 Air-Brakes, of which the following is a specification.

The object of my invention is to provide a simple, efficient, economical, and automatic triple valve, especially adapted to be connected with the air-brake systems now in use; and the invention consists in the features and combinations hereinafter described and claimed.

In the application of the automatic air-brake, as heretofore and at present commonly in use, each car is provided with a train-pipe, an auxiliary reservoir, a brake-cylinder, and a triple valve, the triple valve having three connections—to wit, one to the train-pipe, one to the auxiliary reservoir, and one to the brake-cylinder. The train-pipe has a stop-cock at or near each of its ends, to be opened or closed as required, and is fitted with flexible connections and couplings for connecting the pipes from car to car of a train, so as to form a continuous line for the transmission of compressed air from a main reservoir supplied by an air-pump on the engine. When the brakes are off or released, but in readiness for action upon the wheels of the train, the air which fills the train-pipe has a pressure of seventy pounds to the square inch, and by reason of the connections referred to the same pressure is exerted in the casings of the triple valves on both sides of their pistons and in the auxiliary reservoirs connected therewith. At the same time passages called "release-ports" are open from the brake-cylinders to the atmosphere. When it is desired to apply the brakes, a slight reduction of pressure in the train-pipe is made, which acts to admit air-pressure from the auxiliary reservoir to the brake-cylinder sufficient for an ordinary or service stop. For an emergency stop, in order to apply the brakes with greater force, a further reduction of pressure in the train-pipe acts to admit air from both the auxiliary reservoir and train-pipe directly to the brake-cylinder. To release the brakes the train-pipe pressure is raised, which acts to close all communication between the train-pipe, auxiliary reservoir

and brake-cylinder, and to open communication between the brake-cylinder and the outer air.

In a service application of a triple valve it is an advantage and almost as much of a necessity that the successive triples of a train should act with great rapidity as when an emergency application is desired, this necessity becoming more urgent the greater the length of the train. In the present system this requirement is not fully met, as the air at the last triple must be set in motion and travel the whole length of the train-pipe to the engineer's valve. In my device this feature is improved by making a preliminary exhaust or vent of air from the train-pipe at each triple valve, in this manner: A slight reduction of pressure is made at the engine, about three pounds, and this is sufficient to actuate each triple-valve piston to effect a further reduction of pressure from its train-pipe of about three or four pounds more and then to effect a closure of this vent, and at this point admission from the auxiliary reservoir to the brake-cylinder begins and continues until equalized or until the main valve closes. Thus instead of necessitating the withdrawal of all the air sufficient to operate the piston from the last triple up to the engine, only a certain part of it has to travel that far and the rest is vented at each triple, thus greatly increasing the rapidity of action.

Again in the operation of the main valve for service stops it is a desirable feature that the admission of pressure from the auxiliary reservoir to the brake-cylinder should be in proportion to the reduction of pressure in the train-pipe. This has been accomplished before by what is known as the "graduating-valve."

In my invention I provide a more simple and reliable means by using a lift-valve for the main valve, which also does duty as the emergency-valve.

In the drawing the figure is a vertical sectional elevation of my device.

I provide a main casing A with the bushings *a* and *a'* forming the chamber's A' and A², respectively. In the chamber A' works the piston B provided with the stem *b* on one side and the stem *b'* on the other. In the chamber A² works the slide-valve C. This valve

controls the connection between the brake-cylinder and the atmosphere by the ports c and channel c^2 , and a comparatively small auxiliary connection between the train-pipe 5 and atmosphere by the ports c' c^3 and channel c^4 . Port c' leads to the atmosphere and port c to the brake-cylinder by the opening H. Working in the chamber A^2 is also the piston-valve D, which is a hollow cylinder, 10 having within it the hollow valve-stem d , through which plays a stem b^2 , which is firmly screwed into the piston-stem b' . Stem b^2 has a head b^3 adapted to operate the main-valve stem. The piston-valve is provided with 15 rings d' and d^2 which prevent the entrance of air from the train-pipe into the auxiliary chamber A^3 . The main-valve stem is firmly screwed to the main-valve body D' , which forms one compact piece with a shoulder 20 adapted to operate the piston-valve D. The chamber A^3 is connected with the auxiliary reservoir by the port e' and the chamber A^2 with the auxiliary reservoir by the channel a^3 and port e^2 . The port e^2 also acts to admit 25 a larger volume of pressure from the auxiliary reservoir to the brake-cylinder during an emergency application. The main valve E governs the opening e^3 , which leads directly to the brake-cylinder by the passage e^4 . The 30 piston-valve governs the port e^5 , which connects with the train-pipe by the passage e^6 . In the cap F is the plunger f , pressed against the stop f' by the spring f^2 , and this plunger forms a check to the travel of the piston except during emergency applications.

The operation of the mechanism is as follows: In the drawing the valves are shown in "running position," when train-pipe pressure entering at the connection G feeds past piston B by the channel a^3 , and by channel a^2 40 and port e^2 to the auxiliary reservoir. For a service application a reduction of train-pipe pressure of about three pounds serves to move the piston downward, carrying valve C with it until the stem-head b^3 strikes the piston-valve head d , and stops momentarily at this point, as this reduction of pressure is not sufficient to dislodge the valve E from its seat. This travel of the piston has moved 50 valve C far enough to close brake-cylinder port c , and opens connections between the train-pipe and atmosphere by the port c^3 , channel c^4 , and port c' , so that train-pipe pressure flows rapidly to the atmosphere until it 55 has been further lowered about three pounds, making a total difference of pressure on the two sides of piston B of about six pounds. This is sufficient to dislodge valve E from its seat, and the piston continues its travel until 60 its stem b strikes the plunger f , when the resistance of spring f^2 prevents further travel of the piston. Valve C has now traveled far enough to shut off further exhaust of pressure from the train-pipe to the atmosphere, and 65 valve E being raised from its seat allows auxiliary-reservoir pressure to flow to the brake-cylinder until it has been lowered nearly equal

to the train-pipe pressure, when valve E closes and prevents further admission of pressure to the brake-cylinder. It will be noted that the 70 piston-stem b' has a certain amount of travel without moving valve C. This allows valve E to close without disturbing valve C, and it closes very readily and before the auxiliary-reservoir pressure has been lowered quite as 75 much as the train-pipe pressure on account of the suction of the air rushing around it into the opening e^3 . If a harder application of the brakes is desired a further slight reduction of train-pipe pressure will open valve E again, 80 and so on until the brakes have been applied as hard as is desired. For an emergency application a reduction of train-pipe pressure of about ten or twelve pounds moves the piston downward hard enough to overcome the 85 resistance of the spring f^2 , and compressing it carries piston-valve D past the port e^3 , allowing train-pipe pressure in large volume to rush directly into chamber A^3 and thence to the brake-cylinder. At the same time port e^2 is 90 open to the auxiliary reservoir, allowing pressure from it to join the train-pipe pressure in rushing into the brake-cylinder. The release of the brakes after either a service or emergency application is accomplished by raising 95 the train-pipe pressure, which returns the piston and valves to running position, as shown in the drawing, allowing pressure from the brake-cylinder to pass through ports c c' and channel c^2 . 100

Thus it will be seen that the advantages of my improved valve are economy in the use of air, rapidity of action, and a more ready release, as the slide-valve C is of comparatively small area and hence is held to its seat with a 105 comparatively small pressure and a sensitive graduating-valve.

While I have described my invention with more or less completeness as regards the details thereof, as being embodied in more or 110 less precise form, I do not desire to be limited thereto unduly, as I contemplate all proper changes in form, omission of parts, and substitution of equivalents as circumstances may suggest or necessity render expedient. 115

I claim—

1. In a brake mechanism the combination of a train pipe, an auxiliary reservoir, a brake cylinder and a triple valve provided with a 120 piston whose preliminary travel in the direction necessary to apply the brakes acts to operate a valve independent of and unconnected with either the main admission valve or the emergency valve to vent pressure from the 125 train pipe to the atmosphere, and whose further traverse in this direction acts to admit pressure from the auxiliary reservoir to the brake cylinder, substantially as described.

2. In a brake mechanism the combination 130 of a train pipe, an auxiliary reservoir, a brake cylinder and a triple valve provided with a piston whose preliminary travel in the direction necessary to apply the brakes acts to op-

erate a valve independent of and unconnected with either the main admission valve or the emergency valve to vent pressure from the train pipe to the atmosphere, and whose further traverse in this direction acts to admit pressure from the auxiliary reservoir to the brake cylinder, and whose traverse in the opposite direction acts to release all pressure from the brake cylinder, substantially as described.

3. In a brake mechanism the combination of a train pipe, an auxiliary reservoir, a brake cylinder and a triple valve provided with a piston whose preliminary travel in the direction necessary to apply the brakes acts to operate a valve independent of and unconnected with either the main admission valve or the emergency valve to vent pressure from the train pipe to the atmosphere, and whose further traverse in this direction acts to admit pressure from the auxiliary reservoir to the brake cylinder, and whose final traverse in this direction acts to admit pressure directly from the train pipe to the brake cylinder and to effect a second admission of pressure from the auxiliary reservoir to the brake cylinder, substantially as described.

4. In a brake mechanism the combination of a train pipe, an auxiliary reservoir, a brake cylinder and a triple valve provided with a valve independent of and unconnected with the main admission valve adapted to allow the escape of pressure from either the train pipe to the atmosphere, or from the brake cylinder to the atmosphere, substantially as described.

5. In a brake mechanism the combination of a train pipe, an auxiliary reservoir, a brake cylinder and a triple valve provided with a piston whose preliminary traverse in the direction necessary to apply the brakes actuates a valve independent of and unconnected with either the main admission valve or the emergency valve to effect the escape of sufficient pressure from the train pipe to the atmosphere to accomplish its further travel, substantially as described.

6. In a brake mechanism the combination of a train pipe, an auxiliary reservoir a brake cylinder and a triple valve provided with a piston whose preliminary traverse in the direction necessary to apply the brakes actuates a valve independent of and unconnected with either the main admission valve or the emergency valve to effect the escape of sufficient

pressure from the train pipe to the atmosphere to accomplish its further travel, and to effect the admission of pressure from the auxiliary reservoir to the brake cylinder substantially as described.

7. In a triple valve device, the combination of a casing, a piston provided with a stem and working in a chamber of said casing, a valve independent of and unconnected with the main admission valve actuated by the piston stem to control passages leading to connections with a train pipe and the atmosphere, and with a brake cylinder and the atmosphere respectively, substantially as described.

8. In a triple valve device, the combination of a casing, a piston provided with a stem and working in a chamber of said casing, a valve actuated by the piston stem to control communication between passages leading to connections with a train pipe and the atmosphere, and with a brake cylinder and the atmosphere respectively, a piston valve working in said chamber and actuated by the piston stem to control communication between passages leading to connections with a train pipe and an auxiliary chamber, said auxiliary chamber provided with connections to an auxiliary reservoir, and a main valve actuated by the piston stem to control communication between said auxiliary chamber and the brake cylinder, substantially as described.

9. In a triple valve device, the combination of a casing, a piston provided with a stem and working in a chamber of said casing, a valve actuated by the piston stem to control communication between passages leading to connections with a train pipe and the atmosphere, and with a brake cylinder and the atmosphere respectively, a piston valve working in said chamber and actuated by the piston stem to control communication between passages leading to connections with a train pipe and an auxiliary chamber, said auxiliary chamber provided with connections to an auxiliary reservoir, and a main valve actuated by the piston stem to control communication between said auxiliary chamber and the brake cylinder, and a check valve interposed in the passage leading from a train pipe to such piston valve, substantially as described.

HENRY F. NOYES.

Witnesses:

FRED H. SMITH,
DELLA BALCH.