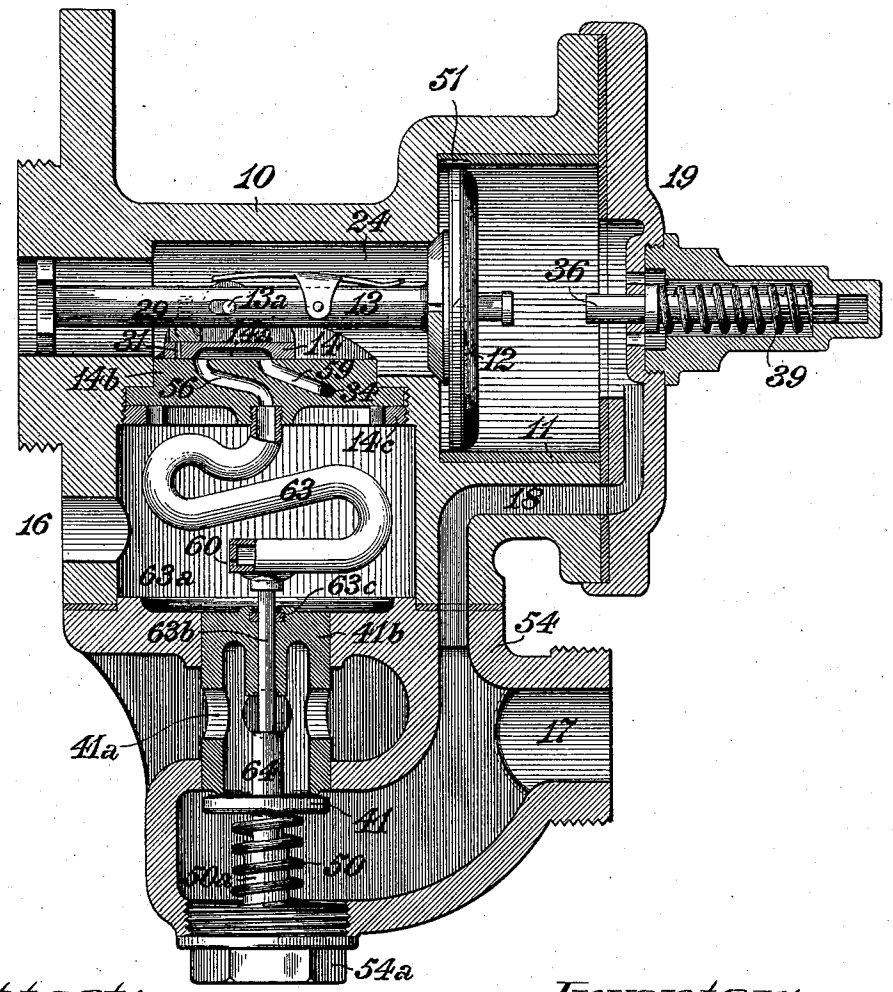
(No Model.)

J. A. HOFF.

QUICK ACTION TRIPLE VALVE.

No. 588,336. Patented Aug. 17, 1897.



Attest;

T. J. Hogan.

S. R. Bell.

Inventor;

John A. Hoff

By Howson & Sons,

Atty.

UNITED STATES PATENT OFFICE.

JOHN A. HOFF, OF ST. LOUIS, MISSOURI, ASSIGNOR TO THE WESTINGHOUSE AIR BRAKE COMPANY, OF PITTSBURG, PENNSYLVANIA.

QUICK-ACTION TRIPLE VALVE.

SPECIFICATION forming part of Letters Patent No. 588,336, dated August 17, 1897.

Application filed May 11, 1897. Serial No. 636,044. (No model.)

To all whom it may concern:

Be it known that I, JOHN A. HOFF, of St. Louis, in the State of Missouri, have invented a certain new and useful Improvement in Quick-Action Triple Valves, of which improvement the following is a specification.

My invention relates to triple valves for automatic air-brake apparatus of the class which are provided with means for effecting the local venting of the train-pipe for the purpose of quickening the serial action of the brakes in emergency applications; and its object is to provide in an appliance of such character simple and effective means whereby service applications of the brakes may be made, as heretofore, by the admission of auxiliary-reservoir air to the brake-cylinder without local venting of the train-pipe and the opening and closure of a local train-pipe vent-valve be effected in proper sequence upon a sudden reduction of train-pipe pressure without the imposition of additional work upon the main piston or the employment of a supplemental or emergency piston.

The improvement claimed is hereinafter fully set forth.

The accompanying drawing is a vertical central section through a quick-action triple valve, illustrating an application of my invention.

In the practice of my invention I provide a valve body or casing composed of a main section 10 and a supplemental section 54, which are connected by bolts with an interposed gasket in the usual manner. The main piston 12 is fitted to work in a bushing 11 in the main casing 10 and is fixed upon a stem 13, which extends into the chamber 24 of the main valve 14 and is connected to said valve, with the capacity of a short degree of independent traverse for graduation purposes, by a pin 13^a, fixed to the main valve and passing through a short longitudinal opening in the piston-stem. A graduating-valve 29, connected to the piston-stem, is fitted to traverse on the back of the main valve and to open and close, as required, a graduating-port 31, passing through the same. The main valve controls a supply-port 56, communicating, as presently to be described, with a passage leading to the brake-cylinder, and an exhaust-port 59, communicating with an exhaust-passage 34, leading to the atmosphere. The supply and exhaust ports are, when the main piston and valve are in release position, as shown in the drawing, connected by the exhaust cavity or recess 14^a of the main valve.

The train-pipe is connected by the usual branch pipe with a train-pipe passage 17, formed on the casing-section 54 and communicating by a passage 18 with the chamber of the main piston 12. A charging groove or passage 51 is formed at the inner end of the piston-bushing 11, and the auxiliary reservoir, which is connected to the outer end of the chamber 24 of the main valve, is charged, in the usual manner, by air from the train-pipe through the passages 17 18, the chamber of the main piston, the charging-passage 51, and the valve-chamber. The brake-cylinder is connected to the outer end of a passage 16, leading into a tube-chamber 63^a in the casing 10 below the valve-chamber 24. The traverse of the main piston 12 in service applications of the brakes is limited by a graduating-stem 36, fitted in a casing connected to the cap 19 of the piston-chamber and bearing a collar abutting against a graduating-spring 39.

The supply and exhaust ports 56 and 59, controlled by the main valve, are formed in a partition 14^b, which separates the valve-chamber 24 from the tube-chamber 63^a, and is preferably, as shown, made detachable and held in position by an annular nut 14^c. The upper side of the partition 14^b is properly finished to form a face for the main valve. The supply-port 56 communicates at its end adjacent to the tube-chamber 63^a with a differential air-delivery device 63, which in this instance is an elastic tube bent into substantially **S** shape and connected at one end to the partition 14^b, in line with the supply-port 56, which it exceeds in diameter, and having its opposite or free end closed, except by a port 60, which is open to the chamber 63^a, and consequently to the brake-cylinder passage 16, the diameter of which port is slightly greater than that of the graduating-port 31 and materially less than that of the supply-port 56. The tube 63 abuts near its lower

end on a stem 63^b, passing through a cylindrical chamber 41^b, secured centrally in the lower wall of the tube-chamber 63^a and open at its lower end to the train-pipe passage 17. Leakage of air from the chamber 63^a is prevented by packing 63^c, surrounding the stem 63^b near the upper end of the chamber 41^b. Lateral release-ports 41^a, which are open to the atmosphere, are formed in the chamber 41^b, and communication between said ports and the train-pipe passage 17 is controlled by an emergency-valve 41, fixed upon a stem 64, which abuts against the lower end of the stem 63^b and is normally held upon an annular seat surrounding the open lower end of the chamber 41^b by a spring 50. The valve-stem 64 fits in and is guided by a socket 50^a, fixed to a screw-plug 54^a, secured in the lower end of the casing-section 54.

The parts having been brought to release position, as shown, and the auxiliary reservoir charged by increase of pressure in the train-pipe in the ordinary manner, and it being desired to make a service application of the brakes, a slow and moderate reduction of train-pipe pressure is made by the engineer. The main piston and main valve then move to the right until their traverse is arrested by the graduating-stem 36 and spring 39, the effect of such movement being to cut off the communication between the train-pipe and auxiliary reservoir through the charging-passage 51 to cut off the communication between the brake-cylinder and the atmosphere through the ports 56 and 59, the exhaust-cavity 14^a of the main valve, the tube 63, port 60, and passage 16 and to open communication from the auxiliary reservoir to the brake-cylinder through the graduating-port 31, supply-port 56, tube 63, port 60, and passage 16. The application may be graduated as desired by movement of the main piston to control the graduating-port 31 by the graduating-valve 29. The position of the free end of the tube 63 is unaffected in service applications by reason of the fact that the port 60 through which it delivers air to the chamber 63^a, and thence to the brake-cylinder, is of larger diameter than the port 31 through which it receives air from the auxiliary reservoir. Upon the restoration of pressure in the train-pipe the parts are returned to release position and the air is exhausted from the brake-cylinder through the passage 16, port 60, tube 63, ports 56 and 59, and the exhaust-cavity of the main valve.

Upon a sudden reduction of train-pipe pressure, effected either by the engineer or by the parting or bursting of the train-pipe, the main piston 12 compresses the graduating-spring and moves to the extreme limit of its outward traverse, the main valve thereby entirely uncovering the opening of the supply-port 56 and admitting air to the full capacity of said port to the tube 63. The delivery of the air thus admitted being limited by the materially smaller diameter of the port 60, the reaction of the air upon the elastic tube 63 causes its bends to spread apart by resultant expansion and its lower end portion to bear downwardly upon the stem 63^b and through said stem and the abutting stem 64 to unseat the emergency-valve 41 and locally vent the train-pipe, the application of the brake being effected by the air delivered to the brake-cylinder through the port 60 and the serial application of the brakes on the succeeding cars being quickened by the local venting of the train-pipe. Upon the equalization of auxiliary reservoir and brake-cylinder pressure and the consequent equalization of pressure on the inner and outer sides of the tube 63 said tube will resume its normal position, and the emergency-valve 41, being relieved from downward pressure from said tube, will be seated by the closing-spring 50, acting in conjunction with train-pipe pressure.

It will be obvious that the differential air-delivery device is not necessarily limited to the form of a tube, as shown, and any other expansible member operative to effect opening movement of the emergency-valve by a restriction of the delivery of air through said member to the brake-cylinder would equally embody the essential feature of my invention.

I claim as my invention and desire to secure by Letters Patent—

1. In a quick-action triple valve, the combination, substantially as set forth, of a triple valve proper, an emergency or train-pipe release-valve, an expansible differential air-delivery device, constituting a portion of the passage-way for air from an auxiliary reservoir connection to a brake-cylinder connection, and controlled, as to the reception of air through a smaller or a larger opening, by the main valve of the triple valve, and intermediate connections through which opening movement is imparted to the emergency-valve by the differential air-delivery device when expanded by the reception of air through the larger opening.

2. In a quick-action triple valve, the combination, substantially as set forth, of a triple valve proper, an emergency or train-pipe release-valve, an expansible differential air-delivery device, constituting a portion of the passage-way for air from an auxiliary-reservoir connection to a brake-cylinder connection, and controlled, as to the reception of air through a smaller or larger opening, by the main valve of the triple valve, intermediate connections through which opening movement is imparted to the emergency-valve by the differential air-delivery device when expanded by the reception of air through the larger opening, and a closing-spring acting upon the emergency-valve in opposite direction to the differential air-delivery device.

3. In a quick-action triple valve, the combination, substantially as set forth, of a triple valve proper, a chamber in the casing thereof, having a brake-cylinder connection, an elas-

tic bent tube inclosed in said chamber, and having an open end which is fixed and a closed end which is free therein, its fixed end communicating with the supply-port through which air passes from the auxiliary-reservoir connection to the brake-cylinder connection, a port in the closed end of said tube which is of greater transverse area than the graduating-port of the main valve of the triple valve, and of less transverse area than the supply-port controlled by said main valve, an emergency-valve controlling communication between the train-pipe connection of the casing and the atmosphere, and a stem through which opening movement may be imparted to the emergency-valve from the elastic bent tube.

4. In a quick-action triple valve, the combination, substantially as set forth, of a triple valve proper, a chamber in the casing thereof having a brake-cylinder connection, a removable partition containing the ports controlled by the main valve of the triple valve, and interposed between the chamber thereof and the chamber having the brake-cylinder connection, an expansible differential air-delivery device connected to the supply-port of said partition, and having a delivery-port of greater transverse area than the graduating-port of the main valve, and of less transverse area than the supply-port controlled by said main valve, an emergency-valve controlling communication between the train-pipe connection of the casing and the atmosphere, and a stem through which opening movement may be imparted to the emergency-valve from the differential air-delivery device.

5. In a quick-action triple valve, the combination, substantially as set forth, of a triple valve proper, a chamber in the casing thereof having a brake-cylinder connection, an elastic bent tube inclosed in said chamber, and having an open end which is fixed and a closed end which is free therein, its fixed end communicating with the supply-port through which air passes from the auxiliary-reservoir connection to the brake-cylinder connection, a port in the closed end of said tube which is of greater transverse area than the graduating-port of the main valve of the triple valve, and of less transverse area than the supply-port controlled by said main valve, an emergency-valve controlling communication between the train-pipe connection of the casing and the atmosphere, a stem through which opening movement may be imparted to the emergency-valve from the elastic bent tube, and a closing-spring acting upon the emergency-valve in opposite direction to said stem.

JOHN A. HOFF.

Witnesses:
H. D. O'BRIEN,
ANNA SCHOEPF.