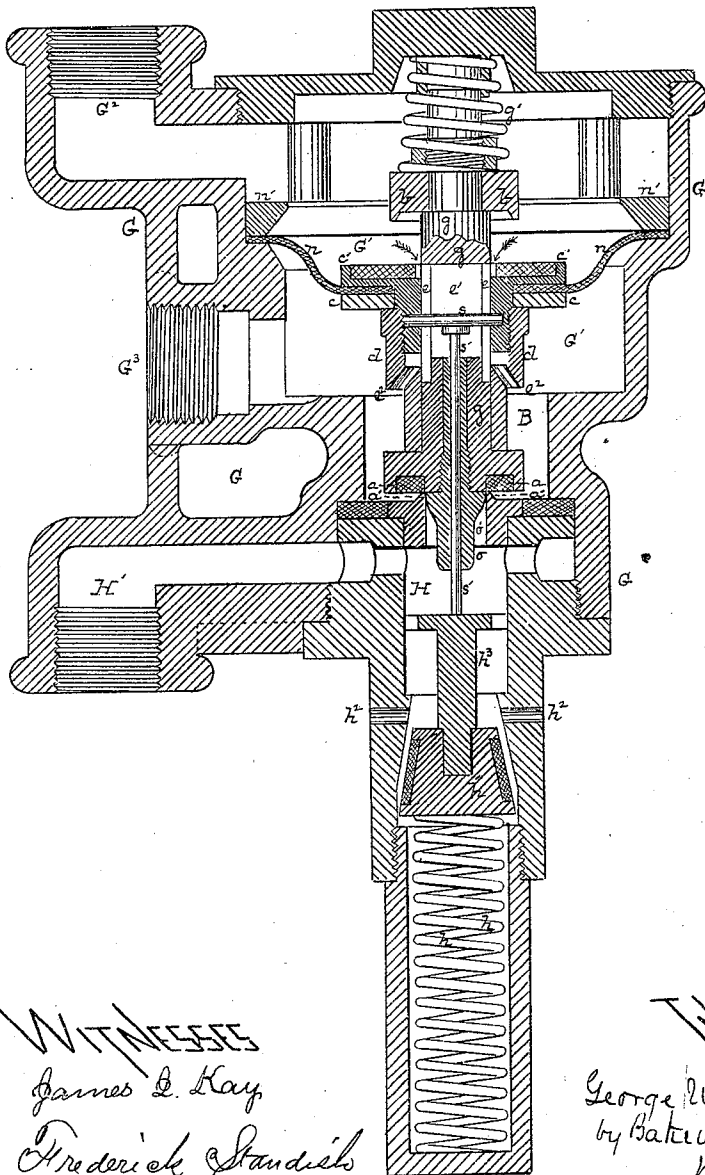


G. WESTINGHOUSE, Jr.
 Valve Devices for Fluid-Brakes.

No. 141,685.

Patented August 12, 1873.



WITNESSES
 James L. Kay
 Frederick Standish

INVENTOR
 George Westinghouse Jr.
 by Batewell, Christy & Co.,
 his Attys.

UNITED STATES PATENT OFFICE.

GEORGE WESTINGHOUSE, JR., OF PITTSBURG, PENNSYLVANIA.

IMPROVEMENT IN VALVE DEVICES FOR FLUID-BRAKES.

Specification forming part of Letters Patent No. 141,685, dated August 12, 1873; application filed May 24, 1873.

To all whom it may concern:

Be it known that I, GEORGE WESTINGHOUSE, Jr., of Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Valve Device for Fluid-Brakes; and I do hereby declare the following to be a full, clear, and exact description thereof, reference being had to the accompanying drawing, which represents in section my improved valve device, designed to be used in connection with a system of brake-pipes, brake-cylinder, and auxiliary reservoir, for the purpose of applying the brakes on railway trains by means of fluid-pressure.

In the system of steam-power air-brakes heretofore described in various patents, provision is made for the flow of air or other fluid under pressure from the brake pipe or pipes into a reservoir arranged under or in connection with each car, and for applying brakes by allowing the compressed air thus stored up in each reservoir to pass into the brake-cylinder. In such combination a triple valve has been described of such construction and with such connections that, by a continuous pressure of air in the brake-pipe, communication was kept open thence to each reservoir and closed to the brake-cylinder, but kept open from the latter to the external atmosphere; and, also, by lowering the pressure of air in the brake-pipe, communication was opened from each reservoir to the brake-cylinder of the car, and all other communication closed.

My present invention relates to an improved construction of triple valve, by means of which this operation is more advantageously effected, and has more particular reference to the construction of devices by which a flow of compressed air from each auxiliary reservoir to its brake-cylinder can be regulated at pleasure, and thereby the brakes be applied with any desired degree of force less than the maximum.

To enable others skilled in the art to make and use my improvement, I will proceed to describe the same.

The valve-case G is of the form substantially as shown, so as to give a valve-chamber, G¹, into which at or near one end a port, G², opens,

and at or near its opposite end a like port, G³, also opens. The same valve-case includes also a valve-chamber, H, with a communicating passage, B, and the air-port H' communicates with the valve-chamber H. The valve-stem *g* has a limited range of motion in the chamber G¹. At or near its lower end it carries a valve, *a*, which seats on the annular V-shaped seat *a'* by suitable packing on its lower face. A spring, *g'*, bearing against the cap of the valve-case G, and against the upper face of the valve-seat *b*, holds the lower valve *a* to its seat, when not raised therefrom by air-pressure. The flexible diaphragm *n* divides the valve-chamber G¹ into two parts. The outer edge of this diaphragm or ring *n* is compressed between an annular metallic ring, *n'*, and a shoulder on the valve-case; and the inner edge of said ring around the stem *g* is compressed between the different parts of the compound nut *c c'*, which nut is free to move vertically on the stem *g*, and the upper face *e'* of which is provided with a suitable packing, so as to make a tight joint when brought against the annular ring of the valve-seat *b*. Commencing at a point a short distance below the upper valve-seat *b*, the stem *g* is turned smaller or reduced in size, as at *e*, and is also slotted, as indicated at *e'*. This reduction in the size of the stem *g* gives an annular air-port, *e*, by which communication is secured from the upper to the lower part of the valve-chamber G¹. The compound nut *c c'*, which constitutes mechanically a piston, has a downward extension around the stem *g*, as shown at *d*, by means of which, in moving up and down on the stem *g*, it covers and uncovers the port *e*, and thereby closes and opens communication between the upper and lower parts of the valve-chamber G¹. The lower end of the annular port *e* communicates with the lower part of the valve-chamber G¹ by means of ports *e'*, which may be made in any desired number. Across the slot *e'* in the stem *g* a cross-bar, *s*, is arranged, with its ends fixed in position in the adjacent walls of the nut *c*. From this slotted part *e'* a pin, *s'*, extends down through and lengthwise of the stem *g* into the chamber H. The lower end of the chamber H is fitted with a spring, *h*, which bears against the conical valve *h'*, having a suita-

ble packing on its conical face. Such valve is arranged in its chamber so as to open and close the escape-ports h^2 . This valve is attached to a stem, h^3 , which, by means of wings of the usual form, causes the valve h^1 to move vertically in its chamber in opening and closing the ports h^2 . The pin s' is of such length and position that with the downward movement of the piston $c c'$ the cross-bar s will be caused to bear against its upper end and force its lower end against the stem h^3 of the valve h^1 , and thereby throw it from its seat and uncover the ports h^2 . The conical plug o is attached to the lower end of the stem g in such position as to enter the port o' , which connects the chambers G^1 and H ; but this plug o is of such shape as to graduate the size of the opening of the port o' , accordingly as it is raised more or less by the upward movement of the stem g . The valve-case described is, by the port G^2 , connected with the brake-pipes, by the port G^3 with the auxiliary reservoir, and by the port H' with the brake-cylinder. If air or other gas or fluid under pressure be admitted by the port G^2 , it will cause the piston $c c'$, with its diaphragm n , to be depressed or to slide down on the stem g until it occupies about the position shown. The cross-bar s will then have opened the valve h^1 , and the valve a will be closed by means of the spring g' , or by fluid-pressure; also, the annular port e will open. In such case the air or other fluid will pass, as indicated by the arrows, from the upper part of the chamber G^1 , along the ports $e e^2$, into the lower part of the chamber G^1 , and out at the port G^3 to the auxiliary reservoir, whereby the auxiliary reservoir will be charged with compressed air of such density as it may be desired to store up for the purpose of operating the brakes. At the same time, by the means already described, the valve h^1 is unseated, and thus a direct communication is opened from the brake-cylinder, through the port H' , chamber H , and ports h^2 , with the external atmosphere. The brakes are then off. As soon as the pressure on the upper and lower sides of the diaphragm n and compound nut $c c'$ is equal, or nearly so, the spring h in the lower part of the case, acting against the valve h^1 through the stem h^3 , pin s' , cross-bar s , will cause the piston $c c'$ to slide upward on the stem g , and thereby cut off communication through the annular passage e , and will seat the valve h^1 so as to close the escape-ports h^2 . Then, if the pressure above the diaphragm n be reduced by allowing a portion of the air to escape from the brake-pipes, the pressure of the air or other gas, acting back through the port G^3 on the under side of the diaphragm n , will raise the piston $c c'$ against the valve-seat b , compress the spring g' , and, by raising the

stem g vertically upward, will lift the valve a from its seat a' , and thereby open communication from the chamber G^1 , through the port o , chamber H , with the port H' . The compressed air or other gas or fluid will then be free to pass from the auxiliary reservoir, through the ports G^3 , o' , and H' , to the brake-cylinder, so as to charge the same and apply the brakes in the usual way. The area of the opening through the port o' is regulated by the distance which the plug o is caused to move vertically upward. Hence, if the pressure be reduced but slightly at G^2 , the plug o will be raised but a short distance, and a small amount of compressed air or other fluid will be allowed to pass through and out at the port H' . When the equilibrium is thereby restored in the chamber G^1 , the valve a will resume its seat and close the communication. If the pressure in the upper part of the chamber G^1 be materially increased, the lower valve h^1 will be unseated, as already described, and an open communication be made from the brake-cylinder, through the port H' and h^2 , to the external atmosphere. By the use of the taper plug o , in the manner described, and by regulating, as can easily be done by the use of suitable cocks, the amount of pressure in the upper and lower parts of the chamber G^1 , it is easy to regulate the amount or density of the air which is permitted to flow through the port o' into the brake-cylinder, and consequently easy to regulate and adjust, at all times, the force with which the brakes are applied, and such force may be varied from the maximum power of the brakes down to the fractional part of a pound, in excess of ordinary atmospheric pressure.

The construction of the piston may be varied somewhat, provided its operation and function remain substantially unchanged.

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

1. The piston $c c'$, having separate and independently-operating connections to, and in combination with, a charging-valve, a , and discharging-valve h^1 , whereby the discharging-valve shall be closed at or before the opening of the charging-valve, substantially as set forth.

2. The pin s' , cross-bar s , and stem g , in combination with the piston $c c'$, valves a and h^1 , and plug o , arranged substantially as set forth.

In testimony whereof I, the said GEORGE WESTINGHOUSE, Jr., have hereunto set my hand.

GEORGE WESTINGHOUSE, JR.

Witnesses:

T. B. KERR,
G. H. CHRISTY.