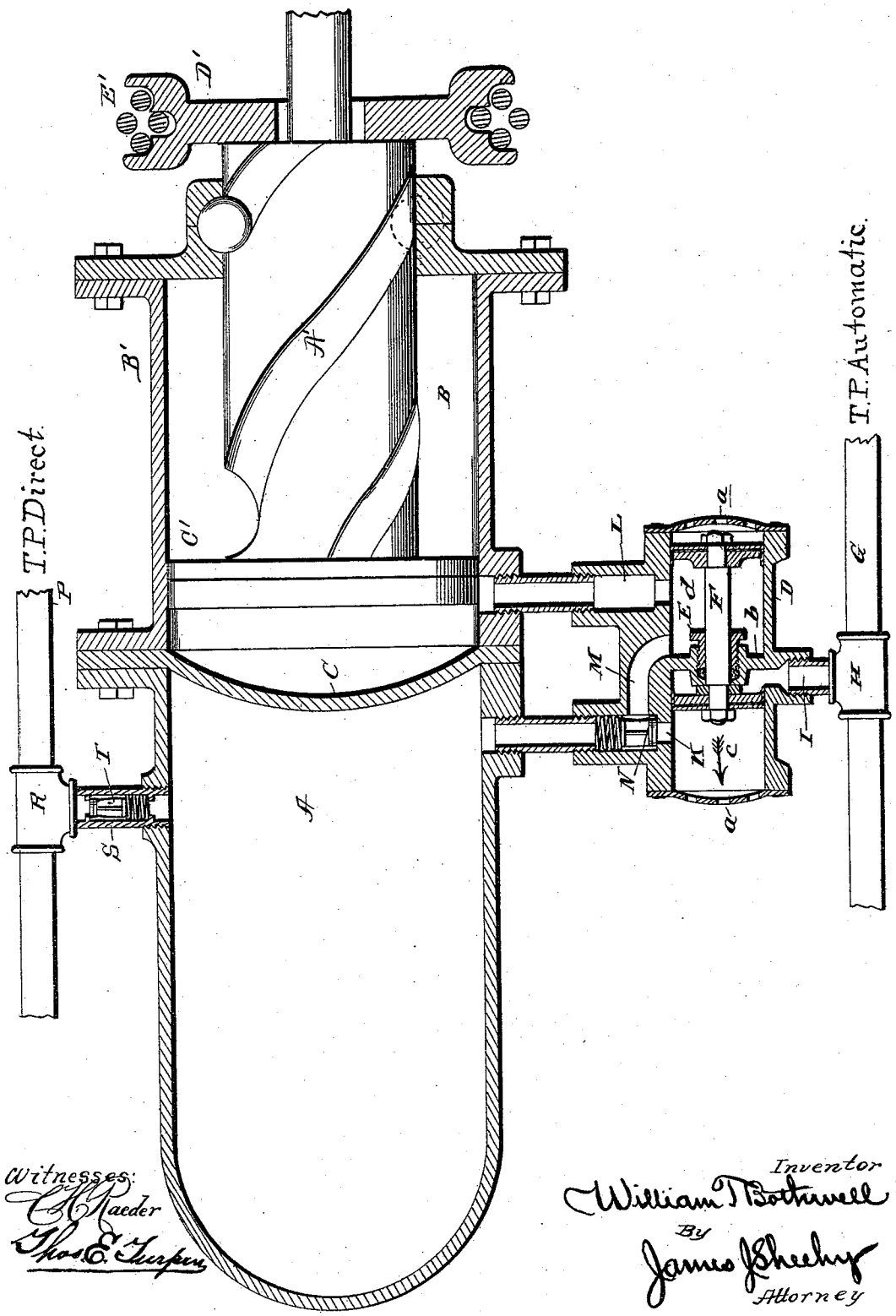
(No Model.)

W. T. BOTHWELL.

AIR BRAKE.

No. 456,247. Patented July 21, 1891.



Witnesses:
C. Maeder
Thos. E. Turpin

Inventor
William T. Bothwell
By
James J. Sheehy
Attorney

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UNITED STATES PATENT OFFICE.

WILLIAM T. BOTHWELL, OF JERSEY CITY, NEW JERSEY.

AIR-BRAKE.

SPECIFICATION forming part of Letters Patent No. 456,247, dated July 21, 1891.

Application filed May 28, 1890. Serial No. 353,497. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM T. BOTHWELL, a citizen of the United States, residing at Jersey City, in the county of Hudson and State of New Jersey, have invented certain new and useful Improvements in 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.

This invention has relation to an improvement in automatic pneumatic brake systems; and it has for its general object to provide devices for the regulation and control of the fluid-pressure.

Other objects and advantages will appear from the following description and claims when taken in connection with the accompanying drawing, in which the figure is a longitudinal sectional view of an auxiliary cylinder and a piston or brake-cylinder, the valve-casing and valve therein, together with a portion of the line-pipes leading respectively to the auxiliary cylinder and to the valve-casing.

Referring by letter to said drawing, A indicates the auxiliary cylinder, and B the piston or brake-cylinder, which are preferably connected, as shown, and are separated by the rigid diaphragm C.

D indicates the valve box or casing, having the exhaust-ports *a* at opposite ends. This valve-box D is divided by a wall *b* into compartments *c* and *d*.

The partition-wall *b* has an aperture, as shown, within which is a packing-gland E, through which the rod F of the duplex valve passes.

G indicates the automatic train-pipe, which is connected with a supply-pipe leading from a source of supply by an engineer's valve, (not shown,) and is also connected with the brake-operating mechanism through the medium of the valve-box D with each car of the line. This pipe G is connected with the valve box or casing by a T-coupling H or other suitable means.

I indicates a passage leading from the T-coupling of the pipe G to the compartment *c* of the valve-casing, and K indicates a passage leading from said valve compartment to the auxiliary reservoir A.

M indicates a passage leading from the passage K around to the compartment *d* of the valve-casing, and L indicates a passage leading from said compartment *d* to the brake-cylinder B.

Arranged in the passage K is a check-valve N, which is backed by a spiral spring, so as to normally close said valve and shut off communication between the auxiliary reservoir and the compartment *c* of the valve-casing D.

P indicates the direct train-pipe, which leads from the three-way or engineer's valve before mentioned and connects with the auxiliary reservoir by means of a branch pipe, within which is a check-valve T, which is backed by a spring. This check-valve is designed to close communication between the pipe *f* and the auxiliary reservoir when the pressure in the direct train-pipe is reduced below that in said reservoir.

In practice a supply-pipe leading from a source of supply is connected by a three-way or engineer's valve (not shown) with the direct train-pipe P and the automatic train-pipe G. The casing of the three-way or engineer's valve is provided with an exhaust-port, and said valve is provided with three ways whereby communication may be established between the supply-pipe and the automatic train-pipe G and the direct train-pipe P alternately, and also between said train-pipes and the exhaust-port before mentioned.

The piston here shown has a series of spiral grooves or channels A′, friction-balls in the head of the cylinder B, which partly enter the grooves in the piston and recesses in the head of the piston-cylinder, so that said piston may be given a partial rotation in its backward and forward motion. The piston is also provided with a suitable head C′ at one end and a plate D′ at its opposite end, the latter being designed to receive the brake-chains E′.

In operation the three-way cock or valve is turned so as to establish communication between the supply-pipe and the automatic train-pipe G, when the fluid will be let in from the pipe G through the passage I of the valve-casing, and acting upon the forward head of the duplex valve will drive the same in the direction of the arrow, and uncovering the passage K will be admitted into the auxiliary reservoir, the opposite head of the duplex

valve having been brought between the ports or passages L and M. Now by turning the three-way cock or engineer's valve so as to establish communication between the pipe G and the exhaust-port in the casing of said cock an exhaust will be afforded and the pressure of the fluid in the auxiliary reservoir, acting upon the check-valve in the passage K, will seat said valve, and the fluid will lead through the passage M and against the opposite head of the duplex valve, so as to uncover the passage L and allow the fluid to enter the brake-cylinder B, where it acts against the piston therein and applies the brakes. Thus are the brakes automatically applied. To release the brakes the cock or valve is turned to establish communication between the supply-pipe and the pipe G, when the fluid will enter the compartment *c* of the valve-casing through the pipe I, and on its way to the auxiliary cylinder will act against the forward head of the duplex valve and drive the same in the direction indicated, whereby the opposite head of the valve will be brought between the ports or passages L and M, so that the fluid in the brake-cylinder may exhaust through the passage L and the ports *a* at the adjacent end of the valve-casing. When the brakes are at rest and it is desired to apply the same by the direct system, it is simply necessary to turn the three-way cock or engineer's valve so as to establish communication between the supply-pipe and the direct train-pipe P, when the fluid, acting against the check-valve T, will enter the auxiliary cylinder A, and will thence pass through the passage K and the passage M into the compartment *d* of the valve-casing, and will pass thence through the passage L to the brake-cylinder, where it will act against the piston-head and apply the brakes. After the brakes have been applied by this direct system the exhaust may be effected and the brakes released in the same manner as when the brakes have been applied by the automatic system—that is, by turning the three-way cock or engineer's valve so as to establish a communication between the automatic train-pipe G and the exhaust-port in the casing of said cock.

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

1. In a pneumatic brake, the combination, with an auxiliary reservoir and a brake-cylinder, of a valve-casing divided into two compartments, a passage connecting one of the compartments with the auxiliary reservoir, a passage connecting the other compartment with the brake-cylinder, and a port connecting the latter compartment with the passage which connects the valve-casing with the auxiliary reservoir, a check-valve arranged in the passage connecting the auxiliary reservoir and valve-casing, and a duplex valve arranged in said casing, substantially as specified.

2. The valve-casing having the exhaust-ports at opposite ends and a central diaphragm or partition and also the passages K M L, the duplex valve having its stem passing through the diaphragm and provided with a packing-gland, the check-valve arranged in the passage K, and the passage I for connecting the automatic train-pipe G, substantially as specified.

3. In a pneumatic brake, the combination, with an auxiliary reservoir and a brake-cylinder, of a valve-casing connected with the brake-cylinder and auxiliary reservoir by the passages K M L, the duplex valve, a check-valve in the port connecting the valve-casing and the auxiliary reservoir, an automatic train-pipe connected with said valve-casing, and a direct train-pipe connected directly with the auxiliary reservoir and carrying a check-valve, substantially as specified.

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

WILLIAM T. BOTHWELL.

Witnesses:
S. G. HOPKINS,
T. E. TURPIN.