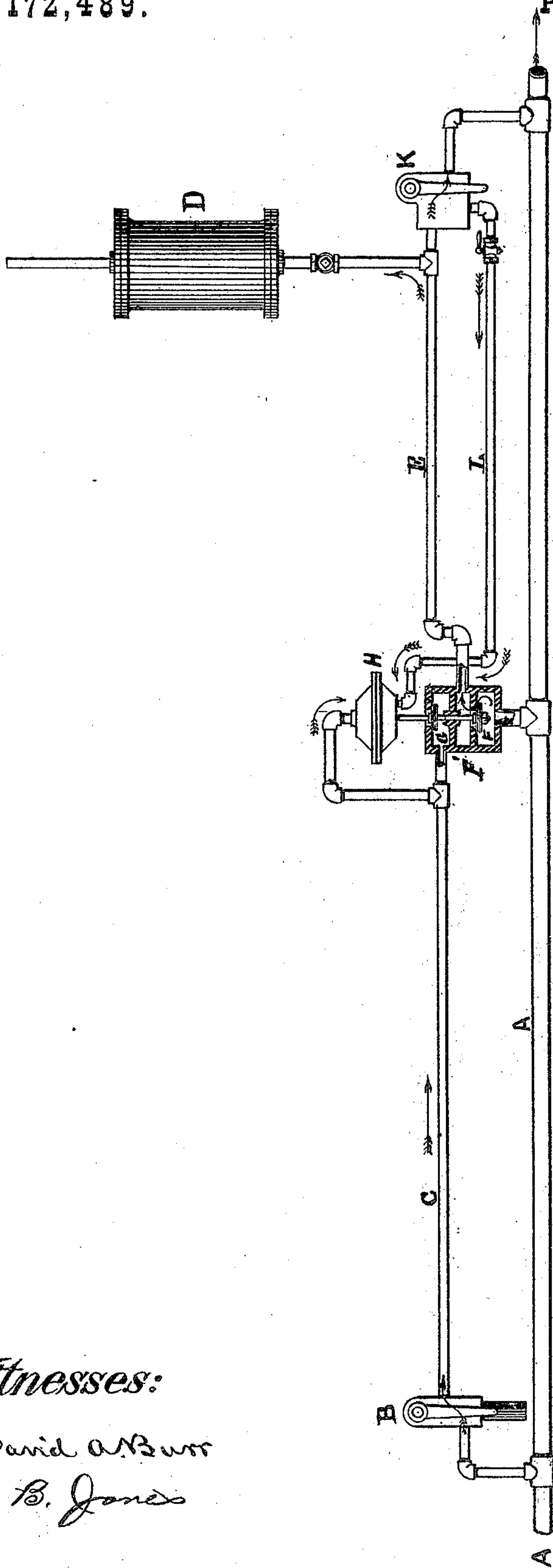


W. E. PRALL.

PNEUMATIC SIGNALING APPARATUS.

No. 172,489.

Patented Jan. 18, 1876.



*Witnesses:*

*David A. Burr*  
*S. B. Jones*

*Inventor:*

*W. E. Prall*

# UNITED STATES PATENT OFFICE.

WILLIAM E. PRALL, OF WASHINGTON, D. C., ASSIGNOR TO PRALL RAILWAY SIGNAL AND TELEGRAPH COMPANY, OF NEW YORK, N. Y.

## IMPROVEMENT IN PNEUMATIC SIGNALING APPARATUS.

Specification forming part of Letters Patent No. 172,489, dated January 18, 1876; application filed November 21, 1874.

### CASE F.

*To all whom it may concern:*

Be it known that I, WILLIAM E. PRALL, of Washington city, in the District of Columbia, have invented an Improvement in Pneumatic Signals for Railways, of which the following is a specification:

My invention relates to a novel method of operating the pneumatic signals in my improved signal-system for railroads. It consists in connecting the piston or diaphragm of each signal directly with the air-main at or near the signal, the valve controlling the direct supply-pipe being operated by a secondary diaphragm or piston actuated by air admitted from the air-main through a long length of pipe extending to a distant supply-commutator; and it has for its object the production of a rapid movement of the signal by utilizing the force of the compressed air passing through the long pipe from the supply-commutator to open a short and direct channel of communication between the air-main and signal.

My said invention is illustrated in the accompanying drawing, wherein A is an air-main charged with compressed air, and extending along the line of a railroad; B, a supply-commutator or automatic air-supply valve constructed substantially as described in a separate application for Letters Patent, and arranged to be thrown open by a train passing upon the railroad, and thereby admit a charge of air into the service-pipe C. The pipe C extends along the line of railway from the point of danger, at which a signal is required, to a point far enough removed to permit the danger-signal to be displayed before the train passing the latter point can reach the former. D is a cylinder containing a piston arranged to move in opposite directions when compressed air is admitted thereto or exhausted therefrom. This piston is employed to open and close a gate or to display a danger-signal of any suitable description. E is a pipe connecting the cylinder of the signal-piston D directly with the air-main A at or near the former, and F is a valve controlling said pipe E. The valve F is so arranged within a suitable chest, F', as to be kept closed by the pressure of air

in the main so long as it covers the valve-opening. Its stem passes into a second chamber, G, formed in the chest F', and carries a second valve, which closes an exhaust-opening therein. The service-pipe C connects with this chamber G and with a diaphragm or piston, H, placed above it, to which the stem of the valve is secured, so that when a charge of air is admitted through the pipe C its pressure upon the diaphragm or piston H will operate to throw open the valve F, and thus admit air freely from the main A to the signal-piston D to operate the latter, and simultaneously, by opening the exhaust-aperture in the chamber G, relieve the pipe C and diaphragm H from pressure, so that the valve F may close again. The weight of the valve F will cause it to remain open until pressure has so accumulated in the pipe E as that, bearing outwardly upon the area of the valve-stem, it will counterbalance the weight of the valve and stem, and thus close it. K is an exhaust-commutator or automatic relief-valve, constructed substantially as described in my separate application for Letters Patent thereon, and arranged to be struck by a train after the train has passed the danger-signal. When struck by the train this commutator opens an exhaust-vent connected with the signal-pipe E, so as to relieve it from pressure, and allow a reversal of the signal. A pipe, L, connects this exhaust-commutator with the diaphragm H, so that the opening of the exhaust will operate to admit a charge of air against the diaphragm to close the valve if it still remains open when the signal is reversed.

In the operation of this improved apparatus, when a locomotive approaches in the direction indicated by the arrow at B and strikes the supply-commutator, a charge of compressed air is admitted from the main A to the pipe C. Instantly the pressure of the air thus admitted is exerted upon the diaphragm at H, and operates to force open the valve F, and thus admit a charge of air from the main A through the pipe E to the piston-cylinder D of the signal, so as to operate the latter. In this manner the friction of the volume of air



required to move the signal-piston D through a pipe laid the entire distance to the commutator B, and the loss of time attendant upon its travel for such a distance, is avoided. The diaphragm H, moved by a comparatively slight amount of air with a light pressure, thus operates quickly to admit the large volume of air required to move the piston D directly from the main at or near said piston. As the valve F opens, the exhaust-vent in the chamber G is likewise opened, so that the pressure upon the diaphragm H is automatically relieved, leaving the valve F free to close automatically so soon as the outward pressure upon the area of its stem counterbalances its weight. When the locomotive has reached the signal and is about to pass it, the exhaust-commutator K is struck, and a charge of air is consequently admitted from the main to a small piston controlling an exhaust-valve in the commutator. This exhaust-valve is thereby opened, and the piston D relieved from pressure, so as to allow its signal to reverse. By means of the pipe L a portion of the air admitted by the movement of the commutator K is allowed to pass to the under side of the diaphragm H, to insure positively

a closing of the valve F. The air in the pipe L is permitted to escape gradually by means of a small open vent therein, so as to release the diaphragm H, and also by relieving from pressure the small piston controlling the exhaust-valve in the commutator K allow said valve to close.

In order to operate the signal-piston D by a train approaching from the opposite direction it is only necessary to duplicate the above-described pipes, valves, and commutators in such opposite direction, and to connect them either with the same piston D, or with a second piston arranged to operate the same signal.

I claim as my invention—

In combination with a supply-commutator, B, service-pipe C, and signal-piston D, a direct pressure-pipe, E, controlled by a valve, F, actuated by a diaphragm, H, connected with said pipe C, all substantially as and for the purpose herein set forth.

W. E. PRALL.

Witnesses:

DAVID A. BURR,  
S. B. JONES.