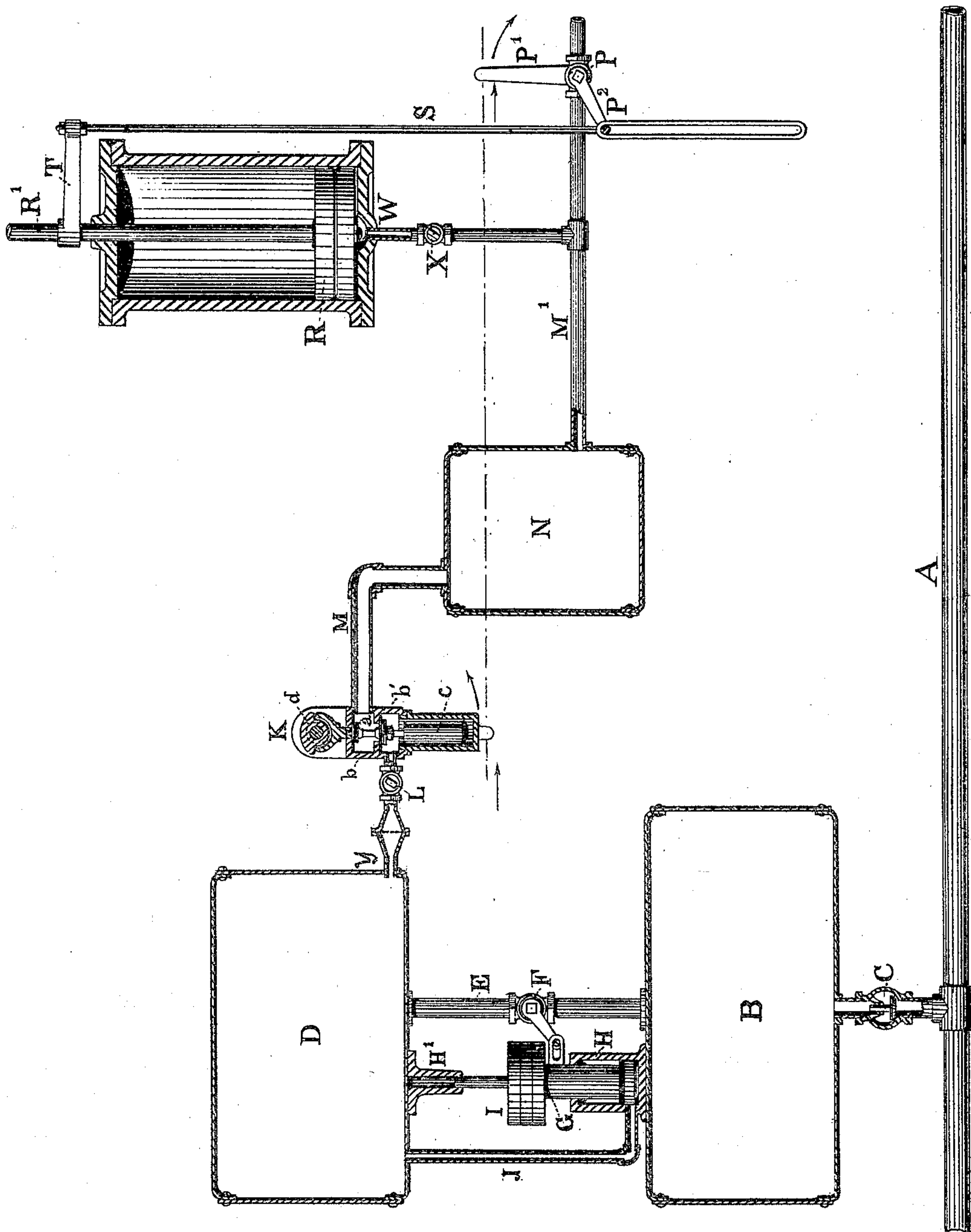


W. E. PRALL.

PNEUMATIC SIGNAL APPARATUS FOR RAILWAYS.

No. 172,490.

Patented Jan. 18, 1876.



Witnesses:

John E. Gering
L. Stackhouse

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 SIGNAL APPARATUS FOR RAILWAYS.

Specification forming part of Letters Patent No. **172,490**, dated January 18, 1876; application filed September 1, 1874.

CASE G.

To all whom it may concern:

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

My invention relates to the system of operating signals for railroads by the use of compressed air, which I have described in the specifications of Letters Patent of the United States heretofore granted to me and in applications now pending, and is illustrated in the accompanying drawing.

In said drawing, A is an air-main kept constantly charged with air under compression, by means of a suitable air-pump. B is an accumulating-tank, connected with the main A, and C is a check-valve interposed between the main A and tank B to admit air freely from the former into the latter, but to prevent its return, so as to obtain within the tank a supply of air, at the highest pressure, in the main, and retain the same independently of variations of pressure in the latter. D is a supply-tank, connected either with the main A or with the tank B by means of a pipe, E, controlled by a cock or valve, F. G is a piston or plunger working in a chamber or cylinder, H, and loaded with one or more weights, I. H' is an upper bearing for the piston-rod. J is a small pipe leading from the tank D to the space in the chamber H beneath the piston G. This pipe J may be dispensed with by causing the piston-chamber to open at its lower or front end either directly into the tank D, or into the pipe E above the cock F. The piston G is arranged (as shown in the drawing) to actuate a lever opening and closing the cock F, so that when the piston is forced up by the pressure of air admitted thereto its movement will operate to shut the cock and close the pipe E, and thus invariably cut off the further admission of air to the tank D, whenever the pressure of that already admitted counterbalances the weights I. When the pressure in the tank so far diminishes again as to permit the piston to move under the influence of the weights, its movement will open

the cock and admit more air. By this means a constant air-pressure may be maintained at a fixed standard in the tank D, for use in signaling, irrespective of the pressure in the air-main, so long as the pressure in the main itself does not fall below such standard.

The piston may be made to work horizontally instead of vertically, and springs be substituted for the weights I, and a diaphragm may in all cases be employed as an equivalent for a piston, G.

K is an air-commutator, consisting substantially of a valve, *a*, controlling an aperture between an upper and lower chamber, *b* *b'*, and to which is suspended a weight, *c*. The air-supply pipe communicates with the lower chamber *b'*, and the air-delivery pipe with the upper chamber *b*. The valve is kept closed, and the weight uplifted, by the pressure of the air from the supply-pipe bearing against its under surface. The valve is forced open when desired by the movement of a cam, *d*, secured upon the end of a rocking shaft, and which bears in a yoke upon the upper end of a rod projecting from the valve upward and outward through the case. After the valve has been opened it is kept open by the weight *c* until the outward pressure in the upper chamber, upon the transverse area of the rod projecting outwardly therefrom, becomes sufficient to carry up the valve and weight. M M' is the signal or delivery pipe carrying air from the commutator K to the signals connected therewith. That portion, M, of the signal-pipe adjacent to the commutator is enlarged, so as to be of a larger capacity than its supply-pipe, in order to avoid or prevent such a momentary accumulation of pressure in the signal-pipe, at the mouth of the commutator—consequent upon the sudden admission of the air thereto—as would operate to close the valve prematurely. The relative proportions of the supply and signal pipes, adjacent to the commutator, may be determined by means of a cock, L, placed in the supply-pipe. This cock L serves likewise to adjust and control the admission of air to the supply-pipe, and thus determine the interval of time during

which the commutator-valve shall remain open before automatically closing. N is an air-tank combined with the enlarged portion M of the signal-pipe M M' to permit a more full and free discharge of air through the commutator into the signal-pipe before the commutator-valve closes, by reason of an accumulation of pressure in said pipe.

P is an exhaust cock or valve placed in the signal-pipe M to provide for a full, free, and rapid discharge of air therefrom, when required. P¹ is a lever, connected with the cock, and arranged to be struck (when the cock is closed) by an attachment upon the locomotive or cars of a passing train, and to thereby operate to throw open the said cock. P² is a second lever connected with the cock, and arranged to be drawn up when the cock is opened, and to operate when thrown down (as shown in the drawing) to close the same. R is an air piston or plunger working in a suitable chamber or cylinder, and provided with a rod, R', projecting outwardly from said chamber. A bar, S, slotted at its lower end to engage a pin in the valve-lever P², is secured to an arm, T, which projects from the rod R', and the slot in the bar S is so extended as that an upward movement of the piston, arm, and bar will not move the lever P²; but when said lever is elevated by the opening of the cock P its pin will bear against the upper end of the slot, so that the descent of the piston will operate to force down the lever and close the cock. W is a pipe connecting the signal-pipe M M' with the piston-chamber beneath the piston, so that when air is admitted to the signal-pipe the piston will rise. This pipe W should be of less capacity than the signal-pipe M' and its exhaust-vent, in order that the piston may not descend and close the exhaust cock or valve until the compressed air in the signal-pipe is fully discharged. The proper degree of contraction in the pipe W, with reference to the pipe M' and its exhaust-vent, may, however, best be adjusted and determined by placing a cock or valve, X, in said pipe W; or a check-valve opening freely toward the piston-chamber, but which, when closed, will present a contracted orifice for the return of the air, may be employed in said pipe as a substitute for its contraction otherwise. I contemplate, also, as an equivalent device, placing a check-valve in pipe W, so

as to admit air to the piston-cylinder, but prevent entirely its return, and combining a separate exhaust-valve with the piston-chamber in such manner as that it shall be opened and closed simultaneously with the main exhaust-valve P by the movement of the bar S, the object of these devices being to provide for an exhaust of air from the piston-chamber, which shall be produced simultaneously with the exhaust of air from the signal-pipe, but which shall be so adjusted, controlled, and retarded as that the piston will not move by reason of such exhaust to close the main exhaust-valve P until the air in the signal-pipe is fully discharged. Y is a strainer to protect the valves from dirt.

I claim as my invention—

1. In combination with each other an air-tank, D, a pipe to supply the same, a cock or valve to govern said pipe, and a piston, G, actuating the cock and subjected to the pressure of air in the tank, substantially as and for the purpose herein set forth.

2. The combination, with an automatic air valve or commutator, K, and with its air-supply pipe, of a delivery-pipe, M, having larger capacity than said supply-pipe, substantially as and for the purpose herein set forth.

3. In combination with each other an air-signal pipe, M', a valve or cock controlling an exhaust-vent in said pipe, and a weighted piston, R, actuated and supported by the pressure of air admitted thereto from the pipe M', and operating automatically, when relieved from such air-pressure, to close said exhaust-valve, substantially in the manner and for the purpose herein set forth.

4. The combination, with an exhaust-vent and valve, P, in an air-pipe, M', and with a piston, R, actuated by compressed air from said pipe, and operating, when relieved from pressure, to close said valve, of a cock or valve, X, controlling the communication between the air-pipe and piston to insure a comparatively slow discharge of air from the piston-chamber, when the exhaust-vent in the air-pipe is opened, substantially as and for the purpose herein set forth.

W. E. PRALL.

Witnesses:

R. E. SHAPLEY,
DAVID A. BURR.