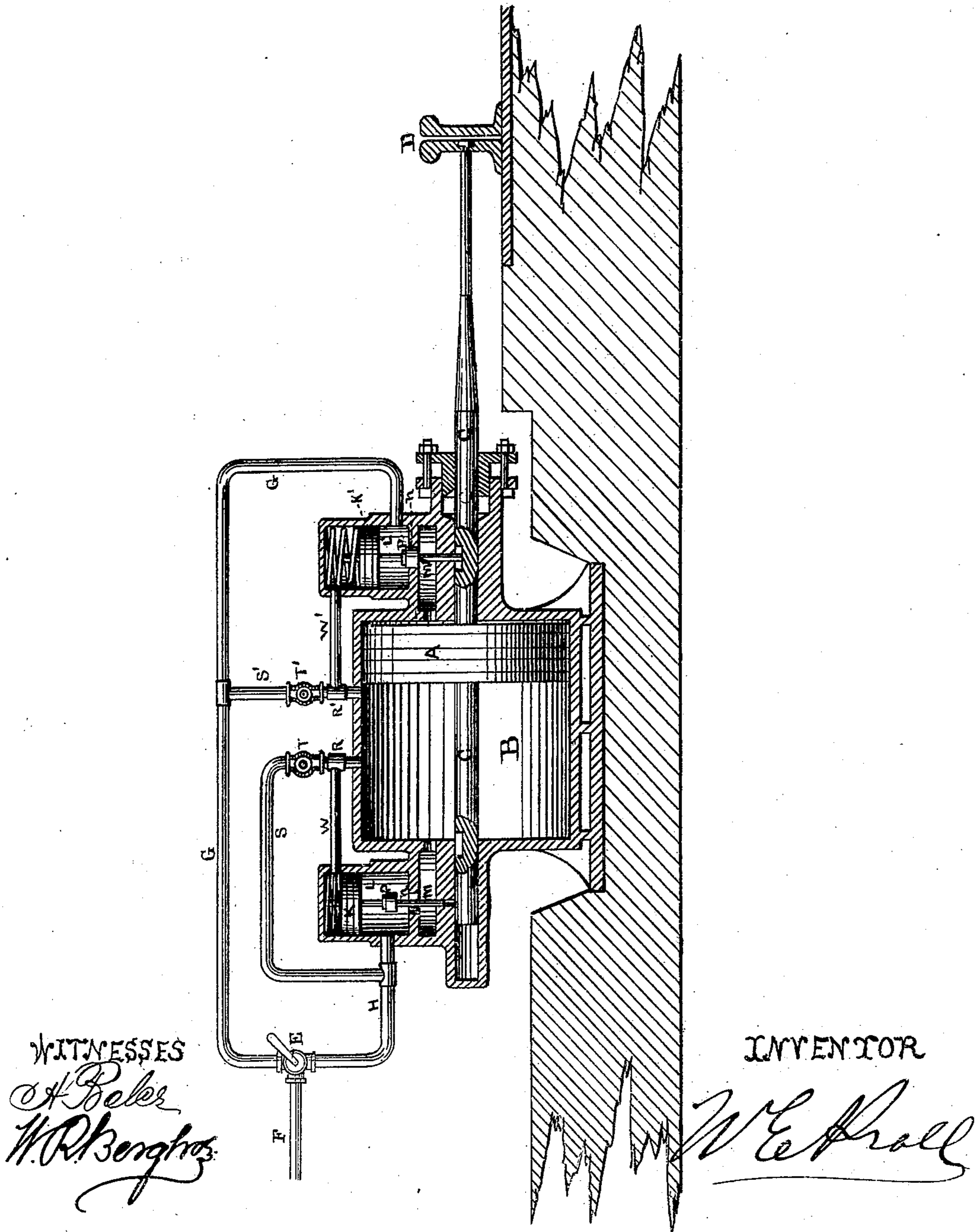


W. E. PRALL.

PNEUMATIC SWITCH LOCKS, &c.

No. 178,952.

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UNITED STATES PATENT OFFICE.

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IMPROVEMENT IN PNEUMATIC SWITCH-LOCKS, &c.

Specification forming part of Letters Patent No. **178,952**, dated June 20, 1876; application filed April 17, 1876.

To all whom it may concern:

Be it known that I, WILLIAM E. PRALL, of Washington city, in the District of Columbia, have invented a new and useful Improvement in Apparatus for Moving and Locking Railway Switches and Signals by Means of Compressed Air, which said improvement is fully set forth in the following specification, reference being had to the accompanying drawings.

The object of my invention is to move and to lock and unlock automatically a pneumatic piston actuating a railway switch or signal, and when the piston has completed its movement in either direction, and is locked, to obtain notice thereof by means of an exhaust of air at the supply-cock, produced from the piston-cylinder through the opposite supply-pipe. It consists, first, in connecting the exhaust-vent, through which the charge of air which has propelled the piston in either direction finds an escape at the end of the stroke, with the pipe which admits air to the opposite end of the cylinder, by means of a branch pipe controlled by a check-valve, so placed as to permit a free passage of air from the cylinder through the branch connecting-pipe, but to prevent an opposite flow of air through it into the cylinder. It consists, secondly, in combining, with a latch or lock engaging either end of the piston-rod, a small plunger playing vertically in a chamber connected with the air-supply pipe at that end of the piston-cylinder, and which carries upon its stem a valve controlling the admission of air from the said supply-pipe to the main piston, the space in the chamber above the plunger being so connected with the branch exhaust-pipe between its check-valve and the piston-cylinder as that the air-pressure from the supply-pipe upon the under side of the plunger shall be balanced so soon as the piston has in its movement passed the exhaust-vent with which said branch pipe communicates.

In the accompanying drawing, which is a vertical longitudinal section of the piston-cylinder and locking apparatus, A is a pneumatic piston, playing freely within a cylinder, B; C, the piston-rod extending through the piston, and projecting centrally from both sides there-

of. One end of the piston-rod projects outwardly through a stuffing-box at one end of the cylinder, so as to connect with the movable rails of a railway-switch, D. The other projects into a recess formed in the cylinder-head to receive it. The play of the piston in its cylinder B is proportioned to the movement of the switch D. E is a four-way cock, arranged to open communication alternately, on the one hand, between an air-main or supply-pipe, F, connected with a suitable air-compressor or reservoir and pipes G H, extending thence to the opposite ends of the piston-cylinder B, and, on the other between the same pipes, respectively, and an exhaust-opening in said cock, its key being so arranged as that when communication is established between either pipe and the main F the opposite pipe will communicate with the exhaust-opening, and vice versa, and so that when the key is placed in a right position, midway of its movement, both pipes G and H will be cut off from communication with either the main or the exhaust. K K' are plungers, each playing vertically with an air-tight joint in small chambers L and L', formed at either end of the piston-cylinder B. M is a bar or latch, which extends from the under side of each plunger down to the piston-rod C, so as to engage a recess cut therein, and thus lock the rod. The bottom of the plunger-chamber L is pierced with an aperture, *n*, through which the latch-bar extends, and which forms a communication between the chamber and the interior of the piston-cylinder. P is a valve-piece formed upon the latch-bar, and which plays into the opening *n*, so as to open or close the same as the bar rises or falls. The supply-pipes G and H from the main cock E are connected directly with the chambers L L' below the plungers K K', and the communication between the supply-pipe and the piston-chamber at each end thereof is formed through the plunger-chamber and the opening *n* therein, and is, consequently, controlled by the valve-piece P, actuated by the plunger. R R' are vent-openings formed in the sides of the cylinder B, and so arranged as to be uncovered by the piston at the end of each stroke thereof. S S' are branch pipes, con-

necting, respectively, these vent-apertures R R' with the supply-pipes G and H, the pipe at either end of the cylinder being thus connected with the vent nearest thereto. T T' are check-valves placed in the said branch pipes to open outwardly from the cylinder, so as to prevent a passage of air through either branch pipe into the cylinder, but permit a free passage of air in the opposite direction. W W' are pipes connecting the branch pipes from a point in each, between its check-valve and the cylinder, with the plunger-chambers L L'.

In the operation of my improved pneumatic self-locking switch and signal cylinder, when it is desired to move the switch D to the position, for example, shown in the drawing, the four-way cock E is turned to establish communication between the main F and the supply-pipe H, the communication of the other pipe, G, being thereby cut off from said main and established with the exhaust-vent in the cock. The compressed air from the main thus admitted to the pipe H will pass into the chamber L under its plunger K, and immediately force it up, and thereby lift the latch M out of the locking-recess in the piston-rod C, (the engagement of the latch with the piston-rod otherwise preventing any movement of the piston A.) This movement of the latch will simultaneously open the valve P, formed thereon, and thus admit the air through the passage *n* into the piston-cylinder, to force the piston over to the opposite end, as shown in the drawing. So soon, however, as the piston has passed in its movement the first exhaust-vent R, the air flowing under pressure into the pipe W, and through it to the upper side of the plunger K, will equalize the pressure thereon which supported it from the under side, and thus allow it to drop by its own gravity, so that the locking latch-bar M will fall and rest upon the piston-rod, ready to drop

into the locking-recess whenever the piston shall be moved back in this direction. So soon as the piston A has completed its stroke, as shown in the drawing, the second exhaust-vent R' is uncovered, so that the air in the piston-cylinder will pass into the pipe S', lift its check-valve, and thus escape back through the pipe G to the cock E, where its escape through the exhaust-vent will serve as notice that the movement of the piston is completed, and the cock may now be turned to the midway point, ready for another movement. If the cock be turned to admit air to the pipe G, the movements as above described will take place in their order at the opposite end of the piston-cylinder and cause the switch to move in the opposite direction.

I claim as my invention—

1. Pipes G and H, conducting air to opposite ends of a pneumatic piston, combined with interconnecting branch pipes S S', fitted with check-valves and controlled by the piston, so as to allow a flow of air from the one pipe, G or H, to the other when the piston has completed its stroke, but not otherwise, substantially as and for the purpose herein set forth.

2. A locking-latch, M, engaging and locking the rod of a pneumatic piston, A, and operated by a plunger, K, arranged to be lifted by an admission of air from the air-main, and to open thereby a passage for the air into the piston-cylinder, and combined, also, with a branch pipe, W, admitting a return of air from the piston-cylinder to the upper side of the plunger, to equalize the pressure thereon so soon as the piston has moved, all substantially in the manner and for the purpose herein set forth.

W. E. PRALL.

Witnesses:

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