

W. E. PRALL.

VALVES FOR PNEUMATIC SIGNAL APPARATUS.

No. 172,492.

Patented Jan. 18, 1876.

Fig. 1

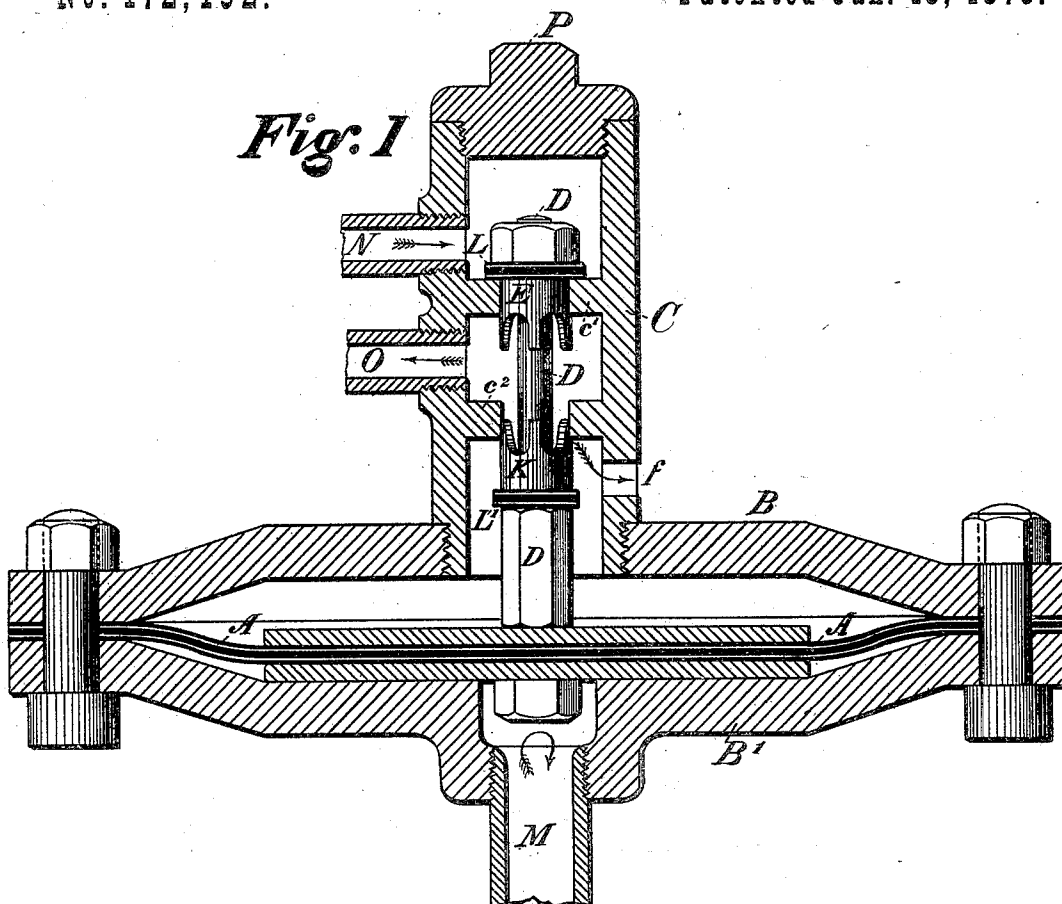
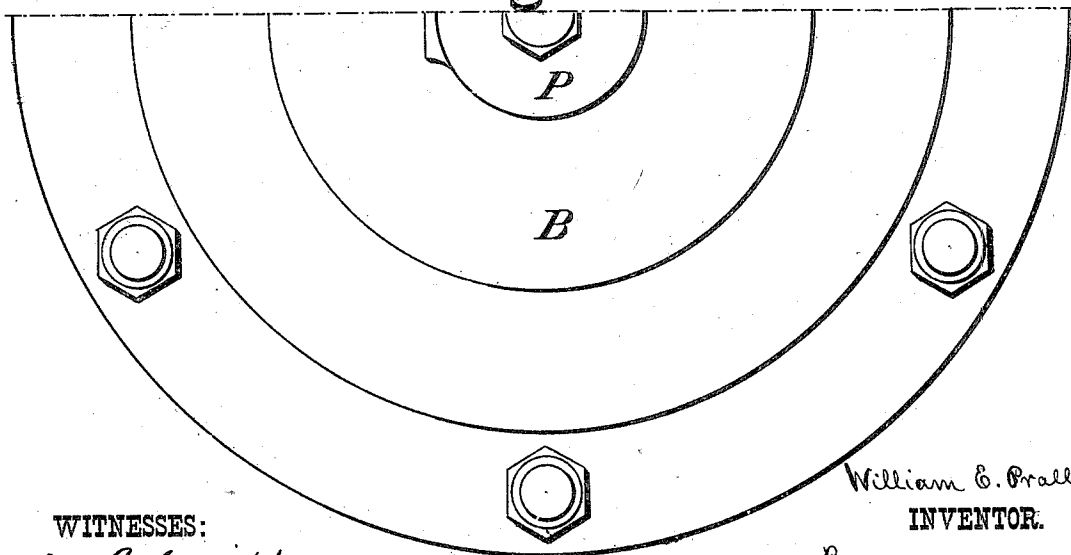


Fig. 2



WITNESSES:

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IMPROVEMENT IN VALVES FOR PNEUMATIC SIGNAL APPARATUS.

Specification forming part of Letters Patent No. **172,492**, dated January 18, 1876; application filed December 8, 1875.

CASE I.

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 Valves for Pneumatic Signal Apparatus, which is fully described in the following specification, reference being had to the accompanying drawings.

The object of my invention is to provide a combined diaphragm and valve for a pneumatic signal system which shall operate to establish direct communication, first, between the main air-supply pipe of the system and the piston or other device operating a signal or gate whenever the diaphragm is subjected to pressure; and, second, between the same piston and an exhaust-vent into the outer air when the diaphragm is relieved from pressure.

In the accompanying drawings, Figure 1 is a central vertical section of the diaphragm and valve, and Fig. 2 a top or plan view of a semi-section thereof.

A is a diaphragm, of rubber, leather, or of thin metal, closely confined at its edges between two circular plates, B B', which are slightly dished or recessed inwardly to allow a limited play to the diaphragm between them. C is a cylindrical valve-chest, secured centrally upon the upper plate B' of the diaphragm-casing. This valve-chest is divided by two transverse partitions, $c^1 c^2$, into three chambers, and central openings are formed in these partitions, so as to afford free communication between all three of said chambers. The lower chamber opens into the space above the diaphragm A, and communicates also with the outer air by means of an exhaust-vent, f , which may be pierced in the side of the cylinder, as illustrated in the drawing, or in the upper plate of the diaphragm-casing. D is a valve-stem, secured centrally to the diaphragm A, and which, extending up into the valve-chest C, carries two cylindrical valves, E and K, which are fitted, respectively, to move freely, yet closely, within the openings in the two partitions $c^1 c^2$, said openings thus being made to serve as bearings for the stem D. The upper edge of the lower valve K, and the lower edge of the upper valve E, are so notched, (see

Fig. 1,) and the valves are so proportioned in length, and so secured upon the stem relatively to each other, as that, when the opening in the upper partition c^1 is fully closed by its valve E, free communication is established through the opening in the lower partition c^2 , by means of the notches in the lower valve K, as illustrated in Fig. 1, the closing of this valve K operating in like manner to open the upper valve E. L L' are packing-rings, of rubber, leather, or other equivalent material, placed, respectively, at the upper end of the valve E and lower end of the valve K, so as to project radially beyond the same. These rings stop the movement of the valve when closed, and overlap the joint between the valve and valve-opening, so as to constitute a perfect packing therefor. (See E, Fig. 1.) M is a signal air-pipe, which extends in one direction to the point from which it is desired to operate the signal, at which point it is connected with the air-main by a suitable automatic valve or supply-commutator, which serves, when properly actuated, to admit a charge of air to the signal-pipe, and it extends in the other direction to the point from which it is desired to reverse the signal where it communicates with an exhaust-vent through a second automatic valve or exhaust-commutator, which serves, when actuated, to allow the air in the signal-pipe to escape. N is a pipe connecting the upper chamber of the valve-chest directly with the air-main, and O a second pipe connecting the central chamber directly with the piston or other actuating device of the signal or gate to be operated. P is a plug closing the upper end of the valve-chest, left open to admit of the introduction of the packing-ring L and nut, which secures it above the upper valve-opening.

The operation of this improved apparatus is simple and effective: So soon as air is admitted to the signal-pipe M, the diaphragm A is thrown up, carrying with it the valve-stem D, whose upward movement will serve to close the communication between the signal-pipe O and the exhaust-vent f , through the central and lower chambers, and to open the communication between said signal-pipe O and the

main air-pipe N through the central and upper chambers.

The air under pressure in the pipe N is thus admitted freely to the signal-pipe O to actuate the mechanism with which said pipe is connected. So soon, however, as the pressure upon the diaphragm A is relieved by an exhaust of the compressed air contained in the pipe M, the valve-rod will instantly drop, under the influence of the pressure, upon the lower valve K, and thereby close the valve E, and, cutting off communication between the air-main N and signal-pipe O, will simultaneously open communication between said pipe and the exhaust-vent *f*, and thus allow the compressed air in the pipe to escape.

The rapidity with which the compressed air shall exhaust through the opening *f* may be

so adjusted by means of a suitable cock at said opening, or by a determination of the opening itself, as to regulate and determine the rapidity of the reverse movements of the mechanism actuated and controlled by the admission of said compressed air thereto.

I contemplate the substitution of a piston as an equivalent for the diaphragm A.

I claim as my invention—

The connected valves E K, combined with a main pressure-pipe, N, a signal-pipe, O, an exhaust-vent, *f*, and a diaphragm, A, substantially as and for the purpose herein set forth.

W. E. PRALL.

In presence of—

A. H. NORRIS,
DAVID A. BURE.