

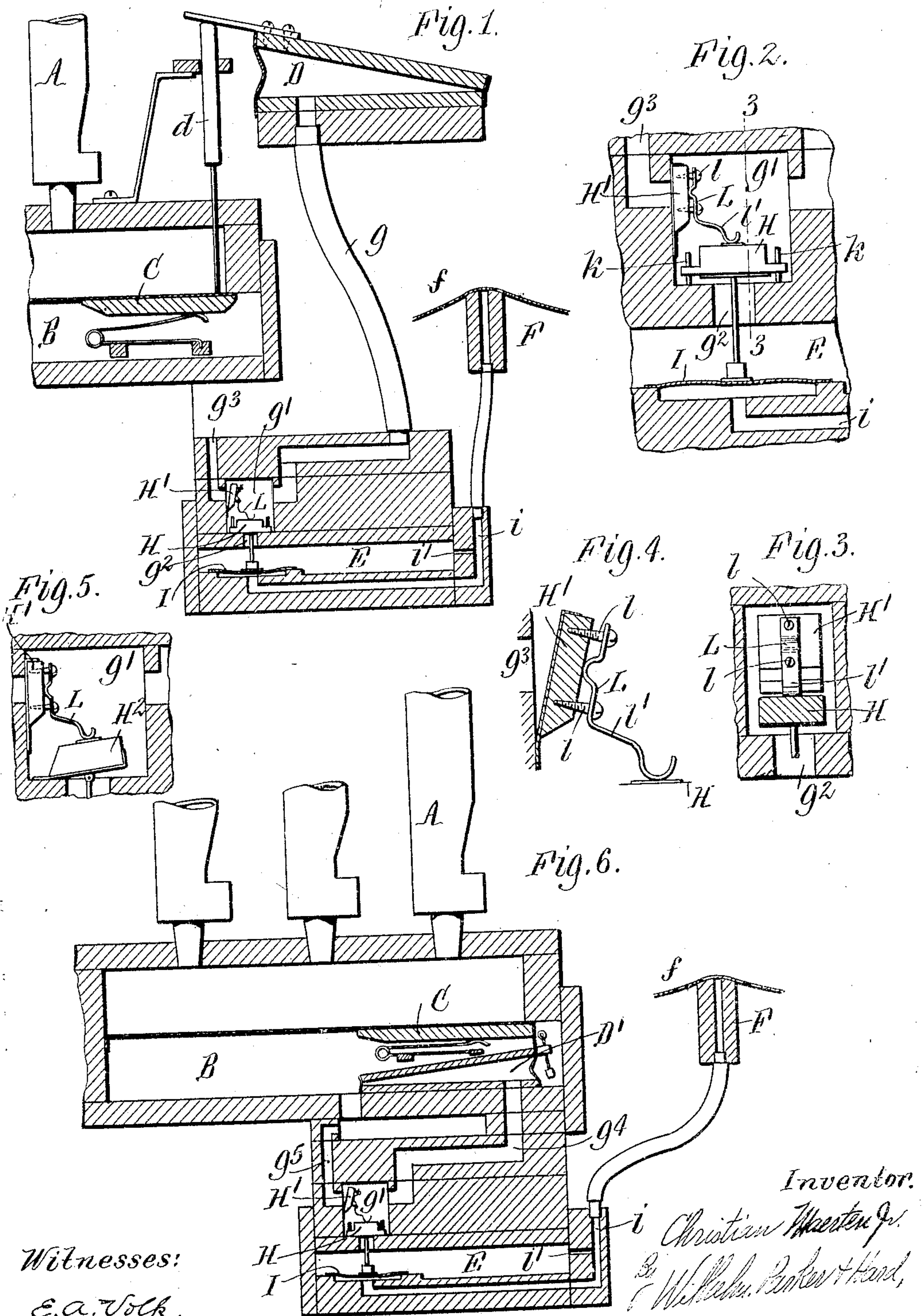
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PNEUMATIC ACTION FOR MUSICAL INSTRUMENTS.

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UNITED STATES PATENT OFFICE.

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PNEUMATIC ACTION FOR MUSICAL INSTRUMENTS.

No. 879,110.

Specification of Letters Patent.

Patented Feb. 11, 1908.

Application filed April 3, 1907. Serial No. 366,145.

To all whom it may concern:

Be it known that I, CHRISTIAN MAERTEN, Jr., a citizen of the United States, residing at Martinsville, in the county of Niagara and State of New York, have invented a new and useful Improvement in Pneumatic Actions for Musical Instruments, of which the following is a specification.

This invention relates to pneumatic actions for musical instruments, and more particularly to the valves for controlling the pneumatic motors of pneumatic actions for self-playing instruments.

The invention is illustrated in the drawings and hereinafter described in connection with actions for self-playing organs or wind instruments, but is applicable also to pianos, mechanical piano players, and other instruments capable of operation by pneumatic action. The valves shown are operated by pneumatic pressure controlled by a perforated note sheet traveling over a tracker board in the usual manner, but they could also be actuated by mechanical means.

Each pneumatic in an action of the sort illustrated is controlled by a double valve or two cooperating valves for alternately connecting the pneumatic with the exhaust trunk and atmosphere, or wind chest, to collapse and expand the pneumatic, or move its operative part in opposite directions, and the objects of this invention are to provide valves for this purpose which will be positive and quickly responsive in action and which can be operated with less power than is required for the operation of valves heretofore used; also to provide an operating connection between the two valves whereby a leverage is secured between the valves in favor of one of them; also to make the lever connection between the valves adjustable to regulate the movements of the valves.

In the accompanying drawings: Figure 1 is a fragmentary sectional elevation of a pneumatic action for a self-playing organ, embodying the invention. Fig. 2 is an enlarged sectional elevation of the controlling valves for a pneumatic and their chamber and actuating device, and showing a different position of the valves. Fig. 3 is a sectional elevation of the valve chamber and valves, in line 3--3, Fig. 2. Fig. 4 is a sectional elevation of one of the valves and its operating lever, on a still larger scale. Fig. 5 is a sectional elevation similar to Fig. 2, showing a slightly different construction. Fig. 6 is a

fragmentary sectional elevation of an organ action of a modified construction.

Like letters of reference refer to like parts in the several figures.

Referring particularly to Fig. 1, A represents one of the speaking pipes of an organ, B the wind chest, C one of the valves for controlling communication between the wind chest and the pipe or pipes for each note, D the pneumatic motor, bellows or pneumatic which operates the pipe valve through the push rod *d* or other connection, E the exhaust trunk in which a suction or partial vacuum is maintained, and F the tracker board, over the channels of which the perforated note sheet *f* travels to control the operation of the action. This action with the exception of the arrangement and construction of the controlling valves for the pneumatic D, which will be hereinafter described, is of well known construction and operation. The pneumatic D is connected by a conduit or passage *g* to a valve chamber *g'* which is connected by a port *g*² with the exhaust trunk E and by a port *g*³ with the atmosphere.

H H', Fig. 1, represent cooperating valves controlling the ports *g*² and *g*³, respectively, for each pneumatic. The valves are connected to move together, as later described. The stem of the valve H is attached to a diaphragm I arranged in the exhaust trunk over a chamber connecting by a passage or pipe *i* to one of the channels of the tracker board. This passage also connects by the usual bleeder duct *i'* with the exhaust trunk. When one of the perforations of the note sheet registers with the corresponding channel of the tracker board, the atmospheric pressure entering the channel and passage *i* will lift the diaphragm and valve H connected thereto, and open the port *g*², thus connecting the conduit *g* for the pneumatic with the exhaust trunk. The air will then be drawn out of the pneumatic and the latter collapsed to open the pipe valve C and cause the speaking of the instrument. The valve H' is moved to close the port *g*³ to the atmosphere, by the opening of the other valve H. When an imperforate portion of the note sheet covers a channel of the tracker board, the pressure in the corresponding passage *i* will be reduced by the suction in the exhaust trunk through the bleeder duct *i'* and the diaphragm will again descend and seat the valve H, so as to close the port *g*² to the exhaust trunk and permit the opening of the other

valve H' controlling the port g^3 to the atmosphere. The atmospheric pressure will then enter the pneumatic through the port g^3 , valve chamber and passage g , thereby distending the pneumatic and allowing the pipe valve C to close under the action of the usual spring.

The valves H H' for controlling the pneumatic may be of different construction and arrangement. As shown in Figs. 1—3, the valve H consists of a vertically movable block guided by fixed upright pins k extending through notched flanges at the ends of the valves. The valve could, however, be of the ordinary hinged type illustrated at H² in Fig. 5, but the vertically movable valve is preferable for the reason that its stem moves vertically only and does not swing or tilt at its connection with the diaphragm, and is therefore less liable to injure the diaphragm. The other valve H' is preferably of the usual hinged type and is arranged to seat against one of the upright walls of the valve chamber, to close the port g^3 to the atmosphere. A lever L is secured to this valve and has an arm l' projecting therefrom at an angle and adapted to bear at its free end on the other valve H, the end of the lever arm being preferably curved or rounded so that it can rock on the valve. A piece of skin or other suitable, pliable material is preferably cemented to the valve H for the arm to bear against. The arrangement of the valves and lever L is such that, when the valve H is seated, the other valve H' will swing away from its seat and open the atmospheric port, as indicated in Figs. 1 and 4, while, when the valve H is unseated to open the suction port g^2 , it will through the lever L seat the other valve H'.

In order to secure a proper movement of the valves, the lever L is preferably angularly adjustable on the valve to which it is secured. For this purpose the lever is attached to the valve H' by two screws l and is provided between these screws with a lateral projection or bend which bears against the face of the valve. By loosening one screw and tightening up the other the free end of the lever arm l' can be adjusted up or down, thus permitting a greater or less movement of the valves toward and from their seats. As the lever arm projects at an angle to the valve to which it is secured, a leverage is secured between the valves in favor of the valve H which is actuated by the diaphragm, and this leverage can be increased or decreased as required, by making the lever arm of the necessary length. The leverage can also be adjusted slightly by angularly adjusting the lever L by means of its securing screws. Thus by properly proportioning and adjusting the lever L the necessary movements of the valves can be secured, and the valve H' can be moved against the atmospheric pressure acting thereon by a feebler

impulse on the diaphragm than would be required if the valves were directly connected to each other or to the same stem, and therefore the channels of the tracker board and passages leading from the same to the diaphragms can be made smaller, which permits a closer arrangement of the channels and perforations in the note sheet and makes it possible to use a note sheet of less width than ordinarily employed. For the same reason, smaller diaphragms can be used and as the pressure in the exhaust trunk need not be so attenuated, a less powerful exhaust device can be used.

In the drawings the valve H is shown as operated by a diaphragm but it will be understood that a bellows or other pressure-operated device could be employed instead. The described lever connection between the valves would also be desirable with valves operated by electro-magnets, or other means, for the reason that less power would be required to actuate the valves.

Fig. 6 shows the valves H and H' applied to a different action in which the pneumatic D', which operates the pipe valve C, is operated alternately by the action of suction and compressed air instead of suction and atmospheric pressure, as in the action described. In this action shown in Fig. 6, the pneumatic or bellows D' is located in the wind chest B, being exposed externally to the air pressure in the wind chest. The valve chamber g' connects by passages g^4 g^5 , respectively, with the pneumatic and with the wind chest B. The valve H is operated by a diaphragm controlled by the perforated music sheet on the tracker board in the same manner as in the first action described. Instead of the pneumatic being inflated and expanded by the atmospheric pressure, however, it is expanded by the greater pressure from the wind chest. The arrangement and operation of the valves H H' are the same as previously described, the two different actions simply being illustrated to show the applicability of the valves to different actions.

While the valve mechanism constituting the invention has been described only in connection with pneumatic actions for self-playing organs, it will be manifest that the invention is not limited to such application as the pneumatic motors D controlled by the valves H H' could be employed for operating the hammers or other parts in pianos or other musical instruments, or in a piano player for operating the fingers which actuate the keys of a piano. The invention is not restricted to the particular use to which the pneumatics controlled by the valves are put.

I claim as my invention:

1. In a pneumatic action, the combination of a pneumatic, valves controlling the passage of air to and from said pneumatic, means for operating one of said valves, and a lever

arm fixed to one of said valves for transmitting the motion of one valve to the other valve, whereby a leverage is created in favor of one valve, substantially as set forth.

5 2. In a pneumatic action, the combination of a pneumatic, valves controlling the passage of air to and from said pneumatic, means for operating one valve, and a lever arm secured to one of said valves and bearing
10 against the other valve whereby one valve is moved upon a movement of the other valve, substantially as set forth.

3. In a pneumatic action, the combination of a pneumatic, valves controlling the passage of air to and from said pneumatic, one of
15 said valves being hinged, means for operating one of said valves, and a lever arm which is secured to said hinged valve for transmitting motion from one valve to the other
20 to cause said valves to move together, substantially as set forth.

4. In a pneumatic action, the combination of a pneumatic, valves controlling the passage of air to and from said pneumatic, one of
25 said valves being hinged, means for operating one of said valves, and a lever arm which is secured to said hinged valve and bears against said other valve to be operated thereby, substantially as set forth.

36 5. In a pneumatic action, the combination of a pneumatic, valves controlling the passage of air to and from said pneumatic, one of said valves being hinged, means for operating

ing one of said valves, a lever arm which is secured to said hinged valve and bears against
35 said other valve to be operated thereby, and means for angularly adjusting said lever arm on the valve to which it is secured, substantially as set forth.

6. In a pneumatic action, the combination
40 of a pneumatic, valves controlling the passage of air to and from said pneumatic, means for operating one of said valves, the other valve being hinged, a lever arm, and
45 two screws securing said lever arm to said hinged valve, said lever arm having a projection between said screws bearing against said hinged valve, whereby the lever arm
can be angularly adjusted on the valve, said
50 lever arm being arranged to be operated by said other valve, substantially as set forth.

7. In a pneumatic action, the combination of a pneumatic, valves controlling the passage of air to and from said pneumatic, one
55 of said valves being hinged, pneumatic means for operating one of said valves, and a lever arm secured to said hinged valve for transmitting the motion of one valve to the other valve, substantially as set forth.

Witness my hand, this 22d day of March, 1907.

CHRISTIAN MAERTEN, JR.

Witnesses:

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E. C. HARD.