

L. H. MAIER.
VALVE FOR PLAYER PIANOS AND THE LIKE.
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992,435.

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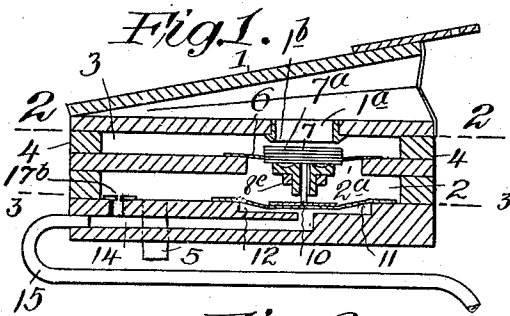


Fig. 2.

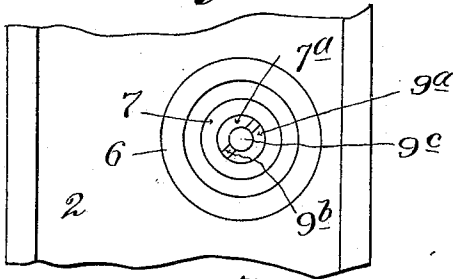


Fig. 3.

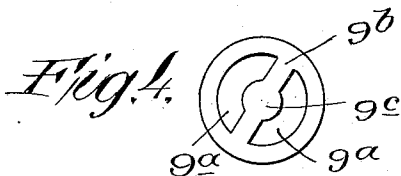
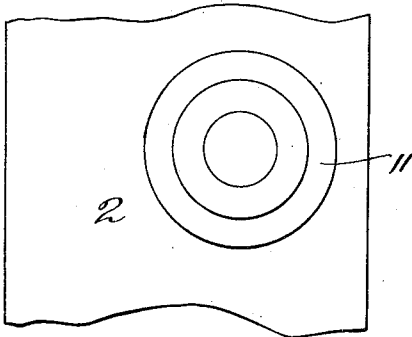


Fig. 4.

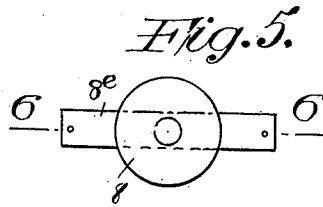


Fig. 5.

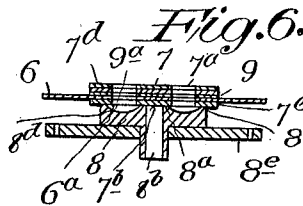


Fig. 6.

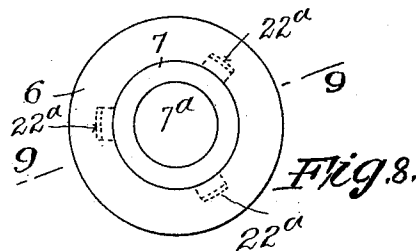


Fig. 8.

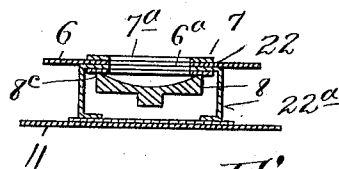


Fig. 9.

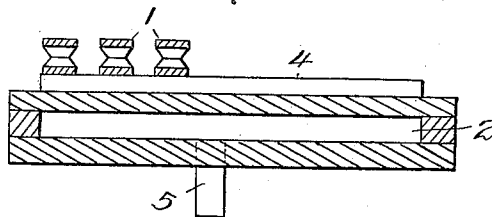


Fig. 7.

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UNITED STATES PATENT OFFICE.

LOUIS H. MAIER, OF NEW YORK, N. Y.

VALVE FOR PLAYER-PIANOS AND THE LIKE.

992,435.

Specification of Letters Patent.

Patented May 16, 1911.

Original application filed November 22, 1909, Serial No. 529,254. Divided and this application filed June 4, 1910. Serial No. 564,909.

To all whom it may concern:

Be it known that I, LOUIS H. MAIER, a citizen of the United States, and resident of New York city, borough of the Bronx, in the county of New York and State of New York, have invented certain new and useful Improvements in Valves for Player-Pianos and the Like, of which the following is a specification.

This application is a division of my application filed November 22, 1909, Serial No. 529,254, on automatic musical instruments, and the present invention relates to improvements in the valve mechanism of the pneumatics or fluid pressure device, the object of the invention being to provide an improved construction to permit the automatic passage and flow of air in one direction while preventing the flow in the opposite direction.

The invention comprises novel details of improvement and combinations of parts that will be more fully hereinafter set forth and then pointed out in the claims.

Reference is to be had to the accompanying drawings forming part hereof, wherein,

Figure 1 is a sectional view illustrating my improvements in connection with a primary valve-chest; Fig. 2 is a section on the line 2, 2, in Fig. 1; Fig. 3 is a section on the line 3, 3, in Fig. 1; Fig. 4 is a detail of part of my improved valve; Fig. 5 is a detail plan view of the valve seat; Fig. 6 is a section of the valve and its seat, on the plane of the line 6, 6, in Fig. 5; Fig. 7 is a sectional detail view, on a reduced scale illustrating several pneumatics associated with a suction chest; Fig. 8 is a plan of a modified form of my improved valve; and Fig. 9 is a section on the line 9, 9, in Fig. 8.

Similar numerals of reference indicate corresponding parts in the several views.

I have illustrated my invention in connection with the pneumatic adapted for musical instruments, although the same may be used in other relations where fluid pressure is to be controlled.

In the drawings the numeral 1 indicates any ordinary or suitable bellows or power pneumatic, provided with a port or opening 1^a in one wall, shown having a suitable seat 1^b. Pneumatic 1 is mounted upon a chest 2 and spaced therefrom to provide an air passageway 3, as by suitable blocks 4, said passageway permitting air to enter and flow

from the pneumatic. Several pneumatics 55 may be placed side by side upon chest 2 at a suitable distance apart, as illustrated in Fig. 7, suction pipes 5 being connected with chest 2 in any usual manner. Chest 2 is provided with an opening 2^a in line with each pneumatic 1, and over or in line with each opening 2^a is a diaphragm 6 secured to chest 2 in usual manner. Upon diaphragm 6 is an apertured valve 7, the aperture 7^a of which aligns with a corresponding aperture 6^a in diaphragm 6. Valve 7 also has a central valve portion 7^b to fit against the inner surface 8^a of seat 8, concentric with its bore 8^b, and valve 7 at its outer under surface is adapted to fit against the concentric seat 8^c. In the arrangement shown valve 7 comprises one or more rings 7^d, say of leather, fitted upon a metal ring 9 having apertures 9^a corresponding to apertures 6^a, 7^a, and aligned therewith, the cross bar 9^b being shown provided with a centrally disposed enlargement 9^c to which is attached the valve part or washer 7^b that is adapted to fit against seat 8^a, the under part 7^e of valve 7 being fitted against the diaphragm 6. This arrangement may be adopted as a convenient means to secure the valve to the diaphragm to operate against the opposed seats 1^b and 8.

I have shown seat 8 as countersunk at 8^a to provide the concentric seats 8^a, 8^c to assure close fitting of the valve at seat 8, although it will be understood that said seat may be otherwise suitably arranged, such as by having the surface of seat 8 flat, whereby under one condition valve 7 will close opening 1^a at seat 1^b and under another condition the valve will close the opening at seat 8 through the openings 6^a, 7^a. The metal piece 9 is provided for purpose of rigidity and to afford a central part 9^c against which a plunger or stem 10 is adapted to bear, which plunger is guided in the bore 8^b of seat 8. Seat 8 may be supported by a bar or extension 8^e secured to chest 2. Plunger 10 extends into chest 2 and bears against diaphragm 11 which covers the recess 12 communicating with port 13 of bore or conduit 14 of chest 2. The device above described may be connected with the appropriate valve of any well known primary valve-chest construction or to a power bellows in any well known manner.

Suction being maintained in chest 2 as

through pipe 5, and means being provided to admit air as required through pipe 15 into conduit 14, admission to pipe 15 being closed, diaphragm 6 will be drawn to close valve 7 upon seat 8 to uncover seat 1^b and atmospheric air will pass through channel 3 into the pneumatic 1, see Fig. 1. When air is admitted to pipe 15 it causes the diaphragm 11 to bulge outwardly, thereby pushing upon stem 10 which raises valve 7 from seat 8 and closes valve 7 against seat 1^b, and then the exhaust in chest 2 will draw the air from pneumatic 1 into said chest 2 through the opening in valve 7 and diaphragm 6, causing such pneumatic to collapse, atmospheric air thus being shut off from the pneumatic by the seating of valve 7 against seat 1^b. As soon as atmospheric air is again shut off from pipe 15 the bleed 17^b exhausts air from under diaphragm 11 and such diaphragm moves down, thereupon the suction in the corresponding chest 2, by drawing upon diaphragm 6, pulls valve 7 from seat 1^b and upon seat 8, thus shutting off suction in chest 2 through valve 7 and permitting air from channel 3 to pass into pneumatic 1 through opening 1^a, whereupon said pneumatic will expand. Thus, by the use of the double-acting valve 7 in connection with the opposed seats 1^b and 8 I am enabled to permit atmospheric air to enter the pneumatic when the valve moves in one direction and to shut off such air and suck air from the pneumatic when the valve moves in the opposite direction, effected by the simple back and forth movement of the apertured valve, the arrangement being such that when the apertured valve moves away from seat 1^b the aperture no longer serves as a passage for air, as it is then firmly seated upon seat 8, and yet atmospheric air passes freely from channel 3 over valve 7 to opening 1^a. The freedom of movement of the valve 7 by being mounted upon diaphragm 6 reduces friction of air flowing into the pneumatic, as the opening 1^a can be relatively large, and has direct communication with the atmosphere, and the suction from the pneumatic is also directly through such relatively large opening 1^a and the relatively large aperture or apertures in valve 7. Such direct action of the air overcomes the requirement of the usual ports and channels containing angles in piano playing mechanisms which set up resistance to the free flow of the air.

It will be understood that when my improvements are used in piano players, that by reason of the suction being relatively light, action of the air in accordance with my invention will give increased efficiency and freedom of vibration of the movable part of the bellows.

In Figs. 8 and 9 I have shown a modification of the means for positively operating

valve 7. In this case seat 8 is not required to have the concentric part 8^a, stem 10 being dispensed with, and the metal ring 22 arranged similarly to ring 9, but provided with extensions 22^a bent toward and adapted to coact with diaphragm 11. In this case when diaphragm 11 bulges toward seat 8, valve 7 will be lifted from said seat, and when diaphragm 6 bulges away from seat 8 valve 7 will be seated thereon. Diaphragm 6 is provided with opening 6^a and valve 7 has opening 7^a as before described, but in this case there is no requirement for the parts 9^b, 9^c. In Fig. 9 seat 8 is shown recessed to afford perfect contact of valve 7 at its outer edge 8^c.

Having now described my invention what I claim is:—

1. The combination of a chamber provided with an opening having an apertured seat, an apertured valve whose aperture registers with said seat in one position to close said aperture, and a diaphragm located at said opening and carrying said valve, said diaphragm having an opening registering with the opening in said valve and movable to unseat said valve, a stem located in the aperture in said seat and coacting with the valve, and a movable member to operate said stem and valve.

2. The combination of a chamber provided with an opening having a seat, an apertured valve whose aperture registers with said seat in one position to close said aperture, another seat opposite the valve having an opening registering with the valve aperture, an apertured diaphragm coöperating with the valve to close the opening in said chamber, the apertures in the diaphragm and valves registering.

3. The combination of a chamber provided with an opening having a seat, an apertured valve whose aperture registers with said seat in one position to close said aperture, another seat opposite the valve having an opening registering with the valve aperture, an apertured diaphragm coöperating with the valve to close the opening in said chamber, the apertures in the diaphragms and valves registering, and a movable member to operate said valve.

4. The combination of a chamber provided with an opening having a seat, an apertured valve whose aperture registers with said seat in one position to close said aperture, an apertured flexible support for said valve, the apertures in said valve and support registering, and a diaphragm opposed to said valve to operate the same.

5. The combination of a chamber provided with an opening having a seat, an apertured valve to coact with said seat in one position to close said aperture, an apertured diaphragm carrying said valve, the apertures in the valve and diaphragm registering, an-

other seat registering with the valve, and a movable member operating said valve successively from seat to seat.

6. The combination of a chamber provided
5 with an opening having a seat, an apertured diaphragm provided with an apertured valve extending over said opening to coact with said seat, said apertures registering, said valve resting upon said seat in one position,
10 another seat registering with the aperture in said valve and spaced therefrom, a movable member, and means interposed between said member and valve to move the valve from the first named seat to the second named
15 seat.

7. The combination of a chamber provided with an opening having a valve seat, an apertured valve to coact with said seat, a flexible support for said valve provided with an
20 aperture registering with the aperture in the valve, said support closing the space between the walls of the opening and seat when the

valve is in one position, and a movable member to operate said flexible support and valve to move said valve from the seat.

8. The combination of a chamber provided
25 with an opening having a valve seat, an apertured valve to coact with said seat, a flexible support for said valve provided with an aperture registering with the aperture in the
30 valve, said support closing the space between the walls of the opening and seat when the valve is in one position, and a movable member to operate said flexible support and valve to move said valve from the seat, and
35 another seat opposed to said valve and registering with the opening in the valve.

Signed at New York city, in the county of New York, and State of New York, this 26th day of May, A. D. 1910.

LOUIS H. MAIER.

Witnesses:

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Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."
