

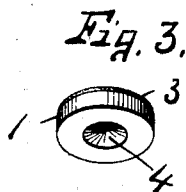
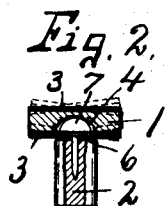
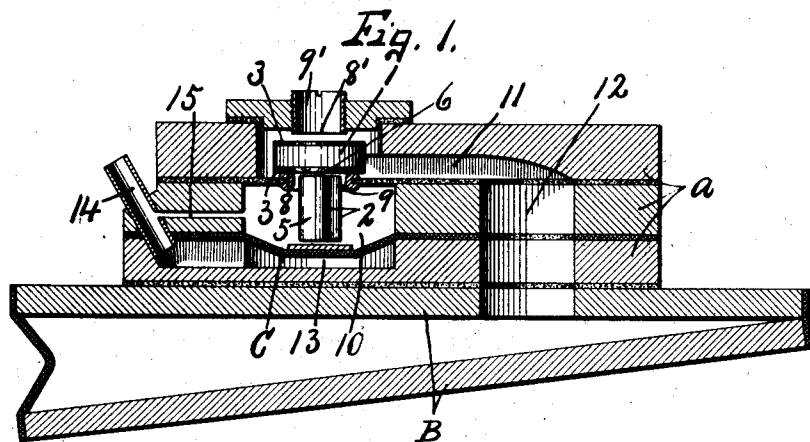
No. 814,679.

PATENTED MAR. 13, 1906.

L. B. DOMAN.

PNEUMATIC SELF PLAYING MUSICAL INSTRUMENT.

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UNITED STATES PATENT OFFICE.

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PNEUMATIC SELF-PLAYING MUSICAL INSTRUMENT.

No. 814,679.

Specification of Letters Patent.

Patented March 13, 1906.

Application filed September 15, 1904. Serial No. 224,565.

To all whom it may concern:

Be it known that I, LEWIS B. DOMAN, of Elbridge, in the county of Onondaga, in the State of New York, have invented new and useful Improvements in Pneumatic Self-Playing Musical Instruments, of which the following, taken in connection with the accompanying drawings, is a full, clear, and exact description.

This invention relates to certain improvements in pneumatic self-playing musical instruments, and refers more particularly to valves for pneumatic actions. It is well known that the degree of perfection in the rendition of any musical selection by such an instrument depends largely upon the ease of action and quick response of each individual valve to the rapid variations of air-pressure such as is produced by the movement of the perforated music-sheet across the ducts of the tracker-board and that this ease of action and responsiveness depends somewhat upon the structure of the valve, but mainly upon the practical absence of air-leaks either at the valve-seats or in the adjacent parts of the structure.

In the device set forth in my former application, Serial No. 219,938, filed August 8, 1904, I have sought to reduce the liability of air leakage to a minimum, and while the structure therein shown accomplishes in a great measure the object sought I have found that sometimes the valve-seats and valve-faces are not exactly parallel or at right angles with the vertical movement of the valves, and therefore a slight leak is produced between the valve and its seat as a result of imperfect contact. This leak is especially noticeable in the production of an audible hissing sound, which is more or less annoying to the operator and indicates a deficiency in the instrument.

The object, therefore, of my present invention is to connect the head and stem of the valve by a simple and effective flexible joint or swivel, whereby the head may have a free oscillatory movement with reference to its stem and still be guided in its vertical movement by said stem, so that the head will automatically and instantly adjust itself to limited angles to effect a positive closure of its port, and thereby increase the efficiency of

the pneumatic action under atmospheric pressure.

Other objects and uses will appear in the following description.

In the drawings, Figure 1 is a transverse sectional view of a valve-shelf of a self-playing musical instrument, showing the application of my improved valve. Fig. 2 is a sectional view of the valve. Figs. 3 and 4 are perspective views of the valve-head and its stem, respectively.

The valve which forms the subject-matter of my present invention consists, essentially, of a head 1 and a stem 2, both of which parts are preferably formed of wood and are flexibly connected together by a swivel or universal joint, so that the head has a free oscillatory movement relative to the stem to permit it to seat itself squarely and positively against either of two opposite valve-seats presently described. The head 1 is here shown as cylindrical and provided with opposite flat and parallel faces which are covered with thin pads 3, of leather or equivalent material, to make air-tight joints with their seats. One side or face (in this instance the lower face) is formed with a recess 4, which extends only part way through the head and has its open side covered by the adjacent pad 3. The stem 2 plays in one of the valve-ports to guide the valve in its vertical movement, and therefore it is preferably angular in cross-section to form air-passages between it and the walls of the port in which it plays, and the stem is therefore centrally disposed with reference to and of smaller diameter than the head, so that the latter may engage and rest upon its seat to cut off the passage of air through the underlying port when closed by the valve. The valve-stem 2 has a comparatively small neck 6 projecting from its upper end through an aperture of substantially the same size in the adjacent pad 3 and terminates in an annular enlargement 7 above said pad and in the recess 4. This neck 6 and enlargement 7 constitutes a part of a round-headed tack or nail which is driven centrally through the lower pad 3 and into the upper end of the stem 2, and as these pads are adhesively or otherwise secured to the head 1 it is apparent that the head 1 and stem are flexibly joined together. The en-

largement 7 is of slightly less size than the recess 4, which receives it, and the neck 6 is somewhat longer than the thickness of the pad 3, through which it passes for the purpose of affording ample clearance between the head and its stem to permit the head to oscillate in any direction in seating itself when the seat is not exactly at right angles to the axial movement of the valve.

In order to demonstrate the utility of such a valve, I have shown a valve-shelf *a* similar to and for the same purpose as that set forth in my former application previously referred to, in which the function of the valve is to control the action of a key-operating pneumatic, as B. The action of the valve is controlled directly by a primary pneumatic, as C, which in turn is controlled by an exhaust-bellows and a perforated music-sheet passing over a suitable tracker-board. (Not shown.)

The valve-head 1 plays between the valve-seats 8 and 8' of two vertically-alined ports 9 and 9', one of which connects an exhaust-chamber 10 with a lateral air-passage 11, and the other one connects said air-passage 11 with the atmosphere, while the air-passage 11 is connected to its key-operating pneumatic B by a second air-passage 12.

The primary pneumatic C consists of a diaphragm which is located beneath the exhaust-chamber 10 and plays in an underlying pocket 13, having an air-duct 14, which is connected to the exhaust-chamber by a smaller branch passage 15 and is also adapted to be connected to its particular duct in the tracker-board. (Not shown.)

The valve-seat 8 and its port consists of a metal eyelet, and the valve-head 1 is normally drawn against the upper face or seat 8 of this eyelet by the suction in the chamber 10 or by atmospheric pressure through the port 9'; but as soon as air under atmospheric pressure is admitted into the duct 14 it operates quickly to elevate the diaphragm C and to thereby close the valve against the upper seat 8'. This closes the port 9' and connects the exhaust-chamber directly with the key-operating pneumatic B, which immediately collapses to actuate the key of a piano or other instrument, the valve returning to its seat 8 as soon as communication between the pocket 13 and atmosphere is cut off.

The upper valve-seat 8' and its port 9' consists of a metal bushing which is threaded and adjustable in the valve-shelf to regulate the amount of movement of the valve.

A series of these valves and their ports are grouped together in one shelf, one for each primary and its key-operating pneumatic, and therefore a large number of valves are employed, and it is not always possible to fit the seats, so as to be exactly parallel with each other and with the adjacent faces of the valve-head 1; but the universal joint between the head 1 and stem 2 enables the head to auto-

matically adjust itself squarely on its seat, even though the seats and valve-faces may be considerably out of parallel.

Although I have shown my improved valve in connection with the key action of a pneumatic self-playing instrument, it is evident that it is equally applicable to other uses, and I do not, therefore, limit myself to the use shown and described.

Having thus fully described my invention, what I claim, and desire to secure by Letters Patent, is—

1. In a pneumatic self-playing musical instrument, a valve-action including a valve having a head and a guide-stem flexibly connected together, the head supporting the stem and both parts having a free oscillatory movement one upon the other.

2. In a pneumatic self-playing musical instrument, the combination with two ports and valve-seats therefor, of a valve comprising two parts, one part being connected by a universal joint to the other part and playing between the two seats and the other part guided by one of the ports.

3. In a pneumatic self-playing musical instrument, the combination with two ports and valve-seats therefor, of a valve having a guide-stem guided by the sides of one of the ports and provided with a head playing between the seats and flexibly connected to the stem.

4. In a pneumatic self-playing musical instrument, the combination with a primary pneumatic and a key-operating pneumatic communicating with the exhaust-chamber and with the atmosphere, of an exhaust-chamber, a valve between the primary and key-operating pneumatic consisting of a head and a stem flexibly connected to each other and each having a free oscillatory movement one upon the other.

5. In a pneumatic self-playing musical instrument, a valve-shelf having a valve-chamber and opposite ports, a primary pneumatic, a valve consisting of a head and stem flexibly connected to oscillate freely one upon the other, the head playing between the ports and the stem supported by the head free from the primary pneumatic and guided by the sides of one of the ports.

6. In a pneumatic self-playing musical instrument, a valve consisting of a head and stem, one of the parts having a recess and the other part having a head playing in the recess and provided with a comparatively small neck, and a comparatively thin covering secured to one of said parts and having an aperture receiving said neck.

7. In a pneumatic self-playing musical instrument, a valve-shelf having a port and a valve-seat, a primary pneumatic directly under the port, and a valve consisting of a head normally resting on the seat and a stem guided by the sides of the port and flexibly

5 attached to and supported by the head with its lower end in the path of the primary pneumatic, the distance between the seat and lower end of the stem being less than the distance between the seat and upper face of the primary pneumatic when the active parts are in their normal position.

In witness whereof I have hereunto set my hand on this 12th day of September, 1904.

L. B. DOMAN.

Witnesses:

Mrs. THOMAS ELLIOTT,
NETTIE A. BIBBENS.