

W. C. STEPHENSON.
 VALVE CONSTRUCTION FOR PNEUMATIC PLAYERS.
 APPLICATION FILED NOV. 27, 1914.

1,160,008.

Patented Nov. 9, 1915.

Fig-1-

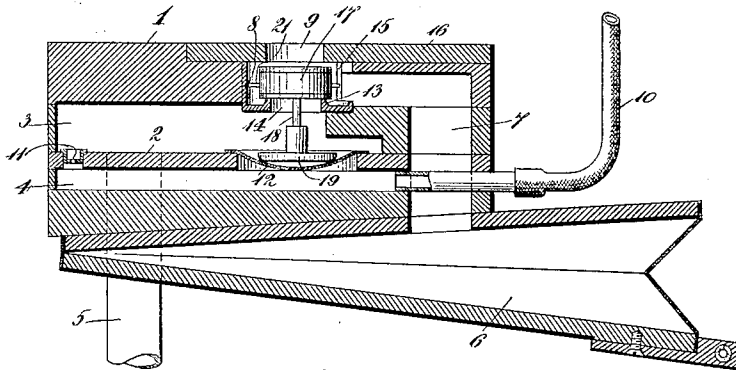


Fig-2.

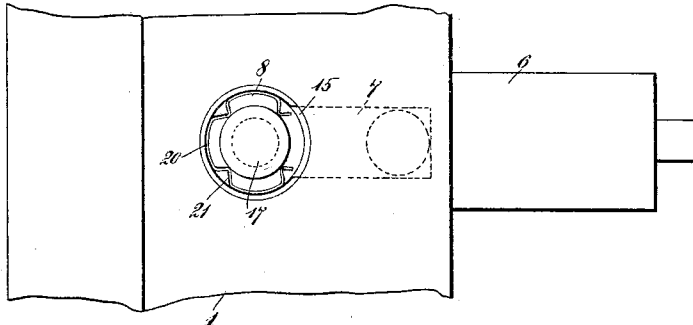


Fig-3.

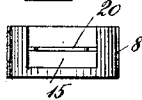


Fig-4.

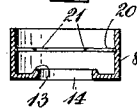
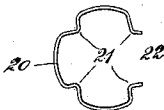


Fig-5.



WITNESSES:

Alvin Beckler,
Joseph H. Ryan

INVENTOR:

William C. Stephenson
 By *Roberts, Roberts & Cushman*
 Attorneys

UNITED STATES PATENT OFFICE.

WILLIAM C. STEPHENSON, OF WOBURN, MASSACHUSETTS, ASSIGNOR TO VOSE & SONS PIANO COMPANY, OF BOSTON, MASSACHUSETTS, A CORPORATION OF MASSACHUSETTS.

VALVE CONSTRUCTION FOR PNEUMATIC PLAYERS.

1,160,008.

Specification of Letters Patent.

Patented Nov. 9, 1915.

Application filed November 27, 1914. Serial No. 874,131.

To all whom it may concern:

Be it known that I, WILLIAM C. STEPHENSON, a citizen of the United States, and resident of Woburn, in the county of Middlesex and State of Massachusetts, have invented new and useful Improvements in Valve Construction for Pneumatic Players, of which the following is a specification.

This invention relates to a valve construction for pneumatic piano players, and consists in the novel and improved features hereinafter described and particularly pointed out in the claims.

In the accompanying drawings which illustrate the preferred embodiment of the invention,—Figure 1 is a vertical sectional view, partly in side elevation, showing my new valve construction, and such associated parts of a pneumatic player apparatus as are necessary to make clear the environment and mode of operation of the valve; Fig. 2 is a plan view of said valve and associated parts with the cover of the valve chamber removed; Fig. 3 is a side view of the valve chamber housing removed from the wind box; Fig. 4 is a sectional view of said valve chamber housing; and Fig. 5 is a plan view of the valve guiding ring.

Referring to the drawings, 1 represents a box or casing divided by partition 2 into two chambers 3 and 4. Chamber 3 is connected by wind pipe 5 to the usual pumping apparatus of the instrument (not shown) by which suction is maintained in chamber 3. A pneumatic 6, which actuates the usual piano action (not shown) is secured to the casing 1 and is connected by passage 7 through the casing, with the valve chamber formed by the valve housing 8 of metal, which is normally open to the atmosphere through valve port 9. The pneumatic 6 is thus normally in open or expanded position, as shown.

The chamber 4 is connected by the usual tube 10 to the tracker bar over which passes the perforated note sheet.

The partition 2 is provided with a small port 11 connecting chambers 3 and 4; and a loose, flexible pouch 12 spans an aperture in said partition.

The valve chamber consists of the cylindrical metal shell or valve housing 8, having a valve seat 13 surrounding a valve port 14 in its bottom. The top of the housing 8 is open, and an opening 15 is provided

through its side to communicate with passage 7. The upper valve port 9 is formed in a removable cover strip 16, that part of which immediately surrounding port 9 forms an upper valve seat. The valve 17 is situated in the valve chamber 8, and is provided on both its upper and lower faces with a lining of leather or other suitable material adapted to make tight joint with the valve seats. The valve 17 is provided with stem 18, which carries a button or head 19 at its lower end, engaging the flexible pouch 12.

The valve is guided in its vertical movement by a series of small guiding projections extending inward from the walls of the valve housing 8 and engaging the valve itself rather than the stem, between which projections the valve is free to move up and down. Heretofore such valves have been guided by laterally extending arms, having sockets in which the valve stem slides. Such stem guides not only prevent any wobbling of the valve, thus preventing the valve from making a tight closure with the seat in case of any unevenness of the parts, but also extend across the valve ports, thereby interfering with the free passage of the air and often causing a whistling sound. The guiding projections of my valve are preferably formed by bending loops or points 21 in an expanding spring ring 20 of fine wire, which is seated in a shallow groove in the circular walls of housing 8 and there held by its own resiliency. Said ring is broken or interrupted as shown at 22 opposite the opening 15 in housing 8.

It will be understood that when suction is created in chamber 3, and also in chamber 4 through port 11, by the pumping device to which pipe 5 is connected, the valve 17 will be closed by gravity on seat 13, thereby closing port 14. The pouch 12 will hang down loosely, since the pressure is the same on both sides. The air in tube 10 will thus be under tension or suction, but will be closed by the note sheet. When a perforation in the note sheet passes and opens tube 10 to the atmosphere, the pressure is suddenly raised in chamber 4, the perforation 11 being so small that the opening of tube 10 will affect chamber 4 before it does chamber 3. Thereupon pouch 12 will be forced upward and will lift the valve, thereby opening port 14 and closing port 9. This will cut off pas-

sage 7 from the atmosphere and connect it to suction chamber 3 through the valve chamber 8, immediately causing pneumatic 6 to collapse and actuate the corresponding 5 hammer of the piano action. When the note sheet again cuts off tube 10 from the atmosphere the valve 17 will drop and the parts be restored to their initial position.

The one piece metal housing 8 constitutes 10 a simple and effective valve chamber, free from the possibility of leaking, and readily inserted or removed together with the valve, should occasion require. If desired, the housing 8 may be cemented or otherwise 15 packed in the hole in which it fits. The valve housing and valve may be properly assembled before they are put into the casing. And the fine wire guide projections 21 permit the free movement of the valve, 20 and also leave the air passages through the valve housing practically uninterrupted.

The wall of the housing 8 which surrounds the periphery of the valve is herein shown as cylindrical; but it will be understood that it might be of some other shape, 25 and the term "wall" as used in the claims is not used as a term of limitation but is intended to include the surrounding wall whether of cylindrical or non-cylindrical 30 shape.

I claim:

1. In combination, a valve chamber consisting of a metal housing, said housing being open at its top and having a valve port and valve seat in its bottom and an air opening through its side, a cover provided with a valve port and seat over the top of said housing, a double faced valve mounted to move vertically in said housing, and guiding 40 projections within said valve chamber extending inwardly from the wall of said housing which surrounds the valve adapted to guide said valve in its vertical movement.

2. In combination, a valve chamber consisting of a metal housing, said housing being open at its top and having a valve port and valve seat in its bottom and an air opening through its side, a cover provided with a valve port and seat over the top of said 50 housing, a double faced valve mounted to move vertically in said housing, and guiding projections, consisting of loops of wire, extending inwardly from the wall of said housing which surrounds the valve adapted 55 to guide said valve in its vertical movement.

3. In combination, a valve chamber consisting of a metal housing, said housing being open at its top and having a valve port

and valve seat in its bottom and an air opening through its side, a cover provided with 60 a valve port and seat over the top of said housing, a double faced valve mounted to move vertically in said housing, and an expansion spring ring supported by the wall of said housing which surrounds the valve and 65 having inwardly extending valve guiding projections.

4. In combination, a valve chamber consisting of a metal housing, said housing being open at its top and having a valve 70 port and valve seat in its bottom and an air opening through its side, a cover provided with a valve port and seat over the top of said housing, a double faced valve mounted to move vertically in said housing, 75 and an expansion ring of spring wire supported by the wall of said housing which surrounds the valve and provided with a series of inwardly bent loops forming valve guiding projections. 80

5. In combination, a pneumatic valve chamber consisting of a metal housing, a plurality of guiding projections disposed in substantially the same horizontal plane and extending inwardly from the wall of the 85 housing which surrounds the valve into direct but loose engagement with the valve at a series of points in said plane adapted to guide the valve to its seat and to permit the valve to tilt with substantial freedom rela- 90 tive to its direction of movement.

6. In combination with a valve chamber for a pneumatic player, a wire ring supported by the wall of the chamber and having inwardly extending guiding projections 95 adapted to engage and guide a valve.

7. In combination with a valve chamber for a pneumatic player, an expansion spring wire ring supported by the wall of the chamber and having a series of inwardly bent 100 loops forming valve guiding projections adapted to engage and guide a valve.

8. In combination, a valve, a valve chamber consisting of a cup-like shell integrally formed of metal, wholly inclosing said 105 valve, open at the top and having a valve port and valve seat in its bottom and an air opening through its side wall, and a cover provided with a valve port over the top of said metal shell. 110

Signed by me at Boston, Massachusetts, this twentieth day of November, 1914.

WILLIAM C. STEPHENSON.

Witnesses:

ROBERT CUSHMAN,
RICHARD W. HALL.