

O. HIGEL.  
 PLAYER PIANO MECHANISM.  
 APPLICATION FILED MAY 15, 1915.

1,198,225.

Patented Sept. 12, 1916.  
 2 SHEETS—SHEET 1.

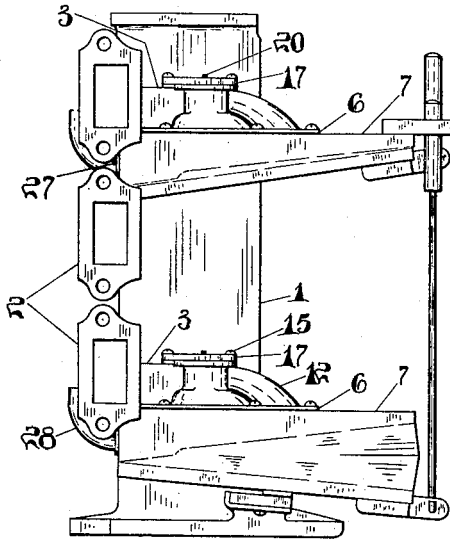


Fig. 1.

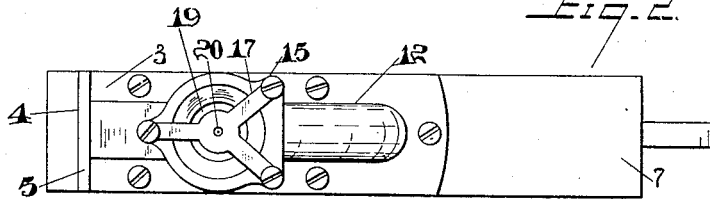


Fig. 2.

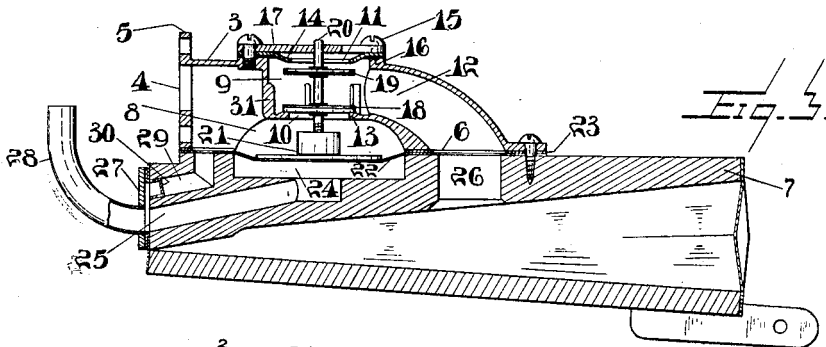


Fig. 3.

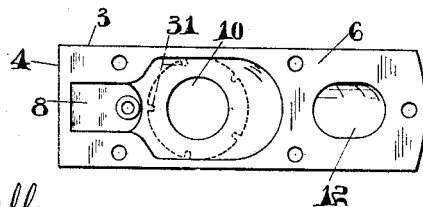


Fig. 4.

WITNESSES.

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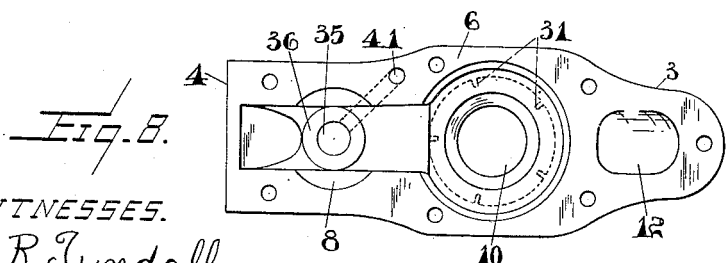
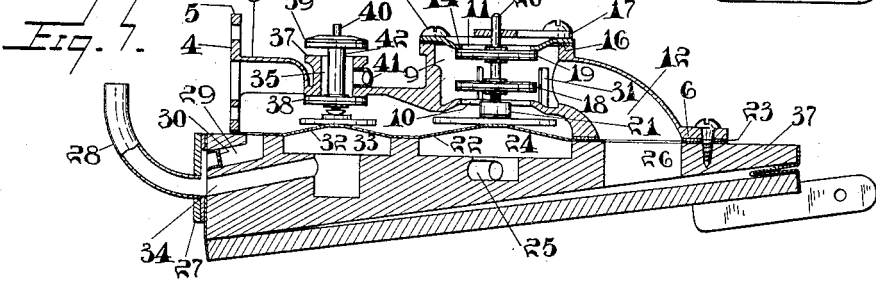
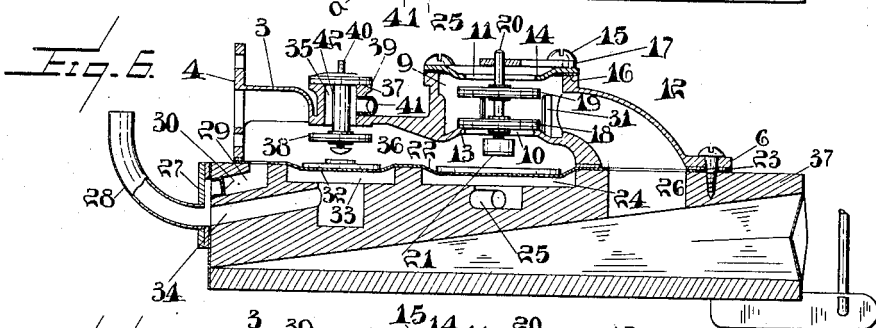
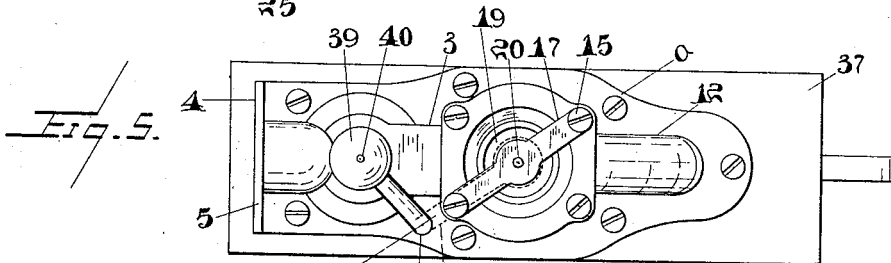
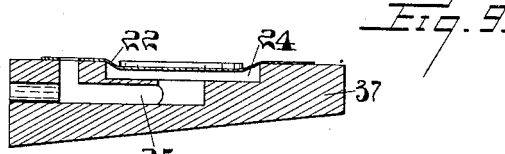
BY J. Edward Maybee.

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# UNITED STATES PATENT OFFICE.

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## PLAYER-PIANO MECHANISM.

1,198,225.

Specification of Letters Patent. Patented Sept. 12, 1916.

Application filed May 15, 1915. Serial No. 28,412.

*To all whom it may concern:*

Be it known that I, OTTO HIGEL, of the city of Toronto, in the county of York, Province of Ontario, Canada, a subject of the King of Great Britain, have invented certain new and useful Improvements in Player-Piano Mechanism, of which the following is a specification.

This invention relates particularly to the valve mechanism in player-pianos, and my object is to so construct said mechanism that the action will remain air tight under all climatic conditions, and so that when any parts become worn with use or fail through other causes, such parts may be easily detached, cleaned or repaired and replaced.

I attain my object by means of the constructions hereinafter more specifically described and illustrated, but which may be briefly described as follows. The valve casings are formed of independent metal castings which are so arranged in connection with the power pneumatics that the fixed members of the latter are utilized for the arrangement of the diaphragms, with their chambers, which control the valves.

Other features which contribute to the desired result will hereinafter be set forth.

The invention is illustrated in the accompanying drawings in which—

Figure 1 is an elevation of portion of a player-piano action showing pneumatics provided with my improved valve construction; Fig. 2 a plan view of a pneumatic provided with a single valve; Fig. 3 a longitudinal section of the same; Fig. 4 a plan view of the under side of the valve casing; Fig. 5 a plan view of a pneumatic provided with a double valve; Fig. 6 a longitudinal section of the same; Fig. 7 a similar view of the parts in a different position; Fig. 8 a plan view of the under side of the double valve casing; and Fig. 9 a section through the stationary member of the pneumatic shown in Fig. 5 along the line *a-a*.

In the drawings like numerals of reference indicate corresponding parts in the different figures.

Referring particularly to Fig. 1, 1 is the main vacuum chamber and 2 transverse vacuum chambers or trunks in connection with the chamber 1, and to which the valve casings 3 are suitably connected and with which they communicate as hereinafter described. The valve casings 3, it will be

noted, are provided with the faces 4 adapted to contact with the faces of the trunks 2, which faces are surrounded by the flanges 5 adapted for the passage of screws or bolts by means of which the casings are secured to the trunks. Each casing has the face 6 formed thereon adapted to contact with the stationary member 7 of a power pneumatic of ordinary type.

Referring particularly to Figs. 1 to 4 in which a valve of the ordinary single type is shown, it will be seen that each valve casing 3 has a diaphragm chamber 8 formed thereon communicating through the face 4 with the interior of a trunk 2 and open at its under side through the face 6. Above the diaphragm chamber is formed the valve chamber 9 communicating by means of the alined openings 10 and 11 with the diaphragm chamber and the atmosphere respectively. From the side of the valve chamber a passageway 12 leads, which passageway opens through the lower face 6 of the casing. This passageway is curved in the direction of its length, which enables me to withdraw the metal cores used in the die-casting of the casing. The withdrawal of the core is also facilitated by making the passageway of increasing cross sectional area from the upper toward the lower end. A valve seat 13 is formed around the opening 10.

14 is a valve seat formed of a separate piece secured to the upper side of the valve chamber by means of screws 15. This valve seat, being removable, provides means for the insertion of a valve. A suitable gasket 16 is interposed between the valve seat 14 and the valve casing to form an air tight joint. Above the valve seat 14 is located the bridge 17, preferably formed of fiber, and having a central opening formed therein concentric with the valve seats, and preferably bushed with cloth, as is common in the art.

The valve is preferably of the ordinary double disk type, the disks 18 and 19 being secured to the stem 20, the one end of which is guided in the central hole in the bridge 17. The disk 18 is adapted to seat on the valve seat 13 from above, and the disk 19 to seat against the valve seat 14 from below. Sufficient play is, of course, allowed so that when one disk closes the opening 10, the other opens up the opening 11 and vice

versa. The lower end of the stem is adapted to engage the diaphragm and is preferably provided with the adjustable button 21 for this purpose.

5 In my construction the diaphragm 22 for operating the valve is located between the valve casing and the upper surface of the stationary member of the diaphragm. In Fig. 3 it will be seen that the edges of the diaphragm are shown as being clamped between the face 6 of the valve casing and the upper surface of the stationary member of the pneumatic, the gasket 23 being interposed between the metal casing and the diaphragm.

10 It is preferable to form a small chamber 24 in the upper surface of the stationary member 7 to receive the diaphragm when the latter is in its lowered position. With this chamber 24 communicates the passageway 25, which leads to the outside of the stationary member of the pneumatic, preferably at its rear end, and provides means whereby, as hereinafter described, atmospheric pressure can be admitted under the diaphragm 22. The diaphragm 22 is of ordinary construction and requires no special description.

15 The passageway 12, it will be seen, terminates over a hole 26 formed through the stationary member 7 communicating with the interior of the pneumatic. The passageway 25 communicates with the opening in the connecting member 27 suitably secured to the end of the pneumatic, forming means for providing communication beneath the passageway 25 and the tube 28. The tubes 28 are the ordinary tubes which lead to the tracker bar of the action.

20 A vent passage 29 is formed through the upper side of the stationary member 7, into the diaphragm chamber 8, and also through the end of the pneumatic adjacent the opening of the passageway 25. A metal plug 30 with a small aperture therein is forced into the passageway 29, or other means are provided for permitting only a very restricted flow through the vent. It will be noted that the connecting member 27 is so constructed as to afford communication between this vent passage and the interior of the tube 28. The function of this vent passage is to permit of the restoration of an equilibrium of pressure on each side of the diaphragm 22 after the latter has been in operation.

25 It will be noticed that ribs 31 are provided on the sides of the valve chamber 9 behind the seat 13. These serve to guide the lower valve disk. If these ribs are of sufficient height, I may in some cases dispense with the bridge 17.

30 The valve operates in the usual manner by the admission of air through the tube 28 below the diaphragm, this connection with the atmosphere being, of course, made every

time an opening in the music roll comes opposite to the opening in the tracker bar corresponding to the tube 28. In high class actions it is usual to employ a double valve, the primary valve being controlled from the tracker bar and it in its turn controlling the secondary valve. This construction is shown in Figs. 5 to 9. The secondary valve is in many respects the same as the valve illustrated in Figs. 1 to 4, and corresponding reference numerals are employed to indicate these parts. A slight variation is, however, necessary as the passageway 25 leads to an opening in the upper surface of the stationary member instead of to the rear end. The valve casing is necessarily made longer, also the diaphragm chamber 8, as two diaphragms are necessarily employed and two valve chambers communicating with the diaphragm chamber above the diaphragms. The diaphragm 32 of the primary valve is located nearer to the rear end of the pneumatic and the chamber 33 is formed in the stationary member 37 below the diaphragm. Extending from this chamber 33 through the rear end of the stationary member is a passageway 34, which communicates with the connecting member 27. The vent 29 is arranged in exactly the same way as in the construction shown in Figs. 1 to 4. The valve chamber 35 communicates with the diaphragm chamber by means of aligned openings, around which are formed the valve seats 36 and 37. The valve is of a double type, being formed with the disks 38 and 39 secured to the stem 40 constructed as hereinafter described. The disk 38 seats against the downwardly facing seat 36 and the disk 39 against the upwardly facing seat 37.

35 From the valve chamber 35 the passageway 41 is run through the metal of the casing, which communicates with the end of the passageway 25, which, as before stated, is extended through the upper face of the stationary member (see particularly Figs. 5, 8 and 9.) The passageway 41 is preferably curved in the direction of its length similar to the passage 12. As in all double valves, the admission of air below the diaphragm of the primary operates the primary valve to bring the under side of the secondary diaphragm in communication with the atmosphere, the secondary valve operating in exactly the same way as the single valve shown in Figs. 1 to 4. The valve stem of the primary valve, it will be seen, is formed of a threaded metal screw 40, which is screwed through the wooden sleeve 42, the disks 38 and 39 being suitably glued or otherwise secured to this wooden sleeve. The lower end of the stem 40 is provided with a suitable head or button. The end of the stem projecting through the sleeve may be readily turned so that the

valve may be easily adjusted without removing the valve casing.

From the above description it will be seen that I have devised a construction in which all the valve casings may be conveniently made of metal, preferably metal castings, and that they are applied directly to the vacuum trunks which are of metal and to the stationary member of the pneumatic, so that possibility of any leakage occurring due to the effect of climatic changes is reduced to a minimum. The construction is also very simple.

What I claim as my invention is:—

1. In player-piano mechanism the combination of a vacuum chamber having an opening in its face; a pneumatic having a stationary member; an integral metal casing forming a valve chamber and having an apertured face formed with a flange at one end adapted to be secured against the face of the vacuum chamber with the opening therethrough in alinement with the opening in the vacuum chamber, and having a face formed at one side provided with a flange adapted to be secured to the stationary member of the pneumatic, the passageway of the valve casing, forming the communication between the pneumatic and the vacuum chamber, opening through the last mentioned face of the casing.

2. In player-piano mechanism, a valve casing adapted for connection to a vacuum chamber and a pneumatic, comprising an integral casting having two faces formed thereon at approximately a right angle to one another, one provided with a flange for connection to the vacuum chamber and the other with a flange for connection to the pneumatic, said casting being shaped to form a lower or diaphragm chamber opening at its underside through one face and also communicating with an opening in the other face, a valve chamber above the lower chamber and communicating therewith and also with the atmosphere by means of alined openings, and a passageway leading from the side of the valve chamber and opening through the same face of the casing as the underside of the diaphragm chamber.

3. In player-piano mechanism, a valve casing adapted for connection to a vacuum chamber and a pneumatic, comprising an integral casting having two faces formed thereon at approximately a right angle to one another, one provided with a flange for connection to the vacuum chamber and the other with a flange for connection to the pneumatic, said casting being shaped to form a lower or diaphragm chamber opening at its underside through one face and also communicating with an opening in the other face, a valve chamber above the lower chamber and communicating therewith and also with the atmosphere by means of alined

openings and a passageway leading from the side of the valve chamber and opening through the same face of the casing as the underside of the diaphragm chamber, a second valve chamber above the lower or diaphragm chamber and communicating therewith and also with the atmosphere by alined openings, and a passageway leading from the side of said second valve chamber and opening through the same face of the casing as the underside of the diaphragm chamber.

4. In player-piano mechanism, a pneumatic having a valve casing secured to its stationary member provided with a diaphragm chamber normally connected with a vacuum trunk, and a diaphragm therein, the pneumatic having a passageway formed therein opening through a face thereof and forming a communication with the underside of the diaphragm, and a restricted passageway forming a vent leading from the diaphragm chamber to a position adjacent the outlet of the first mentioned passage; and a single connection applied to said face communicating with the outlets of both passages whereby both passages may be connected with a tube leading to the tracker bar of the player-piano.

5. In player-piano mechanism, a valve casing adapted for connection to a vacuum chamber and a pneumatic, comprising an integral casting having two faces formed thereon at approximately a right angle to one another, one for connection to the vacuum chamber and the other for connection to the pneumatic, said casting being shaped to form a lower or diaphragm chamber opening at its underside through one face and also communicating with an opening in the other face, a valve chamber above the lower chamber and communicating therewith and also with the atmosphere by means of alined openings, and a passageway formed in the outer wall of the valve casing leading from the side of the valve chamber and opening through the same face of the casing as the underside of the diaphragm chamber, said passageway being curved in the direction of its length.

6. In player-piano mechanism, a valve casing adapted for connection to a vacuum chamber and a pneumatic, comprising an integral casting having two faces formed thereon at approximately a right angle to one another, one for connection to the vacuum chamber and the other for connection to the pneumatic, said casting being shaped to form a lower or diaphragm chamber opening at its underside through one face and also communicating with an opening in the other face, a valve chamber above the lower chamber and communicating therewith and also with the atmosphere by means of alined openings, and a passageway formed in the outer wall of the valve

5 casing leading from the side of the valve chamber and opening through the same face of the casing as the underside of the diaphragm chamber, said passageway being  
 10 curved in the direction of its length and curved also in cross section.

7. In player-piano mechanism a valve casing adapted for connection to a vacuum chamber and a pneumatic, comprising an  
 15 integral casting having two faces formed thereon at approximately a right angle to one another, one for connection to the vacuum chamber and the other for connection to the pneumatic, said casting being shaped to  
 20 form a lower or diaphragm chamber opening at its underside through one face and also communicating with an opening in the other face, a valve chamber above the lower chamber and communicating therewith and  
 25 also with the atmosphere by means of alined openings and a passageway curved in the direction of its length formed in the outer wall of the valve casing leading from the side of the valve chamber and opening  
 30 through the same face of the casing as the underside of the diaphragm chamber, a second valve chamber above the lower or diaphragm chamber and communicating therewith and also with the atmosphere by alined openings, and a passageway curved in the direction of its length leading from the side of said second valve chamber and opening through the same face of the casing as the

underside of the diaphragm chamber and beyond the end of the same. 35

8. In player-piano mechanism a valve casing adapted for connection to a vacuum chamber and a pneumatic comprising an integral casting having two adjacent flat faces formed thereon at approximately a right  
 40 angle to one another, one for connection to the vacuum chamber and the other for connection to the pneumatic, said casting being shaped to form a lower or diaphragm chamber opening at its underside through  
 45 one face and also communicating with an opening in the other face, a valve chamber above the lower chamber and communicating therewith and also with the atmosphere by means of alined openings, a passageway  
 50 leading from the side of the valve chamber, an opening through the same face of the casing as the underside of the diaphragm chamber outside of the chamber and beyond  
 55 the end of the same removed from the face adapted for connection to the vacuum chamber, and a valve seat removably secured to the top of the valve chamber.

Signed at Toronto, Ont., this 10th day of May, 1915, in the presence of the two undersigned witnesses. 60

OTTO HIGEL.

Witnesses:

E. P. HALL,

H. M. CHRISTMAN.

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