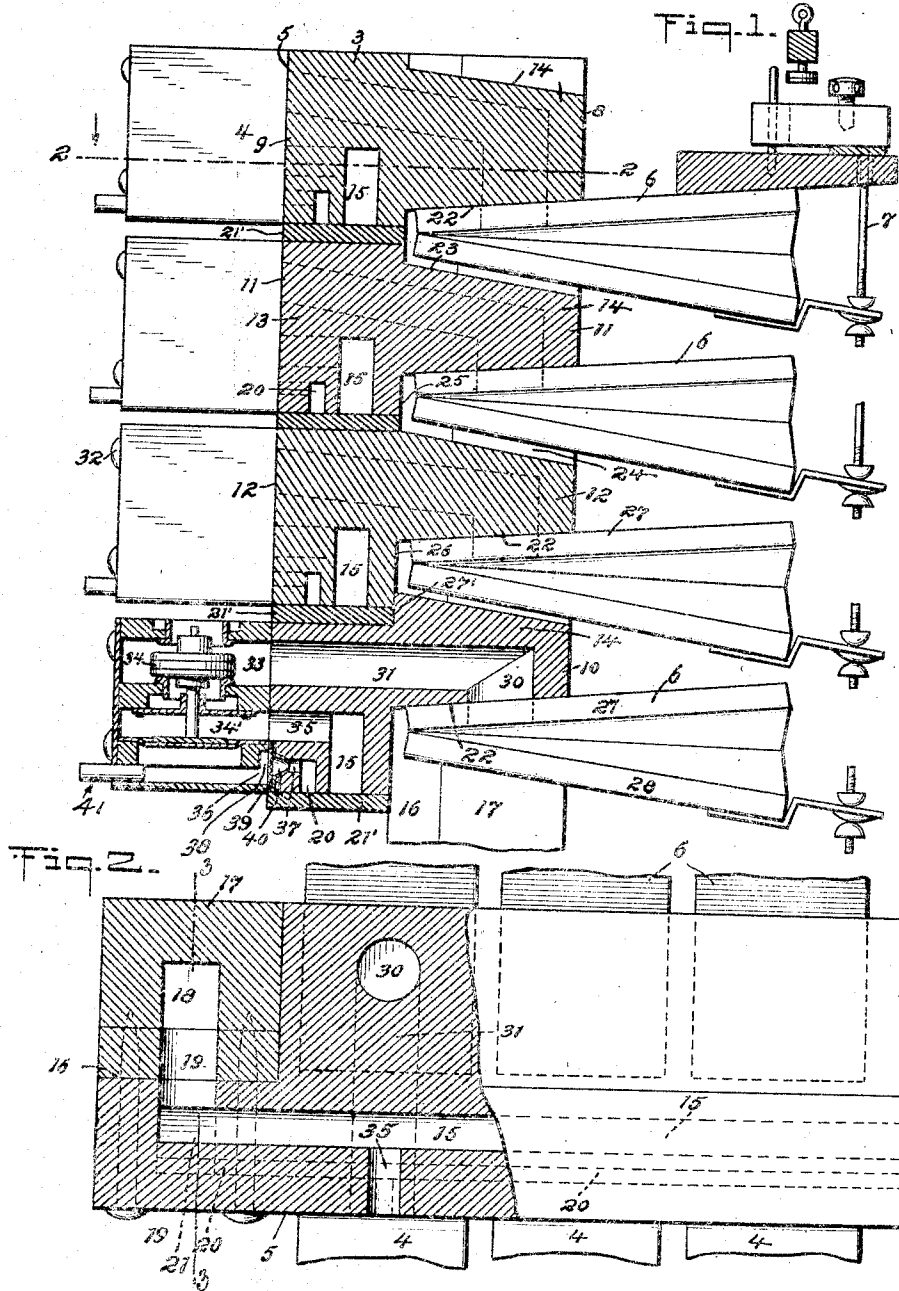


F. G. LYNDE.
PNEUMATIC ACTION FOR PLAYER PIANOS.
APPLICATION FILED JUNE 6, 1917,

1,282,444.

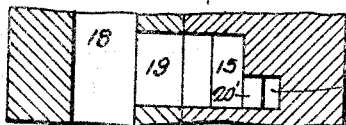
Patented Oct. 22, 1918.



WITNESS:

W. H. Peters

Fig. 3.



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PNEUMATIC ACTION FOR PLAYER-PIANOS.

1,282,444.

Specification of Letters Patent.

Patented Oct. 22, 1918.

Application filed June 6, 1917. Serial No. 173,071.

To all whom it may concern:

Be it known that I, FRANK G. LYNDE, a citizen of the United States, residing in the city of Newark, county of Essex, and State of New Jersey, have invented certain new and useful Improvements in Pneumatic Actions for Player-Pianos, of which the following is a specification.

My invention relates in general to a pneumatic action for player pianos, specifically relates to a built up unit constituting a combined tension chest, player-pneumatic and valvular-control support and constitutes an improvement in the device disclosed in my copending application, Serial No. 819,883 filed Feb. 20, 1914.

The primary object of the invention is to provide a simple form of construction of the class described, which will convey the pneumatic power economically from a source to the several pneumatics and thus improve the efficiency of power consumption and ease of actuation of player pianos in which such a device is installed.

Incidental to this general object it is among the further desiderata to provide a tension box with the least possible number of joints subject to leakage and to simplify and standardize as far as possible, the machining of the parts whereby the device may be made cheaply in large numbers.

I attain this object in general by forming the action of a series of one piece boards, each cut to shape to provide a support for a bank of pneumatics and assembled with but one glued surface between adjacent boards. Further the necessary longitudinal windways are formed as grooves in one of the contacting surfaces and the other passageways are simple drillings straight in from free surfaces.

Another object of the invention is to provide in a player piano of conventional dimensions a tension box for supporting four banks of player pneumatics, which pneumatics are of a relatively large size compared with such pneumatics now known.

Space limitations in the conventional forms of player pianos now known has heretofore prevented the mounting of four banks of pneumatics even when formed of the conventional sizes. This construction is attained in this disclosure by a compromising arrangement of the player pneumatics, par-

tially within and partially extending to the rear of the tension box and so arranged in their vertical organization that the four pneumatics are fitted within the available space for the actions in player pianos. In other words, by utilizing all of the available space both vertically and from front to rear it is possible to give all parts their necessary structural strength and at the same time provide for more powerful pneumatics than have been usual with such devices.

In such devices it has been usual to provide bleeding vents for exhausting from one side of the diaphragm in the valvular control mechanism and to open each of these bleeder spaces free into a reduced pressure chamber usually the main windway. It not infrequently occurs however, that when a plurality of these bleeding vents are discharging simultaneously a sudden load is thrown upon the pumping mechanism. Such a condition rapidly and suddenly reduces the pressure conditions in the tension box and the succeeding note or notes are sounded but weakly, if at all. Accordingly, another object of the invention is to provide an organization of bleeding vents so arranged that the simultaneous discharging of a plurality of bleeding vents will not impoverish the pneumatic power in the tension box.

Still another object of the invention in connection with the bleeder vents is to provide a screening arrangement for intercepting the dust passing therethrough which may be readily demounted for cleaning, repairing and substitution and which will not become clogged as quickly as is usual with such devices.

Various other objects and advantages of the invention will be in part obvious from an inspection of the accompanying drawings and in part will be more fully set forth in the following particular description of one form of mechanism embodying my invention, and the invention also consists in certain new and novel features of construction and combination of parts hereinafter set forth and claimed.

Referring to the accompanying drawings:

Figure 1 is a transverse sectional view through a preferred embodiment of the invention showing certain parts in side elevation and with certain parts shown fragmentary.

Fig. 2 is a fragmentary view partly in plan and partly in transverse horizontal section on the line 2—2 of Fig. 1, and

Fig. 3 is a transverse sectional view taken on the line 3—3 of Fig. 2.

In the following description and in the claims, parts will be identified by specific names for convenience of expression but they are intended to be as generic in their application to similar parts as the art will permit.

In the drawings there is shown a unitary piano action of the demountable unit valve type including, in general, a built up tension box 3 forming an upright board unit and supporting four banks of valvular control units 4 on the front face 5 thereof, and a corresponding number of player pneumatics 6 projecting rearwardly thereof. This action is designed to be bridged across the front of the piano in advance of the hammer action indicated diagrammatically at 7 and in rear of the front board (not shown), all as is usual in some makes of player pianos. While this disclosure is particularly designed to illustrate the invention in connection with four banks of player pneumatics, it is quite obvious that the device may be designed with a less number of pneumatics, or, in case the space should be sufficient, even a greater number than is illustrated.

Referring particularly to the disclosure in Fig. 1, it is noted that the tension box is made up of four superimposed blocks or long boards comprising an upper board 9; a bottom board 10, an upper intermediate board 11 and a lower intermediate board 12 all fastened together to form a single removable unit. As each of these boards are similar in construction a detailed description of the common features in each will be sufficient for any one of the other boards. Each board is of one piece including a front portion 13 rectangular in cross section for containing the windways and a rearwardly tapering ledge 14 reduced in vertical cross-section from the section 13 outwardly. The underside of the section 13 is grooved relatively deep to provide a longitudinal windway 15 extending to adjacent each end of the portion 13 one end of which is shown in Fig. 2. The rear side at each end of the tension box is recessed, to form a mortise 16 into which is fitted an upstanding conduit board 17 cored centrally to form a passageway 18 designed to be connected with a source of pneumatic power (not shown). The passageway 18 opens through laterally extending passageways 19 into each of the four windways 15. The underside of the section 13 is also grooved lengthwise to provide a bleeder-vent-passageway 20 paralleling and disposed in advance of the windway

15. This passageway 20 is relatively small in cross-section and communicates at one end with the passageway 18 through a laterally extending channel 21 shown in dotted lines in Fig. 2 and which constitutes the outlet from the passageway 20. This outlet is so small that its discharging capacity while greater than the discharging capacity of any one of the bleeding vents is small compared to the sum of the discharging capacities of all of the vents in the bank.

It is obvious that the windway 15 and passageway 20 may be closed by positioning an upper block directly upon its next block below gluing the engaging surfaces, but this is entirely discretionary. A strip 21' is glued to the grooved surfaces of the bottom board 10 to close the grooves 15 and 20 and in the drawings a similar strip is shown at the bottom of the other sections so that the disclosure may be considered as showing a mounting of the boards, one upon the other without any necessity of gluing the boards together.

Each of the extensions 14 has its underside cut away to form a recess 22 which coacts with the recess 23 provided by cutting away the upper face of the extension next below to provide a pneumatic containing space 24 with the upper and lower sides thereof converging toward a straight rear wall formed by the shoulders 26 of the cut away portions and by the rear edge of the strip 21'.

This space accommodates about half of the hinged end of the pneumatics 6. The pneumatics are the usual V-bellows with their top boards 27 glued to the underside of the extension and the bottom floating board 28 free to move in the space 24 which space has a configuration and dimension just sufficient to provide for the play of the floating board. In order to elevate the lower pneumatic above the plane of the bottom of the action the recess 22 of the lower board 10 is cut back more than one half of the depth of the board and the recess 22 of the board 12 is not quite so deep with an upper shoulder 27' of the lower board lapping the rear face of the section 13 of the board 12 thus reinforcing the extension 14 of the lower board 10. Progressively from the bottom, the fixed board of each pneumatic is spaced closer to the bottom of the board carrying the same.

The pneumatic engaging surface of each extension is drilled upwardly to provide spaced passageways 30 and the front face 5 of the block is drilled in a substantial horizontal or slightly inclined direction to provide passageways 31, said passageways 30 and 31 coacting to provide conduits leading from the front face of the boards to the pneumatics at the rear thereof. These conduits are so positioned that there is a ma-

terial thickness of wall about the same and in general extend parallel to the surface defining the bottom of the recess 23.

The valvular pneumatic units 4 are removably positioned on the front face of the boards and fastened thereto by screws 32. These valvular units are of the usual single valve construction and are so mounted on the board that the passageway 31 opens directly into the space 33 above the valve 34 when seated. The space 34' below the seated valve opens directly into a connecting passageway 35 drilled inwardly from the front of the board to the windway 15.

The bleeding vent 36 of the valvular mechanisms opens directly into the passageway 20 through a passageway 37, also drilled inwardly from the front face of the board and positioned below the passageway 35.

In this disclosure the bleeding vents in the valvular control mechanism and the correlated passageways in the tension box is modified slightly over conventional forms of these passageways by enlarging the rear end of the vent 36 and the front end of the passageway 37 by counter-drilling each so as to provide a recess 38 of relatively large cross-sectional area compared to the cross-sectional areas of the vent 36 and passageway 37. This space constitutes a holder for containing a removable screen 39 designed to provide a screening surface relatively large compared to the cross-sectional area of the bleeding vent to intercept dust carried by the air passing through the bleeding vent. A funnel shaped metallic tubular member 40 is positioned in the passageway 37 in advance of the screen and with the screw covering its large end. By suitably drilling the opening through the small end of this member a definite control is provided to regulate the rate of air discharge through the bleeder vent. The units are provided with tracker tubes 41.

By means of a device of this character, it is possible to assemble four banks of pneumatics within the vertical space provided for the action in player pianos of conventional dimensions while heretofore it has been possible to accommodate merely three such banks. This is made possible in this disclosure by minimizing the number of parts which go to make up the tension boxes and by shifting the location of the pneumatics in the tension box. In this disclosure it is seen that the tension box is made up of merely one piece, where the boxes are disposed directly one upon the other, or of two pieces when the spacing strip is used as illustrated in Fig. 1. There is but one gluing necessary to seal the windways thus minimizing the possibility of leakage and at the same time providing a well braced construction with the least possible amount of wood used.

As the extension from the board overlaps the bank of pneumatics carried thereby the pneumatics are accordingly drawn closer the front of the action than is usual in such devices, thus providing a greater space from front to rear for the pneumatics positioned in front of the usual hammer action. As the eighty-eight pneumatics usual in devices of this character are disposed in four banks by this arrangement, it is seen that larger and more powerful pneumatics can be utilized and yet disposed within the limited available space. The passageways 30 and 31 may have relatively large cross-sectional area so as to quickly supply such pneumatics with the necessary pneumatic power from the windways. The windways are channeled from a freely exposed surface of the boards before they are assembled thus simplifying the formation of these parts. All other passageways are simply straight drillings, which can be readily performed by a machine including batteries of drills, so disposed as to make the proper boring in each of the boards. As the front end of the borings are all similarly spaced from one edge of the board it is apparent that each of the valvular control units may be interchangeably positioned to control the passage of air from any of the windways to one of the sets of pneumatics supplied thereby.

As the screens in the bleeding vents are of a relatively large screening area they will operate for a relatively long time before becoming choked and even then can be readily removed simply by removing the valvular units thus permitting the ready cleaning of the screen or a new screen may be inserted.

While I have shown and described, and have pointed out in the annexed claims, certain novel features of my invention, it will be understood that various omissions, substitutions and changes in the form and details of the device illustrated and in its operation may be made by those skilled in the art without departing from the spirit of the invention.

Having thus described my invention, I claim:

1. In a player piano, a board having one side constituting a valvular-mechanism-engaging-side and another side constituting a player-pneumatic-engaging-side, said board having a recess in a side thereof, a covering for said recess to form a windway for connection with a source of pneumatic power, a passageway leading from said first named side to said windway, another passageway leading from said first named side and a third passageway leading from said second named side, said passageways being all straight borings and said two last named passageways opening from one into the

other to lead from said first named to said second named side.

2. In a player piano, a pair of superimposed boards the underside of the upper board being recessed to form a wind passageway for connection with a source of pneumatic power, the underside of the upper board and the upper side of the lower board being each recessed from its rear side and coacting to form a recess therebetween to accommodate a player pneumatic, the front sides of said boards each facing a valvular control mechanism and one of the boards provided with passageways for placing a pneumatic in said recess in communication with said windway.

3. In a player piano, a one-piece board having a front side facing a valvular control mechanism, the upper rear side of said board being recessed to provide a space for a player pneumatic, the lower side of said board being similarly recessed, said board being provided with a passageway leading from said front side to one of said recesses, the underside of said board being grooved and a covering for said grooved side co-acting therewith to form a wind passageway, said board provided with a drilled passageway leading from said wind passageway to said front side.

4. In a player piano, a board having a front side for receiving a valvular control mechanism, the upper rear side of said board being recessed to provide a space for a player pneumatic, the lower side of said board being similarly recessed, said board having one side grooved and a covering for said groove to form a windway, passageways leading from said windway to said front side and other passageways leading from said front side to one of said pneumatic containing recesses.

5. In a player piano, the combination of two boards disposed one above the other and positioned relatively close together, the underside of the upper board and the upper side of the lower board being recessed to form a pneumatic containing space between the boards, each of said boards provided with a windway and each provided with other passageways one of which leads to said space and one of said boards having its side adjacent the other board recessed from said side,

6. In a player piano, a built up unit including a plurality of superimposed boards having front faces for receiving pneumatic controlling mechanisms, certain boards having grooves in one face thereof and strips fitting between said boards and closing the grooves to form windways in each of the blocks, each of the boards having portions projecting rearwardly of the windway containing portions and spaced apart to provide

spaces for containing portions of player pneumatics and each of the blocks provided with passageways leading from its front face to one of the pneumatic containing spaces.

7. In a player piano, a built up unit including a plurality of superimposed boards having front faces for receiving pneumatic controlling mechanisms, certain boards having grooves in one face thereof and strips fitting between said boards and closing the grooves to form windways in each of the boards, each of the boards having portions projecting rearwardly of the windway containing portions and spaced apart to provide spaces for containing portions of player pneumatics and each of the boards provided with passageways leading from its front face to one of the pneumatic containing spaces, the side of the extension forming the upper side of each of said recesses being spaced from the lower side of its windway containing portion progressively greater distances from the lower board upwardly whereby all of the pneumatics may be contained within the length of the unit.

8. In a player piano the combination with a plurality of hammer actions, of a unit including four superimposed boards positioned in advance of the hammer actions and in rear of the front board, each board provided with a windway and each having an integral extension provided with a pneumatic supplying passageway and projecting rearwardly from the portion of the board containing the windway and underlapping the hammer actions, contiguous extensions being spaced apart to provide spaces for containing player pneumatics, player pneumatics positioned in said spaces and affixed to the underside of each extension, rods directly connecting the pneumatics with their hammer actions and four banks of valvular control mechanisms demountably positioned on the front of the unit, each mechanism being readily accessible from the front of the piano and each adapted to control the air passing from one of said windways to one of said pneumatics.

9. In a player piano, a compact unit free of valvular elements and including four superimposed boards constituting individual tension boxes and each provided with three passageways opening through the front side thereof, the front ends of the passageways in each block being similarly arranged, a valvular pneumatic unit containing all of the necessary valves and provided with openings adapted to be positioned to open into the set of passageways in any of said boards, four banks of pneumatics, each bank supported by and underlapping one of the boards, whereby the pneumatics are positioned relatively close to the front of the

unit thereby to minimize the depth from front to rear of the unit.

10. In a player piano, the combination of a pneumatic action provided with a plurality of vents, each constituting part of the bleeder vent for a pneumatic valvular control mechanism for actuating hammer actions and a passageway into which all of said vents open, said passageway provided with an outlet for all of the vents, said outlet being relatively small in cross section compared to the aggregate cross sections of all of said vents.

11. In a player piano, a tension chest provided with a longitudinally extending windway and with a passageway having a cross-section relatively small compared to the cross-section of the windway and provided with an outlet opening into the windway and a plurality of vents opening into said passageway, each of said vents adapted to open into the bleeder space of a valvular control mechanism, the discharging capacity of said outlet being small compared to the sum of the discharging capacities of all of said vents.

12. In a player piano, a board provided with a passageway for the air, one end of said passageway being enlarged to form a frusto-conical pocket, a screen disposed across the large end of said pocket and having a screening area materially greater than the cross sectional area of said passageway, a metallic member having an opening

smaller than the area of said passageway disposed at the small end of said pocket and a valvular member removably positioned on one side of said board to hold the screen in place.

13. In a player piano, a metallic member having a fine opening constituting bleeder vent and provided with a screen having a materially greater screening area than the cross-sectional area of the vent and a valvular control unit provided with a passageway open to said vent and adapted to retain the metallic member in place.

14. In a player piano, a passageway having a relatively small cross-sectional area, a funnel shaped metallic tubular member having its small end opening into said passageway, a screen covering the large end of said member and means for holding the screen in engagement against the metallic tubular member.

15. In a player piano, a tension box having a passageway opening into one side thereof, the outer end of said passageway being enlarged to form a screen pocket, a screen mounted in said pocket and a valvular control mechanism removably mounted on said box and adapted to hold said screen in place.

Signed at Newark, in the county of Essex and State of New Jersey this twenty-ninth day of May A. D. 1917.

FRANK G. LYNDE.

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