V. KRANICH.

PNEUMATIC PIANO ACTION.

APPLICATION FILED JULY 29, 1910.

1,038,601.

Patented Sept. 17, 1912.

Fig. 1.

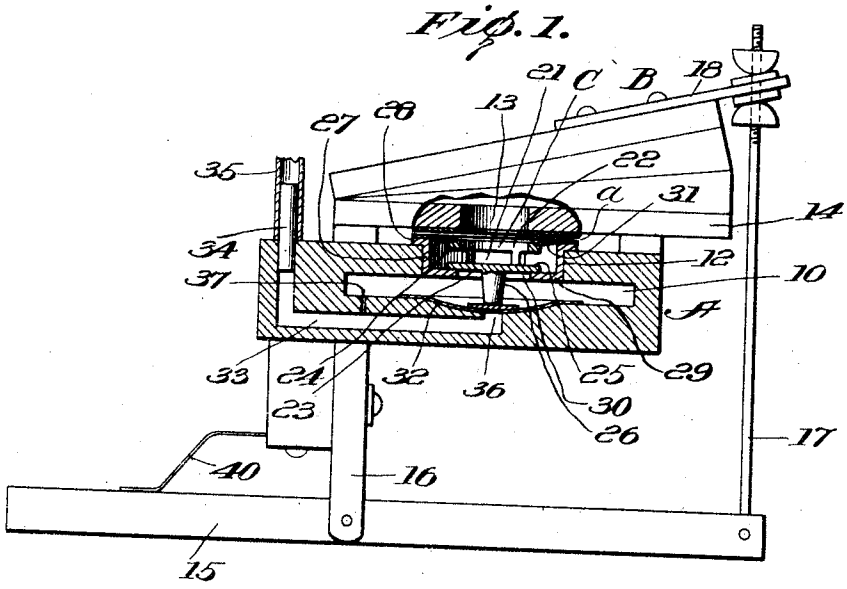


Fig. 2.

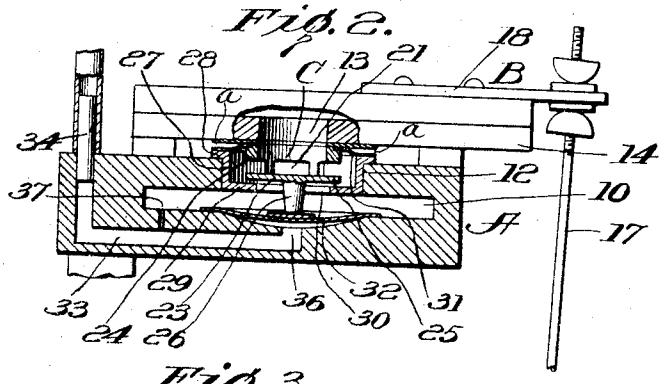


Fig. 4.

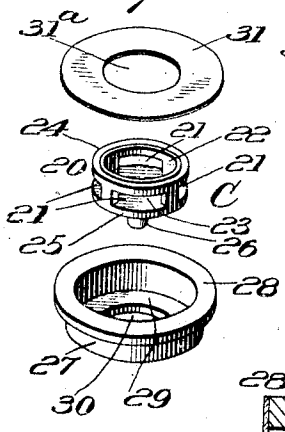
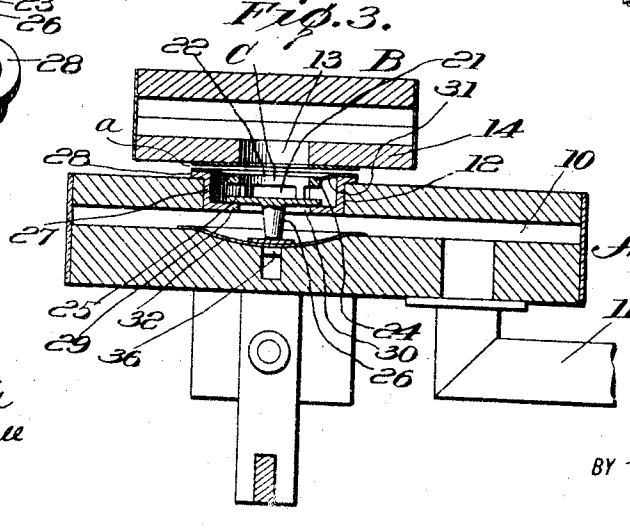


Fig. 3.



WITNESSES

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PNEUMATIC PIANO-ACTION.

1,038,601. Specification of Letters Patent. Patented Sept. 17, 1912.

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To all whom it may concern:

Be it known that I, VICTOR KRANICH, a citizen of the United States, and a resident of the city, county, and State of New York, have invented certain new and useful Improvements in Pneumatic Piano-Actions, of which the following is a specification.

This invention relates to pneumatic mechanism which, in conjunction with suitable perforated music rolls or note sheets, automatically serves to play pianos, organs and like musical instruments.

It particularly relates to an improved mechanism whereby the suctional force in the main suction chamber is, under the control of a perforated note sheet, or roll, communicated to and excluded from the bellows, or other suitable means embodying a movable element, adapted to be operated by suctional force and severally or individually having connection with the sound producing elements of the instruments, that is, with the hammers of the piano action, either through or exclusive of the keys of the piano, or with the reeds or pipes of an organ. Its purpose is to simplify the construction of this part of the apparatus, and to render its action most certain by making it quickly responsive to all variations in the pneumatic forces exerted upon the valvular mechanism in the operation of the instrument. This object is well accomplished by the construction illustrated in the accompanying drawings to exemplify what is now regarded to be the best embodiment of the present invention. To the particular illustrated embodiment however, the invention considered in its broader aspects is not restricted, as many changes may be made therein without departing from the spirit of the invention or the scope of the subjoined claims.

In said drawings:—Figure 1 is a cross sectional view through the chest of a pneumatic player, showing one of the power pneumatics partly broken away and partly in elevation, and also showing a part of the means through which said bellows has connection with a hammer of a piano. This view shows the parts referred to in the positions they occupy when the particular aperture of the tracker-board having connection with them is closed. Fig. 2 is a similar view of the same parts showing them in the positions they occupy when their tracker-board aperture is open and the finger bellows is under suction. Fig. 3 is a longitudinal section through the same parts. Fig. 4 is a detail perspective view of one of the valves, and the valve casing and the diaphragm disassembled.

The same characters of reference designate the same parts in the several views.

A designates a chest having an internal longitudinal chamber 10 which has communication with a suction pump or bellows, not shown, through a conduit 11 whereby said chamber is maintained under suction while the instrument is being played pneumatically. This chest has, at intervals therein, a series of openings in each of which openings fits a valve casing which has an opening therein which registers with a similar opening 13 formed on the baseboard of the power pneumatic B through which communication is established between the chamber 10 and the interior of the power pneumatic. This communication is controlled by valves C in the openings 12, whose actions are, in turn, individually controlled from the note sheet and tracker board, not shown.

Each power pneumatic B operates a particular hammer of the piano action and suitable means for communicating its motion are provided.

In the herein-exemplified form of the invention, showing the pneumatic mechanism embodied in that type of players which are mounted inside the piano and operate upon the piano action, instead of upon the piano keys, the connection between the bellows and the action preferably includes a lever 15 which is pivotally supported between its ends by a suitable means, as a hanger 16 pendent from the chest A, and has one of its ends arranged in coöperative relation with a suitable part of the piano action so as to act upwardly thereon in causing its hammer to strike the string or strings, while the other end of said lever is pivoted to a rod 17 which is also pivoted to the movable board 18 of the bellows B, so as to communicate such movement to the lever when the bellows is deflated. It should be understood, however, that it is within the purview of the invention to embody it in a player which acts upon the piano keys and to arrange it either inside the piano case or in a separate case, outside of that of the piano, as desired.

Each valve C hereinbefore referred to, is preferably of annular form and made to comprise a hollow body 20 which has lateral openings 21, and is open at one end, as shown at 22, and is closed at the other end, 23, and preferably has circumferential rims 24 and 25, and also a projection 26 extending from its closed end. Each valve is mounted for movement inside of a casing 27, which preferably has an outwardly extending flange 28 projecting from one end thereof into engagement with the outer surface of the chest A, for supporting it, while its other end preferably has an inwardly extending flange 29, forming a seat for the valve seat, whose flange 25 rests thereon to cause said wall 23 to close the aperture 30 bounded by the flange 29. Between the walls of the body of the valve and casing a space is left for the passage of air therebetween.

Each valve C is arranged between diaphragms 31 and 32. The diaphragm 31 has its inner portion preferably engaged with the rim 24 of the valve C, while its outer surface is preferably secured to the upper surface of the flange 28, there being left sufficient space *a* between the upper surface of the diaphragm 31 and the lower surface of the baseboard 14 to permit air to pass through said space and through the opening 13 and into the pneumatic when the parts are in the position shown by Figs. 1 and 3 of the drawing. This diaphragm has an aperture 31ª whereby it embraces the body of the valve. It will be noted that it prevents the passage of air between the interior of the power pneumatic B and the interior of the casing 27 except through the interior of the valve C, and also forms a flexible support for the adjacent end of the valve.

The diaphragm 32 serves to raise the valve from its seat. It engages the projection 26 and its operation is pneumatically controlled, as will now be described.

A series of channels 33, each for one of the power pneumatics B and valve C employed, are formed in the chest A. Each of these channels has a tube 34 which is connected to a second tube 35 extending therefrom to one of the apertures of the tracker board, not shown. The other end of each channel is open at 36 contiguous to a diaphragm 32, the latter being disposed in the suction chamber 10 so as to have one of its surfaces exposed to the suction therein while its opposite surface is over one of the openings 36 in the wall of the chest between the suction chamber 10 and the channel 34. Each channel has connection with the suction chamber 10, through a bleed hole 37.

It will be apparent that the parts described will operate as follows: In the normal position, shown best in Fig. 1, the power pneumatic B is inflated, the valve C is upon its seat and the diaphragm 32 is also seated. When the player is in operation, the chamber 10 is maintained under suction which is communicated to the channel 33 through the bleed hole 37. The diaphragm 32 is thus in a vacuum at each side thereof and the weight of the valve C transmitted to said diaphragm is sufficient to flex it and hold it to its seat, the latter being concave, as shown at 38, to correspond to the shape of the diaphragm when thus flexed. In this position the parts remain until an aperture of the roll has been brought into registration with the particular aperture of the tracker board connected with this channel 33. When this occurs, the channel 33 is immediately opened to the atmosphere, thereby destroying the vacuum therein and raising the diaphragm 33 over the channel. This raises the valve C and opens communication of the suction chamber 10 with the interior of the power pneumatic B, thus quickly deflating the latter and causing it to act, through the means hereinbefore referred to, to produce the tone which it controls. When the roll has by its movement carried its said aperture out of registration with the said aperture of the tracker board, communication of the before mentioned channel 33 with the atmosphere is cut off by the solid portion of said roll. Suction from the channel 10 is again communicated to the channel 33, through the bleed hole 37. The weight of the valve becomes effective to restore it to its seat, thus cutting off communication of the suction chamber 10 with the power pneumatic, the air passing between the diaphragm 31 and the bottom of the baseboard 14 passes through the opening 13 into the power pneumatic which causes the said pneumatic to assume its inflated position, the pneumatic being assisted in assuming such position by suitable means such for example, as the spring 40, acting upon the lever 15. This operation is repeated each time an aperture in the music roll passes over the particular aperture in the tracker board connected with the channel 33 referred to.

While I have herein described the invention with particular reference to pianos it will be understood that features thereof may be embraced in pneumatic mechanism for operating organs or other musical instruments and that this is intended to be covered herein. It should also be understood from the foregoing that the invention is in no wise restricted to the illustrated detail embodiment thereof and may be variously embodied without departing from its spirit or the scope of the subjoined claims.

Having now described the invention what is believed to be new and desired to secure by Letters Patent, is:—

1. A valvular means for a power pneumatic or the like of a pneumatic player for

musical instruments, comprising a hollow body having a closed end, and a projection extending from said closed end an open end and lateral inlet openings between said ends.

2. A valvular means for a power pneumatic or the like of a pneumatic player for musical instruments, comprising a hollow body having a closed end, an open end and lateral inlet openings between said ends, an apertured diaphragm supporting the open end of the body, the aperture communicating with the open end of the body, a solid diaphragm, a projection from the closed end of the body engaging the latter diaphragm and a support for the diaphragms.

3. A valvular means for a power pneumatic or the like of a pneumatic player for musical instruments, comprising a casing having at one end an inwardly extending valve seat, an apertured diaphragm mounted over the other end of said casing, a valve having a hollow body with a closed end, an open end and lateral openings between said ends, said upper end being connected to the apertured diaphragm and said closed end adapted to said valve seat the aperture in the diaphragm communicating with the hollow body.

4. A valvular means for a power pneumatic or the like of a pneumatic player for musical instruments, comprising a casing having at one end an inwardly extending valve seat, an apertured diaphragm mounted over the other end of said casing, a valve having a hollow body with a closed end, an open end and lateral openings between said ends, said upper end being connected to the apertured diaphragm and said closed end adapted to said valve seat provided with a projection, and the aperture in the diaphragm communicating with the hollow body, and means for engaging said projection to unseat the valve.

5. A valvular means for a power pneumatic, comprising a casing having at one end an inwardly extending valve seat, an apertured diaphragm mounted over the other end of said casing, a valve having a hollow body with a closed end, an open end, and lateral openings between said ends, said upper end being connected to the apertured diaphragm, the aperture in the diaphragm communicating with the hollow body, said closed end adapted to said valve-seat and provided with a projection, a solid diaphragm to engage said projection, and a support for said casing and said solid diaphragm.

In witness whereof I have hereunto set my hand at the city, county and State of New York, this 15th day of July, 1910.

VICTOR KRANICH.

In presence of—
AGNES C. O'CONNELL,
JOHN J. RANAGAN.