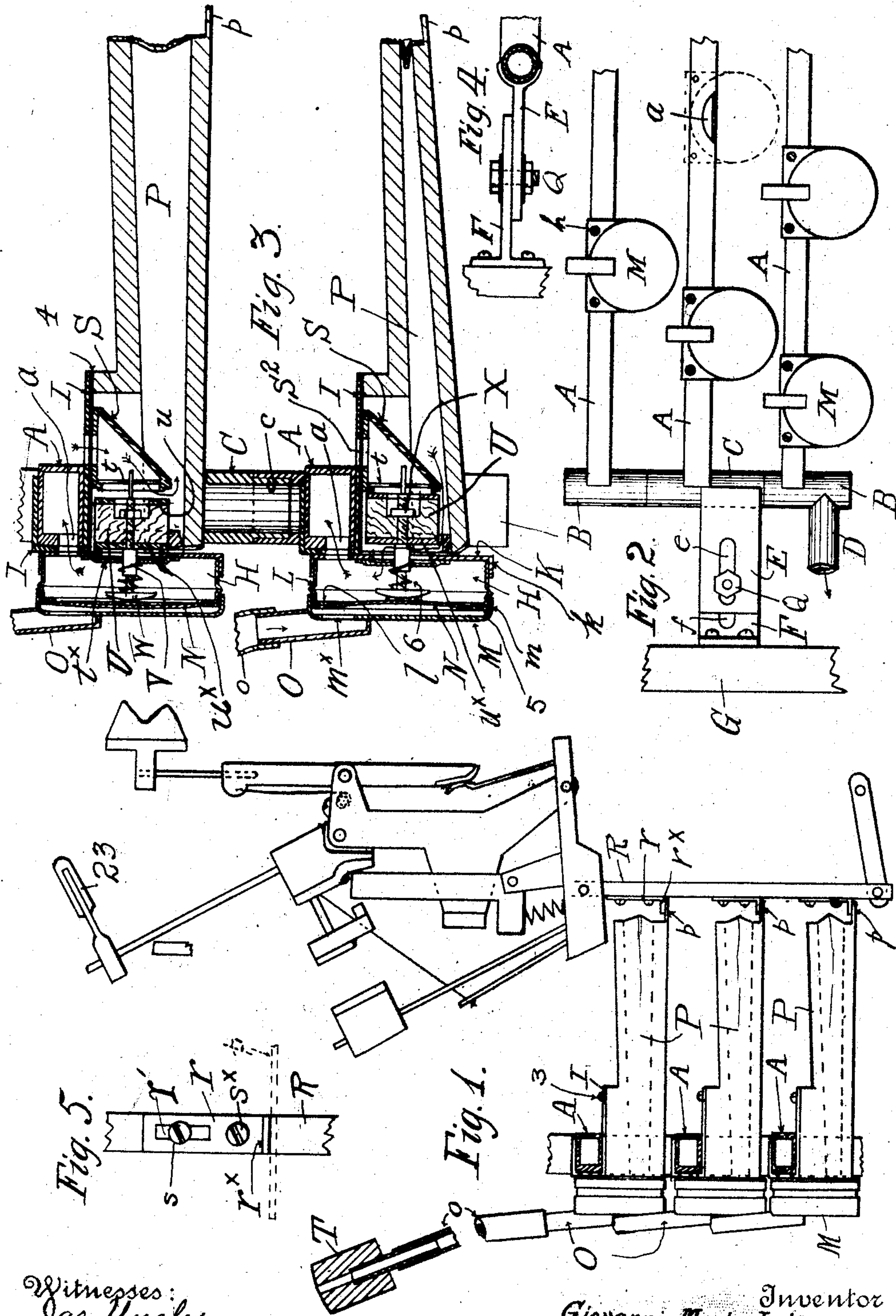


PNEUMATIC PIANO PLAYER ACTION.

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916,713.

Patented Mar. 30, 1909.



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UNITED STATES PATENT OFFICE.

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PNEUMATIC PIANO-PLAYER ACTION.

No. 916,713.

Specification of Letters Patent.

Patented March 30, 1909.

Application filed November 21, 1907. Serial No. 403,170.

To all whom it may concern:

Be it known that I, GIOVANNI M. DE JULIO, a citizen of the United States, and a resident of New York city, in the county of New York and State of New York, have invented a certain new and useful Improvement in Pneumatic Piano-Player Actions, of which the following is a specification.

This invention relates to means for actuating the keys, or the hammer-action, of pianos and the like, and has for its primary object the provision of a simple, durable and efficient piano-player action.

Another object is to so arrange the parts that any pneumatic may be removed readily for repairs, inspection, or the like, and be replaced or substituted with ease, without disturbing or injuring any part of the apparatus.

Another object is to facilitate adjustments and assembling.

Another object is to resist climatic effects or to avoid them altogether.

Other objects will appear hereinafter.

The invention consists in features of construction and combinations of devices hereinafter described and more particularly pointed out in the appended claims.

One embodiment of the invention is illustrated in the accompanying drawing, forming part hereof, in which—

Figure 1 is a side elevation, partly in section, showing the relative arrangement of the parts; Fig. 2 is a partial front elevation of the same, with some parts omitted; Fig. 3 is a vertical sectional view through two pneumatics and an end tube; Fig. 4 is a plan of the adjustable connection with the frame; and Fig. 5 is a front view of a connection.

In the drawing, the reference symbol A marks tubular action chests, of which three are shown, but the number may vary. The outer action chests A open at one or both ends into tubes B which are closed at one end, and the inner chest or chests A open at the same end or ends into the tube or tubes C, which connect telescopically with the tubes B (and with each other, if there is more than one tube C) as shown in Fig. 3, where the tube C has a reduced end *c* which fits in an air-tight manner, substantially, into the counterbored end of the tube B. At least one tube B has a branch D for connection with the air or exhaust pump usually employed in piano-players (pump not shown herein.) The tubes A are perforated at suitable intervals (see *a*) for connection with the

pneumatics, as P, and it is preferred to make the said tubes or chests A of metal, as also the tubes B C, in which event the said tubes are soldered, brazed or welded together, except where they telescope into each other as above set forth. The tube D may be on a central section C, and the bracket E be on the lower section B, instead of being as shown in Fig. 2. The bracket E is slotted at *e*, and the end frame G of the piano or other instrument has a bracket F fast thereto and provided with a slot *f*. A bolt and nut Q, passing through the said slots, serves to connect the brackets in an adjustable manner, so that the chests can be adjusted endwise to accommodate the instrument into which they may be put.

Independent diaphragm chambers H are attached indirectly to the chests A, in the particular instance illustrated, over the ports *a*, as by attaching them to the plates I hereinafter described and by attaching said plates I to the chests A by screws *h* or otherwise. The chambers H shown are formed by means of the plate K which has a circular flange *k* thereon into which fits in an air-tight manner the beaded ring L, and the cover or cap M which fits over the ring L. The ring L has an internal flange *l* thereon and this ring forms a support for the cloth or skin diaphragm N, which is clamped between the ring L and the cap M and the flange *m* of the last-named. Preferably, the diaphragm N is attached by a suitable adhesive to the ring L and flange *l*. The cap M is provided with a perforation *m*^x opening into a tube O, which tube is connected by the flexible tube *o* with the usual tracker T. It will be understood that there is a diaphragm chamber H and the described connections for each note that is to be played from the tracker-board T. Soldered or otherwise attached to the plates K are plates I, which, preferably, are bent to the shape shown to-wit, two horizontal flanges united by a vertical web or plate so as to grip the chests A, and these plates I are provided with perforations which register with the perforations *a* and with the upper perforations in the plates K, whereby the chambers H are placed in communication with the said chests.

The pneumatics P are connected by screws 3 with the plates I and gaskets or packing faces 4 are used to secure air-tight joints. Each pneumatic has therein a closed chamber S, which is attached to the plate I, and

which has therein two openings or perforations, one at S^2 to communicate with the atmosphere, and the other facing the valve face u . A bar t forms a guide for the valve-stem V , which is rounded at that point. The body U on which the valve-faces u u^x are fast is made of cork, wood, or other suitable material, while the valve-faces are of skin or other suitable material. The stem V has a squared portion which passes through a squared hole in the guide bar t^x , and the said stem is screw threaded at both sides of the said squared part thereof. A nut X coacts with one such threaded portion to secure the body U in place, while an adjustable button W is connected to the other threaded portion of the stem. Springs 6 act to keep the valve faces u^x against the valve seats on the plates K , in the normal position of the parts, thus normally keeping the pneumatics P in communication with the atmosphere, as indicated by the arrows in the upper pneumatic in Fig. 3.

Each pneumatic P has a broad flange p at its free end, whereby it operates the desired part of the piano action, whether it be a key or some part of the connection between the key and the hammer 23 , as an abstract R . As shown, the flanges p lie underneath toes r^x on plates r on the abstracts R . The plates r are slotted lengthwise at r' and in assembling, the plates r are adjusted to place and are then secured by the screws s , after which the screws s^x are put in place, thus locking the plates r firmly in their proper positions. The toes r^x are integral with the slotted plates r named. As is indicated in Fig. 5, the flange p is much wider than the toe r^x , whence it follows that the same set of chests A and their attached parts may be used in instruments wherein the spacing of the piano actions vary.

In operation, the usual perforated music sheet is drawn over the tracker T , and whenever a perforation therein registers with a hole in the tracker board, air is allowed to enter the corresponding tube o and press the diaphragm N over from the position thereof shown in the upper pneumatic P in Fig. 3 to the position shown in the lower pneumatic in Fig. 3, thereby closing the connection between the pneumatic and the atmosphere and simultaneously opening the connection between the said pneumatic and the corresponding chest A , whereupon the pneumatic closes as shown in Fig. 3, lower pneumatic, and the corresponding piano action is operated through its toe r^x . It will be noted that the exhaust from the pneumatic P is through the diaphragm-chamber H to the action-chest A . On the closing of the tube o by the paper at the tracker, the spring 6 returns the valve faces u u^x to their normal positions, shown in the upper pneumatic of Fig. 3, and the air in the tube o is exhausted

by the pump through the small hole 5 in the flange l and the diaphragm N , while the air enters the pneumatic and distends it again.

It will be observed that the described constructions and arrangements permit one to remove any pneumatic and to put it back, or to substitute another for it, without in any way injuring any part of the apparatus. Thus, if a diaphragm gets out of order, the removal of the corresponding cap M brings it into view at once, and the diaphragm itself may be removed, if necessary, without disturbing any other part; and the parts removed may be replaced or be substituted without touching any other part; if a pneumatic P requires repairs or replacement by another, the removal of a few screws is all that is necessary to get it out of the instrument. Also, the action chests or educts being of metal, they are not subject to expansion by moisture nor to warping, and are insect-proof, and so may be shipped to any climate, and there be used. The adjustability of the button W allows for greater or lesser motion of the diaphragms before the opening of the valve devices.

What I claim as new and desire to secure by Letters Patent of the United States is—

1. In a piano-player, an action chest, a pneumatic, a diaphragm-chamber, and a metal plate having a vertical and a horizontal part and fast to said chamber and detachably connected to said action chest and to said pneumatic, in combination.

2. In a piano-player, the combination of an action chest, a pneumatic, and a metal plate having a vertical part attached to and detachable from said chest and a horizontal part detachably connected with said pneumatic.

3. In a piano-player, the combination of an action-chest having a port therein, a pneumatic provided with inlet and outlet ports, a double-faced valve between said inlet and outlet ports, a diaphragm chamber spanning said outlet port and the port in the action-chest, a diaphragm in said chamber operating said valve, and means for detachably connecting together said action chest, diaphragm-chamber and pneumatic.

4. In a piano-player, the combination of an action-chest having a port in a vertical side thereof, a pneumatic underneath said chest and provided with an outlet port below the said chest-port and with an inlet port behind said outlet port, a double-faced valve between said inlet and outlet ports, a diaphragm chamber spanning said outlet and chest-ports, a valve-operating diaphragm in said chamber, and means for connecting said parts together.

5. In a piano-player, the combination of an action-chest having a port in a vertical face thereof, a plate attached to said chest and provided with a port registering with

said chest-port and said plate being bent underneath said chest to provide a horizontal plate or shelf beyond said chest and provided in said shelf or extension with a port, a pneumatic, a chamber connected to said shelf or extension and provided with a port registering with said shelf-port and with an inlet port into said pneumatic and also provided with a valve-seat at the inlet for the pneumatic, a diaphragm-chamber provided with a port forming the outlet for said pneumatic and with a port registering with the chest-port named, a double-faced valve between said outlet and inlet ports, and a valve-operating diaphragm in said chamber.

6. In a piano-player, the combination with a plate provided with a circular flange and

with two ports, an action chest connected with one of said ports, a pneumatic connected with the other of said ports, an internally flanged ring coacting with said flange, a diaphragm on said ring, a cap coacting with said ring, a port connecting the spaces at opposite sides of said diaphragm, and a valve-device operated by said diaphragm.

Signed at New York in the county of New York and State of New York this 20th day of November, A. D. 1907.

GIOVANNI M. DE JULIO.

Witnesses:

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R. W. BARKLEY.