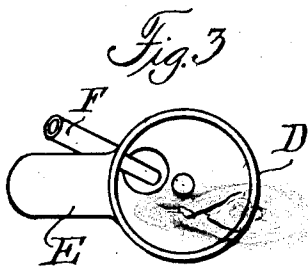
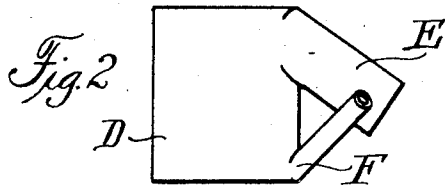
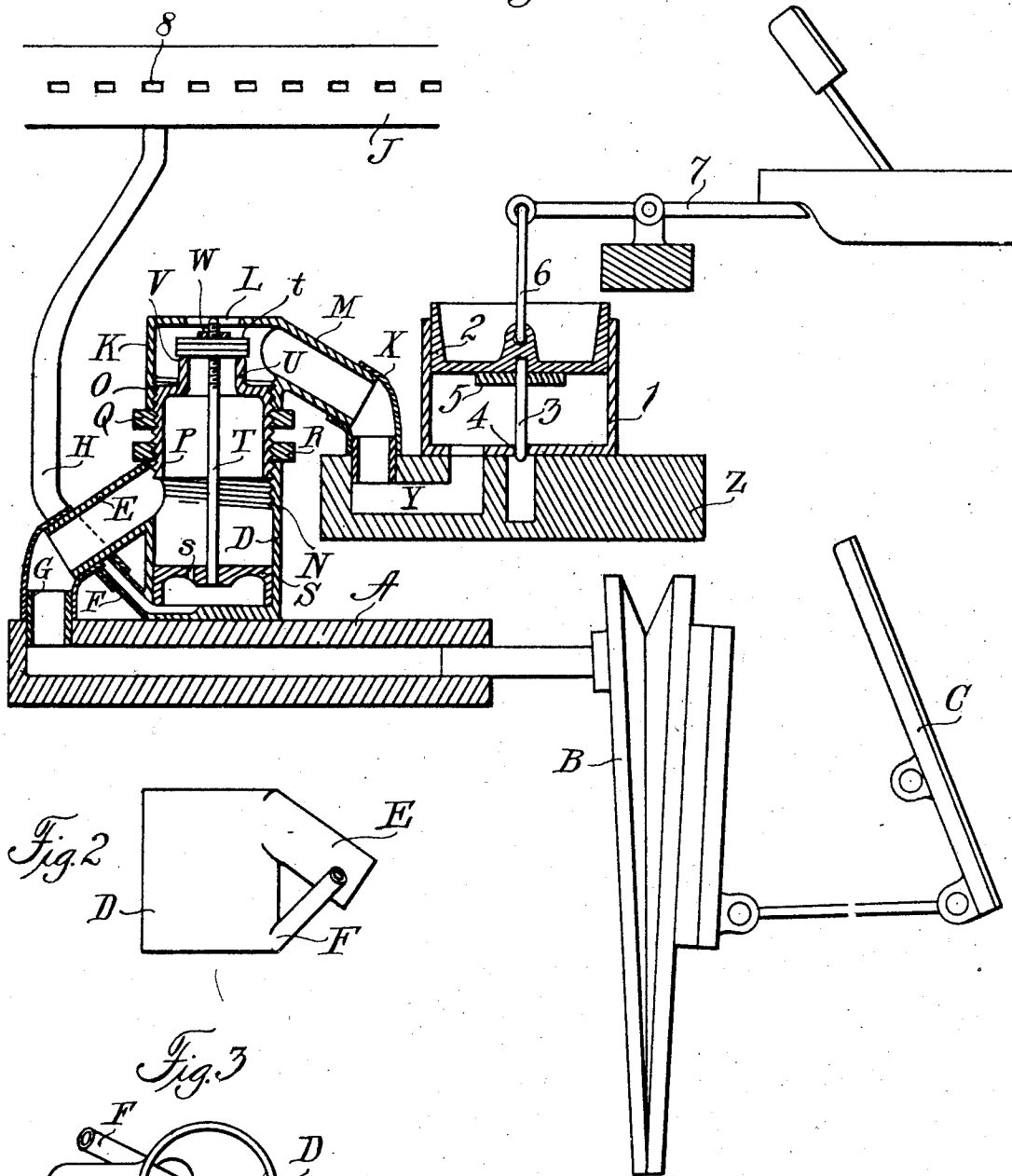


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PNEUMATIC ACTION FOR SELF PLAYING PIANOS.
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1,027,257.

Patented May 21, 1912.

Fig. 1



Witnesses

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PNEUMATIC ACTION FOR SELF-PLAYING PIANOS.

1,027,257.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, WALTER A. KRUCK, citizen of the United States, residing at Camden, in the county of Camden and State of New Jersey, have invented certain new and useful Improvements in Pneumatic Actions for Self-Playing Pianos, of which the following is a specification.

This invention relates to pneumatic actions for self-playing pianos, and the like, and belongs with that class of contrivances interposed between the suction chamber common to all players actuated by atmospheric pressure, and the mechanical piano action for striking the strings.

This invention consists of certain cylinder and piston devices, usually of metal, and having special construction and special arrangement with respect to each other, whereby it is believed one or more of the customary bellows pneumatics are done away with for each piano key, and the whole apparatus thus rendered relatively much more durable and lasting.

The special parts comprising this invention, and their arrangement with respect to each other, are set out in the accompanying drawings, of which—

Figure 1 represents a side view of all the parts assembled, some of which are illustrated in section, to disclose internal elements. Fig. 2 is an exterior view of the lower portion of the valve-operating cylinder, showing the relative positions of the larger and smaller tubular projecting parts thereof. Fig. 3 is a top plan view, showing the interior of the lower portion of the valve-operating cylinder.

In all the views and in the following description, the same letter of reference is used to designate the same part.

Considering Fig. 1, the suction chamber is referred to by the letter A, and a partial vacuum is created and maintained therein by a suitable exhausting bellows B, connected with the suction chamber, and operated by a treadle C. Secured upon the suction chamber, is the lower portion D of the cylindrical valve-operating devices. The lower portion D has two, inclined projecting tubular parts, of which the larger tube E slants downwardly, and, the smaller tube F extends upwardly. A suitable connection G puts the large tubular projection E in communication with the suction chamber A. Another pipe H, connects the smaller pro-

jecting tubular portion F mentioned, with the tracker J. The upper portion K of the cylindrical valve-operating devices, is best illustrated also in Fig. 1. It has an opening L in its top, and a downwardly-inclined tubular projecting part M.

The two cylindrical portions D and K are cup-shaped as shown in Fig. 1, the sides and bottom of each being in one piece. The portion D is inverted and its bottom is uppermost as the parts are assembled.

It will be noted that the lower portion D of the cylindrical valve-operating devices, and the upper portion K thereof, are provided at their mouths with internal threads N and O, and that those threads permit the upper portion K and the lower portion D to be adjustably joined by the coupling P, threaded externally as shown. And, the relative positions of the coupling and the portions of the cylinder connected by it, may be fixed by means of the two ring nuts Q and R, acting as jam nuts against the portions D and K as illustrated in Fig. 1.

Within the lower portion D of the cylindrical valve-operating devices is located a piston S, usually, cup-shaped and made of the same metal as the portion D, in order to avoid binding due to changes of temperature. The cylindrical portion D is bored carefully interiorly, and the piston S is turned with equal care to fit it movably, without packing, and as closely as the effective operation of the parts will admit. Passing through the bottom of the piston S is a small air duct s, to be again referred to.

From the piston S, the valve rod T extends upwardly through the nipple U, that is formed integrally with the coupling P, and the mouth of which, designated by the letter V, is formed as a valve seat for the valve t. By constructing the piston S cup-shaped as illustrated and described, it does not wobble in the cylinder but moves directly up and down, thus adequately guiding the valve rod T without special guiding means therefor. It will be noted that the valve rod T is threaded at its upper end, and that the valve t is, therefore, adjustable on the rod. The nut employed to fix the position of the valve on the rod is marked W.

As previously explained, and as illustrated in Fig. 1, the upper portion K of the cylindrical valve-operating devices, is provided with the tubular projecting part M, and, it will be seen, that the tube M is

joined by a pipe X to the air duct Y in a block Z, upon which is secured the action-operating cylinder 1. The cylinder 1 is in communication with the duct as shown.

5 Within the cylinder 1 is a cupped piston 2, made, usually, of the same material as the cylinder, to avoid binding due to changes of temperature. The cylinder 1 is bored out carefully, and the piston 2 is turned

10 with equal care to fit the cylinder movably without packing, and as closely as the effective operation will admit. Piston 2 ordinarily has a guide rod 3 projecting centrally below it, and passing through a small hole

15 4 in the bottom of the cylinder. It is likewise customary to place a disk of felt next to the bottom of the piston 2, shown in Fig. 1 and marked 5, to cushion the blow of the descending piston upon the bottom of the

20 cylinder 1. On its upper side, the piston 2 is pivotally connected by the link 6, with the lever 7, of the mechanical piano action.

The operation of this invention may be explained by stating that the partial vacuum in the suction chamber being created

25 and maintained, the air is exhausted directly from within the lower portion D of the cylindrical valve-operating devices through the larger tubular projection E, which communicates with the portion D

30 above the piston S. By way of the duct s the air is taken from below the piston S, and by way of the smaller tubular projection F, the air is exhausted from the pipe

35 H connected with the tracker J.

It has been explained that the top of the upper portion K of the cylindrical valve-operating devices has an opening to the atmosphere, and, therefore, the suction keeps

40 valve t seated upon the seat V of the nipple U. So long as the tracker is covered by the sheet in the usual manner, the partial vacuum will be maintained. An orifice 8 of the tracker being uncovered, air enters

45 beneath piston S, raising the piston, and, consequently, valve t, which, being a double-face valve as shown, closes the opening L in the upper cylindrical portion K through the top thereof, and allows the air to be ex-

50 hausted from beneath the piston 2 in the action-operating cylinder 1, and operates the lever 7 of the piano action. It may be that the orifice 8 of the tracker is quickly opened and immediately closed, admitting

55 but relatively little air beneath piston S. But, the piston S has considerably greater superficial area than valve t, and, therefore, the pressure although it may be lower, raises the smaller valve against the pressure

60 of the external air. The tracker orifice 8 being closed, the air admitted beneath the piston S is, very rapidly, taken away into the suction chamber, and the operation may

be quickly repeated. In other words, the same note may be sounded as often as desired in rapid succession, the strength of the blows depending, as usual, upon the degree of suction kept up by working the treadle C and bellows B.

Having now described this invention, 70 what I claim and desire to secure by Letters-Patent of the United States, is:—

1. In a pneumatic action, the combination with upper and lower cup-shaped portions, said upper portion being inverted and hav- 75 ing an opening in its bottom, of a coupling constructed to engage both of said portions adjustably, the said coupling having a nipple extending into said inverted portion and provided with a valve seat, pneumatic 80 key-operating devices, tubular connections leading from said devices and opening into said inverted portion above said valve seat, a valve arranged to cover alternately said seat and the said opening in said inverted 85 portion, a cup-shaped piston movably fitting said lower portion, a valve rod bearing said valve at one end, said rod being rigidly attached to and guided by said piston, a tracker, tubular connections leading from 90 the tracker and opening into said lower portion below said piston, a suction chamber, and tubular connections leading from the suction chamber and opening into said lower portion above said piston. 95

2. In a pneumatic action, the combination with upper and lower cup-shaped portions, said upper portion being inverted and hav- 100 ing an opening in its bottom, of a coupling constructed to adjustably engage both of said portions, the said coupling having a nipple extending into said inverted portion and provided with a valve seat, pneumatic 105 key-operating devices, tubular connections leading from said devices and opening into said inverted portion above the valve seat, a valve arranged to cover alternately said seat and said opening in said inverted por- 110 tion, a cup-shaped piston provided with an air duct and movably fitting said lower portion, a valve rod bearing said valve at one end, said rod being rigidly attached to and guided by said piston, a tracker, tubular 115 connections leading from the tracker and opening into said lower portion below said piston, a suction chamber, and tubular connections leading from the suction chamber and opening into said lower portion above the said piston.

In testimony whereof I affix my signature 120 in presence of two witnesses.

WALTER A. KRUCK.

Witnesses:

WILLIAM P. WALSH,
EDWARD RICHARDSON.