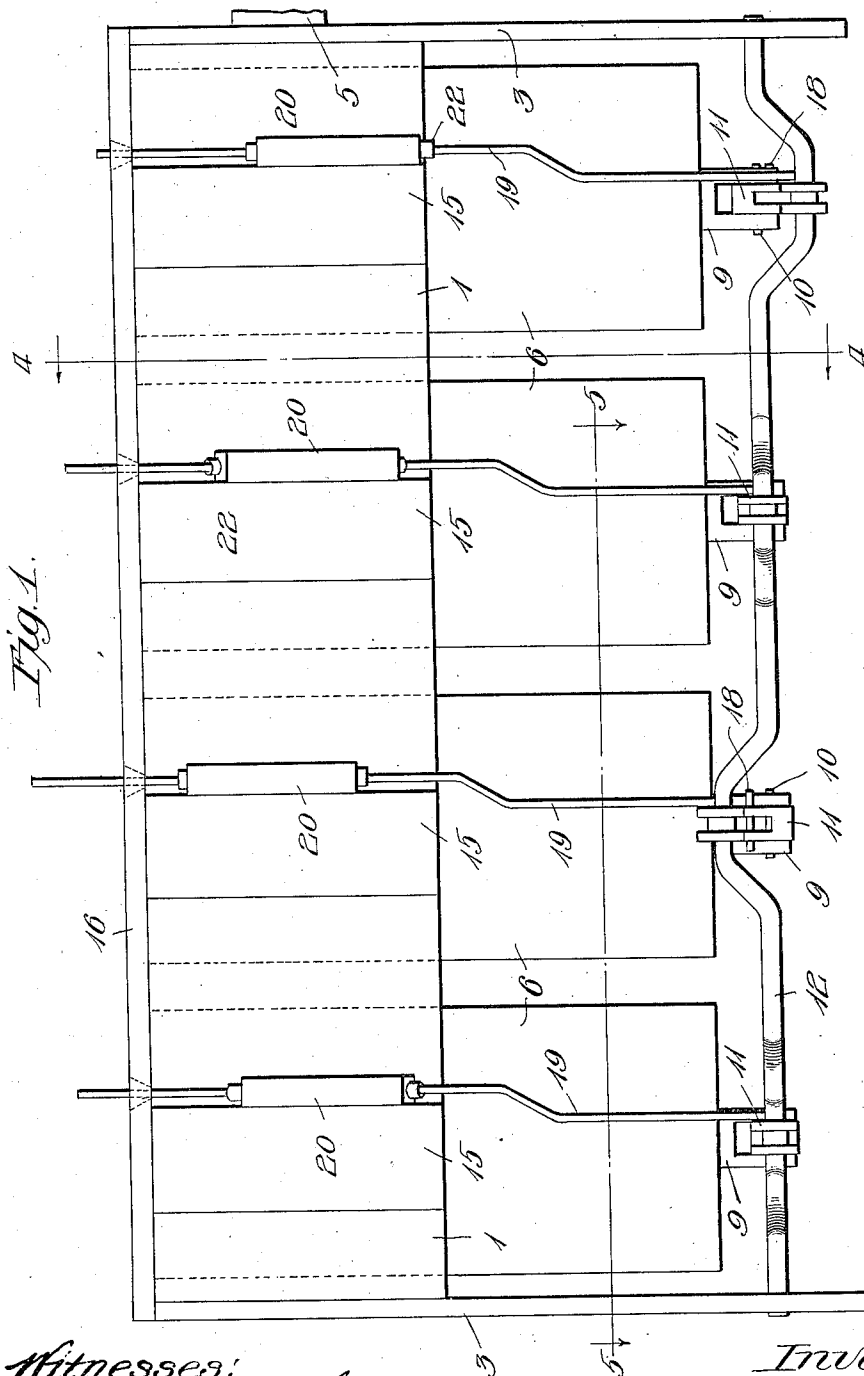


E. T. TURNEY.  
MOTOR FOR PIANO PLAYERS.  
APPLICATION FILED SEPT. 22, 1911.

Patented June 4, 1912.

3 SHEETS—SHEET 1.

1,028,309.



Witnesses:  
Harry S. Gaither  
G. A. Briggs

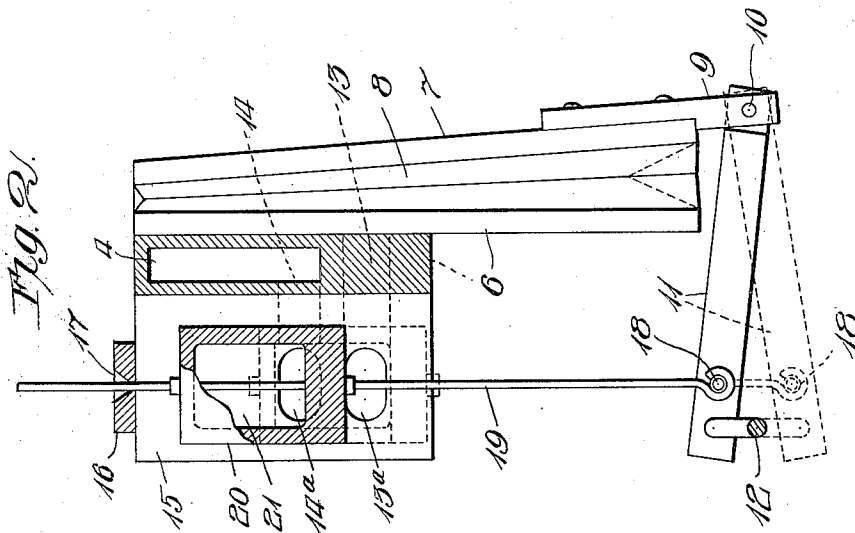
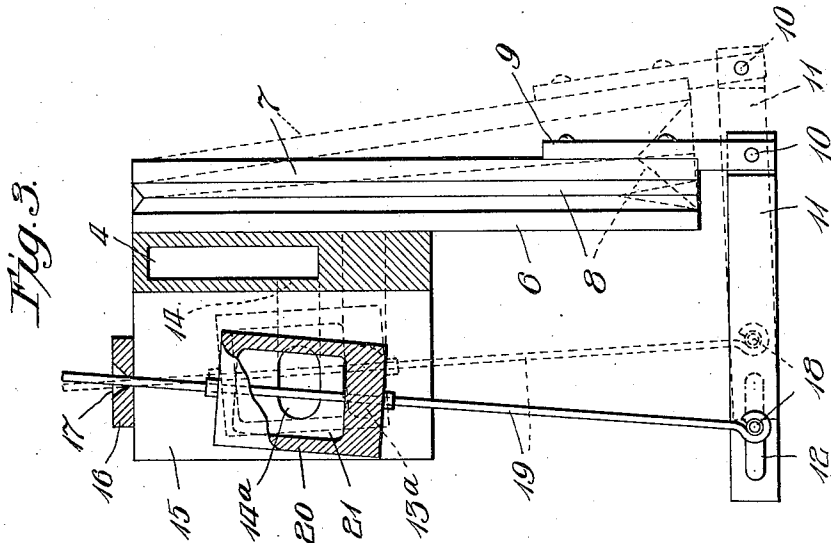
Inventor:  
Eugene T. Turney  
by Benjamin and Rowdhouse  
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Witnesses:

*Harry S. Gaither*  
*J. A. Dwyer*

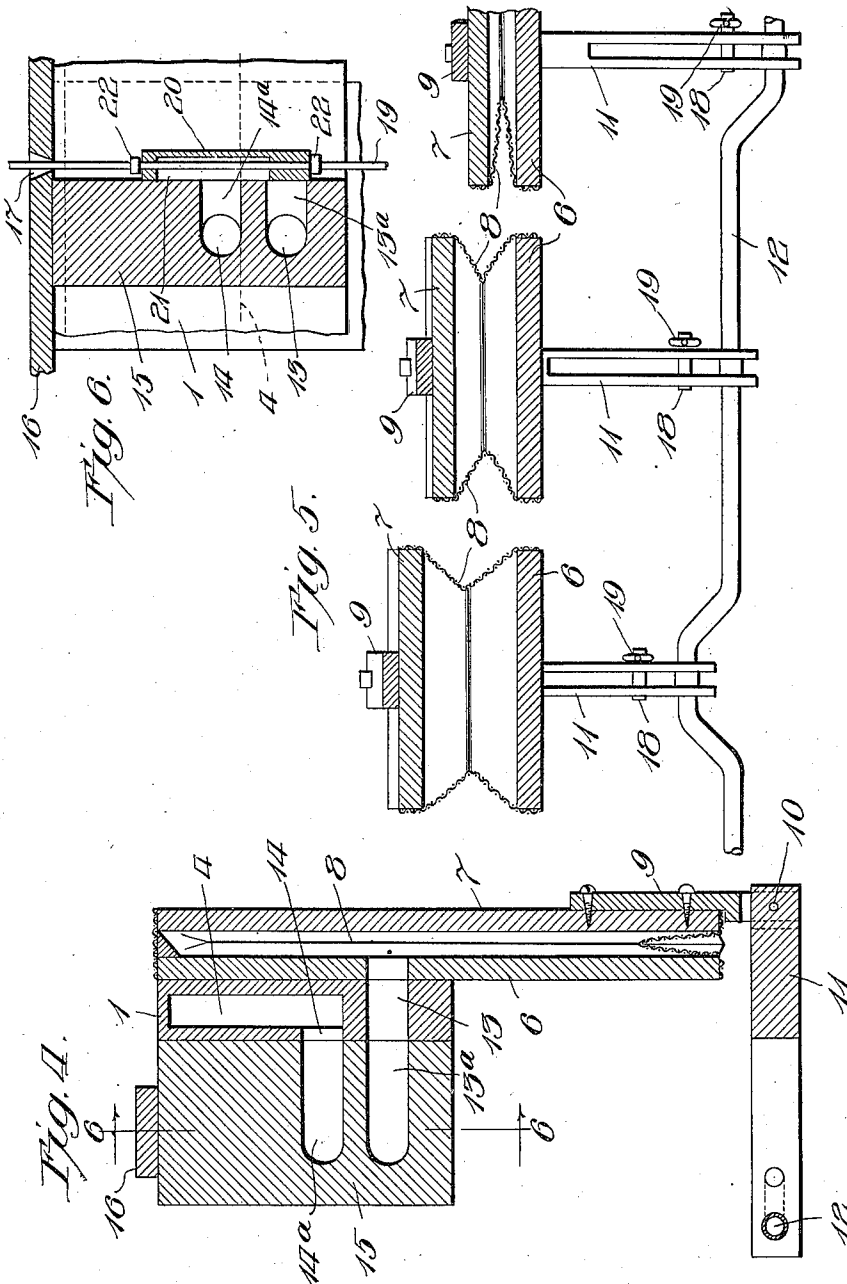
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3 SHEETS-SHEET 3.



Witnesses:  
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Inventor:  
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# UNITED STATES PATENT OFFICE.

EUGENE T. TURNEY, OF DAVENPORT, IOWA, ASSIGNOR TO AMERICAN PNEUMATIC ACTION COMPANY, OF DAVENPORT, IOWA, A CORPORATION OF WEST VIRGINIA.

## MOTOR FOR PIANO-PLAYERS.

1,028,309.

Specification of Letters Patent.

Patented June 4, 1912.

Application filed September 22, 1911. Serial No. 650,827.

*To all whom it may concern:*

Be it known that I, EUGENE T. TURNEY, a citizen of the United States, residing at Davenport, in the county of Scott and State of Iowa, have invented a new and useful Motor for Piano-Players, of which the following is a specification.

My invention relates to improvements in motors for piano players which are adapted to be operated pneumatically and from the same source of power employed in operating the keys of the piano.

The objects of my invention are first, the simplification of the structural features of such a motor together with the incident economy in manufacture, assembly, and repair; and, second, the securing in such a motor of the ability to run evenly and smoothly at low speeds. I attain these objects by the mechanism illustrated in the accompanying drawings, in which—

Figure 1 is a front elevation of my invention; Fig. 2 is a transverse view, partially in section, showing the mechanism in intermediate positions; Fig. 3 is a view similar to that of Fig. 2, showing the bellows in fully extended and fully collapsed positions; Fig. 4 is a section upon line 4—4 of Fig. 1; Fig. 5 is a section looking downwardly upon line 5—5 of Fig. 1, and Fig. 6 is a section on line 6—6 of Fig. 4 through the valve.

Similar reference numerals refer to similar parts throughout the several views.

The reference numeral 1 designates the air chest casing, which extends in front of the several bellows hereafter to be described, and the ends of which are secured between the plates 3. The rear edges of the plates, 3, are secured in the piano in suitable relation to the spools (not shown) which carry the music roll. In the air chest casing is the air chest, 4, which extends throughout the length of the casing, and communicates through the piping 5, with the vacuum producing mechanism (not shown).

To the rear face of the valve casing are secured four stationary bellows members 6, which extend downwardly, parallel with each other and the plates 3, movable bellows members, 7, are secured to the stationary members, 6, by bellows folds, 8, so that they hinge at their upper edges, and expand at their lower edges. An arm, 9, is secured to each of the movable bellows members, so

that it will project below the lower edge thereof. The downwardly extending portion is bifurcated and between the portions is pivoted by the pin, 10, a connecting bar, 11. The forward portion of the connecting bar, 11, is split or bifurcated vertically so as to secure a road bearing with a light construction. The forward ends of the connecting bars, 11, are connected with a crank shaft, 12, the ends of which are journaled in the plates 3.

The wind chest casing, 1, extends downwardly some distance beyond the wind chest, and through this downwardly extending portion is provided a passageway, 13, which extends from the forward face of the casing backwardly through the immovable bellows member, 6, into the bellows. Another passageway, 14, is provided in the wind chest casing which extends from the front face of the casing closely contiguous and just above the opening of the passageway, 13, back into the wind chest, 4.

A valve block or base, 15, for each bellows is disposed transversely of the wind chest casing, and in it is provided channels, 13<sup>a</sup> and 14<sup>a</sup>, the rear opening of which registers with the respective passageways, 13 and 14, and the front ends of which open, one above the other upon the side of the block.

Across the tops of the valve blocks or bases, 15, is a strip or bar, 16, and in it, directly above the center of the openings, 13<sup>a</sup> and 14<sup>a</sup>, is a guide hole or aperture, 17. Secured to a pin, 18, in the connecting bar, 11, is a valve rod, 19, the upper end of which extends through said guide hole or aperture, 17. Upon the said guide rod 19, is a boxing, 20, which has a cavity 21 therein opening toward the face of the valve block or base, 15. The boxing is adjustably secured upon the rod, 19, by means of the washers 22.

It will now be seen that when the mechanism is in the position shown in dotted lines in Fig. 3, air will be drawn from the bellows through the passages 13 and 13<sup>a</sup>, into the cavity 21, and from thence through the passageways 14<sup>a</sup> and 14 to the wind chest 4. The atmospheric pressure will then collapse the bellows, throwing the connecting bar, 11, forward, thereby turning the crank shaft, and, also moving the valve rod, 19, through the position shown in dotted lines in Fig. 2, to a position shown in full lines in Fig. 3. In this position the boxing,

20, has been moved so that the connection between the openings 13<sup>a</sup> and 14<sup>a</sup> through the cavity 21, has been closed and the opening 13<sup>a</sup> is just commencing to be uncovered to the atmosphere, so that the air can freely enter the bellows through the channels 13<sup>a</sup> and 13. This condition continues through the position shown in full lines in Fig. 2 and throughout the upward half of the revolution of the crank shaft until the mechanism again occupies the position shown in dotted lines in Fig. 3 when the operation is repeated as above described. The several bellows are secured to the crank shaft at angles of 90° from each other, so that they are successively brought into operation and at least two of them are continuously exerting pressure upon the crank shaft. It will be further seen that the arrangement of the valve rod 19 and valve boxing 20 is extremely simple and that at least two important results are obtained from this arrangement, which are, first, the valve rod prevents the atmospheric pressure from forcing the boxing, 20, so tightly upon the face of the valve block 15, as to cause excessive friction between the parts, and, second, by pivoting the valve rod in the guide hole, 17, somewhat remote from the boxing, 20, the said boxing is given a combined vertical, and horizontal motion which is continuous, and does not come to a full stop at the end of each reciprocation. This latter feature obviates the jerking or irregularity, especially at slow speeds, which arises upon the starting of the valve action at the end of each reciprocation. Very sensitive control of these valves is necessary. The motor must be able to start instantly at full speed and to stop with equal suddenness. This invention is important in making the friction or inertia of the valve substantially the same at all times by reason of its being continuously in motion.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is:—

1. In a motor for piano players, a vacuum chamber, a bellows, ports leading to said chamber and said bellows, a crank shaft, a connecting rod between said shaft and said bellows, a valve rod pivoted to said connecting rod, a guide hole for the other end of said valve rod, a valve carried by said rod intermediate its connections for controlling said ports.

2. In a motor for piano players, a crank shaft, a plurality of bellows, connecting rods between said bellows and said shaft, valve rods one end of which is pivoted to said connecting rod and the other ends of which move in guides, and valves carried by said rods intermediate their connections,

and their bearings for controlling the exhaustion of air from and the admission of air to said bellows.

3. A pneumatic motor comprising a bellows, a crank shaft, a connecting rod between said shaft and said bellows, a guide way, a valve rod one end of which extends in said guide way and the other end of which is rotated by the action of said crank shaft, and a valve carried upon said valve rod intermediate its driven and guided ends for controlling the exhaustion of air from and the admission of air to said bellows.

4. A pneumatic motor comprising bellows hinged so as to expand and collapse at one end, a crank shaft, connecting rods between said shaft and the expanding and collapsing ends of said bellows, a vacuum chamber, valve blocks extending at right angles to said bellows, channels leading to said vacuum chamber and said bellows, and having ports upon the sides of said blocks, a valve rod extending by said ports one end of which is rotated by the action of said crank shaft and the other end of which extends through a guide hole, and a valve carried by said valve rod for controlling said ports.

5. A pneumatic motor comprising a plurality of bellows, a crank shaft, connecting rods between said bellows and said crank shaft, a valve rod one end of which is rotated by the action of said crank shaft, guide openings for the unattached ends of said valve rod, and a valve carried by said valve rod at a point remote from the guided portions for controlling the admission of air to and exhaustion of air from said bellows.

6. In a motor for piano players or the like, a driven shaft, an air motor for driving said shaft, a sliding valve for said motor, and means for giving to said valve a continuous combined longitudinal and transverse motion.

7. In a motor for piano players, a vacuum chamber, a bellows, ports leading to said chamber and said bellows, a crank shaft, means driven by said bellows for rotating said shaft, a valve rod having one end rotated by said means, and a valve controlling said ports and carried by said rod so as to receive a combined longitudinal and transverse movement, said rod being pivotally held at a point outside of its connection to said valve.

In testimony whereof, I have hereunto set my hand, in the presence of two witnesses.

EUGENE T. TURNEY.

Witnesses:

FRITZ BECKER,  
F. J. BEIER.