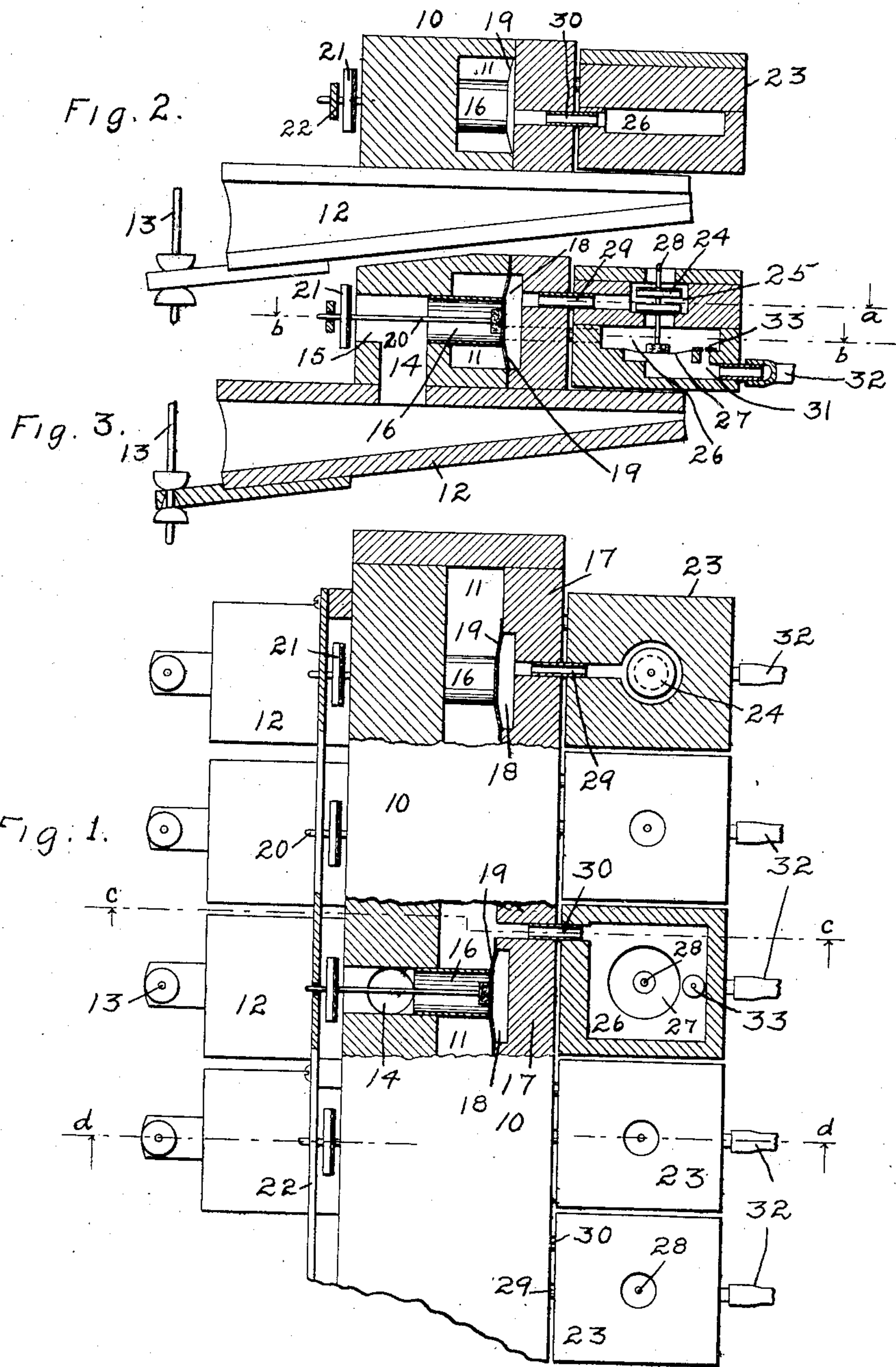


No. 850,621.

PATENTED APR. 16, 1907.

A. T. CHESTER.
MECHANICAL MUSICAL INSTRUMENT.

APPLICATION FILED JUNE 8, 1906.



WITNESSES:

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ARTHUR T. CHESTER, OF PELHAM, NEW YORK.

MECHANICAL MUSICAL INSTRUMENT.

No. 850,621.

Specification of Letters Patent.

Patented April 16, 1907.

Application filed June 8, 1906. Serial No. 320,700.

To all whom it may concern:

Be it known that I, ARTHUR T. CHESTER, a citizen of the United States, and a resident of Pelham, Westchester county, and State of New York, have invented certain new and useful Improvements in Mechanical Musical Instruments, of which the following is a specification.

My invention relates to mechanical musical instruments and mechanical players for musical instruments, such as the pianola piano, pianola, and the like. Its object is to render the pneumatic-valves of such instruments more prompt and certain in their action.

A further object is to simplify the erection and repair of such instruments by making some of the parts more accessible and easily detachable from the others.

Further objects of the invention will appear in the specification and be pointed out in the claims.

In the drawings, Figure 1 is a fragmentary top plan view of the action-casing of a mechanical musical instrument, the upper portion thereof being cut away on the plane *a a* of Fig. 3 and an intermediate portion being cut away on the plane *b b* of the same figure. Figs. 2 and 3 are vertical sections of the parts shown in Fig. 1 on the planes *c c* and *d d*, respectively.

(Referring to the drawings, the figures show a part of the action-casing of the instrument, consisting of a chest 10, in which is a suction-chamber 11. It is of course understood that several of these chests, usually three or four in number, are employed, one being superposed over the other. Connected with the chest 10, and in the present instance at the lower side thereof, are the striking-pneumatics 12, each of which is connected by a rod 13 to a key-lever (not shown) or to a jack or other means for sounding one of the notes of the musical instrument. The pneumatic 12 is connected by a passage 14 to the chest 10, the passage 14 having a rearwardly-extending aperture 15, which connects with the atmosphere, and a forwardly-extending passage, (shown as a tube 16,) which opens into the suction-chamber 11. In the front wall 17 of the chest 10 are provided recesses 18, one for each of the striking-pneumatics 12. Each recess is closed by a diaphragm 19, the central portion of which forms a closure for the valve-seat 16. Passing rearwardly from the

diaphragm 19 is a stem 20, at the rear end of which is a valve 21, adapted to open and close the aperture 15. The stems 20 are guided in a suitable bar 22.

Detachably secured to the chest 10 is a series of valve-boxes 23—one for each of the striking-pneumatics 12. In each of these is an ordinary double valve 24, adapted to open the chamber 25 alternately to atmosphere or to the lower chamber 26. At the bottom of the lower chamber 26 is a diaphragm 27, connected by a stem 28 to the double valve 24. The chamber 25 is connected in the present instance by a tube-nipple 29 with the recess 18, which is closed by the front side of the diaphragm 19. The lower chamber 26 of the box 23 is connected by a second nipple 30 with the suction-chamber 11 in the chest 10. Beneath the diaphragm 27, which closes the lower side of the chamber 26, is a chamber 31, connected by a flexible tube 32 to one of the ducts of the tracker of the instrument (not shown in the drawings) and over which the music-sheet is moved in the usual manner. The chambers 26 and 31 are connected by the usual "bleed-hole" 33.

The operation of my device is as follows: When a perforation in the music-sheet (not shown in the drawings) passes over one of the ducts in the tracker, air will pass through the tube 32 and into the chamber 31, thereby raising the diaphragm 27. The double valve 24 then acts to cut off the chamber 25 from atmosphere, with which it is normally connected, and connect it with the chamber 26, which, it will be remembered, is connected by means of the nipple 30, with the suction-chamber 11 in the chest 10. The effect of this is to permit the air to exhaust from the recess 18 into the chamber 26. Up to this time the striking-pneumatic 12 has been distended by air entering through the passages 15 and 14 thereinto. This air-pressure now acts on the rear side of the diaphragm 19 within the tube 16 to force the same forward, thereby closing the valve 21, so as to cut off the pneumatic 12 from atmosphere and to permit the exhaustion of the striking-pneumatic 12 into the suction-chamber 11. This acts to raise the rod 13 and to sound one of the notes of the instrument in the usual manner. When an imperforate portion of the music-sheet passes over the duct, the air in the lower chamber 31 of the box 23 ex-

hausts into the chamber 26 through the bleed-hole 33. The double valve 24 then drops to the position shown and admits air to the aperture 18 through the tube 29. This acts to close the diaphragm 19 and to open the passages 15 and 14, and consequently the striking-pneumatic 12, to atmosphere, by which the pneumatic is again distended. It will be seen that the valves on the stem 20—that is, the valve which is, in effect, a portion of the diaphragm 19—and the air-valve 21 are subject to the air-pressure on both sides thereof and that the diaphragm 19 is moved by the alternative effective excesses of air-pressure on its opposite sides, this being due to the greater effective surface of the diaphragm on its front side. This valve having a horizontally-disposed axis, as above described, is not affected by gravity and does not require any spring or the like to move it in either direction. For this reason its movement will be very prompt as well as reliable.

In the present construction each of the valve-boxes 23, in which the primary valve 24 is located, is made separate from the others and is independently connected to the chest 10 in the present instance by the nipples 29 and 30. These can be made to have a snug sliding fit in the wall either of the chest 10 or of the boxes 23, so that each box may be independently and separately detached from the remainder of the pneumatic-action. This facilitates not only the erection of the instrument, but its subsequent repair when this is necessary.

I have illustrated the player or instrument as operated by suction; but it is of course obvious that such an instrument may be operated by superatmospheric pressure, the necessary changes being within the skill of the mechanic.

It is also obvious, as already stated, that my invention refers both to mechanical players for musical instruments and to such instruments when the pneumatic playing action is built within the casing of the piano or other instrument itself. When, therefore, in the claims I use the phrase "a mechanical musical instrument," I of course intend to include the player, whether it is located

within the casing of the instrument or is an independent device or machine.

What I claim is—

1. In combination with a bellows-pneumatic, a suction-chamber 11 and passages from the pneumatic to the atmosphere and to the suction-chamber, a valve-stem and two valves thereon for the respective passages opening outward therefrom, one of said valves being in the form of a diaphragm in the said chamber for actuating the said stem, and means for applying suction or atmosphere on the side of said diaphragm-valve remote from the said passages.

2. In combination with a suction-chest and with a pneumatic-passage 14 to be controlled, ports leading therefrom to atmosphere and to the said chest, a diaphragm-valve in the said chest for closing and opening the said port leading to said chest, a valve-stem, and a valve thereon for the port leading to atmosphere, and connections for varying the pressure action on the side of said diaphragm remote from the said ports.

3. In a mechanical musical instrument, a plurality of striking-pneumatics, a chest common thereto, passages from the said pneumatics to the said chest and to atmosphere; valves for the said passages, one of said valves being in the form of a valve-actuating pneumatic controlling the said passages of each of the said striking-pneumatics, valves for controlling each said valve-actuating pneumatics, and separable casings in which the last said valves are mounted separately for each of the said valve-actuating pneumatics, a diaphragm and connections for actuating the last said valves and mounted in the respective casings, and two pneumatic connections for each of the said casings, one for connecting the said valve-actuating pneumatic with its controlling valves, and the other for supplying actuating-wind for the said diaphragm.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

ARTHUR T. CHESTER.

Witnesses:

A. W. SPENCE,
W. C. MANSFIELD.