No. 742,760. PATENTED OCT. 27, 1903.

E. S. VOTEY.

MEANS FOR REGULATING THE EXPRESSION OF MECHANICAL MUSICAL INSTRUMENTS.

NO MODEL. APPLICATION FILED AUG. 21, 1903. 2 SHEETS—SHEET 1.

Fig. 1.

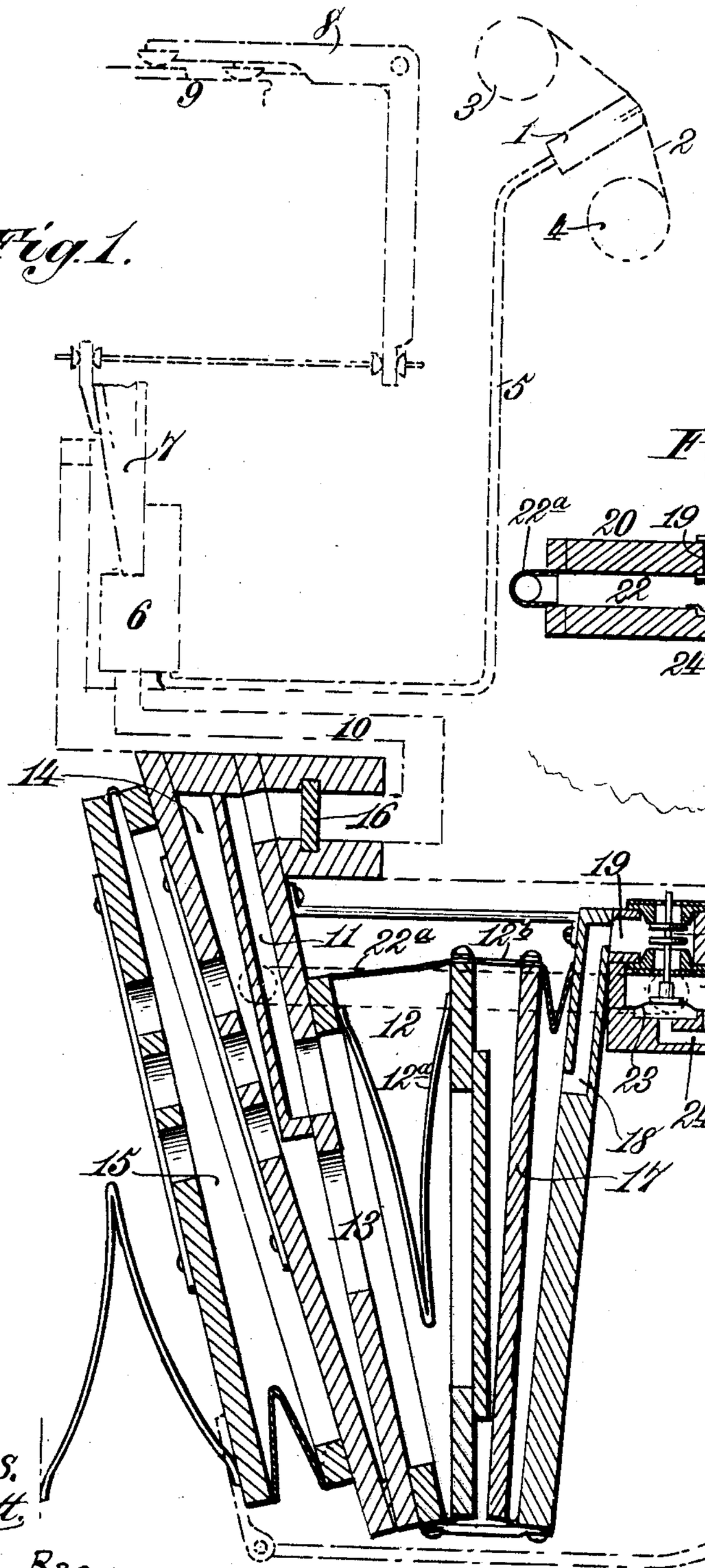
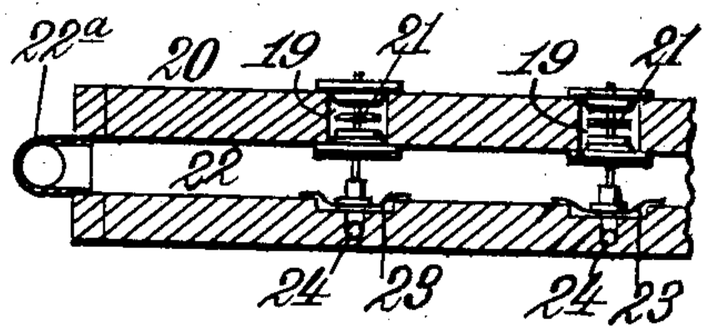


Fig. 2.



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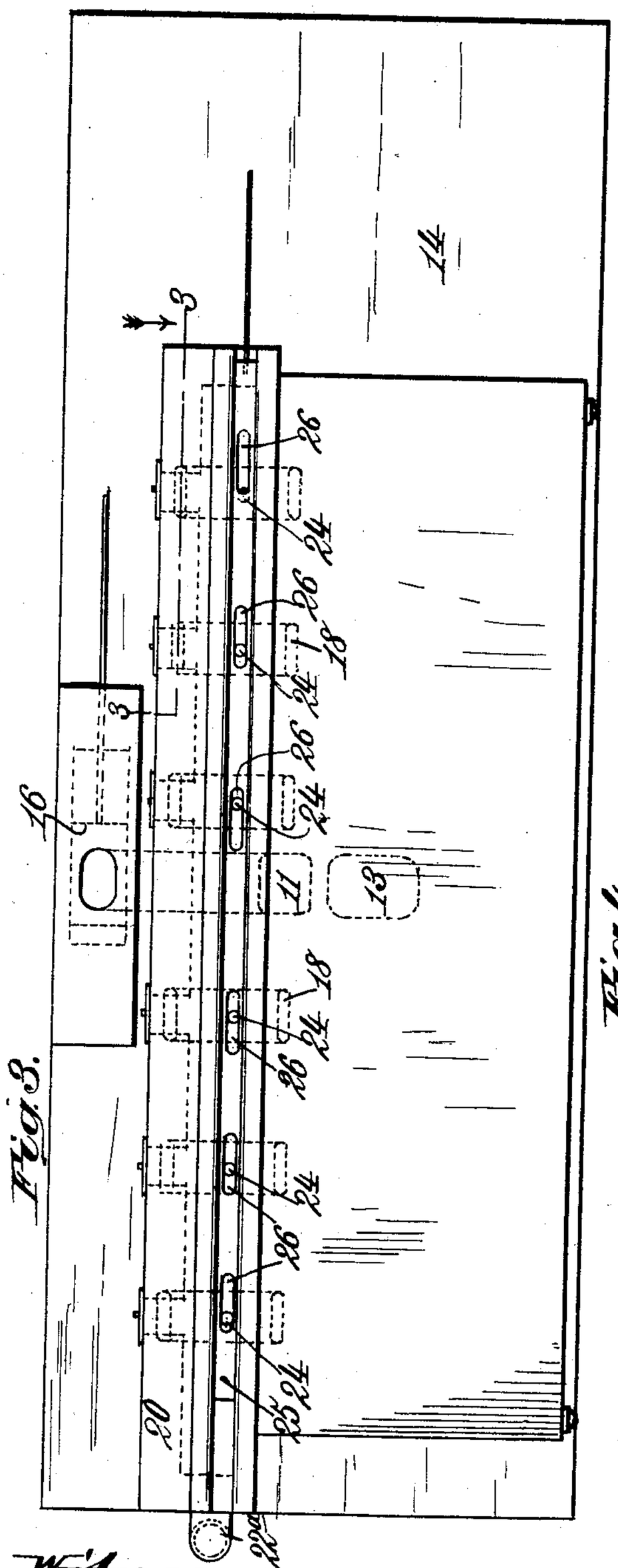

Fig. 3.

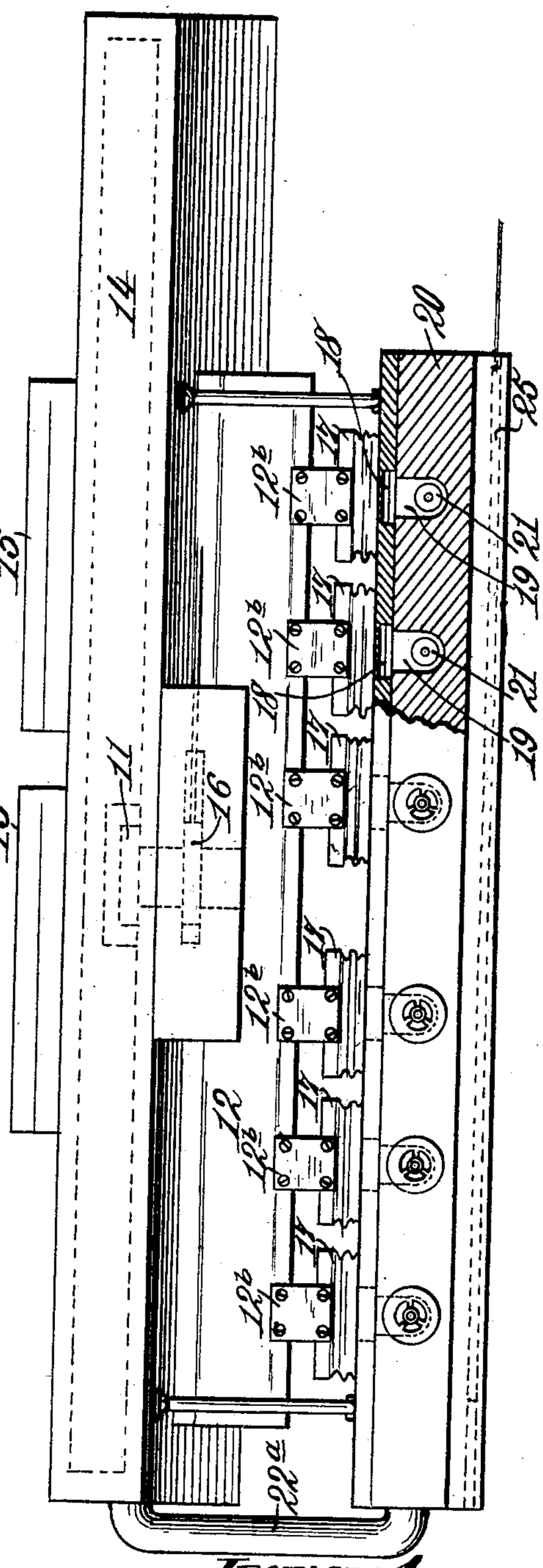

Fig. 4.

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No. 742,760. Patented October 27, 1903.

UNITED STATES PATENT OFFICE.

EDWIN S. VOTEY, OF SUMMIT, NEW JERSEY, ASSIGNOR TO THE AEOLIAN COMPANY, OF NEW YORK, N. Y., A CORPORATION OF CONNECTICUT.

MEANS FOR REGULATING THE EXPRESSION OF MECHANICAL MUSICAL INSTRUMENTS.

SPECIFICATION forming part of Letters Patent No. 742,760, dated October 27, 1903.

Application filed August 21, 1903. Serial No. 170,351. (No model.)

To all whom it may concern:

Be it known that I, EDWIN SCOTT VOTEY, a citizen of the United States, residing at Summit, in the county of Union and State of New Jersey, have invented new and useful Improvements in Means for Regulating the Expression of Mechanical Musical Instruments, of which the following is a specification.

My invention relates to improvements in means for regulating the expression of mechanical musical instruments according to the will of the operator to cause such instruments to produce a loud, soft, or intermediate expression; and it has for its object to provide novel, simple, and satisfactory means for this purpose.

The invention is intended for use, particularly though not exclusively, in mechanical piano-players, and while said invention will be hereinafter referred to with particular reference to such mechanical players it will be understood that it is not by reason thereof restricted to such use, the illustrated example being directed merely as the statute requires to the best-known embodiment of the invention.

To the end stated the invention consists in the novel combination and arrangement of elements hereinafter set forth and claimed.

In the drawings, Figure 1 is a vertical sectional view of a mechanical musical-instrument player embodying my invention. Fig. 2 is a fragmentary sectional view illustrating part of a vacuum-box which constitutes an element of the means for selectively cutting the exhauster-assisters into and out of operation and two of the valve mechanisms controlling the communication of said exhauster-assisters with said vacuum-box. Fig. 3 is an elevation illustrating the slide-gate for cutting the exhauster-assisters into and out of operation. Fig. 4 is a plan view showing the series of exhauster-assisters operatively connected with the pneumatic exhauster.

In the following specification a description of the best-known embodiment of my invention—to wit, that adapted for operation in a mechanical musical instrument organized on the vacuum or exhaust system—will be referred to, without, however, restricting the invention to such particular embodiment, because the invention resides in improved means for regulating or modifying the expressional function of automatic musical instruments irrespective of the particular instrument in which it may be embodied.

In the said drawings the reference-numeral 1 designates the usual or any suitable tracker-board, and 2 a perforated music-sheet which is caused to operatively pass said tracker-board—for example, from a roll 3 to a roll 4, as shown. The ducts of the tracker-board communicate in any suitable manner, as by means of flexible tubes 5, with an action-box 6, (which may be of any approved or known construction,) that has independent valved communication with a predetermined number of key-pneumatics 7, the latter having operative communication with fingers 8, that are caused to actuate the keys 9 of a musical instrument—for instance, the keys of a piano—the arrangement being such, for example, and as is usual, wherein atmospheric pressure, admitted through the note-perforations of the music-sheet, the ducts of the tracker-board, and the tubes, to the action-box, so dispose the controlling-valves of the key-pneumatics that the latter are in a state to be exhausted of their contained air, whereby they are collapsed, and in collapsing cause their respective key-actuating fingers to operate.

The action-box 6 has communication—such, for instance, as by way of passsages 10 11—with a key-pneumatic exhauster 12, provided with a suitable type of expanding-spring 12^a and having communication by way of a port 13 with a vacuum or, as it is commonly termed, "wind" chest 14, in which operative vacuum is maintained by the usual or any suitable pumps or vacuum-maintainer 15. A cut-off valve 16 is interposed in the line of communication between the action-box and key-pneumatics and the exhauster, the office of which is to close the communication to enable a sheet of music to be rewound after having been played without causing the operation of the apparatus.

As thus far described, the apparatus is of any usual or suitable type.

Operatively connected with the exhauster 12, as by means of straps 12^b, is a series of

exhauster-assisters 17, consisting, as shown in the present example of my invention, of bellows, which work when brought into operation selectively, in succession, or multiple, as hereinafter described, to assist the spring 12ª in expanding the exhauster, whereby the latter operates with greater power or pull, causing the key-actuating fingers to impart a more vigorous touch to the key and resulting in the enunciation of a louder tone. The exhauster-assisters have communication by independent passages 18 with a series of valve-controlled chambers 19 in a valve-casing 20, each of which is arranged to control a double-acting valve 21, adapted at one side to open and close communication between the exhauster-assisters and the atmosphere and at the other side to open and close communication between said exhauster-assisters and a vacuum-box 22 in the valve-casing, which vacuum-box communicates by a passage 22ª and is common to all the chambers 19 and the passages leading therefrom to the exhauster-assisters. As shown, these valves are operated by means of pneumatics 23, attached to the stems of the valves, and cover independent passages 24 in the valve-casing. The admission of atmospheric pressure to said passages 24 is controlled by a slide-gate 25, having a series of ports 26, corresponding in number to the passages 24, and preferably arranged, as shown, to admit atmosheric pressure to or cut it off from said passages one at a time. In the particular embodiment of the invention shown in the drawings the ports 26 in the slide-gate 25 are so disposed with reference to the passages 24, leading to the pneumatics 23, that operate the valves 21, that on manipulation of the said slide-gate said passages are exposed one at a time, whereby the exhauster-assisters are brought into operation one at a time; but, as stated hereinbefore, this arrangement may be varied and the ports in the slide-gate so disposed that two or more exhauster-assisters may, if desired, be brought into operation, said difference in arrangement being a mere modification or variation of the arrangement shown in the drawings and within the range of the skill or judgment of the mechanic.

In operation, according to the particular embodiment of the invention shown in the drawings, the exhauster 12 when the exhauster-assisters are cut out of operation by the slide-gate acts in the usual manner to collapse the key-pneumatics, exerting a minimum influence on the key-actuating fingers in so doing. When a more forceful touch of the keys by said fingers is desired, one or more of the exhauster-assisters are brought into play in the following manner: The slide-gate is adjusted to open one or more of the passages 24 to atmospheric pressure, which atmospheric pressure acting on the pneumatic diaphragms 23 lifts the double-acting valve or valves 21 and closes communication of the corresponding chamber or chambers 19 from the atmosphere and at the same time places said chamber or chambers and the communicating exhauster assister or assisters in circuit with the vacuum-box 22 and vacuum-chest 14. The contained body of air in said selected assister or assisters is now withdrawn by the pump mechanism or vacuum-maintainer 15, and said assister or assisters, according to a well-known law of physics, immediately and forcefully collapses or collapse, and by reason of the operative connection thereof with the exhauster assists or assist in expanding the latter, causing it to collapse the operative key pneumatic or pneumatics with increased energy, resulting in an increased force of touch of the key-actuating fingers upon the keys, whereby the expression of the tone produced by the instrument is altered. It will be obvious that with the assistance rendered as described the expanding or key-pneumatic-collapsing action of the exhauster will vary according to the number of exhauster-assisters brought into action, with the result that the expression is regulated or controlled in accordance therewith.

Air-seep holes 29 are provided in the valve-casing to afford communication between the vacuum-box and each of the passages 24, whereby when the said passages 24 are closed by the slide-gate equilibrium or equalization of vacuum on opposite sides of the diaphragm-pneumatics 23 is established, permitting the valves 21 under the influence of atmospheric pressure to close the communication between the exhauster-assisters and the vacuum-box. In this position of the ports air immediately fills the exhauster-assisters, leaving them in a position to be called into operation in the manner hereinbefore described.

Having thus described my invention, what I claim is—

1. In mechanical musical instruments, the combination with a key-pneumatic exhauster, of a series of exhauster-assisters operatively connected thereto, and means for selectively cutting said exhauster-assisters into and out of operation.

2. In mechanical musical instruments, the combination with a key-pneumatic exhauster, of exhauster-assister bellows operatively connected thereto, and means for selectively cutting said exhauster-assisters into and out of operation.

3. In mechanical musical instruments, the combination with a key-pneumatic exhauster, of a series of exhauster-assister bellows operatively connected thereto, a vacuum-maintainer communicating with said exhauster and exhauster-assisters, and means for cutting said exhausters into and out of operation.

4. In mechanical musical instruments, the combination with key-pneumatics and a vacuum-maintainer, of a key-pneumatic exhauster, and exhauster-assisters operatively connected with said exhauster, and means for selectively placing said exhauster-assisters

under the influence of said vacuum-maintainer, substantially as described.

5. In mechanical musical instruments, the combination with key-pneumatics and a vacuum-maintainer, of a key-pneumatic exhauster, exhauster-assisters operatively connected therewith, valve-controlled means for controlling the communication of said exhauster-assisters with said vacuum-maintainer, and means for selectively operating the valves thereof.

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

EDWIN S. VOTEY.

Witnesses:
W. C. MANSFIELD,
W. H. ALFRING.