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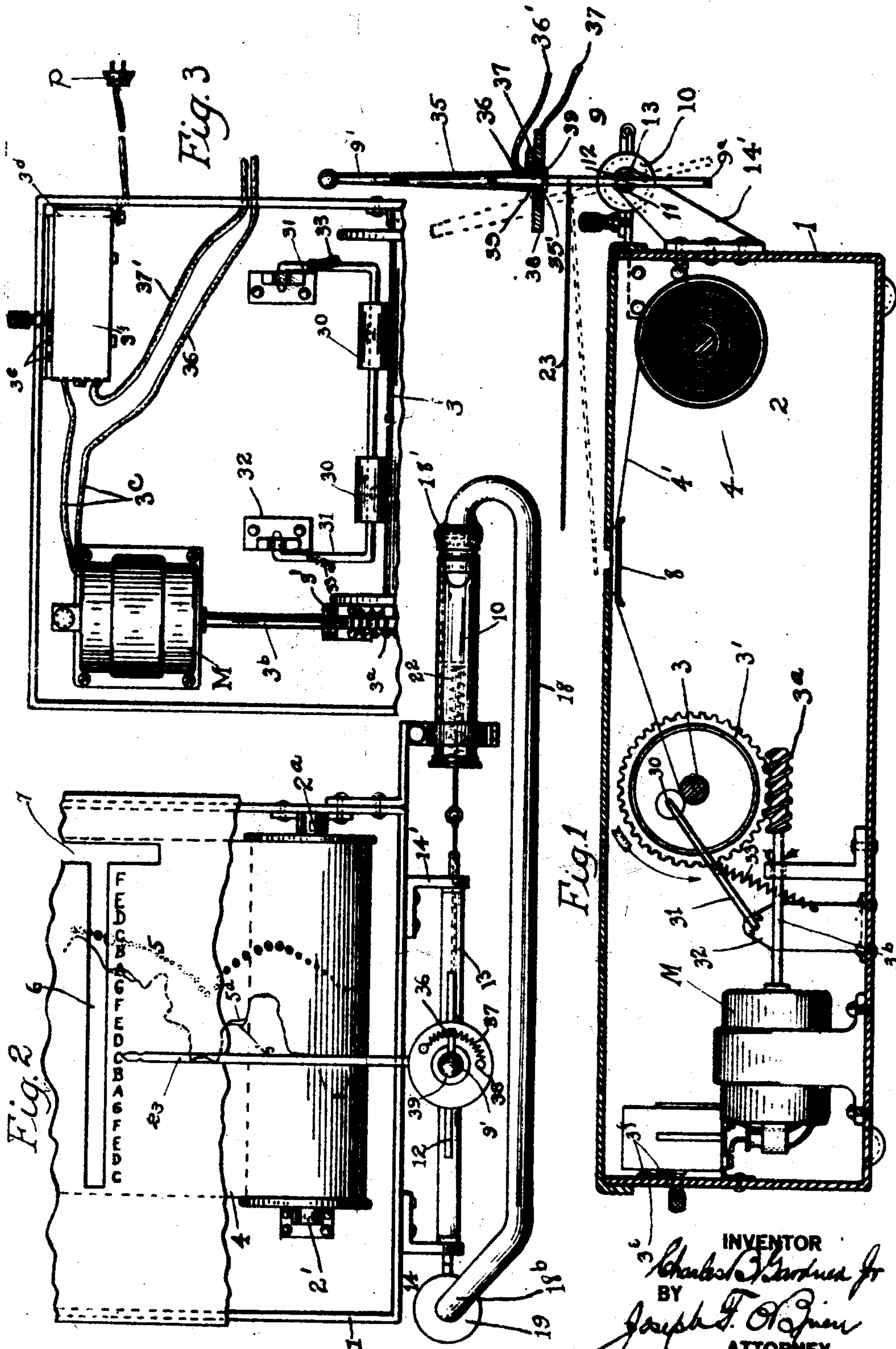
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MUSICAL INSTRUMENT AND PLAYING MEANS THEREFOR

Filed Feb. 16, 1927

3 Sheets-Sheet 1



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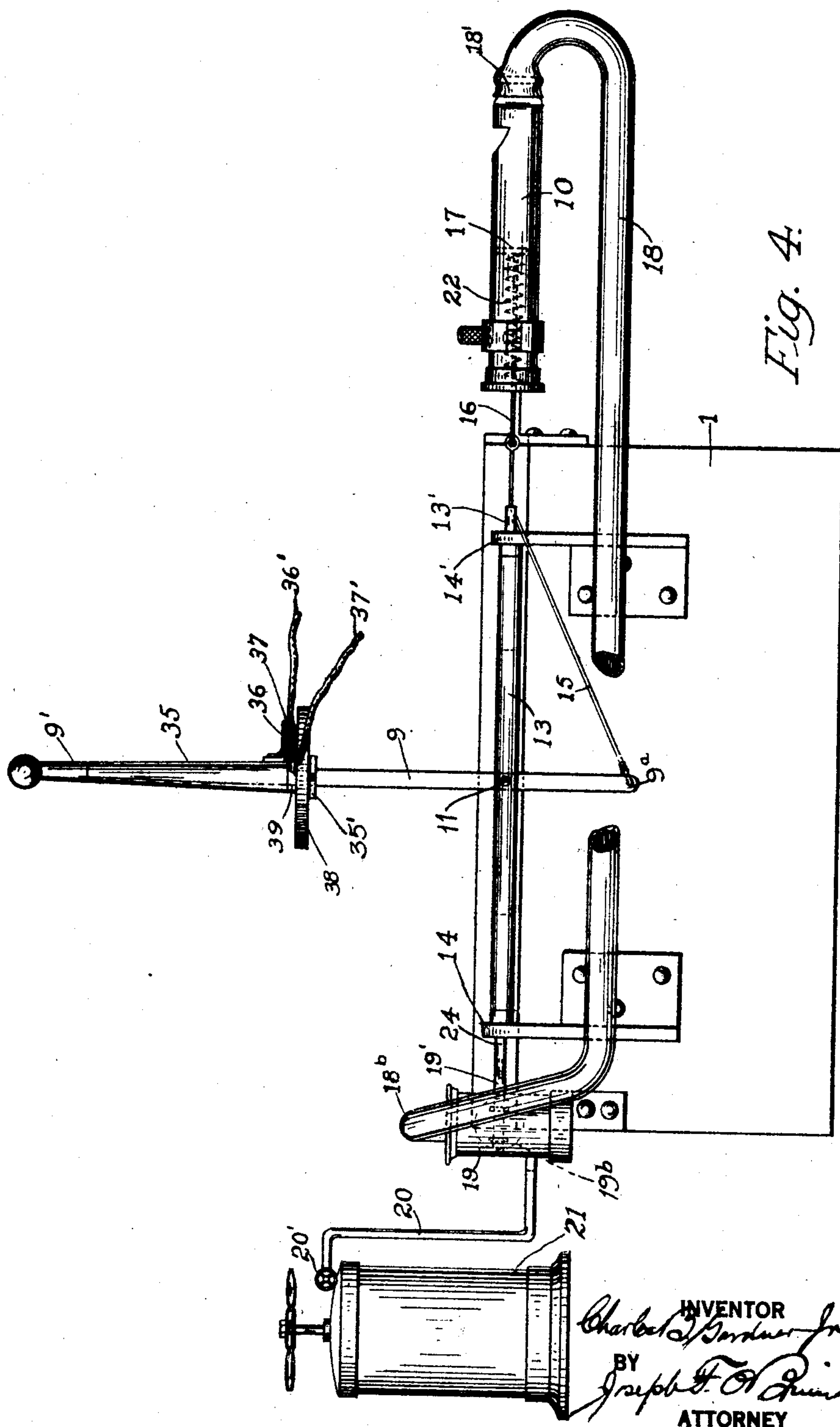
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MUSICAL INSTRUMENT AND PLAYING MEANS THEREFOR

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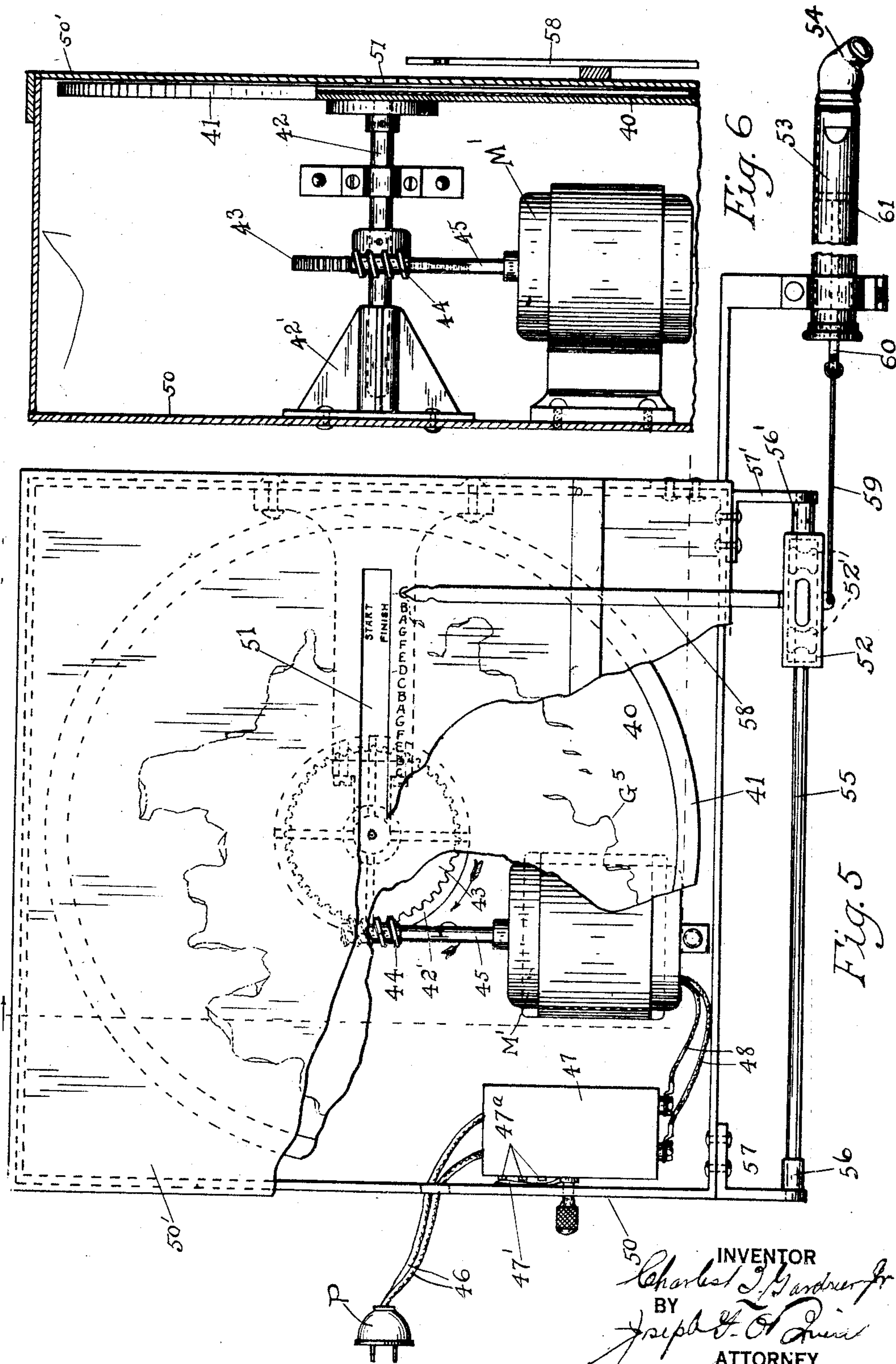
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MUSICAL INSTRUMENT AND PLAYING MEANS THEREFOR

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# UNITED STATES PATENT OFFICE

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MUSICAL INSTRUMENT AND PLAYING MEANS THEREFOR

Application filed February 16, 1927. Serial No. 168,495.

This invention relates to improvements in musical instruments and playing means therefor.

One of the objects of this invention is to produce a device by which an unskilled player may produce a musical composition.

Another object of the invention is to provide a musical instrument with a playing or operating element which is adapted upon longitudinal movement to produce musical notes of varying characteristics and to arrange this playing element in cooperation with a movable graph representing a musical composition, tune or melody and having a relatively short section exposed whereby the movement of the operating element to follow the movement of the exposed section of the graph will cause the composition or tune to be played on the musical instrument.

Another object of the invention is to produce on the graph in combination, with the lines indicating the position on the scale of the notes, of means for indicating the intensity or force with which the note is to be played and to provide, in combination with such visual indications, a means operable by the operating or playing element for varying the intensity, force or loudness with which the note should be played.

Another object of the invention is to provide, in combination with a graph movable longitudinally of the character specified, combined with a playing instrument having a playing element movable in accordance with the movement of the exposed graph section in the slot, said movable element being also provided with a pointer adapted to follow the graph with greater accuracy.

Still another object of the invention is to provide a musical instrument with a playing element arranged upon longitudinal movement to produce notes of varying frequencies on the scale and by a rotational movement in opposite directions to vary the degree of air pressure or like force utilized in the operation of the instrument.

With these and other objects in view, the invention comprises the combination of members and arrangement of parts so combined as to co-act and cooperate with each other in

the performance of the functions and the accomplishment of the results herein contemplated, and comprises in one of its adaptations the species or preferred form illustrated in the accompanying drawings, in which:—

Fig. 1 is a central longitudinal section of the device embodying my invention;

Fig. 2 is a view, in plan, partially broken away, of the device shown in Fig. 1;

Fig. 3 is a view, in plan, with the cover removed, of the rear end of the device shown in Fig. 1;

Fig. 4 is an end elevation of the device shown in Figs. 1, 2 and 3 respectively;

Fig. 5 is a plan view, partly broken away, of a modified form of my invention; and

Fig. 6 is a fragmentary section of the device shown in Fig. 4.

Referring now to Figs. 1 to 4 of these drawings, 1 indicates a suitable casing in which is disposed a plurality of spaced rollers 2 and 3 on which is mounted so as to be wound from one to the other, in any suitable way, a roll of paper 4 having inscribed or recorded thereon by graph 5 a musical composition or piece, the relative position of the notes of which is indicated by the position of the line in relation to a music scale or scales which, however, is not represented on the graph by the usual scale lines.

As illustrated, the roller 2 is mounted in bearings 2', 2<sup>a</sup> within the casing 1 and the roller 3 is preferably driven by fixing thereon a worm wheel 3' meshing with a worm 3<sup>a</sup> on a shaft 3<sup>b</sup> rotated by motor M supplied with electrical energy from any suitable source and, as shown, having connections by cables 3<sup>c</sup> with a variable resistance box 3<sup>d</sup> to a plug P. Said resistance box preferably is provided with means such as the contact arm 3<sup>e</sup> and contacts 3<sup>f</sup> for varying the speed of the motor M to cause a faster or slower winding of the music roll and a consequent faster or slower exposition of the graph and playing of the composition. A suitable smoothing means is preferably utilized in connection with the driving roller 3, and, as illustrated, a hold-down roller 30 is pivotally mounted at the outer ends of arms 31 pivoted at their inner ends in brackets 32 and normally resiliently



held in engagement with the paper 4' as it is being wound on the roller 3 by a spring or springs 33 stretched between the said arms 31 and the bearings 32. The web portion of the roll of paper between the two rollers 2 and 3 is moved longitudinally beneath a relatively transverse slot 6 so as to exhibit from above a relatively short portion of the graph line 5. This slot 6 preferably communicates with a short longitudinal slot 7 arranged over the edge of the roll of paper and the said edge of the roll of paper is preferably provided with words, titles or the like of the music represented by the graph 5. As illustrated, the intermediate web 4' is fed over a plate 8 suitably spaced below the slots 6 and 7, so that when a roll is wound from one roller, as for example, from the roller 2 to the roller 3, short longitudinal portions of the graph 5 will be exhibited in the transverse slot 6 and words of a song or melody may be exposed in the slot 7, and in accordance with my invention, I mount in cooperative relationship with the graph 5 and preferably in parallelism with the slot 6 through which portions of the graph are continuously and successively exposed, an operating member 9 for a musical instrument 10, said operating member 9 being arranged to have a movement which will cause a varying of the notes of the musical instrument 10 in accordance with the position of parts of the graph 5 exposed through the slots 6.

In accordance with the preferred embodiment of my invention illustrated in Figs. 1 to 4, an operating lever 9' is pivoted intermediate its ends at 11 in a slot 12 formed in a rod 13 rotatably mounted at opposite ends in bearing brackets 14, 14' preferably mounted on the end of the casing 1. The lever 9' is suitably connected with a musical instrument 10 and, as shown, the lower end 9<sup>a</sup> of the lever 9' is connected by a cord or a cable 15 with a rod 16 connected with the plunger 17 operating within the musical instrument 10 which, as shown, comprises a whistle, it being understood that the movement back and forth of the plunger will change or vary the column of air or vibrating element within the whistle and consequently produce varying notes or tones of varying frequencies, provided, of course, that air is supplied to said instrument. The supply of air may be furnished in any suitable manner and, as illustrated, an air hose 18 has one end 18' connected with the end of the whistle 10 and at the other end 18<sup>b</sup> with an air valve 19 which is, in turn, connected by the pipe 20 through the hand-operated valve 20' with the compressed air tank 21. As illustrated, the cord or cable 15 is connected intermediate its ends to a projecting portion 13' of the rod 13 so as to permit a connection axial of the instrument with the plunger rod 16, the plunger 17 being normally held in its innermost position by means of a spring 22.

The lever 9' is preferably provided with a pointer 23 extending into proximity with the slot 6 so as to enable a more facile following by the lever 9' through said slot of the successively and continuously exposed graph portions.

In the preferred embodiment of my invention, the rod 13 which is provided with the graph-following lever 9' is arranged to vary the pressure of air to the whistle by a rotational movement thereof and, as illustrated, the rod 13 is provided at the end opposite to the connection of the musical instrument with a reduced projection 24 which has an operative connection with a valve stem 19<sup>b</sup> connected with a conventional damper valve member 19<sup>a</sup> within the valve 19 so that upon rotation of the rods 13 and 24 in one direction, the valve 19 will open to allow greater pressure from the tank 21 to be supplied, whereas movement in the opposite direction will reduce the amount of air pressure passing through the pipes. I am thus enabled, by a simple longitudinal movement of the lever 9' to follow the exposed portions of the graph in the slot 6 and simultaneously therewith by movement of said lever to rotate the rod 13 to vary the air pressure and produce louder or softer tone qualities, and in the graph 5 I preferably indicate by double lines 5', 5<sup>a</sup> the portions of the record at which greater air pressure should be admitted to the instrument. It will be seen that I am, therefore, able by simple longitudinal movement of the lever 9' to vary or modify the notes in accordance with the showing of the graph line through said slot and also by a simple turning of the same element to increase or decrease the loudness of the sound produced.

In accordance with my invention, I preferably provide means carried by the operating element for varying the speed of the motor and, therefore, enabling the operator to produce a faster or slower movement of the rolls and a faster or slower exposition of the graph inscribed thereon. In the preferred embodiment of my invention, I also preferably indicate on the paper rolls, in combination with the graph, means for indicating the speed with which the rolls are moved and thus provide means for indicating the variation of the tempo or relative rate of speed or movement of the graph in a given composition or portion thereof. My preferred form of tempo indications comprises a series of dots D inscribed on the rolls in juxtaposition to that portion of the graph the speed of movement of which it is desired to vary. Such a series comprises a plurality of dots diminishing or increasing in size. This series of dots when disposed with the diminishing dots directed toward the direction of playing movement are intended to indicate "faster" and a similar series in reverse direction are intended to indicate "slower". My preferred means



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for varying the movement of the graph in accordance with the instructions thereon and thus causing the composition to be played faster or slower comprises a sleeve 35 rotatably mounted on the lever 9'. Said sleeve is insulated by a suitable ring 35' of insulation from a contact arm 36 arranged to operate over a resistance coil 37, mounted on a disc 38, fastened to the lever 9' and insulated therefrom by another insulating disc 39. The contact arm is electrically connected by a conducting wire 36' to the motor and the resistance coil 37 is connected to the resistance elements in the main resistance box 3<sup>d</sup> by conductor 37'.

It will be obvious that a turning of the sleeve 35 will swing the contact arm on the resistance coil 37 and cause the rolls on which the graph is inscribed to be moved faster or slower. This tempo sleeve may, of course, be operated during the following movement of the lever and even simultaneously with the variation of the intensity with which the column of air within the instrument is vibrated, the pressure of which air column is varied by a swinging movement of the lever at right angles to its following movement. In the embodiment shown, the length of the air column is varied by the movement of the plunger 17.

In Figs. 5 and 6, I have illustrated a modified form of my invention in which a graph G<sup>5</sup> is inscribed on a disc 40 mounted on a turn-table 41 detachably keyed to and rotated by a spindle 42 suitably mounted in a bearing 42' driven through worm wheels 43 and worm 44 by the shaft 45 of a motor M' to which electric-motive force is supplied from any suitable source and, as shown, electricity is supplied through the conductor 46 connected with the plug P' passing through a resistance box 47 and conductors 48. The turn-table is, as shown, mounted in a casing 50 provided with a cover 50' having a radial slot 51 through which short sections of the graph are adapted to be successively and in a continuous manner exposed.

Mounted, as shown, in substantial parallelism with the slot 51 is a longitudinally-movable operating element 52 of a musical instrument comprising a whistle 53 which is supplied through the hose 54 with compressed air from any suitable source such as hereinabove specified. As illustrated, the element 52 is mounted on rollers 52' on a rod 55 mounted at opposite ends in bearing members 56, 56' connected to brackets 57, 57' connected, as shown, to the edge of the casing 50. The element 52 is provided, as illustrated, with a pointer 58 extending into proximity with the slot so as to permit a more accurate following by the member 52 of the graph portions as they appear within the slot 51. The element 52 is, as shown, connected by a rod 59 with an operating rod 60 extending within the whistle 53 and connected within said whistle to a plunger 61.

Obviously by the use of a device of this character, I will be enabled by sliding the element 52 along the rod 55 to follow the positioning in the slot of the sections of graph as they are exposed by the rotation of the turn-table and it will, furthermore, be apparent by such movement along the rod 55, the length of the column of air in the whistle 53 will be varied and consequently the notes produced by said whistle will be varied in accordance with the movement of the element 52 and it will also be seen that when the element 52 is moved in accordance with the exposition of the graph lines, a melody may be produced by the whistle.

In the embodiment of my invention shown in Fig. 5, the resistance box 47 is provided with contact arms 47' and contact points 47<sup>a</sup> connected up in any conventional way for the purpose of increasing or decreasing the speed of the motor to cause the exposition of the graph line sections through the slot 51 at varying speeds and consequently to cause the production of the notes of the melody to be faster or slower as desired.

Having described my invention, I claim:—

1. In a musical instrument, a sound-producing device, a manually-actuated playing element therefor, means for guiding longitudinal movement of said playing element, an element movable independently of said playing element and indicating means arranged on movement of said independently-movable element to display successively notes of a musical composition and in varying positions and to indicate the direction and degree of movement necessary to produce said musical composition.

2. In a musical instrument, a sound-producing device, a manually-actuated playing element therefor, means for guiding longitudinal movement of said playing element, a graph representing musical notes, and means for moving and successively displaying the note-representing portion of said graph to cause the same to cross and to be displayed along a predetermined line and successive portions of such graph to move to opposite sides of a point in said line.

3. In a musical instrument, a sound-producing device, a manually-actuated playing element therefor, means for guiding longitudinal movement of said playing element, a graph representing musical notes, means for moving and successively displaying the note-representing portion of said graph to cause the same to cross and to be displayed along a predetermined line and successive portions of such graph to move to opposite sides of a point in said line, and a pointer member connected with said playing element and movable to follow the said exposed portions of said composition graph.

4. In a musical instrument, a sound-producing device, a manually-actuated playing



element therefor, means for guiding longitudinal movement of said playing element, and indicating means cooperating with said manually-actuated playing element and movable to indicate the direction and degree of movement necessary to produce a musical composition, said sound-producing device having a vibrating element, and means operable simultaneously with the longitudinal guided movement of said playing element for varying the intensity with which said vibrating element is vibrated.

5. In a musical instrument, a sound-producing device, a manually-actuated playing element therefor, means for guiding longitudinal movement of said playing element for the purpose of varying the pitch of the instrument, said element also having another movement at substantially right angles to said longitudinal movement, and means operable by said last-mentioned movement for the purpose of varying the intensity of vibration of the vibrating element.

6. In a musical instrument, a sound-producing device, a manually-actuated playing element therefor, means for guiding longitudinal movement of said playing element, said playing element also having an additional movement, and means operable by said additional movement to vary the movement of the graph and the time element of the composition.

In witness whereof, I have signed my name to the foregoing specification.

CHARLES B. GARDNER, JR.