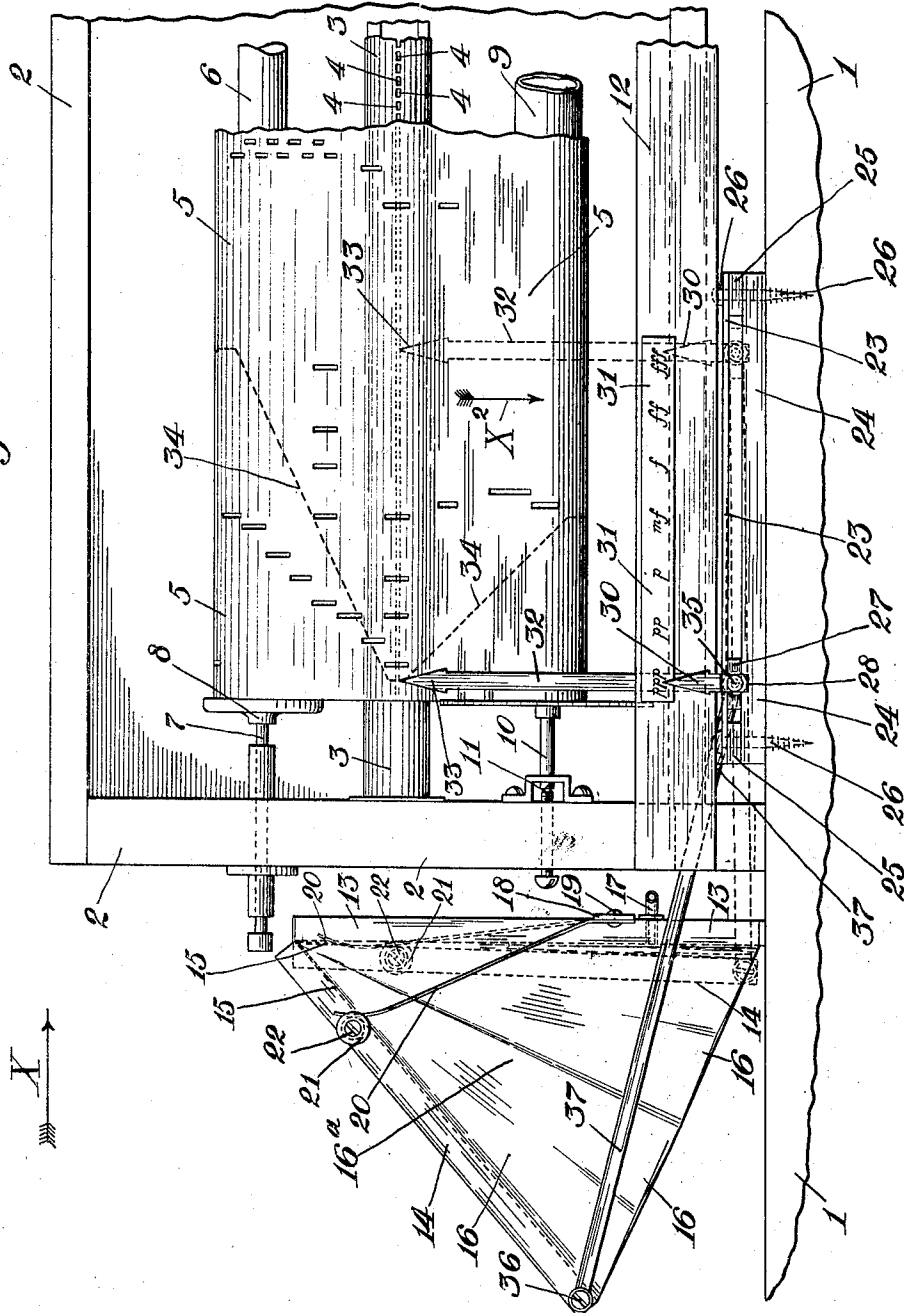


EXPRESSION CONTROLLER FOR MUSICAL INSTRUMENTS.

1,031,784.

Patented July 9, 1912.

Fig. 1.



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2 SHEETS—SHEET 2.

Fig. 3.

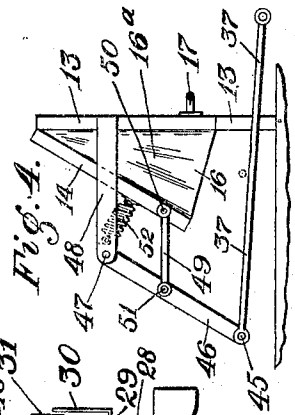
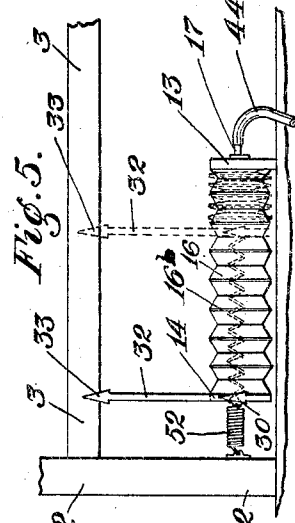
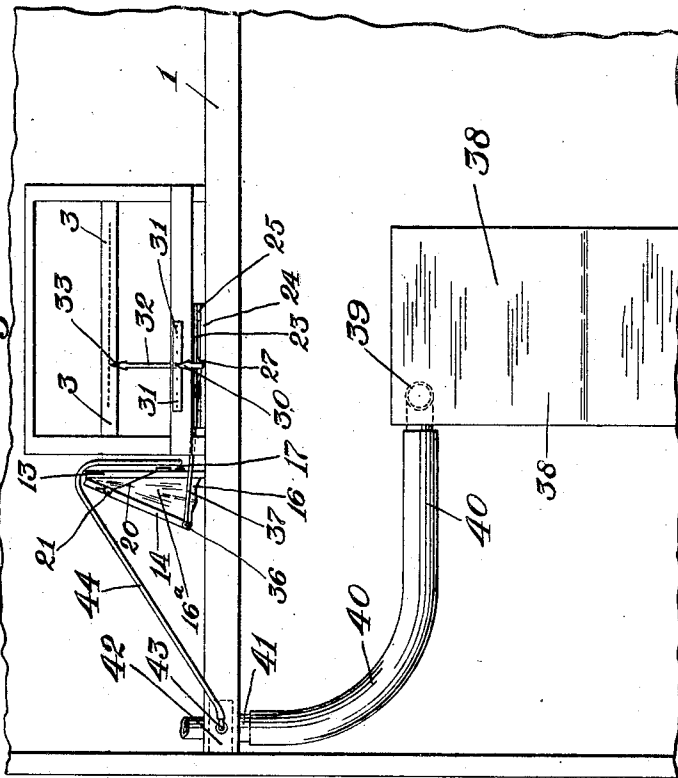
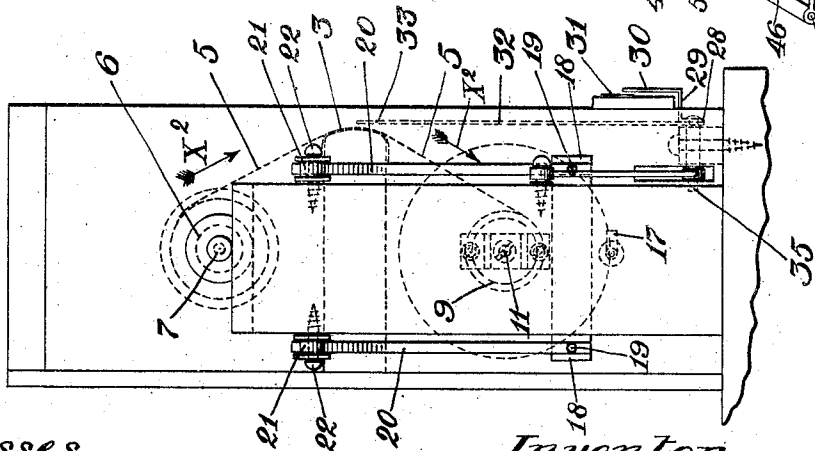


Fig. 2.



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UNITED STATES PATENT OFFICE.

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EXPRESSION-CONTROLLER FOR MUSICAL INSTRUMENTS.

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To all whom it may concern:

Be it known that I, FREDERICK GRUNDY, a citizen of the United States, residing at Los Angeles, in the county of Los Angeles and State of California, have invented certain new and useful Improvements in Expression-Controllers for Musical Instruments, of which the following is a full, clear, and exact specification, reference being had to the annexed drawings and to the letters and figures marked thereon.

The mechanism constituting my invention is provided with an indicator adapted to follow an expression line, which line is drawn upon a perforated music sheet, whereby an accurate degree of intensity of tone, varying from "pianissimo" to "fortissimo" may be produced by a musical instrument to which my invention is attached, and whereby the exact musical effect, or rendering intended to be expressed by the composer of a musical composition may be accurately reproduced upon such mechanical musical instrument.

The class of mechanical musical instrument to which my invention more particularly relates, is that wherein exhaust bellows are provided, whereby air is drawn through the perforated music sheet, thence through the various mechanical operating devices, and finally through the main bellows which is operated by pedal action controlled by an operator.

While there are at present in use certain devices for producing musical effects in the mechanical musical instruments to which my invention relates, such devices are deficient in the matter of the production of the necessary intermediate variations of intensity of tone between extreme softness and extreme loudness; and the said intermediate variations in intensity are obtained solely by the varying amount of muscular force exerted by the operator upon the pedals of the instrument. The amount of exhausting effect produced in the main bellows, and the corresponding intensity of tone thereby obtained from the instrument is directly proportionate to the amount of muscular force expended upon the pedals attached to the said main bellows, and I therefore apply in my invention a device operated by the exhausting action of the said main bellows whereby a corresponding effect is produced in an auxiliary, smaller bellows which is normally held expanded by a spring, or springs, and which is caused to collapse

more or less as the air is exhausted therefrom to a greater or less degree; the interior of the said auxiliary bellows being in communication through an air conduit or pipe with the interior of the said main bellows. The movement of a movable member of the smaller bellows is conveyed by suitable connections to an indicator moving in guides and the free end of which is caused to follow the expression line upon the perforated music sheet.

In the drawings: Figure 1, is a front elevation of the auxiliary bellows and the indicator connected therewith, together with a portion of the musical instrument with a perforated music sheet thereon. Fig. 2, is a side elevation corresponding with Fig. 1, and looked at in the direction of the arrow X, of Fig. 1. Fig. 3, is a front elevation upon a smaller scale, of part of a mechanical musical instrument with my device attached thereto, showing the air conduits and pipes leading thereto, and part of the main bellows. Fig. 4, is a side elevation drawn to a different scale, of a modified form of auxiliary bellows, and the connections thereof. Fig. 5, is a side elevation drawn to the same scale as Fig. 4, of another modified form of auxiliary bellows and the indicator attached thereto.

Attached to the body 1, of the musical instrument is a box 2, containing the usual tracker-board 3, whereinto are fitted the several conduits 4, and over which the perforated music sheet 5, mounted upon the spool 6, which rotates upon the pin 7, travels, holding it upon a hub 8, upon the said spool 6. The lower edge of the music sheet 5, is wound off the spool 6, and upon the spool 9, which is driven mechanically and turns upon the shaft 10, which is held in position by the conical ended adjusting screw 11.

Attached to the front of the box 2, at the lower part thereof, is a flat bar 12. All of the above described parts are of well-known construction, in common use and do not constitute part of my present invention.

Adjacent to the box 2, I apply an auxiliary bellows 16, Fig. 4, having a fixed member 13, and a movable member 14, having a hinge 15, preferably of leather between, and glued to both of the members 13, and 14. The bottom and sides of the members 13, and 14, are joined by fabric 16, glued or otherwise suitably attached thereto, and forming the collapsible por-

tion of the said bellows. The rigid member 13, has a hole therein, into which is fitted a nipple 17, through which air is capable of being exhausted from the interior of the said auxiliary bellows 16^a.

To the back of the fixed member 13, is attached by screws or otherwise, a bar 18, and attached to each end of the said bar 18, by rivets 19, is a spring 20, bearing upon a flanged roller 21, capable of rotation upon a screw 22, which is screwed into the movable member 14, of the said auxiliary bellows.

Attached to the body 1, of the musical instrument, within the box 2, and at the end adjacent to the auxiliary bellows, are guides consisting of an upper member 23, a lower member 24, and separators 25, between the ends of the said guides; the guides 23, and 24, and separators 25, being attached to one another, and to the body 1, by screws 26. Between the guides 23, 24, is adapted to slide a block 27, to which is riveted a short indicator 28, which has a horizontal offset portion 29, and a vertical portion 30, adapted to traverse a gage 31, having expression marks such as "ppp", "pp", "p", "mf", "f", "ff", and "fff", thereon, and which gage 31, is glued or otherwise fastened to the bar 12.

Behind the bar 12, and riveted to the short indicator 30 by a single rivet, as at 29', and to the block 27, is a long indicator 32, the upper end of which 33, extends to about the center of the tracker-board 3, and is adapted to follow an expression line 34, upon the perforated music sheet 5.

Pivoted at one end upon a pivot 35, upon the sliding block 27, and at the other end, upon a pivot 36, upon the movable member 14, of the auxiliary bellows 16^a, is a link 37.

A convenient method of connecting the auxiliary bellows with the main exhausting bellows, is shown in Fig. 3, wherein is the main exhaust bellows 38, having an elbow 39, opening thereinto, and connected by a pipe 40, which is usually of rubber hose, to a nipple 41, communicating with an air chamber 42, within the body of the instrument 1. A small nipple 43, communicates with the said chamber 42, and a flexible pipe 44, of rubber or other suitable material, connects the nipples 41 and 17. In Fig. 3, the indicator is shown in its mid position, and the auxiliary bellows in the corresponding partially collapsed condition.

In the modification illustrated in Fig. 4, the link 37, is not directly pivoted to the movable member 14, of the auxiliary bellows 16^a, but is attached by a pivot 45, to a lever 46, which is pivoted at its opposite end upon a pin 47, rigidly attached to a bracket 48, secured to the stationary member 13, of the auxiliary bellows, and a short connecting link 49, pivoted upon the mov-

able member 14, of the said auxiliary bellows, by the pin 50, and upon the lever 46, by the pin 51; so that the motion of the link 37, is greater than that of the movable member 14, of the auxiliary bellows 16^a, and the latter may therefore be made of smaller dimensions. A spiral spring 52, attached at one end to the movable member 14, and at the opposite end to the bracket 48, holds the auxiliary bellows 16^a, in a distended or expanded position.

In the modification shown in Fig. 5, the auxiliary bellows 16^b, is of a different form, wherein the movable member 14, of the auxiliary bellows is not hinged to the stationary member 13, but is capable of movement directly away from or toward the said stationary member 13, and at the limit of its outward stroke occupies the position shown in full lines in the said Fig. 5, as also does the collapsible fabric portion 16; and in its completely collapsed condition occupies the position shown in dotted lines in the said Fig. 5.

The modified auxiliary bellows 16^b, is held normally in a distended condition by the tension of a spring 52, attached at one end to a fixed part of the instrument, such as to the side of the box 2, and at its opposite end to the movable member 14, of the auxiliary bellows. In this construction the indicators 30, and 32, are attached directly to the movable member 14, of the auxiliary bellows 16^b. In operation and in respect of the nipple 17, and pipe 44, the device is similar to that herein previously described.

From the foregoing description it will be evident that when the main bellows 38, is not being operated, that is to say, when no air is being exhausted therefrom, that the springs 20, Figs. 1, 2, and 3, or the springs 52, Figs. 4, and 5, will hold the auxiliary bellows 16^a, in a fully distended or expanded position, and the indicator 30, will register with the mark "ppp" upon the gage 31, which position corresponds with the softest tones which may be produced upon the instrument; and when the air is exhausted in a greater or less degree from the main bellows 38, the auxiliary bellows 16^a, will be collapsed or contracted in a greater or less degree, and by means of the pivotally connected link 37, will cause the indicators to travel to a greater or less extent away from the position wherein the lower indicator 30, registers with the mark "ppp" upon the gage 31, and when this exhausting action of the main bellows 38, is at its maximum the said auxiliary bellows 16^a, will be fully collapsed and the lower indicator will register with the mark "fff" upon the indicator 31, as shown in dotted lines in Fig. 1, and any intermediate exhausting effect will cause the indicator 30, to take up a position intermediate between the extreme limits and corre-

sponding with the various degrees of exhausting effect produced as described.

In forming the expression line 34, upon the music sheet 5, the indicator 33, is provided with a pencil attachment and is caused to travel to and fro over the said music sheet, its position varying in direct proportion to the muscular force expended upon the pedals by the operator, which is in direct proportion to the intensity of tone desired, and thereby describing the expression line 34, as the music sheet 5, travels in the direction of the arrows X², Figs. 1, and 2.

In reproducing the effects, the operator varies the force expended in pedaling, so as to cause the end 33, of the indicator 32, to follow the expression line 34, whereby the exact effects are reproduced which were obtained when the expression line was drawn upon the music sheet 5. In this manner the most artistic musical effects may be reproduced with the greatest exactitude of repeated expression.

I claim as my invention—

1. In a mechanical musical instrument, the combination of main exhausting bellows, an auxiliary bellows, a tracker board, a perforated music sheet having an expression line thereon, a pair of guides horizontally-disposed along the front of the music sheet below the tracker board, a block movable between said guides and operatively-connected with the auxiliary bellows, an expression plate parallel with the guides, a short indicator attached to the movable block to follow the gage, and a long indicator also at-

tached to the block, with its upper end terminating at a point along the tracker board.

2. In a mechanical musical instrument, the combination of main air-exhausting bellows, auxiliary bellows, a perforated music sheet having an expression line thereon, a tracker board, a pair of horizontal guides transversely disposed along the front of the music sheet, and a block movable between said guides operatively-connected with the auxiliary bellows, a transverse gage at the guides, and an adjustable indicator attached to the block by a single pivot, extending upwardly to the tracker board to follow the expression line of the music sheet.

3. In a mechanical musical instrument, the combination of main exhausting bellows, an auxiliary bellows, a tracker board, a perforated music sheet, a pair of guides horizontally-disposed along the front of the music sheet below the tracker board, a block movable between said guides and operatively connected with the auxiliary bellows, and an adjustable indicator secured to the movable block by a single rivet and extending to the tracker board, whereby the upper end may be moved laterally across the music sheet a limited distance.

In testimony whereof, I have hereunto set my hand and seal at the city of Los Angeles aforesaid, in the presence of two subscribing witnesses.

FREDERICK GRUNDY. [L. S.]

Witnesses:

ST. JOHN DAY,
J. D. CORY.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."