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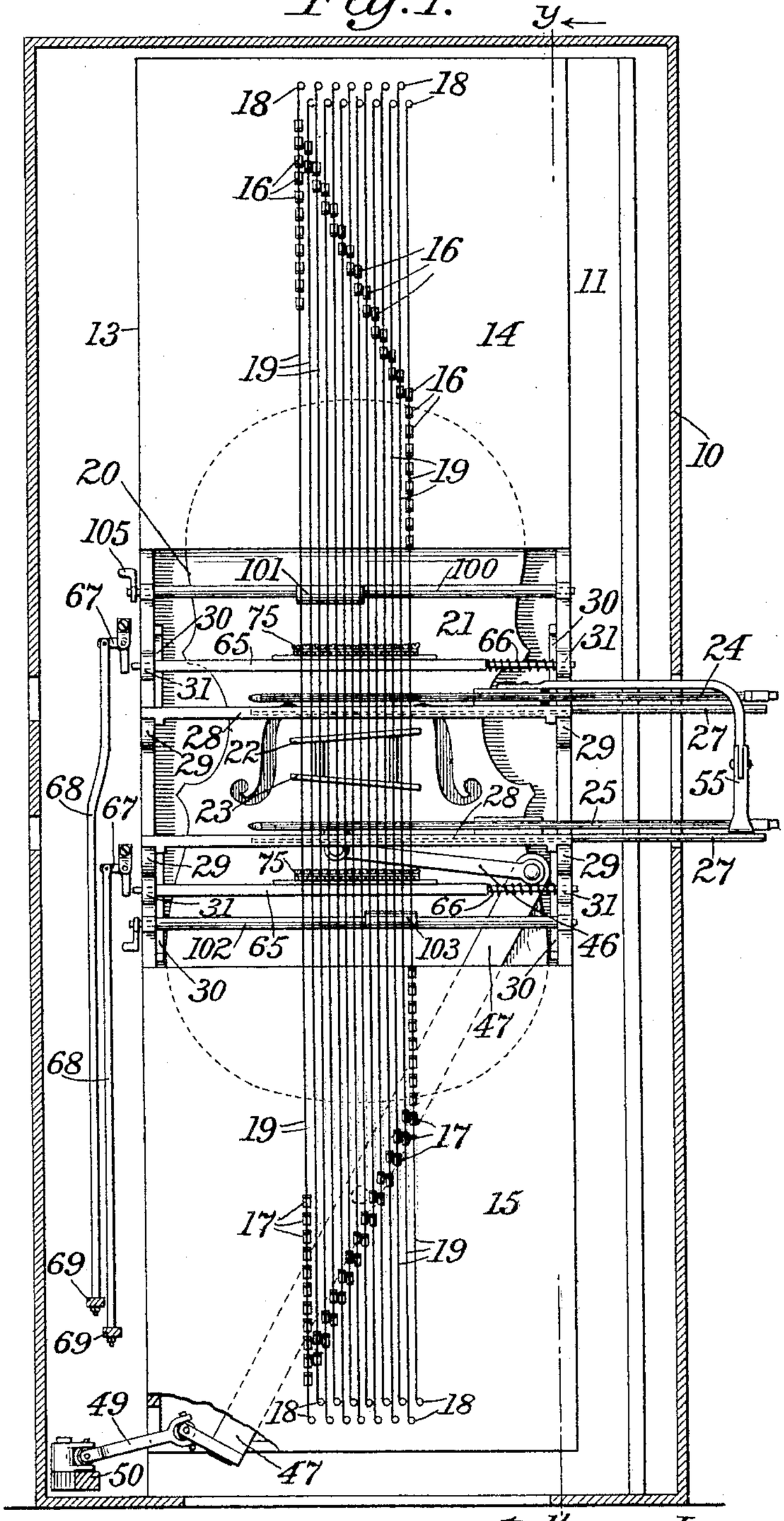
O. BREIBY.

MUSICAL STRINGED INSTRUMENT.

No. 581,688. Patented May 4, 1897.

Fig. 1.



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O. BREIBY.

MUSICAL STRINGED INSTRUMENT.

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Fig. 2.

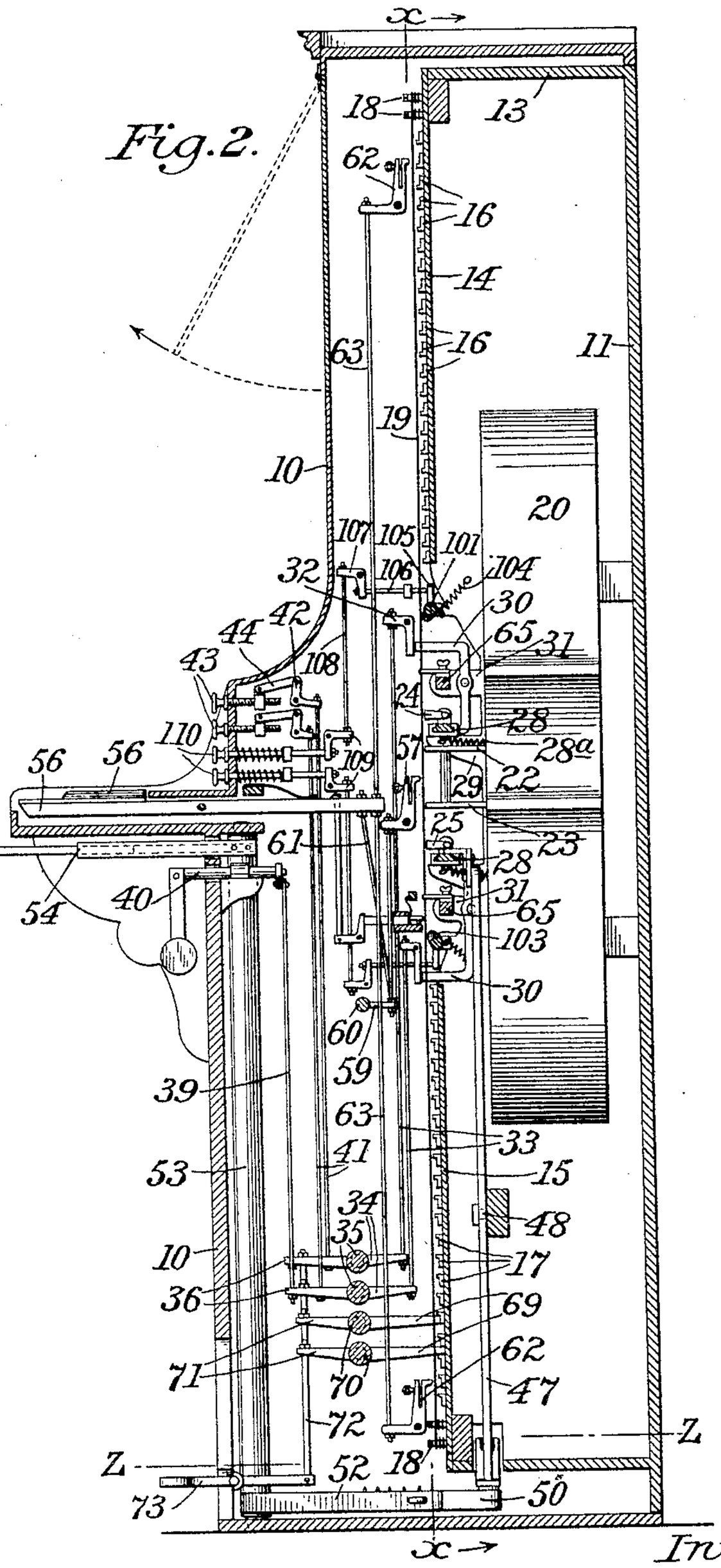

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Fig. 3.

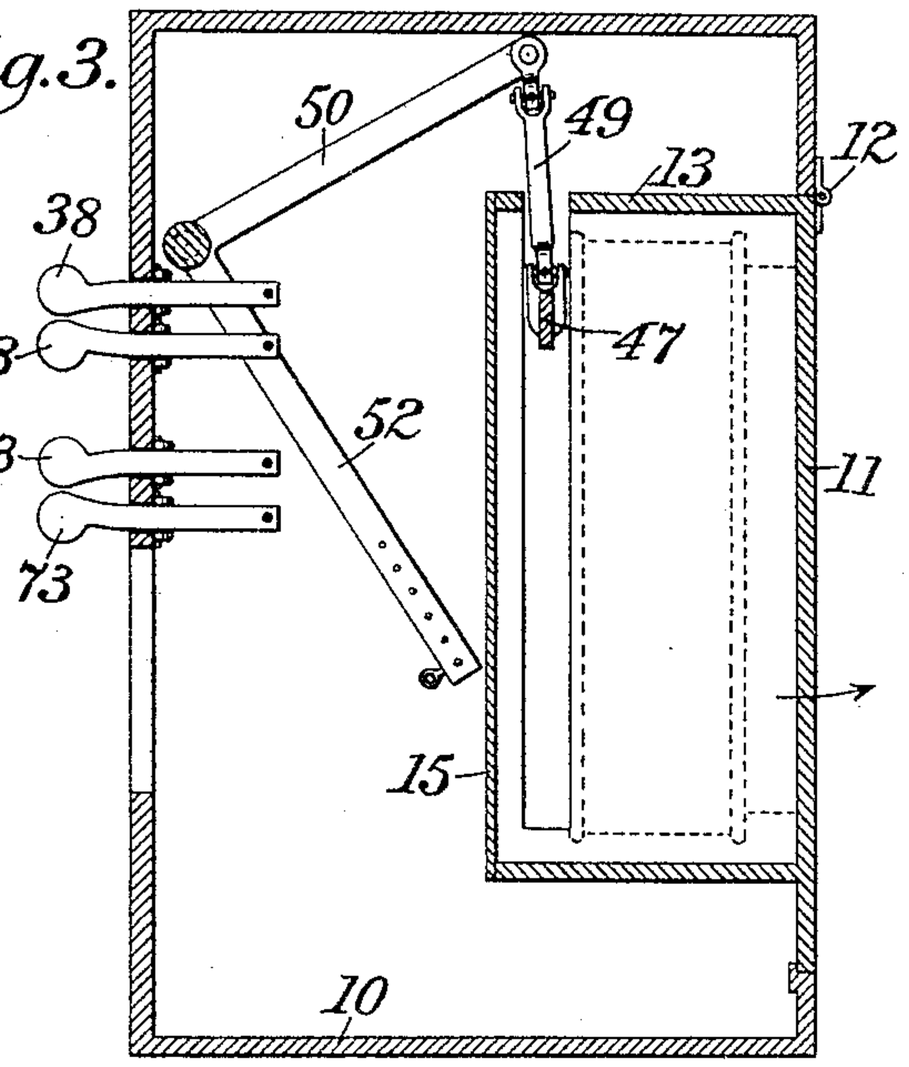
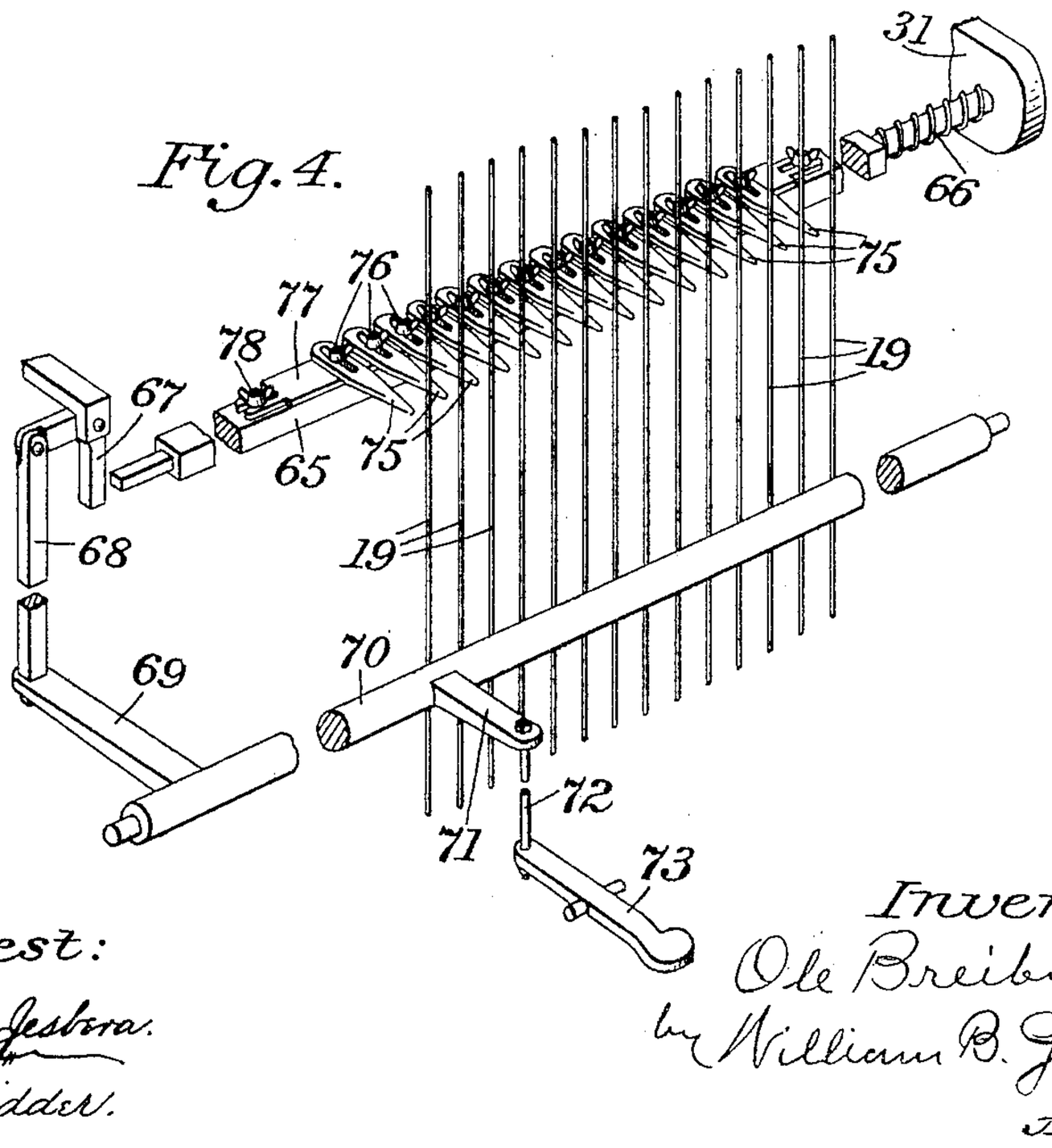


Fig. 4.



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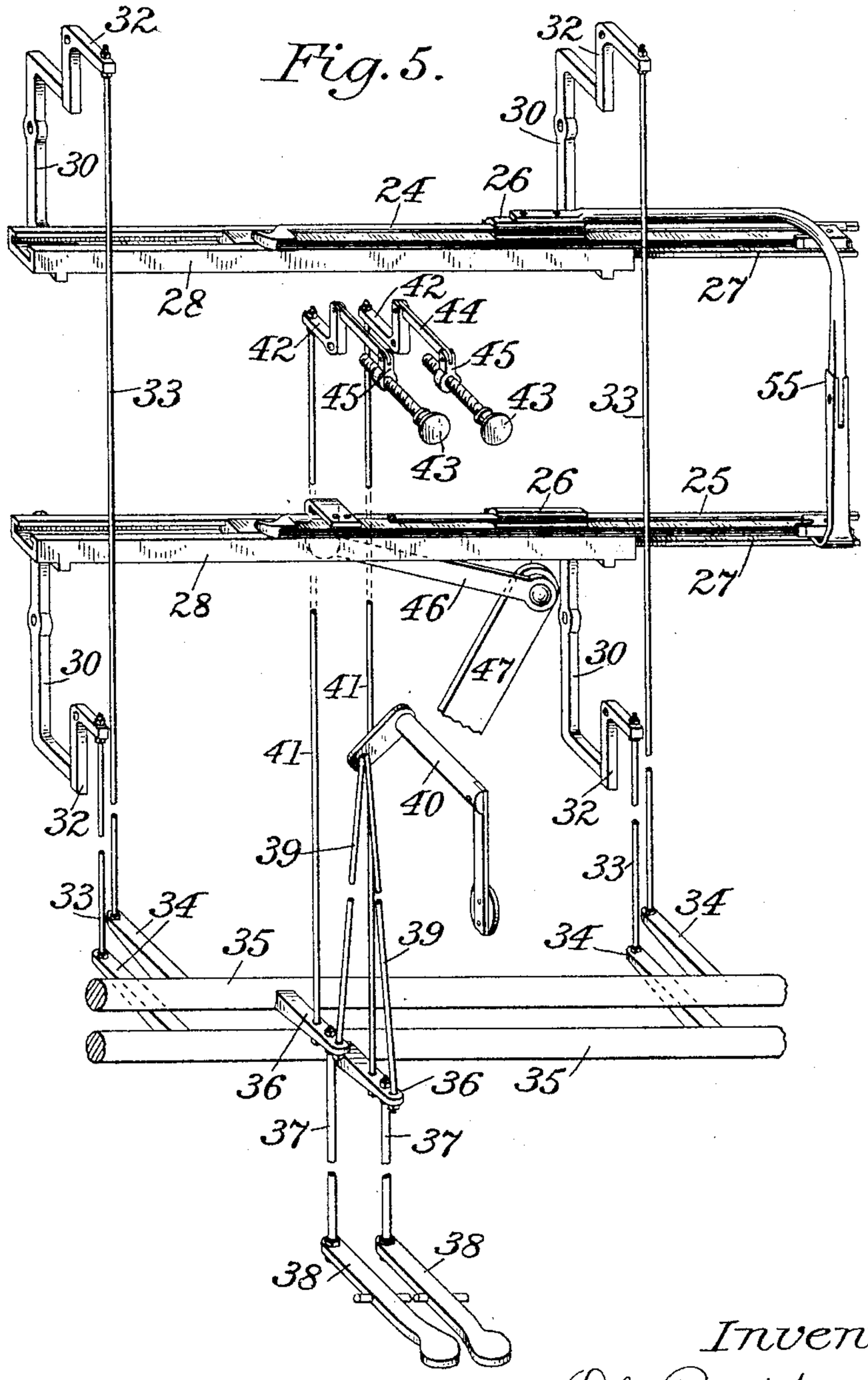
No. 581,688. Patented May 4, 1897.

Fig. 5.



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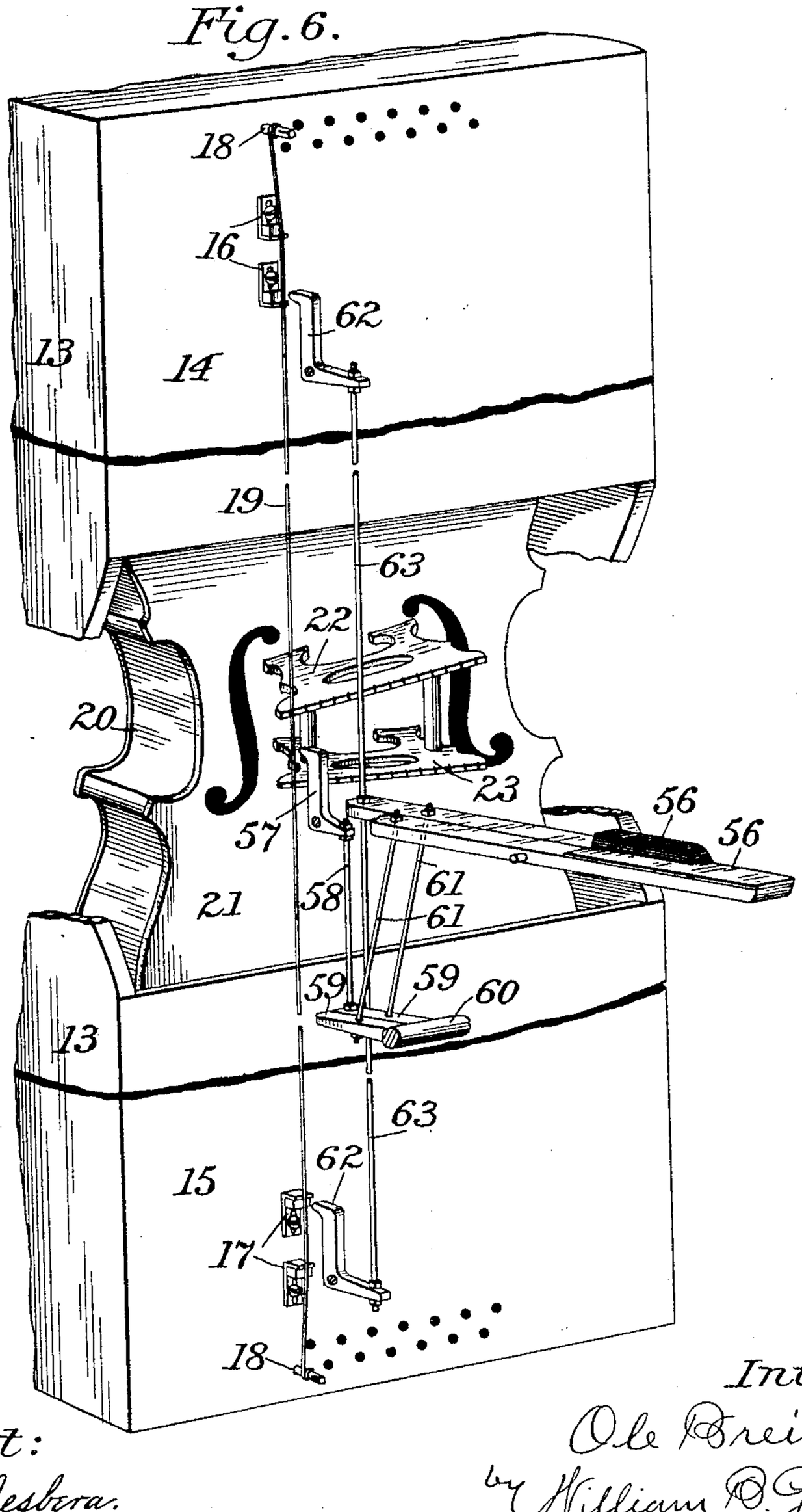
No. 581,688. Patented May 4, 1897.

Fig. 6.



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MUSICAL STRINGED INSTRUMENT.

No. 581,688. Patented May 4, 1897.

Fig. 7.

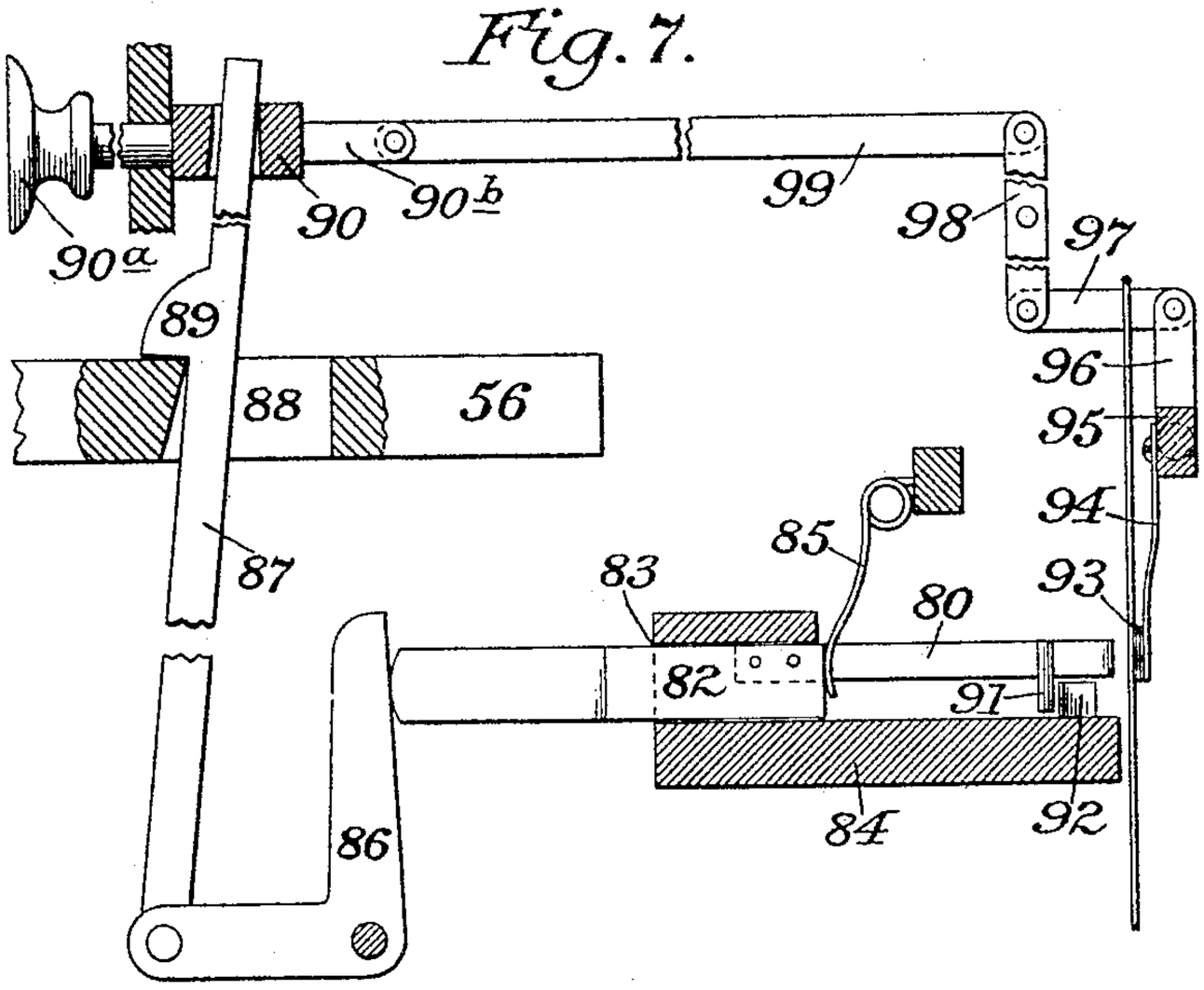
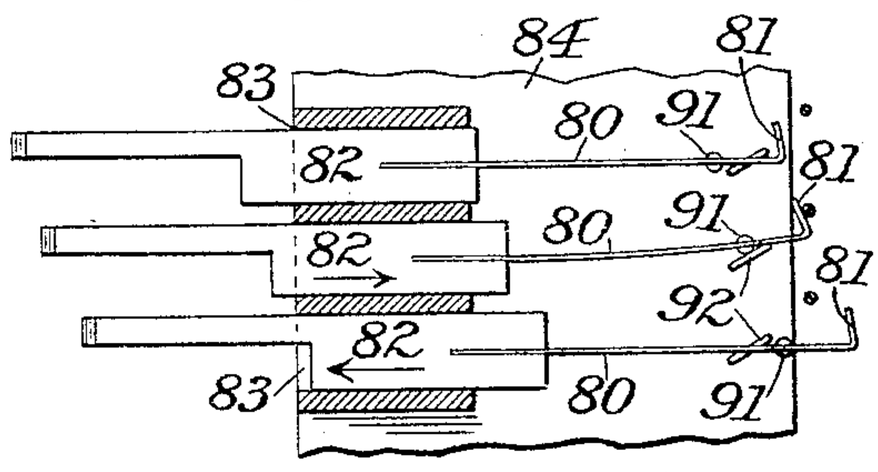


Fig. 8.



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O. BREIBY.

MUSICAL STRINGED INSTRUMENT.

No. 581,688. Patented May 4, 1897.

Fig. 9.

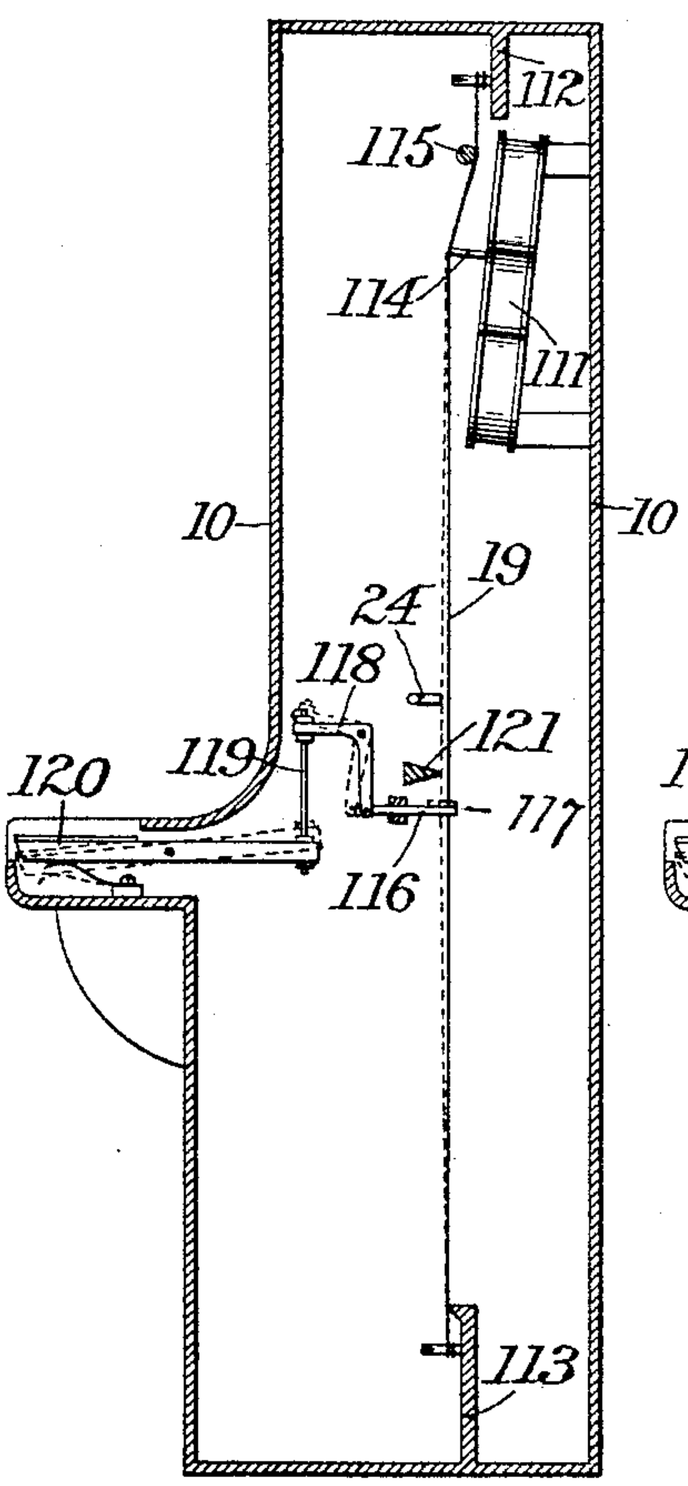
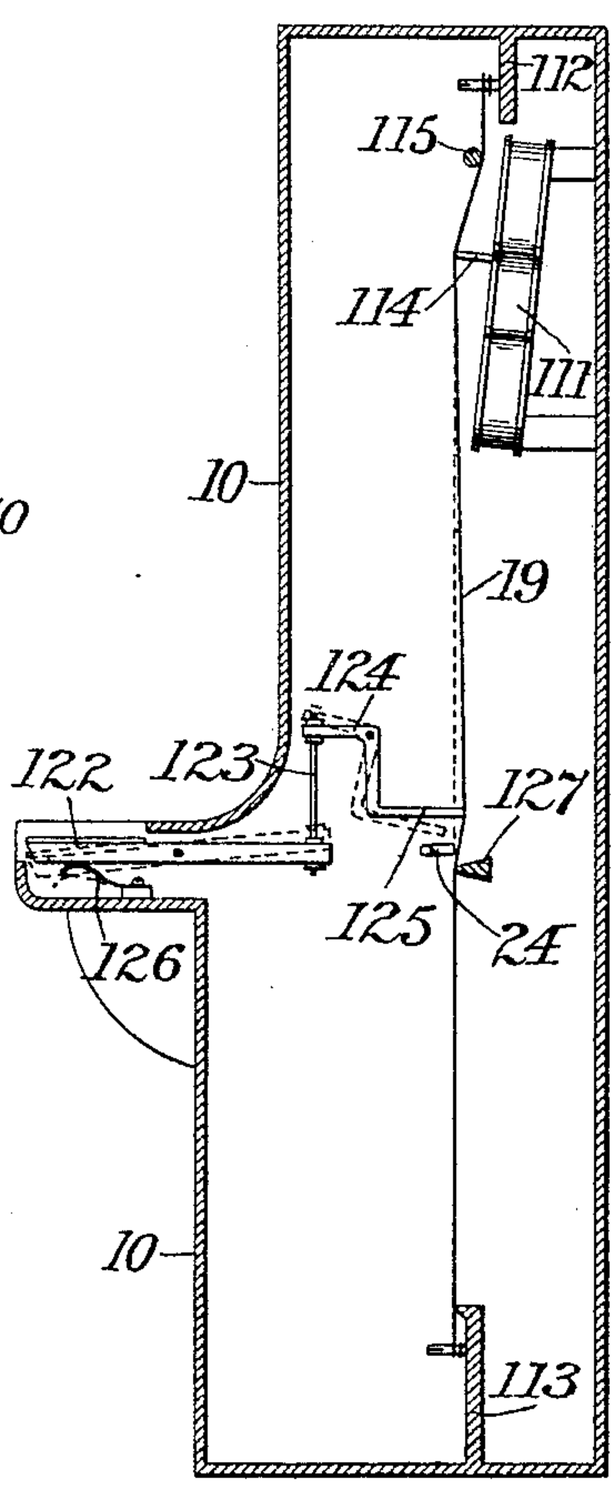


Fig. 10.



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UNITED STATES PATENT OFFICE.

OLE BREIBY, OF JERSEY CITY, NEW JERSEY.

MUSICAL STRINGED INSTRUMENT.

SPECIFICATION forming part of Letters Patent No. 581,688, dated May 4, 1897.

Application filed March 16, 1892. Renewed June 30, 1894. Serial No. 516,175. (No model.)

To all whom it may concern:

Be it known that I, OLE BREIBY, a subject of the King of Sweden and Norway, and a resident of Jersey City, in the county of Hudson and State of New Jersey, have invented certain new and useful Improvements in Musical Stringed Instruments or Claviolas; and I do hereby declare that the following is a full and exact description thereof, reference being had to the accompanying drawings, and to the figures of reference marked thereon, making a part of this specification.

My invention relates to musical instruments which are operated through the intermediary of a keyboard to produce the desired notes or tones from vibrating strings.

My main object is to produce an improved and effective instrument of the violin-piano type, in which the vibration of the strings is effected through the action of a sliding bow, which is under the control of the performer as fully as is the bow in the hand of a violinist, thereby producing the effect of a violin, while the different tones desired are produced or controlled through keys operated by the fingers, as are the keys of a piano or organ, but certain features of my invention are applicable to instruments in which the strings are made to vibrate by plucking or striking.

In the accompanying drawings I have represented my invention as embodied in an instrument in which the main vibrator is a bow and in which a supplemental plucking vibrator or vibrators may be employed to produce, when desired, a pizzicato effect. On account of the mechanical difficulties which would be involved in changing the position of the bow, as is done by the hand in playing upon an ordinary instrument of the violin type, I arrange the strings side by side and cause the bow to move in a straight line parallel with the plane of the strings. Normally the several strings are out of contact with the bow, but as each string is called into action it is moved into the path of the bow. At the same time if the string is normally out of contact with the sounding-board it may be brought into contact therewith, or rather into contact with a bridge-piece which serves like any bridge to transmit the vibration of the string to the sounding-board. For the purposes of the pizzicato attachment alone, however, as each string may be plucked by an independent device, it would not be necessary that the string should be moved and it might always be in contact with the sounding-board bridge.

In the accompanying drawings, Figure 1 is a vertical section on the line *x x* of Fig. 2, looking toward the right. Fig. 2 is a vertical section on the line *y y* of Fig. 1, looking toward the left. Fig. 3 is a horizontal section on the line *z z* of Fig. 2. Fig. 4 is a detail perspective view of one of the pizzicato mechanisms. Fig. 5 is a detail perspective view of the means for operating the bow shown in Figs. 1 and 2. Fig. 6 is a detail perspective view of the resonant bodies and the string-fingering devices shown in Figs. 1 and 2, the outer resonant body being partly broken away. Fig. 7 is a detail view, in vertical section, illustrating the other pizzicato mechanism. Fig. 8 is a detail view, in horizontal section, of a portion of the mechanism shown in Fig. 7. Figs. 9 and 10 are vertical sections illustrating different arrangements of parts of the instrument, as hereinafter more particularly described.

A casing 10, of any suitable material and construction, is adapted to protect and support the essential parts of the instrument. The rear portion 11 of the casing is preferably fixed to the main body of the casing, so that it can be moved readily, as by hinges 12, as indicated in Fig. 3. This portion 11 supports indirectly all the strings of the instrument, to which access can thus be had readily by moving the strings and the resonant body outward to the rear without interfering with the mechanism in front of them. The portion 11 forms the back of a false or supplemental resonant body 13, having two false sounding-boards 14 and 15, which carry the two series of frets 16 and 17. The wrest-pins 18 are supported by the upper and lower ends of the resonant body 13, and between them are stretched the strings 19. Within the resonant body 13 is supported the true resonant body 20, (see Figs. 1, 2, and 6,) which may be of any desired shape and has upon its front or outer sounding-board 21 the bridge or bridges 22 23. These bridges may be of any suitable form or construction, and the term "bridge"

is used herein to include whatever serves to transmit the vibrations of the strings to the sounding-board. I have shown in Figs. 1, 2, and 6 strings of double length and a separate bridge for each part of the string for the sake of the increased volume of tone which is thereby secured, but when a simpler and less expensive instrument is desired a single string and a single bridge may be employed, as shown in Figs. 9 and 10 and described hereinafter. The strings may be normally out of contact with the bridges and each string adapted to be moved into contact therewith and at the same time to be moved into the path of the vibrator, or, as shown in the modified form hereinafter described, the strings may be always in contact with the resonant body and may be moved simply into the path of the vibrator.

The means which I prefer to employ for moving the strings will be described presently, but first I will proceed to describe the vibrator, which may be employed to produce a violin effect. For this purpose I prefer to employ two bows 24 and 25 (see Figs. 1, 2, and 5) of ordinary construction, with means for reciprocating said bows and for varying the pressure of the bows upon the strings to vary the volume of tone. I prefer to use separate bows for the two portions of the double strings in order to give fullness and richness to the tone, but as both bows and their actuating devices are substantially identical a description of one will suffice for both. The bow is clamped firmly in a holder 26, which is fixed to a slide 27, adapted to move in a guideway 28. The guideway is supported by suitable brackets 29, fixed to the box 13, and is adapted to be moved thereon bodily toward and from the strings. This bodily movement of the slide and bows toward and from the strings may be effected by any suitable means from a knee-lever or other devices under the control of the performer. I have shown for this purpose a lever 30, pivoted upon a bracket 31 and adapted to bear at one end against the slideway 28. The other end of the lever is in the path of a bell-crank 32, which is pivoted to the fixed framework of the instrument.

I prefer that there should be no connection between the lever and the bell-crank in order that the former may be free to move with the sounding-box and the strings when the same are moved rearwardly from the fixed parts of the instrument. The bell-crank is connected by a rod 33 with an arm 34, which is fixed to a rock-shaft 35. Said rock-shaft is also provided with an arm 36, from which connection may be made through a rod 37 to a pedal 38, or through a rod 39 to a knee-lever 40, or through a rod 41 to a bell-crank 42, which is adapted to be operated by the hand of the operator. As shown in the drawings, the bell-crank may be connected through a link 44 with a traveling nut 45, which is engaged by the screw-threaded shank of a stop 43. Any one or all of these devices for actuating the slideway 28 may be used as desired. A spring 28ª may be used to keep the bow away from the strings.

The bow may be reciprocated by any suitable means which will enable the performer to control its movements fully, but I prefer to provide for its operation by the foot of the performer. The slide 27, which supports the lower bow 25, is connected by a link 46 (see Figs. 1 and 5) with one end of a lever 47, which is pivoted on a fixed support 48, secured to the box 13. The lower end of said lever (see Figs. 1, 2, and 3) is connected by a link 49 with an arm 50 of a bell-crank lever which is pivoted at the bottom of the casing 10. The other arm 52 of said lever is adapted to be engaged by the foot of the performer and to be moved to and fro thereby. This movement is transmitted through the described connections to the slide and bow. Should it be desired to permit the bow to be operated by hand, the arm 50, before referred to, may be fixed to a vertical rock-shaft 53, (see Fig. 1,) which may be provided near its upper end with a handle 54 in a position to be grasped and operated by the hand of the performer. I have shown both bows as adapted to be operated together, the two being made to move in unison by a coupling 55, which may be disconnected at will. It is evident, however, that each bow might be moved independently of the other or that one bow alone might be employed, if desired. The link 46 is connected to the slide 27 and to the lever 47 with sufficient looseness to permit the slide and bow to be moved toward and from the strings as desired. In order that the connection of the lever 47 with its actuating mechanism may not prevent the box 13 from being turned on its hinges when desired, the link 49 is connected with said lever and with the arm 50 by universal joints, as shown.

As before stated, the strings are normally clear of the path of the vibrator, and each string, when it is required, must be moved independently into the playing position or into the path of the vibrator. To this end each key 56 is adapted when depressed to cause the movement of the proper string, as just stated. It is immaterial whether the string be pushed or pulled into playing position; but in Figs. 2 and 6 of the drawings I have shown a bell-crank lever 57, which is pivoted on the opposite side of the string from the bridge and is connected through a rod 58 with an arm 59, which is fixed to a rock-shaft 60. The key 56 is connected to the same or another arm of the rock-shaft by a rod 61. The effect, then, of the depression of the key 56 is to cause its corresponding bell-crank lever 57 to thrust the string with which it coöperates against the bridge and at the same time into the path of the bow. When, as shown in Figs. 1, 2, and 6, strings of double length and two bridges are employed, I prefer to place the bell-crank 57 between the bridges.

In the arrangement described above it will be observed that the tension of the string must be overcome in order that the string may stand in the path of the vibrator. The action is therefore somewhat hard or heavy, and I prefer the arrangement shown in Fig. 10, wherein the key or some convenient part of the intermediate mechanism is acted upon by a spring of sufficient strength to bend the string slightly. Although the specific function of the key in the latter case is to overcome the tension of the spring and permit the string to straighten into the path of the bow, it is evident that so far as other features of the mechanism are concerned the one arrangement is an equivalent for the other, and in certain of the claims hereinafter contained I have described both of said arrangements as means intermediate the key and the string to move the latter into the path of the vibrator.

I have thus far referred to each string as if it were always open and capable of producing but a single tone. Each string, however, of the series may be capable of producing two or more tones, and means are provided for fingering each string to produce this result. I prefer to give the intermediate strings of the series two tones each, one tone to be produced by the string as an open string without fingering and the other to be a half tone higher and to be produced by fingering the string or causing it to be moved into contact with the second fret of the pair, which are shown in Fig. 1 as provided for each single string. The means employed for this purpose consist of a bell-crank lever 62, which is pivoted in the proper position in front of its respective string and is connected by a rod 63 with its key 56 to be operated thereby when the latter is depressed. Provision is thus made for fingering each of the intermediate strings to produce a second tone; but it is evident that the same string must be moved into the path of the vibrator by either of the keys which represent its two tones. This might be effected by independent devices; but I prefer to connect all of the keys which coöperate with a single string to an arm or arms 59 upon the common rock-shaft 60, as shown in Fig. 6, and from the same or another similar arm on the rock-shaft to make a single connection to the single string-moving lever 57.

As indicated above, each string of the intermediate strings may be operated only as an open string but for a given compass this necessitates a correspondingly-increased number of strings, and I therefore prefer the arrangement already described. As it is rare that two or more notes of the extreme upper and lower ranges of the instrument will be involved in the harmony at the same time, the first and the last strings of the series may be fingered to produce each a series of tones. Accordingly I have provided a series of frets for each of said strings, as shown in Fig. 1, and have also provided a corresponding number of fingering devices, which are sufficiently illustrated in Fig. 6, as the only change to be made in the construction therein shown is to extend the shaft 60 and add other arms 59. It is evident therefore that while all the keys of the lower range, for example, must operate to move the lower string into the path of the vibrator each one of such keys must operate to finger the same string independently of the other keys. For this reason, as before described with respect to each pair of keys which control each intermediate string, each one of such lower range of keys is connected by its own rod 61 to an arm 59, fixed to a common rock-shaft 60, while from one of said arms or another arm connection is made by a rod 58 with the lever 57, which moves the string. Consequently the depression of any one of the lower range of keys operates to move the string as described. Each one of said keys, however, is connected independently of the rest by its rod 63 to its respective fingering bell-crank lever 62.

I have represented the instrument as provided with two independent pizzicato mechanisms. They may be used independently of each other, and for most purposes the instrument would be complete with either. For the sake of the greater capacity of the instrument for different effects, however, both mechanisms may be used in one instrument. The mechanism which I shall describe first and which is shown in detail in Fig. 4 is adapted to be operated in part by the foot, and is designed particularly to be used in playing chords. A bar 65 is adapted to have a limited longitudinal movement in the brackets 31 upon the same side of the strings as the bow. The bar is pressed in one direction by a spring 66 and is adapted to be moved in the opposite direction, when desired, by a bell-crank lever 67, which is connected by a rod 68 with an arm 69 of a rock-shaft 70. A second arm 71 is fixed to the rock-shaft in a convenient position and is connected by a rod 72 with a pedal 73. The bar 65 bears a series of fingers 75, corresponding to the several strings and standing normally out of reach of the strings and each a little to one side of its respective string. If any string be moved into the path of the vibrator or playing position, as before described, and at the same time the pedal 73 be operated to shift the bar 65, such a string will be plucked by its corresponding finger and will give the pizzicato sound. The depression of the key of course operates as before to effect the required fingering. That each finger 75 may be set with the necessary exactness with respect to its string each finger is slotted and secured by a bolt and thumb-nut 76 to a plate 77, which is itself slotted longitudinally and secured to the bar 65 by a bolt and thumb-nut 78.

I have described above a single bar and set of fingers, with means to operate them, while I have shown in the drawings two such sets

of devices; but as the two sets are identical the description of one will serve for both, and I have therefore used the same numerals of reference for like parts so far as they are shown in Figs. 1 and 2.

The other pizzicato mechanism consists of a series of independent devices for each key and adapted to act separately upon the several strings. These devices may be operated by the keys 56, as shown in Figs. 7 and 8; but it is obvious that they may be operated by a separate set of keys. In either case the device consists, essentially, of an independent tongue which is adapted to be moved with respect to the string and is formed to engage and pluck the string in its movement. As shown in the drawings, the tongue is formed as a flat spring 80, adapted to yield laterally, and is provided with a bent tip 81 of a suitable shape to pluck the string as it passes. The tongue is secured to a block 82, which is adapted to slide toward and from the string in a guideway 83, formed on a plate 84. The block is normally pressed from the string by a spring 85 and may be moved toward the string by a bell-crank 86, which is connected with the key by a rod 87. If the instrument is provided with a single set of keys only, each of the keys is preferably slotted, as shown at 88, and each rod 87 is provided with a tooth 89, which may engage with the key or may pass freely through the slot, according to the position of the rod in the slot. The several rods are engaged by a transverse bar 90, which is connected to a stop or register 90^a, and by drawing said stop or register out or pushing it in the rods are moved into a position to be engaged by the keys or to be free therefrom, according as it is desired to bring the pizzicato mechanism into operation or to keep it out of operation. In order that the string may be plucked by the tongue as it is moved in one direction only, I provide the tongue with a pin 91 and a plate with a cam 92, or vice versa, the pin and cam being so placed with reference to each other that the tip of the tongue shall be moved to one side as the block 82 moves to or fro and shall clear the string, the several positions being indicated in Fig. 8. A damper 93 is normally held against the string by a spring 94 and stands in the path of the tongue. As the tongue moves forward the damper is struck by the tongue and is carried away from the string before the latter is plucked. It thus serves to check any vibration in the tongue itself after the latter has plucked the string, as well as to check the vibration of the string itself when the tongue retires. In order that these dampers may not interfere with the free vibration of the strings when the bow is used, they may be carried by a bar 95, which is axially pivoted and may be turned by any suitable means to swing all of the dampers away from the strings. For this purpose I have shown the bar as provided with an arm 96, which is connected by link 97, lever 98, and link 99 to the stem 90^b of a stop.

In Figs. 1 and 2 I have represented dampers which may be used when desired to soften the tones and particularly when it is desired to subdue the tones on part of the strings upon which the accompaniment may be played for a melody performed upon the other strings. For this purpose a rock-shaft 100 may be journaled in the frame parallel with and adjacent to the plane of the strings. It is provided with a cam-surface 101, which may be covered with skin or any other suitable substance and is adapted to be moved against the strings when the shaft is rocked. As shown, the cam-surface 101 of the shaft 100 is adapted to coöperate with part of the strings only, while a second rock-shaft 102 is journaled below the first and is provided with a cam-surface 103, which is adapted to cooperate with the remaining strings of the series. The two shafts are adapted to be rocked by any convenient means. I have shown each shaft as having connected thereto a spring 104 to keep the cam-surface of the shaft normally out of contact with the strings. I have also shown each shaft as provided with an arm 105, which stands in the path of a rod 106, connected to a bell-crank 107. The other arm of the bell-crank 107 is connected by a rod 108 with a second bell-crank 109, which is in turn connected to a stop or register 110. These means for bringing the cam-surface into contact with the strings I have found convenient, and as there is no connection between the rod 106 and the bell-crank 105 there is no interference with the movement of the sounding-boards and strings rearwardly to give access to the strings on the interior mechanism of the instrument.

In Fig. 9 I have shown an instrument embodying my invention in which the strings are always in contact with the resonant body and are moved only to bring them into the path of the vibrator. In this case I have shown the resonant body as an ordinary violin-body 111, fixed to the main casing or frame near the upper end. The strings are stretched between the pins fixed in the wrest-planks 112 and 113. The strings are preferably passed from the pins of the wrest-plank 112 to the bridge 114 beneath a rod 115, so that the strings are bent out of a right line over the bridge, and are thereby made to contact more closely and firmly with the bridge. The fingering devices for the strings of this form of the instrument are the same as those already described and are therefore omitted from Fig. 9 to avoid unnecessary repetition. The bow or other vibrator 24 may be supported and operated as previously described, and each string is adapted to be moved into its path by the action of its respective key. The means I have shown for this purpose consist of a rod 116, having a hook or eye 117 for engagement with the string and connected

with one arm of a bell-crank 118. The other arm of said bell-crank is connected by a rod 119 with the key 120. As the string might be moved laterally with the vibrator to an undesirable extent if it were unsupported, I fix a bar 121 near the bow, against which bar the string may be drawn and by which it may be held from lateral movement, the bar being grooved transversely or being covered with skin or other suitable material to hold the string. The bar serves also to fix the length of the vibrating portion of the string.

In Fig. 10 I have shown the means which I prefer, on account of the easier action of the instrument, for causing the movement of the strings into the playing position, the instrument otherwise being shown as having the same general structure as that represented in Fig. 9. In this case each string, instead of standing normally in a right line and being moved out of a right line into the playing position, is normally held out of a right line and is caused to stand in a right line when it is in the playing position. The mechanism I have shown as adapted to cause the proper movement of the string is somewhat similar to that shown in Fig. 9. Each key 122 is connected by a rod 123 to one arm of a bell-crank 124, the other arm of which carries a finger 125, which is adapted to be thrust against the string.

The usual spring 126, which restores the key to its normal position if it is depressed, is sufficiently stiff to cause the finger 125 to hold the string normally out of a right line and out of the path of the vibrator, as shown by the full line. When the key is depressed, however, the resistance of the spring 125 is overcome and the string assumes the dotted-line position in the path of the vibrator. The action of this device is somewhat easier than when in the other forms shown, for the reason that it is not necessary to hold the key down hard to its full extent during the continuance of a note, but it is only necessary to overcome the excess of resistance of the spring 126. A bar 127 may be fixed in such position as to have the strings always in contact therewith and thereby to hold the strings properly under the action of the vibrator and to fix the length of the vibrating portion of the string.

I am aware that various forms of violin-pianos have been devised hitherto, but they have been of such cumbersome and clumsy construction as to render it impossible to use them as musical instruments or they have been of extremely limited compass. Furthermore, the vibrators employed have been either continuously-moving belts or reciprocating bows actuated by some purely mechanical devices, so that it has been impossible with such instruments to produce anything like the effect of ordinary violins. In other words, the forms devised hitherto have been mere machines or toys, while it is my object to produce a musical instrument fitted for the rendition of musical compositions with all the effect of ordinary violins. This result I am enabled to secure by the use of the improved features of construction herein described.

I claim as my invention—

1. In a musical instrument, the combination of the strings, a bow, a slide carrying said bow, a guideway in which said slide may be reciprocated, said guideway being movable to carry the bow toward or from the strings, means under the control of the performer to move the guideway, a series of keys and intermediate means to control the movement of each string with respect to the path of the bow, substantially as shown and described.

2. In a musical instrument, the combination of a string, a vibrator therefor, a key, and intermediate devices to control the position of said string, and means acting in opposition to said key and normally bending said string out of a straight line and out of the path of the vibrator, substantially as shown and described.

3. In a musical instrument, the combination of a string, a vibrator therefor, a slide carrying said vibrator, a guideway in which said slide is adapted to be reciprocated, a key and intermediate devices to control the position of the string, and means acting in opposition to said key and normally bending said string out of a straight line and out of the path of the vibrator, substantially as shown and described.

4. In a musical instrument, the combination of a string, a vibrator, a key, means controlled by the key to move the string, a finger adapted to press upon said string, and means connecting said finger to said key whereby upon the depression of the key the string moves into the path of the vibrator and is simultaneously fingered, substantially as shown and described.

5. In a musical instrument, the combination of a string, a vibrator, a series of keys, means controlled by each key to move the string, a series of fingers adapted to press upon the string and an independent connection between each of said keys and its respective finger, substantially as shown and described.

6. In a musical instrument, the combination of a string, a sliding block, a guideway therefor, means including a key to reciprocate said block, a spring-tongue fixed to said block and having its end bent to engage and pluck said string, a pin or projection carried by said tongue near its free end, and an inclined guide fixed in the path of said pin or projection, substantially as shown and described.

7. In a musical instrument, the combination of the strings, a bow therefor, means to reciprocate said bow, a series of keys, means intermediate each key and its respective string to move the latter into the path of the bow, a series of tongues formed to engage and pluck said strings, means to move said

tongues toward and from the strings, a series of dampers to coöperate severally with said tongues and strings, and means controlled by a stop or register to move said dampers together from contact with the strings, substantially as shown and described.

8. In a musical instrument, the combination of a series of strings, a series of tongues formed to engage and pluck said strings, a series of keys, means between each key and tongue to move the latter and including a toothed rod, and means to control the engagement of said toothed rods with said keys, substantially as shown and described.

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

OLE BREIBY.

Witnesses:
A. N. JESBERA,
A. WIDDER.