

Dec. 20, 1955

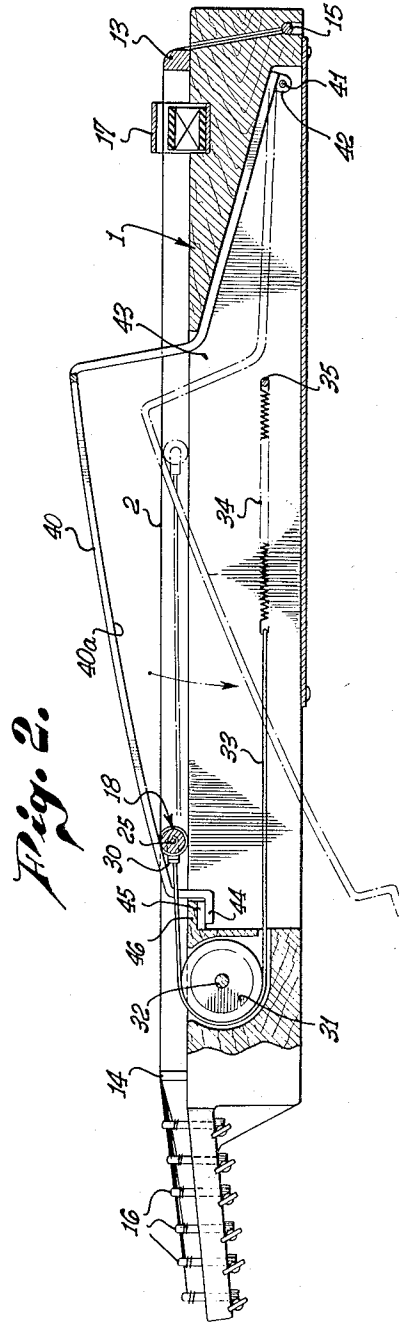
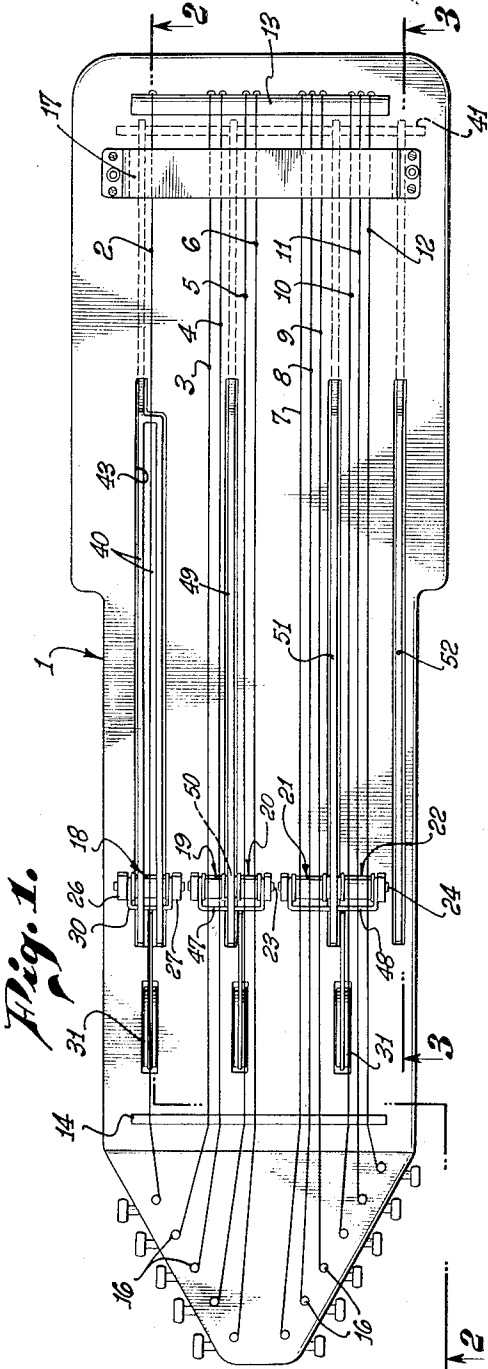
J. W. McBRIDE

2,727,422

STRINGED MUSICAL INSTRUMENT

Filed Dec. 21, 1951

3 Sheets-Sheet 1



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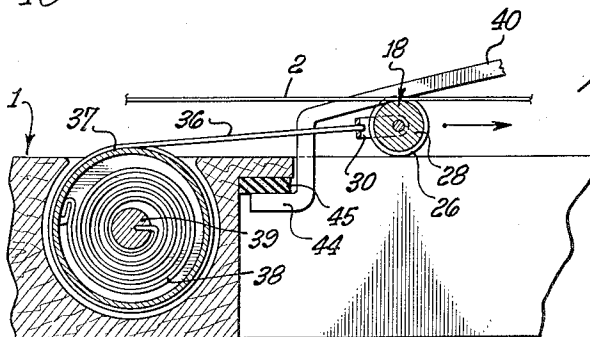
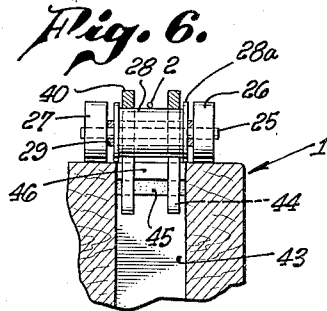
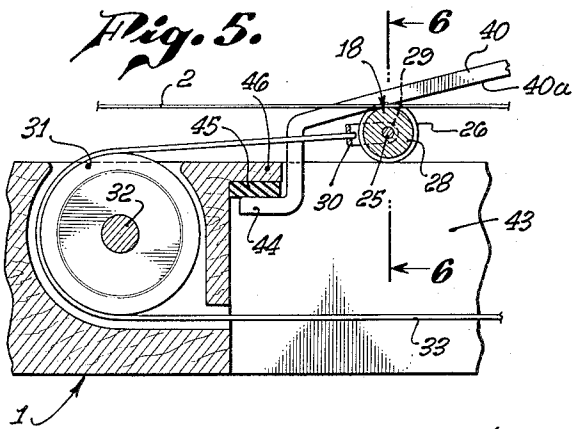
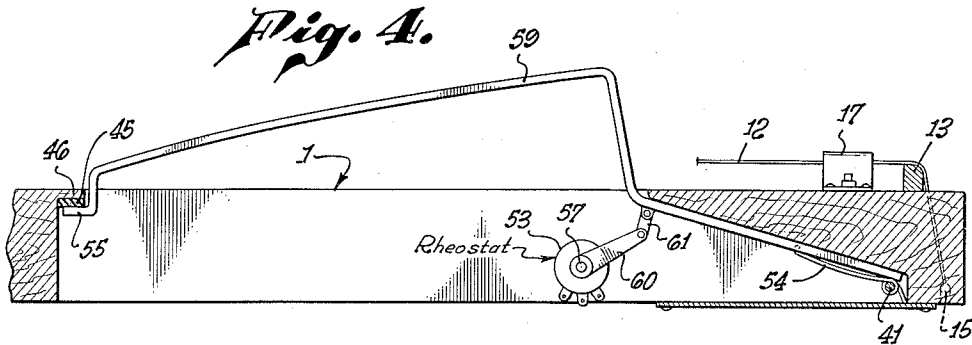
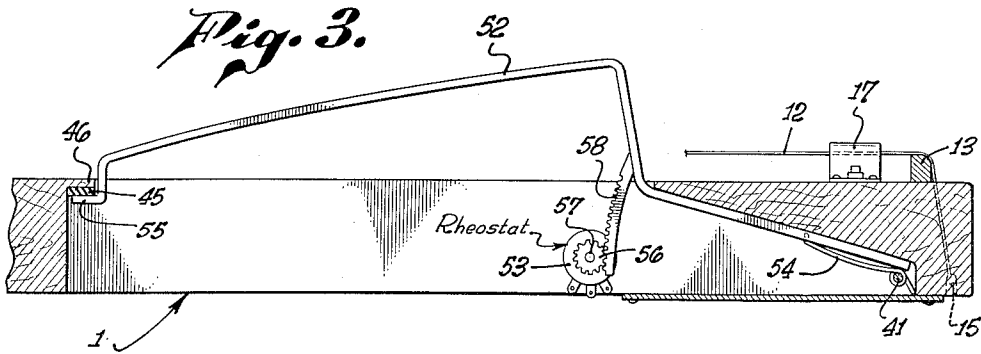
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STRINGED MUSICAL INSTRUMENT

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3 Sheets-Sheet 2



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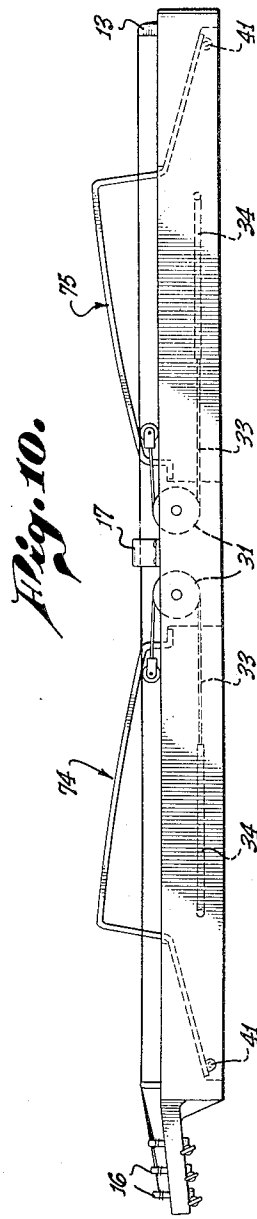
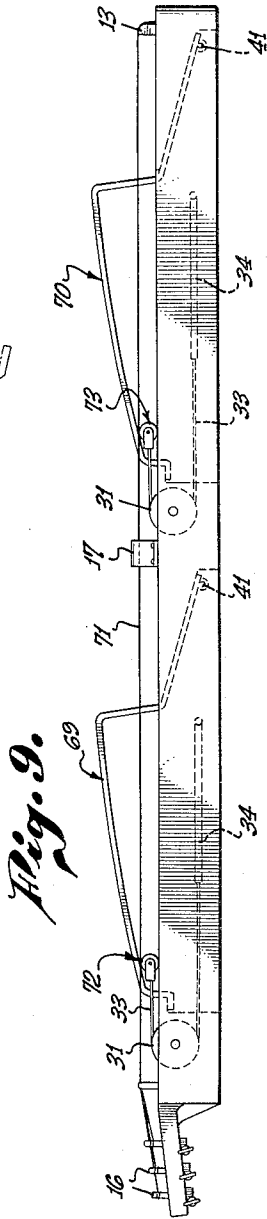
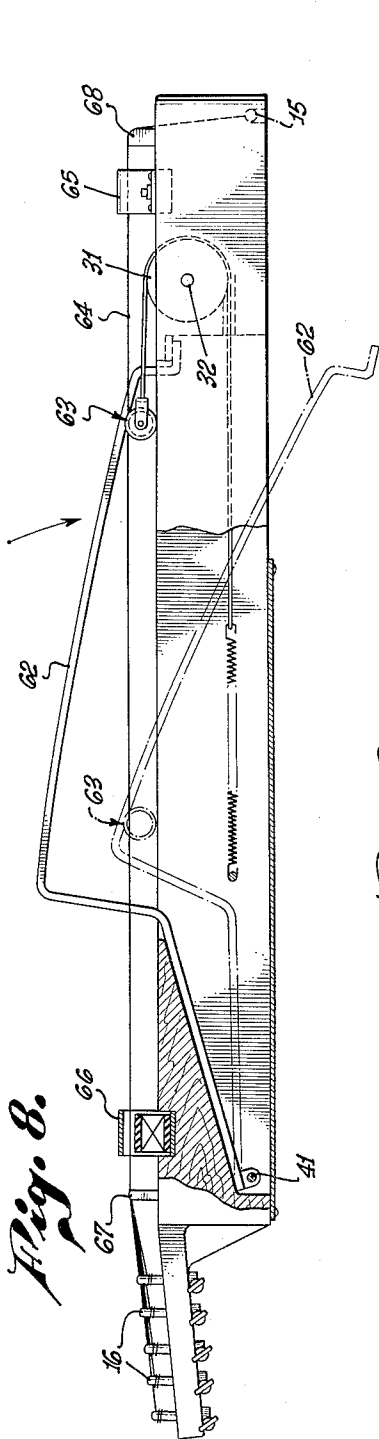
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STRINGED MUSICAL INSTRUMENT

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3 Sheets-Sheet 3



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2,727,422

STRINGED MUSICAL INSTRUMENT

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Application December 21, 1951, Serial No. 262,805

15 Claims. (Cl. 84—315)

This invention relates to musical instruments having one or more tensioned strings, such as banjos, guitars, or mandolins.

In such instruments, it is customary to provide a series of frets, arranged beneath the string, against which the strings may be pressed by the fingers. In this manner, the free vibrating length of the strings and the tone corresponding thereto may be chosen by the player.

This application is a continuation-in-part of an application filed on August 10, 1951, in the name of John W. McBride, under Serial No. 241,359, and entitled: Stringed Musical Instrument.

It is one of the objects of this invention to make it possible to adjust the free vibrating length of the string without delicate finger manipulation.

It is another object of this invention to make it possible to adjust the free vibrating length of the string by a simple manipulation, by hand or foot, whereby the instrument may be successfully operated even by the physically handicapped.

To accomplish such result, use is made of rollers that engage the strings and are movable by manipulation of a lever, or the like. Such manipulations may be made by the palm of the hand, or a foot.

In stringed musical instruments, it is common to provide means for translating the string vibrations into electrical impulses for operation of the instrument with a loud speaker. In such operation, controls for the electric circuit are commonly provided, such as to control the volume of sound produced, in order to add proper interpretative effect.

It is a further object of this invention to provide a readily accessible means for operating such controls, and in such a manner that control may be effected by a simple manipulation of the hand or foot. For this purpose, a lever is provided, similar to that provided in connection with adjustment of the operative length of the string, together with appropriate connections to circuit elements.

It is another object of this invention to improve, in general, instruments of this general character.

It is still another object of this invention to provide an instrument of this character that is simple in construction, but yet effective in operation.

This invention possesses many other advantages, and has other objects which may be made more clearly apparent from a consideration of several embodiments of the invention. For this purpose, there are shown a few forms in the drawings accompanying and forming part of the present specification. These forms will now be described in detail, illustrating the general principles of the invention; but it is to be understood that this detailed description is not to be taken in a limiting sense, since the scope of the invention is best defined by the appended claims.

Referring to the drawings:

Figure 1 is a plan view of a musical instrument incorporating the invention;

Fig. 2 is a side sectional view, taken along the plane indicated by line 2—2 of Fig. 1;

Fig. 3 is a fragmentary sectional view, taken along the plane indicated by line 3—3 of Fig. 1;

Fig. 4 is a view, similar to Fig. 3, showing a modified form;

Fig. 5 is an enlarged sectional view corresponding to a portion of Fig. 2;

Fig. 6 is a sectional view, taken along the plane indicated by line 6—6 of Fig. 5;

Fig. 7 is a view, similar to Fig. 5, illustrating a modified form;

Fig. 8 is a sectional view, similar to Fig. 2, illustrating a modified form of this invention; and

Figs. 9 and 10 are views similar to Fig. 2, illustrating still further modifications.

In the form shown in Figs. 1 to 7, inclusive, a body 1 is provided which may be made of any appropriate material, and which conforms in contour to a guitar, or the like. The body 1 serves to support a plurality of tensioned strings 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, and 12. These strings are generally in coplanar, parallel arrangement mounted above the upper face of the body 1, as by the aid of bridges 13 and 14. Each of the strings is provided with an anchoring enlargement or knot 15 (Fig. 2), as well as with a tuning peg 16 arranged in the usual manner. An electromagnetic pick-up device 17 is arranged adjacent the right-hand end of the instrument for the translation of the string vibrations into electrical impulses in a well understood manner.

In the present instance, there are five rollers 18, 19, 20, 21, and 22 confined below the strings 2 to 12, inclusive, and which are adapted to roll with respect to the strings on the upper surface of the body 1. The axes of the rollers are transverse to the strings. Each roller provides a rolling stop for one or a group of strings. Thus, roller 18 cooperates with string 2, roller 19 cooperates with strings 3 and 4, roller 20 cooperates with strings 5 and 6, and the other rollers 21 and 22 cooperate with strings 7—9 and 10—12, respectively. Movement of the rollers longitudinally of the strings with which they cooperate adjusts the free vibrating lengths thereof.

While the roller 18 is movable by itself, rollers 19 and 20 are movable together. Similarly, rollers 21 and 22 are movable together. For this purpose, a common spindle or shaft 23 mounts rollers 19 and 20; and, similarly, a shaft 24 is provided for rollers 21 and 22. Accordingly, the strings are grouped for control in numbers of one, four, and six respectively.

Figs. 2, 5, and 6 illustrate roller 18 and its cooperation with string 2. String 2 serves to confine the roller structure 18 against the top surface of the body 1. A shaft 25 mounts a pair of freely rotatable body-contacting rollers 26 and 27, as well as a string-contacting element therebetween. Between opposite ends of the string-contacting roller element 28 and the corresponding end rollers 26 and 27, there is mounted an apertured bifurcated extension 29 of a yoke 30.

The roller structure 18 is constantly urged toward the left, longitudinally of string 2, as illustrated in Figs. 1, 2, and 5. For this purpose, there is provided a pulley 31 mounted for free angular movement on a shaft 32 secured to the body 1. A segment of the pulley extends above the body 1. A string or cord, or other flexible element, 33 is secured at one end to the yoke 30 in an appropriate manner, and extends around the pulley 31. The other end of the string 33 (Fig. 2) is secured to one end of a tension spring 34, the other end of which is anchored to the body, as by a pin 35 extending transversely of the body. Since the pulley 31 has a segment extending above the body 1, as through an appropriate aperture or slot, the string or cord 33 contacts only

the yoke 30, pulley 31, and the spring 34 for every position of the roller 18 on the body 1.

In the form illustrated in Fig. 7, the roller 18 may be urged to the left by the use of a cord 36 wound upon a pivotally mounted drum 37. This drum may be urged toward an angular direction, corresponding to cord tensioning position, by the aid of a helical spring 38 secured at one end to the drum 37 and at the other end to a stationary pin 39 about which the drum 37 is angularly rotatable.

For urging the roller 18 longitudinally of the string 2 against the force exerted by the tensioned cord 33 or 36, in order to vary the free vibrating length of the string, a depressible lever 40 is provided. This lever 40 normally slantingly projects above the body 1 and the string 2 (Fig. 2), and is pivoted at one end for angular movement about an axis provided by a pin 41. This pin extends transversely of the body, and below and parallel to the top surface thereof, as well as normal to the length of string 2. The lever 40 has, at one end, an ear 42 through which the pin 41 extends. The pin 41 mounts the lever for movement transversely of the string 2, as well as transversely of the body 1. A longitudinal slot 43 permits movement of the lever 40 into the body 1.

In the present instance, the lever 40 is of bifurcated form, the bifurcations encompassing the string 2 as the lever 40 is depressed for movement into the body 1 through the slot 43 aligned with lever 40. Furthermore, the bifurcations encompass the cord 33 aligned with the string 2.

As shown clearly in Figs. 2, 5, and 6, the lever 40 has an edge or surface 40a inclined to the body 1 and the string 2. Different portions of this surface 40a are positioned intermediate the string 2 and the body 1 as the angular position of the lever 40 is adjusted.

The configuration of the surface 40a is such that a wedge-shaped space is defined, together with the body 1, and opening generally toward the axis of movement of the lever 40. Within this space the roller structure 18 may be positioned. The intermediate roller 28, confined between the string 2 and body 1, may be contacted by the lever surface 40a slightly to the left of the roller 28, as illustrated in Figs. 2 and 5. The roller 28 has flanges 28a limiting lateral movement of the lever 40.

Since the distance from the surface 40a to the axis of movement of the lever 40 varies uniformly, it is apparent that the wedge-shaped space between surface 40a and the body 1 is located longitudinally with respect to the string 2 according to the angular position of the lever 40. In the full line position of Fig. 2, the wedge-shaped space is near the peg end of the instrument; whereas, in the phantom line position, the space is near the axis of movement of the lever at the other end of the instrument.

Although urged to the left, the roller structure may be moved longitudinally of the string 2 against the tension of spring 34. The force with which the lever 40 is depressed is transmitted to the roller structure 18 through the intermediate roller 28; and, since this force acts on one side of roller 28, there is a component of force urging the roller structure to the right longitudinally of the string. Accordingly, depression of lever 40 serves to move the roller structure 18 to vary the free vibrating length of the string 2. Since the roller 18 is resiliently urged toward the left, as above described, angular depression of the lever 40 directly determines the free vibrating length of the string 2.

When the lever 40 is released, the resiliently urged roller 18 urges the lever 40 toward the position illustrated by the full lines in Fig. 2. The lever 40 has a projection 44 engaging a pad 45 secured to an overhanging edge 46 of the body 1 for determining the retraction position of the lever 40, as well as roller 18.

The roller and lever arm constructions for the groups of strings 3-6 and 7-12 are similar to that described

in detail for the string 1. In these instances, however, two rollers are secured together and, accordingly, larger yokes 47 and 48 are provided. While the lever 40 shown in connection with string 1 was of bifurcated form in order to achieve a symmetry of operation productive of a balance of lateral forces, such construction is unnecessary in connection with the other groups of strings. Thus, a lever 49 is illustrated as being disposed between four strings 3-6 and contacting an intermediate idler roller 50 to achieve a balanced operation. The lever 51 is similar to lever 49, but is disposed between six strings 7-12. The pin 41 serves to mount all of the levers 40, 49, and 51. Other structural details are identical to those illustrated in connection with the mechanism for string 1.

A lever 52, shown most clearly in Fig. 3, similar to levers 40, 49, and 51, is illustrated for operation of a circuit controlling device, shown, in this instance, as a rheostat 53. Ordinarily, such devices are operable only by a delicate finger manipulation. By providing for its operation by a lever 52, this rheostat may be controlled by a readily accessible member, and without the aid of delicate finger manipulation.

The lever 52 is pivotally mounted on the pin 41, and the lever 52 projects above the body 1 of the instrument, similar to levers 40, 49, and 51. The lever 52 is resiliently urged to the position illustrated in Fig. 3 by the aid of a spring 54 having turns whereby it may be carried by the pin 41. One end of the spring 54 contacts the bottom side of the lever 52, and the other end abuts the body 1. The other end of the lever 52 has a projection 55 engaging the pad 45 secured to the overhanging edge 46 of the body 1.

The rheostat 53 carries a gear 56 on its shaft 57 such that angular adjustment of the gear 56 effects the operative position of the rheostat 53. For operating this gear 56, the lever 52 carries a gear segment 58 in engagement with the gear 56. Depression of the lever 52 accordingly effects control of the rheostat 53. The rheostat may, for instance, control the volume characteristics of a loudspeaker with which the pick-up 17 cooperates.

In the form illustrated in Fig. 4, a lever 59, similar to lever 52 and similarly mounted, operates the rheostat 53 by a crank arm and link. The rheostat shaft 57 is secured to crank arm 60 operated, in turn, by a link 61. The link 61 is pivotally mounted at one end to the lever 59, and pivotally mounted at the other end to the crank arm 59 by appropriate pin and bracket constructions. Depression of the lever 59 against the force of spring 54 serves to rotate the rheostat shaft 57.

In the form illustrated in Fig. 8, the operative structures are the same as is found in the form illustrated in Fig. 2. In the present instance, however, the lever 62 is pivoted at the peg end of the instrument. The roller structure 63 is urged toward the right, rather than toward the left, in the form illustrated in Fig. 2. Accordingly, the roller structure in its normal position determines a short length of freely vibrating string 64 with respect to a pick-up 65. This is contrasted with the form illustrated in Fig. 2 where, from the mounting of the structure, a substantial length of freely vibrating string was determined. Either form of instrument may be provided, depending upon the requirements of the player.

In Fig. 8 there is illustrated a second pick-up structure 66. This pick-up may cooperate with the length of string 64, determined by the bridge 67 and the roller structure 63, while the other pick-up may cooperate with the length of string 64 determined by the bridge 68 and the roller structure.

The form illustrated in Fig. 8 is particularly adapted for operation by one hand or foot. Thus, the inclined configuration of the lever 62 is such that a hand may be used simultaneously to depress the lever 62, as well as

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to pluck the string 64 intermediate the roller 63 and the pick-up 65.

In the form illustrated in Figs. 9 and 10, two lever mechanisms cooperate with one group of strings. In Fig. 9, for instance, lever structures 69 and 70 are disposed longitudinally of each other in cooperation with a group of strings or string 71. Each structure has a cooperating roller mechanism 72 and 73, respectively. The free vibrating length of string is determined by the relative positions of the roller structures 72 and 73.

The form illustrated in Fig. 10 is similar to that illustrated in Fig. 9. In this instance, the levers 74 and 75 may be oppositely inclined to suit the requirements of the player.

The inventor claims:

1. In a stringed musical instrument: a body, a tensioned string mounted above and along a surface of said body; a string-contacting member; means guiding said member for movement longitudinally of said string; an operator for said member, said operator having an edge inclined with respect to said body; and means mounting said operator for movement with respect to said body for movement of said edge transversely of said body; said edge being engageable with one side of said member for movement of said member longitudinally of said string according to the movement of said edge.

2. In a stringed musical instrument: a body; a tensioned string mounted above and along a surface of said body; a string contacting member; means guiding said member for movement longitudinally of said string; an operator for said member, said operator having an edge inclined with respect to said body; means mounting said operator for movement with respect to said body for movement of said edge transversely of said body; said edge being engageable with one side of said member for movement of said member longitudinally of said string according to the movement of said edge; and resilient means urging said member against said edge.

3. In a stringed musical instrument: a body; a string mounted above and along a surface of said body; a lever mounted on said body for limited pivotal movement, said lever having a lateral edge inclined to the length of said string and said body for every angular position of said lever; said lever edge and said body defining a wedge-shaped space, the apex of which is determined with respect to the length of said string according to the angular position of said lever; and a string-contacting element in said space, and guided for movement longitudinally of said string, said element engaging said lever edge at one side of said element.

4. In a stringed musical instrument: a body; a string mounted above and along a surface of said body; a lever mounted on said body for limited pivotal movement, said lever having a lateral edge inclined to the length of said string and said body for every angular position of said lever; said lever edge and said body defining a wedge-shaped space, the apex of which is determined with respect to the length of said string according to the angular position of said lever; a string-contacting element in said space, and guided for movement longitudinally of said string, said element engaging said lever edge at one side of said element; and resilient means urging said element in one direction longitudinally of the string and into contacting relationship with said lever edge.

5. In a stringed musical instrument: a body having a top surface; a tensioned string mounted above said body surface and parallel thereto; a lever mounted for limited pivotal movement on said body about an axis parallel to said body surface and normal to said string; said lever having a lateral edge, a portion of which is positionable between said string and said body surface, said lever edge being at a continuously diminishing distance from said axis along the length of said lever edge; a roller having an axis transverse to the string and having a string-contacting surface, said roller being confined against said body, said

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roller engaging said lever edge at one side of said roller; and resilient means urging said roller in one direction longitudinally of the string and against said lever surface.

6. In a musical instrument: a body having a top surface; a tensioned string mounted above said body surface; a lever mounted for limited pivotal movement on said body about an axis normal to said string; said lever having a lateral edge, a portion of which is positionable between said string and said body surface, said lever edge being at a continuously diminishing distance from said axis along the length of said lever edge; a roller having an axis transverse to the string and movable longitudinally of the string, said roller being between the string and said body surface, said roller having a string-contacting surface; said roller engaging said lever edge at one side of said roller; a flexible cord secured to said roller, and extending in one direction longitudinally of said string; and means imposing a resilient force on said cord for urging said roller in one direction along said string corresponding to lever edge engaging position.

7. In a musical instrument: a body having a top surface; a tensioned string mounted above said body surface; a lever mounted for limited pivotal movement on said body about an axis normal to said string; said lever having a lateral edge, a portion of which is positionable between said string and said diminishing distance from said axis along the length of said lever edge; a roller having an axis transverse to the string and movable longitudinally of the string, said roller being between the string and said body surface, said roller having a string-contacting surface; said roller engaging said lever edge at one side of said roller; a flexible cord having one end secured to said roller, and extending in one direction longitudinally of said string; a guide for said cord at one end of said instrument; and a tension spring having one end secured to the other end of said cord, and having another end secured to said body for urging said roller in one direction along said string corresponding to lever edge engaging position.

8. In a musical instrument: a body having a top surface; a tensioned string mounted above said body surface; a lever mounted for limited pivotal movement on said body about an axis normal to said string; said lever having a lateral edge, a portion of which is positionable between said string and said body surface, said lever edge being at a continuously diminishing distance from said axis along the length of said lever edge; a roller having an axis transverse to the string and movable longitudinally of the string, said roller being between the string and said body surface, said roller having a string-contacting surface; said roller engaging said lever edge at one side of said roller; a flexible cord having one end secured to said roller, and extending in one direction longitudinally of said string; a drum for said flexible cord, said drum being mounted for angular movement about an axis transverse to said cord; the other end of said cord being secured to said drum; and a spring urging said drum in one angular direction for tensioning said cord to urge said roller in one direction along said string corresponding to lever edge engaging position.

9. In an electrically operated stringed musical instrument: a body; a tensioned string supported above one surface of said body; means for adjusting the free vibrating length of said string, including a first lever extending from said body and above said surface along the length of said string; a circuit controller; a second lever pivotally mounted on said body, and extending above said body, said second lever having an operating length extending a substantial distance along the length of said body; and a connection between said second lever and said circuit controller for adjusting said circuit controller according to the angular position of said second lever.

10. In a musical instrument: a body; a tensioned string extending along a surface of the body; a roller movable longitudinally of the string and having an axis transverse

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to the string, said roller having a surface engaging said string for determining a free vibrating length thereof; and a lever pivoted on said body on an axis parallel to said roller axis, said lever having an edge engageable with one side of said roller surface for determining the position of said roller longitudinally of said string.

11. In a musical instrument: a body; a tensioned string extending along a surface of the body; a roller movable longitudinally of the string and having an axis transverse to the string, said roller having a surface engaging said string for determining a free vibration length thereof; and a lever pivoted on said body on an axis parallel to said roller axis, said lever having a pair of spaced parallel arms both engageable with one side of said roller surface at places spaced axially of said roller, said lever determining the position of said roller longitudinally of said string.

12. In a musical instrument: a body; a tensioned string extending along a surface of the body; a roller movable longitudinally of the string and having an axis transverse to the string, said roller having a surface engaging said string for determining a free vibrating length thereof; a lever pivoted on said body on an axis parallel to said roller axis, said lever having a pair of spaced parallel arms both engageable with one side of said roller surface at places spaced axially of said roller, said lever determining the position of said roller longitudinally of said string; and means resiliently urging said roller in one direction longitudinally of said string and into engagement with said lever edge; said lever, when said roller is urged in said one direction having a major portion of its length extending above said body for manipulation.

13. In a musical instrument: a body; a tensioned string extending along a surface of the body; a roller movable longitudinally of the string and having an axis transverse to the string, said roller having a surface engaging said string for determining a free vibrating length thereof; a lever pivoted on said body on an axis parallel to said roller axis, said lever having a pair of spaced parallel arms both engageable with one side of said roller surface at places spaced axially of said roller, said lever determining the position of said roller longitudinally of said string; means resiliently urging said roller in one direction longitudinally of said string, and into engagement with said lever edge; movement of said roller in said one direction through engagement with said lever edge serving to move said lever angularly in one direction; and means carried by the body for limiting angular movement of

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said lever in said one direction; said lever when limited by said means having a substantial portion of its length extending above said body for manipulation.

14. In a musical instrument: a body; a tensioned string extending along and above a surface of the body; a roller structure including a pair of end rolling elements in contact with said body surface and an intermediate rolling element, said intermediate rolling element being angularly movable independently of the end rolling elements and about a common axis, said intermediate rolling element being spaced from said body surface; said roller structure being movable longitudinally of the string, said axis being transverse to the string, said intermediate roller element being in engagement with said string for determining a free vibrating length thereof; and a lever pivoted on said body on an axis parallel to said roller axis, said lever having an edge engageable with one side of said intermediate rolling element for determining the position of said roller structure longitudinally of said string; said body having an elongate slot to permit passage of said lever upon movement thereof.

15. In a musical instrument: a body; a tensioned string extending along and above a surface of the body; a roller structure including a pair of end rolling elements in contact with said body surface and an intermediate rolling element, said intermediate rolling element being angularly movable independently of the end rolling and about a common axis, said intermediate rolling element being spaced from said body surface; said roller structure being movable longitudinally of the string, said axis being transverse to the string, said intermediate roller element being in engagement with said string for determining a free vibrating length thereof; said lever having a pair of spaced parallel arms both engaging one side of said intermediate rolling element at places spaced axially thereof, said lever determining the position of said roller structure longitudinally of said string; said body having an elongate slot to permit passage of said lever upon movement thereof.

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